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How general practitioners and patients discuss type 2 diabetes mellitus and cardiovascular diseases concerns during consultations: Implications for digital health

Urvashi Rohilla[1,*], Jayashanthi P Ramarao[2,*], Jared Lane[1,*], Neha N Khatri[1], James Smith[3], Kathleen Yin[1] and Annie YS Lau[1]

Abstract

Objective: To analyse general practitioner–patient consultations about type 2 diabetes mellitus or cardiovascular diseases and describe (i) the nature of self-management discussions; (ii) actions required from patients *during* and *after* consultation regarding self-management; and (iii) implications for digital health to support patients *during* (and *after*) consultation.

Method: This study screened 281 general practitioner consultations conducted in 2017 within the UK general practice setting from an existing dataset containing videos and transcripts of consultations between GPs and patients. Secondary analysis was conducted using a multi-method approach, including descriptive, content, and visualisation analysis, to inform the nature of self-management discussions, what actions are required from patients, and whether digital technology was mentioned during the consultation to support self-management.

Results: Analysis of eligible 19 consultations revealed a discord between what self-management actions are required of patients *during* and *after* consultations. Lifestyle discussions are often discussed in depth, but these discussions rely heavily on subjective inquiry and recall. Some patients in these cohorts are overwhelmed by self-management, to the detriment of their personal health. Digital support for self-management was not a major topic of discussion, however, we identified a number of emergent gaps where digital technology can support self-management concerns.

Conclusion: There is potential for digital technology to reconcile what actions are required of patients during and after consultations. Furthermore, a number of emergent themes around self-management have implications for digitalisation.

Keywords

General practitioner–patient consults, digital health, self-management, diabetes, cardiovascular diseases, telehealth, mixed methods

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Introduction

Increasingly, patients are expected to take care of their health outside of medical settings (i.e. self-management).[1] Self-management includes the actions taken by individuals to lead a healthy lifestyle, manage their long-term condition and prevent further illness, both individually and with support from healthcare professionals.[2] It is widely promoted to empower patients, improve health outcomes, and reduce constraints on overstretched health systems.[3] However, many individuals living with chronic conditions struggle to practise self-management

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effectively.[4–6] Yet, few studies have focused on how self-management is discussed in general practitioner (GP)–patient consultations, specifically using a patient-centred analysis.

When self-management is poorly integrated, it can lead to treatment non-compliance, negatively impacting on health outcomes.[7,8] GP consultations often present a major milestone for patients to stop and reflect on making changes that are actionable and sustainable for their health and wellbeing. However, GP consultations also present a missed opportunity to help patients in that regard. Limited studies have explored what 'work' is required from patients *during* and *after* the consultation regarding self-management.[9,10] In some circumstances, self-management is discussed hastily due to time pressures in a consultation;[11] and some self-management recommendations, whilst given with goodwill, may fail to acknowledge the specificities of the individual, such as daily routine, physical environment, social obligations, as well as beliefs and attitudes.[12–15] As a result, some patients leave the consultation feeling unsupported, not knowing what to do or how to start. Over time, a patient's will and momentum to make changes diminish, and the patient returns to living in the status quo with no changes attempted, made or maintained to improve their health and wellbeing.

In parallel, well-evidenced interventions are not routinely introduced to patients during consultations. Specifically, digital health interventions hold the promise to improve self-management. However, numerous studies evaluating digital self-management interventions showed a high participant dropout rate, with some studies having retention rates of 1% by the end of the study period.[12,15–17] In particular, participants reported the lack of 'fit' of the intervention,[18] the lack of helpful advice received from the intervention,[18] or the inconsistency between GPs' advice and the digital intervention as major reasons for discontinuation of use.[18]

Understanding whether there is dissonance between GP advice, patient circumstances and the work involved in self-management is important to overcome barriers and challenges. Past studies reporting on challenges to self-management have focused on the difficulty in self-management,[5] time invested and required,[19] competing priorities,[20,21] support sources required[22] and how self-management differs between patients' and healthcare professionals' perspectives.[11] These previous approaches relied on self-report methods (interviews, focus groups and questionnaires), medical records, or direct observation (researchers being present), which are subject to levels of reliability in self-report data, lack of meaningful data in medical records, and the degree of discomfort participants experience during direct observation. No studies have examined what actually happens inside a GP–patient consultation regarding self-management.

To our knowledge, this is the first study that examines how self-management is discussed in GP consultations. It also addresses three major gaps in the literature, namely the lack of studies reporting: (1) what happens inside a GP–patient consultation regarding self-management; (2) patient-centred analysis on the work required in self-management (during and after the consultation); and (3) implications for digital health to support patients during (and after) consultation.

Materials and methods

Study design and setting

This study is a secondary multi-method analysis, including descriptive, content and visualisation analysis. The dataset originates from a large qualitative mixed-methods study titled 'Harnessing Resources from the Internet to maximize outcomes for GP consultations' (HaRI): A mixed qualitative methods study to investigate internet use in GP.[23] The HaRI archive contains 281 GP consultations video-recorded during 2017 by 10 GPs, working at eight different GP clinics. These clinics are distributed across a wide range of urban, suburban and rural areas and counties in Southeast England. For details on how patient and GP participants were selected and recruited in the original HaRI study, please refer to Seguin et al.[23]

Ethics approval was obtained for the original collection of these consultations (HaRI) from National Health Services (16/LO/1029; IRAS project ID: 197875), and secondary use of the HaRI archive from NHS (REC reference: 19/LO/0364 Protocol number: 120807 IRAS project ID: 257924) and in Australia from Macquarie University Human Research Ethics Committee for Medical Sciences (reference number: 52020558018892), where written consent has been given by participants for their data to be used for secondary data analysis (including this study).

Data screening

We categorised the HaRI data according to the primary reason the patient saw the GP according to ICPC-2 (International Classification of Primary Care).[24] We searched the accompanying SPSS metadata file that comes with the HaRI archive for all cases where the primary reasons for seeing the GP were coded as 'Endocrine' or 'Cardiovascular to identify potentially relevant consultations. We eliminated duplication of any consultations from the HaRI archive. Three researchers (JR, UR and AL) read the transcripts of these extracted consultations, where 32 consultations met the inclusion criteria, and 19 consultations remained after meeting the exclusion criteria. Out of 19 consultations that met eligibility criteria, 11 discussed type 2 diabetes mellitus (T2DM), and eight discussed cardiovascular diseases (CVDs).

Inclusion criteria

- Consultations that discuss T2DM or CVD as part of a patient's presentation or past medical history.
- Consultations where any lifestyle advice, self-management support or behavioural modifications related to T2DM/CVD management or prevention were discussed by the GP or patient.
- Consultations where a transcript and/or de-identified video recording of the consultation between GP and patient was available.

Exclusion criteria

- Consultations with patients with gestational diabetes, type 1 diabetes or prediabetes.
- Consultations with patients with T2DM or CVD that did not contain any discussion of lifestyle advice, self-management support, or behavioural modifications related to diabetes management or prevention.
- Consultations where T2DM or CVD was discussed did not concern the patient(s) physically present at the GP office.

Data analysis

Descriptive statistics, content analysis, and visualisation analysis were used to analyse the 19 transcripts (see Supplemental Appendix A, Figure 1).

Statistical analysis

Descriptive statistics were reported for patient demographics (e.g. age and gender) and consultation characteristics (e.g. whether a companion was present, topics and conditions discussed, and use of subjective and objective measures during consultation). A Mann-Whitney *U*-test was used to compare the average count of topics discussed between T2DM and CVD consultations to confirm there were no statistically significant differences between them before grouping the conditions to be analysed as one group.

Content analysis

To examine the tasks conducted by GPs during consultations, as well as topics and actions discussed between GPs and patients, we adapted Assarroudi's three-phase directed content analysis approach,[25] and devised 14 steps for preparation, organisation and reporting to analyse the transcripts (shown in Table 1).

Phase 1: Preparation: Each transcript was coded using two coding schemes: One described by Kocaballi et al.,[26] which focuses on GP-centred activities; Another scheme which focuses on patient-centred activities is adapted from self-management studies conducted by Blakeman et al.[27] and Yin et al.[28] The final coding framework on GP and patient-centred activities is shown in Supplemental Appendix Tables B and C.

Phase 2: Organisation: NVIVO (Version 12, QSR International Pty Ltd) was used to code consultation transcripts. The first five transcripts were coded independently by UR and NK to establish coding frameworks (see Table 1). By following this coding process, we were able to identify tasks conducted by GPs during consultations (e.g. physical examination), self-management activities that occurred (e.g. lifestyle changes), as well as actions required from patients during the consultation (e.g. discussing dietary habits), and after consultation (e.g. start physical activity) (refer to Appendix A, sample coding scheme, Samples 1 and 2). Identifying potential gaps in self-management for digital health involved analysing consultations and discussions between researchers to identify: aspects of consultations where self-management was insufficient to manage disease; aspects of consultations where self-management relied on subjective measures; aspects of consultations where primary care was insufficient to address self-management concerns.

Phase 3: Reporting: Findings from content analysis were presented according to frequency (i.e. how many consultations discussed this task/topic/action) and by duration (how much conversational content did this topic/action occupy in a consultation). For frequency, we used the pivot table feature in Excel to count how many consultations discussed a specific task/topic/action; for example, 10 out of 19 consultations involved Physical Examination. For the duration, we used the percentage coverage feature in NVivo (which measures the number of characters coded at that node in a consultation transcript) to report in percentage how much conversational content that code (or node) occupied in a consultation transcript. For example, 20% of a consultation transcript was coded at the node Physical Examination. To calculate the average duration of each code across the 19 transcripts, measures of percentage coverage across all transcripts for each topic/action code were summed and divided by 19. Aspects of consultations where gaps for digital health were identified were reported as 'Emergent gaps', with supporting quotes from transcripts provided.

Visualisation approach

We used visual inspection to identify different visit types common in consultations involving T2DM and CVD. We also referred to the 'Present Complaint' code from Kocaballi et al.[26] framework to identify whether the visit was related to medication review, investigation/test results review, or review of condition. We used Miro software[29] to illustrate flowcharts representing each visit type, where codes from both GP and patient-centred activity frameworks were used in the visualisation.

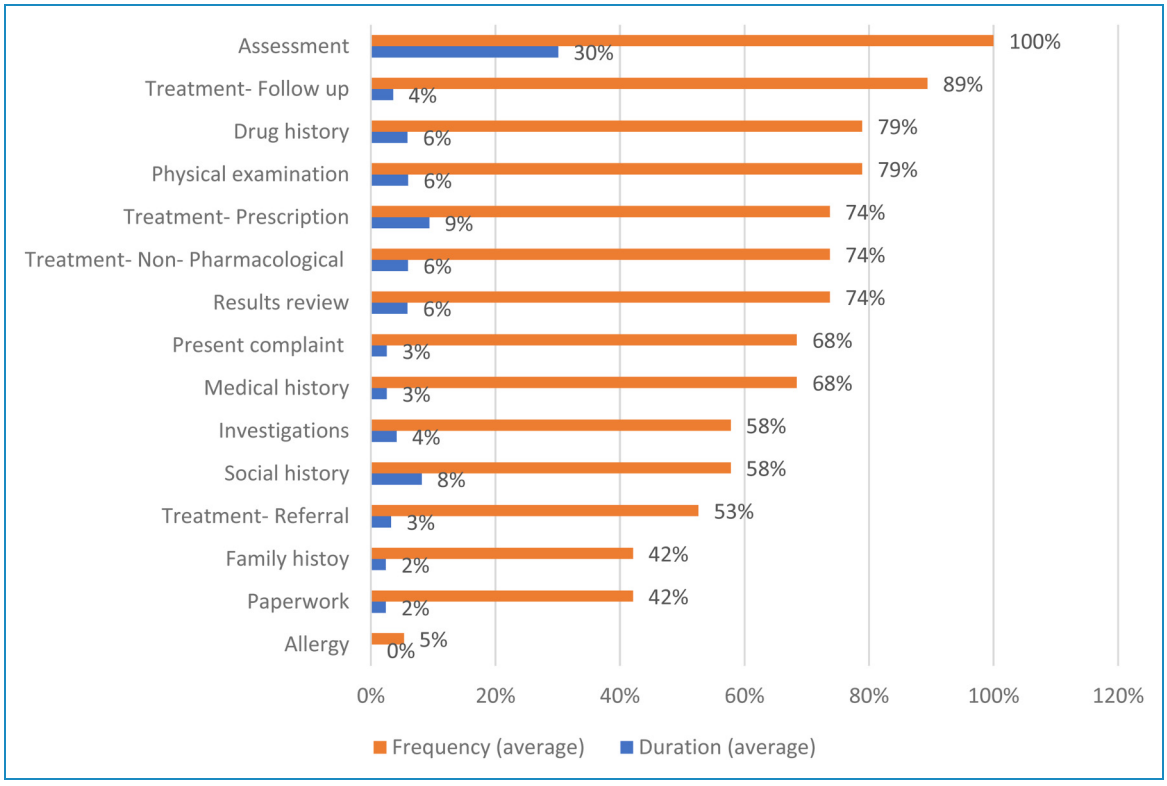


Figure 1. Comparison of average frequency and duration across clinical tasks conducted by general practitioners (GPs) during a consultation (n = 19).

Results

Patient demographics and consultation characteristics

Table 2 describes patient demographic and consultation characteristics of included consultations. Overall, 19 in-person consultations are analysed in this study, where 11 pertain to T2DM and eight to CVD management.

Consultation activities

GP-centred activities. Across the 19 consultations, a consultation on average contains 9.7 GP-centred activities (SD = 2.2) meaning GPs on average are engaged in 9.7 clinical tasks in a consultation. Similar numbers are found across T2DM consultations (mean = 9.9 GP-centred activity codes; SD = 2.1) and for CVD consultations (mean = 9.4; SD = 2.2). A Mann-Whitney *U*-test was performed to confirm there was no significant difference in the average number of GP-centred activity codes across CVD and T2DM consultations ($U = 38.5$, $p = 0.645$), suggesting CVD and T2DM consultations in this sample can be combined for analysis on GP-centred activity codes.

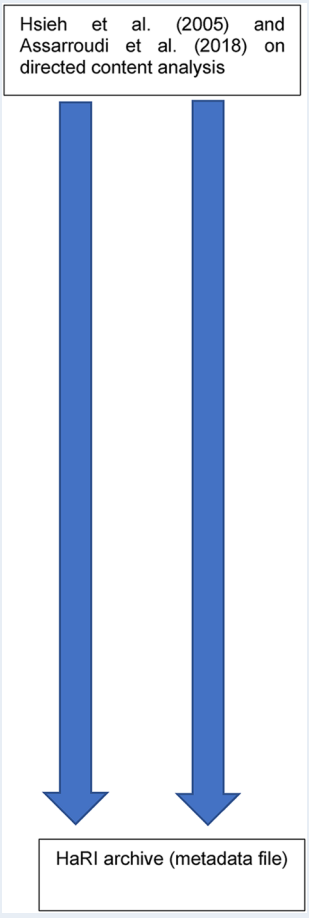
Figure 1 compares the average frequency and duration across clinical tasks conducted by GPs during a consultation. This classification of tasks was adapted from Kocaballi et al.[26] All consultations (100%, 19/19) involved *Assessment* (i.e. assessing a patient's situation during a consultation), where Assessment is also the task that took the longest during a consultation (30% average duration). The next most frequent clinical task that GPs conducted during a consultation was *Treatment-Follow up*, where 89% (17/19) of consultations incorporated this task and on average occupied 4% of a consultation. *Non-pharmacological Treatment* was discussed in 74% (14/19) of consultations, where discussion on average took 6% of a consultation.

Patient-centred activities. Across the 19 consultations, a consultation on average contains 7.3 patient-activity codes (SD = 1.5), meaning patients on average perceive 7.3 topics were discussed that are related to self-management during a consultation. Similar numbers are found across T2DM consultations (mean = 7.3 patient-centred activity codes; SD = 1.9) and for CVD consultations (mean = 7.3; SD = 0.83). After conducting a Mann-Whitney *U*-test, no significant difference was found in the average number of patient-centred activity codes across T2DM and CVD consultations ($U = 43.0$, $p = 0.932$), suggesting CVD and T2DM consultations in this sample can be combined for analysis on patient-centred activity codes.

Figure 2 compares the average frequency and duration across patient-centred activities related to self-management

Table 1. Directed content analysis.

Analytical process	Description	Approach (Assarroudi et al. 2018) GP's perspective	Patient's perspective
1. Preparation phase			
1. Acquiring the necessary general skills	Analytical skills – Familiarizing with Kocaballi et al. 2019, Blakeman et al. 2010 and Yin et al. coding framework, excel analysis, visualisation approach, directed content analysis and data coding. Technical Skills – Coding in NVivo and visuals in Miro.		
2. Selecting the appropriate sampling strategy	Purposive Sampling – Transcripts are selected from the HaRI dataset using the keywords: endocrine and cardiovascular on the metadata file and applying inclusion and exclusion criteria.		
3. Deciding on the analysis of manifest and/or latent content	Manifest content- GP – Patient consultations are analysed as transcribed verbatim.		
4. Specifying the unit of analysis	GP – Patient consultation transcript. Each transcript was assigned an ID.		
5. Being immersed in data	Three researchers (JR, UR and AL) read three hundred and five extracted consultations from the metadata file of the HaRI archive and found 32 potential transcripts after applying inclusion criteria. After applying exclusion criteria, the final 19 transcripts (11 for diabetes and eight for CVD) discussing T2DM and CVD as a chronic disease were identified. Duplication of any consultations was eliminated. Any unresolved conflict was discussed with the team for final decision.		



(continued)

Table 1. Continued.

Analytical process	Description	Approach (Assarroudi et al. 2018) GP's perspective	Patient's perspective
2. Organisation phase		Deductive – data is coded according to an existing framework Kocaballi et al. 2019), focusing on *GP-centred activities*	Deductive – data is coded according to Blakeman et al. 2010 and Yin et al. 2019, focusing on *Patient-centred activities*
6 and 7. Developing a formative categorisation matrix and theoretically defining the main categories and subcategories	Each of the eligible T2DM and CVD consultations was analysed and coded using two coding schemes – One using the coding scheme developed by Kocabelli et al. which focuses on GP-centred activities, and the other coding scheme developed internally by our team which focuses on patient-centred activities. A deductive-inductive approach was used to develop codes for GP and patient-centred activities during a consultation.		
8. Determining coding rules for main categories	The first five consultations of the T2DM and CVD eligible consultations were used to develop the coding schemes constantly. Each of these five consultations was coded twice, independently by UR and NK, and any conflict in coding was resolved by consensus, or with a third researcher (AL). We conducted visualisations and the coding team met weekly and fortnightly as a group to discuss the findings and approach.		
9. Pre-testing the categorisation matrix	Each coder (UR, NK) independently checked the other researcher's coding of these first five transcripts to ensure codes were applied consistently, and that definitions of codes were agreed upon.		
10. Choosing and specifying the anchor samples for each main category	Definitions and examples from the GP consultation dataset were extracted. UR and NK met regularly to discuss the coding process and code definitions over a period of 4 weeks. The final coding schemes were reviewed by AL and agreed upon by all coders before proceeding to coding the rest of the consultations.		
11. Performing the main data analysis	Final coding schemes were agreed upon by all members of the coding team, the remaining consultations were coded by one researcher (UR) following the coding schemes. NVivo and Pivot table (excel) analysis of all 19 transcripts was done to find out the duration of consult and most frequently concerned health topics and their frequency in all consultations. Gaps in digital health were identified with the assistance of supporting quotes from relevant consultations.		
12. Inductive abstraction of main categories from preliminary codes	Topic codes – We added codes that emerged from the data which were not covered by the pre-determined coding scheme, focusing on self-management. Action codes – *During-visit action* and *post-visit action* were developed and were grouped under self-management topic codes.	Inductive - Any Topic/ Action that cannot not be categorised with the Kocabelli's framework would be given a new code; however, no new code was found.	Inductive – Any Topic/Action that cannot be identified with Blakeman et al or Yin et al would be given a new code (e.g., Procedures, Health Literacy).

(continued)

Table 1. Continued.

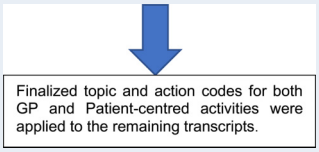
Analytical process	Description	Approach (Assarroudi et al. 2018) GP's perspective	Patient's perspective
13. Establishment of links between generic categories and main categories	Constant re-visiting of the established categories and main categories to ensure codes that require more details are renamed or re-categorised into comprehensive codes.		
3. Reporting phase			
14. Reporting all steps of directed content analysis and findings	As outlined in this table and in methods		

Table 2. T2DM and CVD demographics and consultation characteristics (n = 19).

Demographic	T2DM (n = 11)	CVD (n = 8)
Gender % (n)	M = 45.5% (5) F = 54.5% (6)	M = 37.5% (3) F = 62.5% (5)
Age % (n)	26–35 = 9.1% (1) 36–45 = 0% (0) 46–55 = 0% (0) 56–65 = 36.4% (4) 66–75 = 36.5% (4) 76–85 = 18.2% (2)	26–35 = 0% (0) 36–45 = 12.5% (1) 46–55 = 25.0% (2) 56–65 = 25.0% (2) 66–75 = 37.5% (3) 76–85 = 0
Presence of a companion % (n)	Y = 27.3% (3) N = 72.7% (8)	Y = 12.5% (1) N = 87.5% (7)
Number of health conditions discussed during consultation % (n)	1 = 18.2% (2) 2 = 45.5% (5) 3 = 9.1% (1) 4 = 27.3% (3)	1 = 50.0% (4) 2 = 50.0% (4)
Types of conditions discussed	Diabetes, mental health, pain (musculoskeletal, nerve), numbness and tingling, hypertension, vascular heart disease, lung disease, vertigo, prostate issues	Arrhythmia, hypertension, vascular heart disease, thyroid disease, IVF, HRT, mental health
Objective measures used to assess condition	HBA1C, glucose testing, cholesterol levels, weight, blood pressure, physical examination	Blood pressure, chest auscultation, cholesterol levels, BNP levels, cardiac risk assessment tool, physical examination
Subjective measures used to assess conditions (e.g. fatigue, sleep quality etc.)	Patient mood, the feeling of a 'hypo event', recall of lifestyle habits	Patient mood, feeling of palpitations, energy levels, recall of lifestyle habits
Topics discussed	Diet, exercise, pharmacotherapies, self-management, trouble sleeping, time off work, mood	Diet, exercise, pharmacotherapies, self-management, mood

T2DM: type 2 diabetes mellitus; CVD: cardiovascular disease; BNP: Brain Natriuretic Peptide; IVF: in vitro fertilization; HRT: hormone replacement treatment.

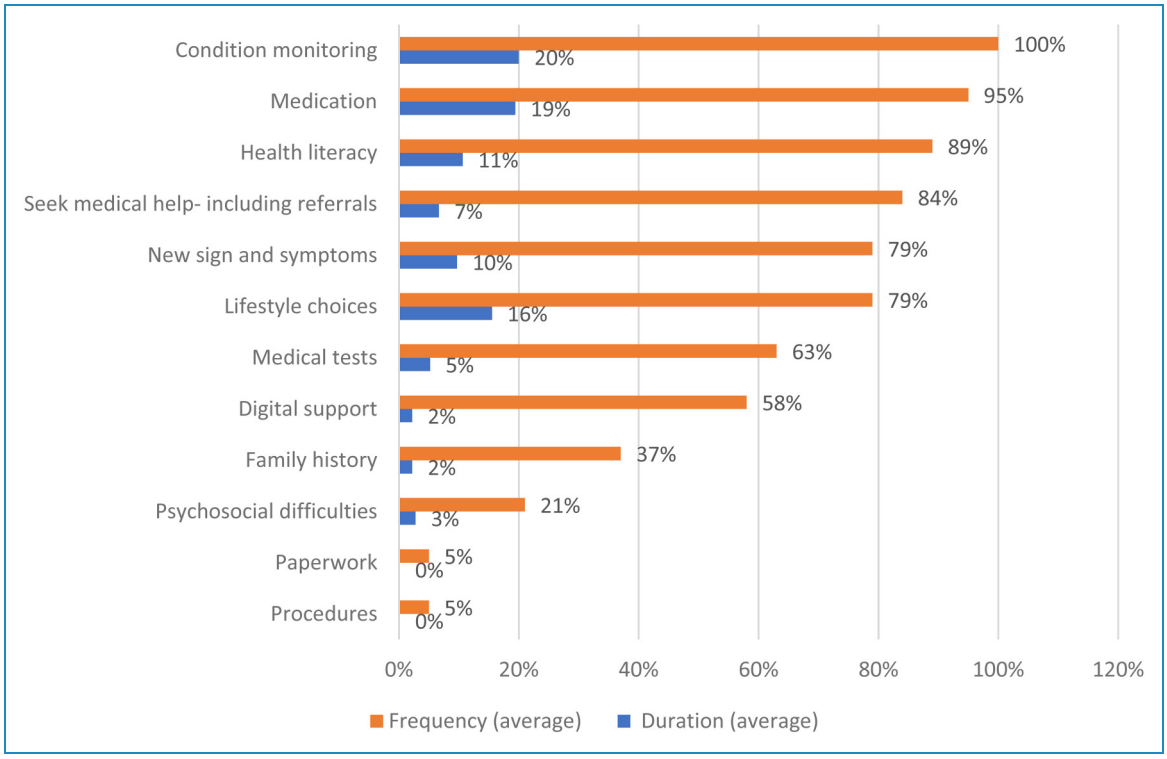


Figure 2. Comparison of average frequency and duration across topics perceived by patients related to self-management during a consultation (n = 19).

during a consultation. All consultations (100%, 19/19) involved *Condition monitoring* (i.e. monitoring of clinical parameters, symptom measures and daily activities related to the condition), where *Condition monitoring* is also the activity that took the longest during a consultation (20% average duration). The next most frequent activity during consultation was *Medication*, which occurred in 95% (18/19) of consultations and on average occupied 19% of a consultation. *Lifestyle Choices* were discussed in 79% (15/19) of consultations, where discussion on average constituted 16% of a consultation.

Content and visualisation analysis

Content analysis and visualisation approach revealed three major activities performed during T2DM and CVD consultations, namely *medication review*, *results review*, and *condition review*. Definitions and details of each visit type are found in Supplemental Appendix A. A focus on how often and how long *Lifestyle Choices* were discussed during a consultation are also outlined for each of these three visit types.

Medication review. Figure 3 illustrates a typical consultation for CVD and T2DM where *medication review* is the major activity. These consultations discuss how the patient has been taking their medications, any concerns on medication adherence behaviours, side effects reported by the patient, and whether medication or the existing dose needs to be changed. These consultations also discuss other aspects such as symptoms and lifestyle. Amongst medication reviews (n = 5), *Lifestyle choices* were discussed in 80% (4/5) of consultations, where it occupied 17% of a consultation.

Results review. Figure 4 illustrates a typical consultation for CVD and T2DM where *results review* is the major activity. These consultations discuss the results of an investigation ordered previously. They often acknowledge a patient's understanding, and their progress is defined by GP and patient discussion on the results of the investigation. Amongst results review (n = 10), *Lifestyle choices* were discussed in 90% (9/10) of consultations, where it occupied 17% of a consultation.

Condition review. Figure 5 illustrates a typical consultation for CVD and T2DM where *condition review* is the major activity performed. A condition review often includes a discussion of recent or past investigations, diabetes or heart complications like diabetic foot, neuropathy, kidney diseases, as well as any new or ongoing symptoms. These consultations encompass the chronic condition as a whole, rather than referring to specific aspects in isolation. Amongst review of condition (n = 4), *Lifestyle choices*

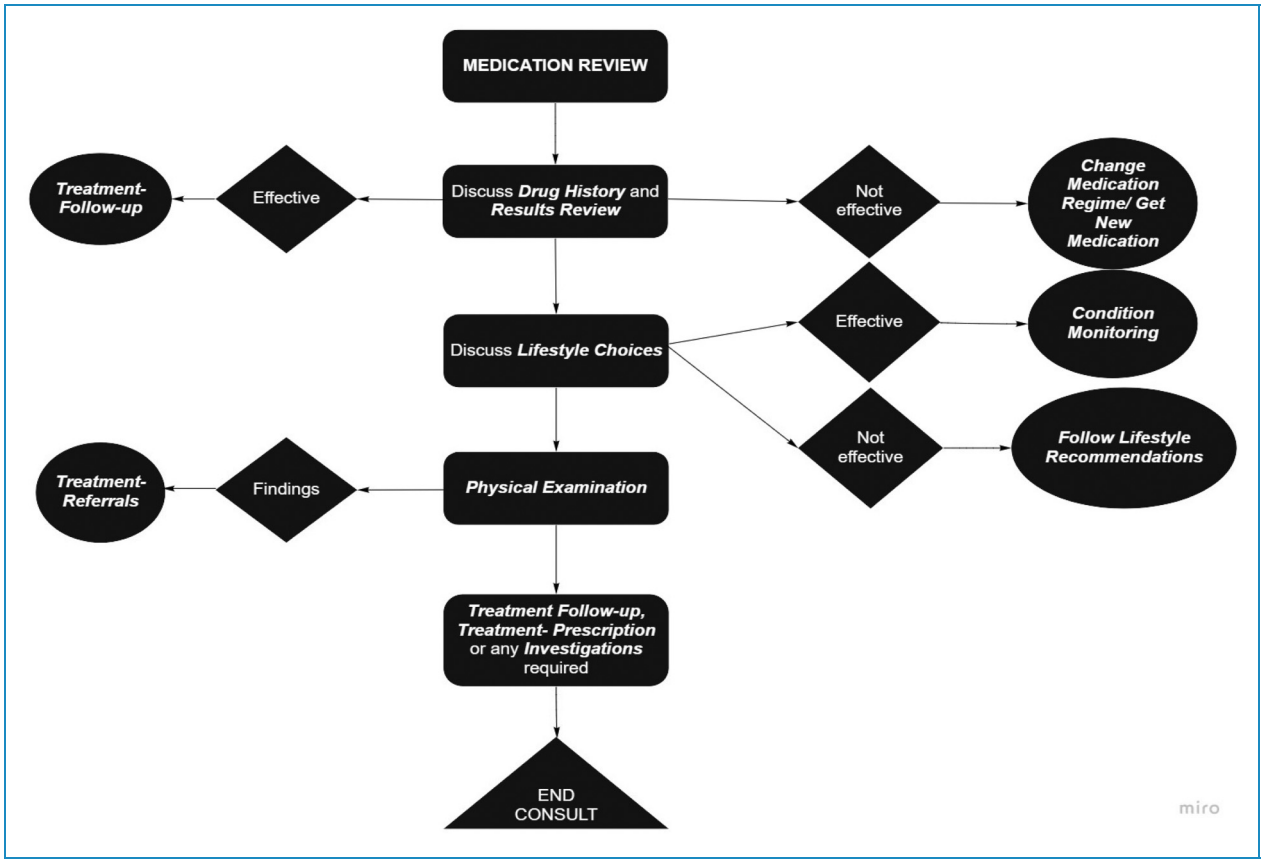


Figure 3. Example of a typical medication review consultation.

were discussed in 50% (2/4) of consultations, where it occupied 11% of a consultation.

Actions required of patients during *and* after *consultation*

Table 3 describes the actions required of patients *during* and *after* a GP consultation relating to self-management of T2DM and CVD. The top five most frequent actions required of patients *during* GP consultations are: *seek clarification about their current condition* (89%, 17/19); *discuss medication rationale and use* (79%, 15/19); *monitor clinical measures* (e.g. blood pressure, temperature) (79%, 15/19); *discuss referrals* (68%, 13/19); and *listen to GP's explanation* (e.g. test results) (68%, 13/19).

However, the top five frequent actions required of patients *after* a GP consultation are: *organise administrative tasks* (e.g. book appointments, insurance) (89%, 17/19), *follow lifestyle recommendations* (79%, 15/19), *visit other healthcare professionals* (79%, 15/19), *obtain new medications* (68%, 13/19) and *measure and record changes in signs and symptoms* (63%, 12/19).

Use of digital technology during and after consultation

Digital support for self-management was not a major topic of discussion during consultations. 26% (5/19) of consultations discussed the use of digital devices for self-management, and only one consultation involved a GP demonstrating use of digital devices to patients for self-management. Post-consultation, patients are recommended in 37% (7/19) of consultations to get digital devices to monitor their clinical measures (e.g. glucometer and blood pressure monitor).

Emergent gaps in self-management for digital health

Analysis informed by patient-centred activity codes revealed a number of areas where self-management may have been insufficiently addressed during the consultation. These 'emergent gaps' are potential targets for digital health technology to improve self-management both *during* and *after* primary care consultations.

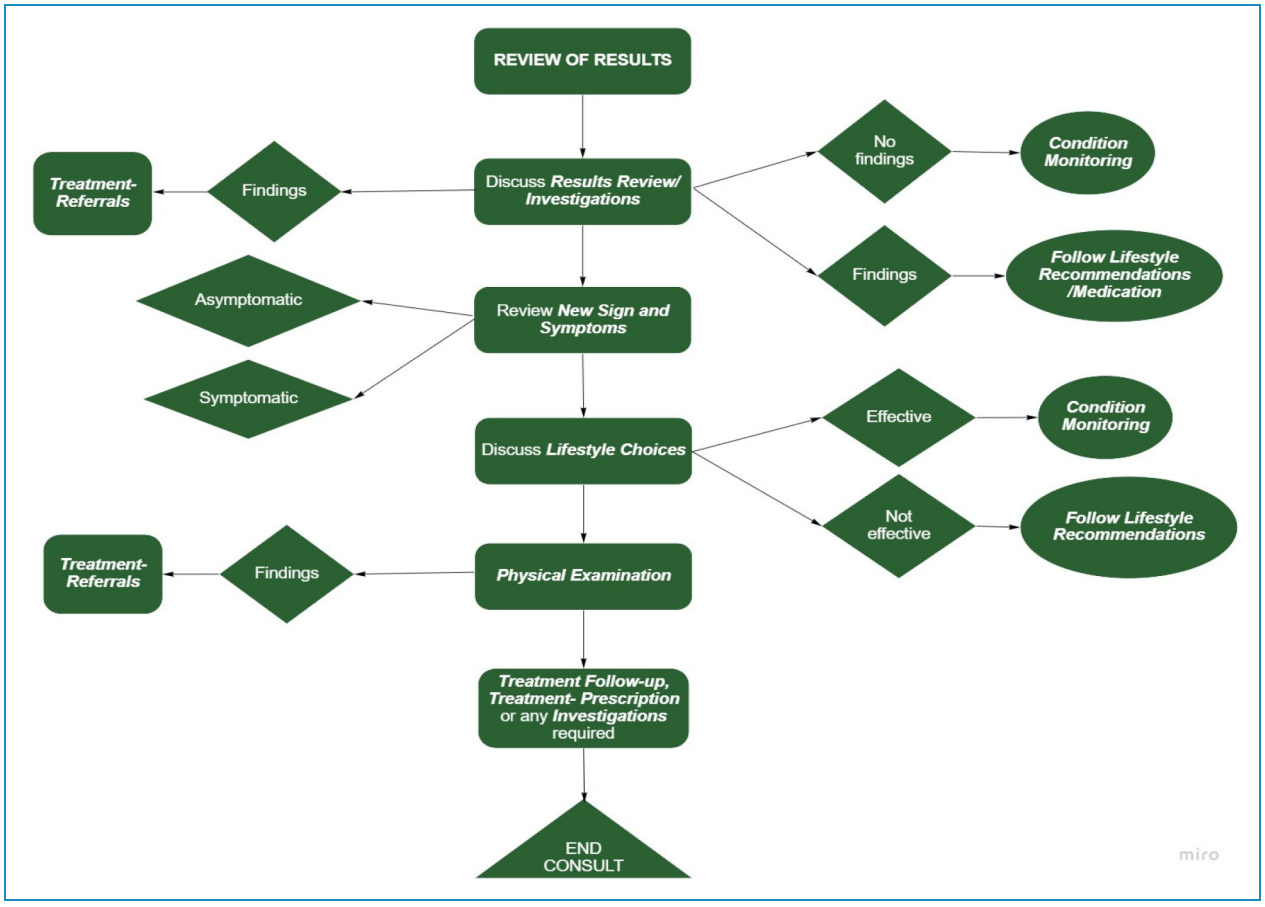


Figure 4. Example of a typical results review consultation.

Lifestyle discussions are prone to subjective inquiry and objective measures

Lifestyle factors are a significant discussion topic and often involve extensive inquiry by GPs to collect objective measures (such as blood pressure, blood glucose levels), as well as subjective measures regarding a patient's diet, exercise, or social habits. Facilitating patients to collect and retrieve objective and subjective measures of their health during GP consultation may allow patients and GPs to develop actionable tasks after the consultation. This combination of facilitating objective measures during subjective inquiry requires further investigation in the design of the GP-patient interactive system, as well as patient-facing digital technology to support self-management.

Overwhelmed by self-management

Patients express reluctance and uncertainty about the amount of medication, appointments, and their ability to manage multiple self-management tasks simultaneously. Some of these patients have companions to help them manage their health.

Expectation that ancillary services will perform more in-depth examinations

There is an expectation that certain in-depth tasks will occur outside of the GP office by nurses or other healthcare professionals. Often GPs perform examinations but possibly for lack of time, indicate that a nurse will perform certain tasks. This may complicate the primary care process for patients if it requires arranging and finding time for extra appointments. There is potential for digital health to streamline GP consultations so that these investigations can be performed within a single consult and the patient does not require multiple appointments.

Table 4 describes 'emergent gaps' in self-management for digital health. For each 'emergent gap', the relevant patient-centred activity code, transcript reference, author observations, insights for digital health, and relevant transcript quotes are provided as supporting evidence. Refer

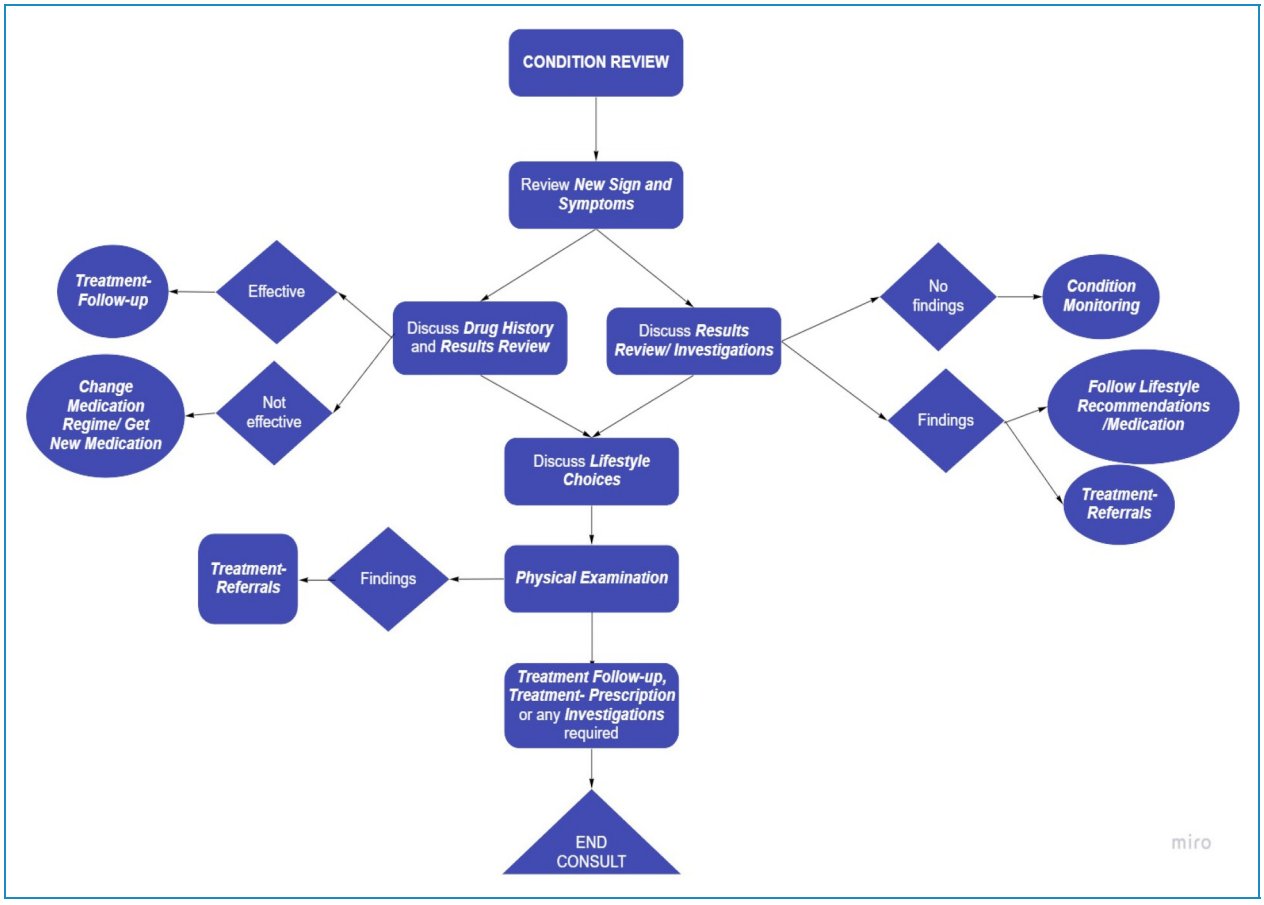


Figure 5. Example of a typical condition review consultation.

to Supplemental Appendix A, Supplementary Extracts for full consultation transcript extracts.

Discussion

Main findings

Our findings indicate that chronic care consultations for primary care patients with T2DM and CVD are largely driven by three major activities – medication review, results review and condition review. Nevertheless, GPs typically perform similar tasks for these cohorts regardless of whether medication; condition; or results review was the major purpose for the consultation.

Self-management, in particular, is a common topic of discussion for these cohorts and pertains to many issues including medication, condition assessment, lifestyle choices and psychosocial assessment. In particular, discussions around lifestyle management are explored extensively and often in great detail during consultations in this study. Another insight was that patients sometimes feel overwhelmed by the extent of their self-management, in some cases leading to non-adherence and consequent poor health outcomes. Possibly for lack of time, physical examinations are sometimes not performed in-depth and there is an expectation that ancillary health professionals will do so.

Furthermore, within these cohorts, there is a wide variety of actions required by patients to self-manage their conditions. The most frequent actions required of patients *during* consultations include seeking clarification about their current condition, discussing medication rationale and use, and monitoring clinical measures. After consultation, the most frequent actions required of patients include organising administrative tasks, following lifestyle recommendations, and visiting other healthcare professionals.

Strengths and limitations

Analysing video and transcript data from actual consultations, rather than self-reported data which is subject to recall biases, enabled a more accurate representation of what happens during a GP consultation. A limitation of this study is that we do not have access to prior or follow-up consultations. Therefore, it is unknown whether self-management strategies were previously implemented and whether they have been successful. Another limitation is

Table 3. Frequency of actions required of patients during and after GP consultation relating to self-management of T2DM and cardiovascular health (n = 19).

Self-management topics	During visit actions	Percentage (count)	Post visit actions	Percentage (count)
Lifestyle choices	Discuss dietary habits	58% (11)	Follow lifestyle recommendations	79% (15)
	Discuss social habits (e.g. smoking, alcohol consumption etc.)	32% (6)		
	Express concerns about lifestyle	26% (5)		
	Explain lifestyle changes (e.g. start walking, join a gym, weight loss etc.)	26% (5)		
Medication	Discuss medication rationale and use (e.g. possible side effects, what is this for)	79% (15)	Get new medication	68% (13)
	Explain the current medication regime	63% (12)	Stop medication	21% (4)
	Express concerns on medication use	42% (8)	Change medication regime	16% (3)
	Understand medication regime	37% (7)	Re-start medication	16% (3)
	Recall medication effects	32% (6)		
	Seek or renew medication prescription	26% (5)		
	Describe medication use (oral and other routes)	5% (1)		
New Signs and Symptoms	Explain the signs and symptoms	63% (12)	N/A	
	Express concerns about signs and symptoms	53% (10)		
	Seek clarification on signs and symptoms	26% (5)		
Condition Monitoring	Seek clarification about the current condition	89% (17)	Organise administrative follow-up tasks (e.g. manage insurance, book appointments)	89% (17)
	Monitor objective measures (e.g. BP, temperature, breathing, pulse, weight etc.)	79% (15)	Measure and record changes in signs and symptoms (e.g. BP, temperature, breathing, pulse etc.)	63% (12)
	Express concerns on the current condition	42% (8)		
	Explain the current mode of monitoring	37% (7)		
	Recall symptoms on the current condition	21% (4)		
	Explain emotional difficulties	26% (5)	Manage psychological concerns	5% (1)

(continued)

Table 3. Continued.

Self-management topics	During visit actions	Percentage (count)	Post visit actions	Percentage (count)
Psychosocial Difficulties	Explain psychological history	11% (2)	using resources (e.g. breathing exercise brochure, calling helpline number)	
Seek medical help-including referrals	Discuss referrals (e.g. Allied Health)	68% (13)	Visit other healthcare professionals	79% (15)
	Discuss resources available (e.g. social prescription, quit smoking clinic, dietician)	32% (6)		
	Seek (or receive) help from a companion during consultation	21% (4)		
	Describe other healthcare professionals' visit (e.g. rationale, what is involved)	16% (3)		
	Call for emergency help (e.g. going to the ER)	0%		
Procedures	Explain the procedure performed (or required)	5% (1)	N/A	
	Explain post-procedure complications	0%		
Health literacy	Listen to GP's explanation (e.g. test results, diet, lifestyle, aetiology, medication, procedure, diagnosis, condition, adverse events)	68% (13)	N/A	
	Understand/explain medication use, administration method, and impact	37% (7)		
	Understand condition	32% (6)		
	Understand tests results	26% (5)		
	Understand the details and risks of a procedure	16% (3)		
	Understand the risks of developing critical events (e.g. stroke)	5% (1)		
	Understand diagnosis	5% (1)		
	Understand healthy boundaries of lifestyle choices (e.g. alcohol consumption)	5% (1)		
Family history	Recall the family history of health events or conditions	37% (7)	N/A	
Paperwork	Seek medical certificate	5% (1)	N/A	

(continued)

Table 3. Continued.

Self-management topics	During visit actions	Percentage (count)	Post visit actions	Percentage (count)
Digital support	Discuss the use of the digital device(s)	26% (5)	Get digital monitoring apparatus (e.g. BP monitor, glucometer)	37% (7)
	Demonstrate the use of digital devices	5% (1)		
Medical tests	Discuss investigation required	42% (8)	Organise health-related follow-up tasks (e.g. attend investigative/ blood test)	58% (11)

that chronic disease management requires multi-disciplinary care, and this data is limited to GP consultations. Therefore, the extent to which allied health and other health specialists discuss or implement self-management strategies is unknown. Lastly, this study has a small sample size with consultations in the UK only. Future studies may want to explore other sources to incorporate consultations from other countries, healthcare systems, and different clinic setups (e.g. urban vs. regional, different GP demographics).

Comparison with existing literature

Many studies have analysed self-management in primary care consultations. Lim et al. surveyed patients with T2DM and hypertension to assess the level of self-management support provided in primary care.[30] Blakeman et al.[27] conducted semi-structured interviews with a sample of patients living with long-term conditions and subsequently interviewed the health professionals. Our study used an observational study approach to ensure insights drawn reflects the true nature of GP–patient interactions occurring during consultations, which helps illuminate the context that remains poorly understood by self-reported data alone.[31,32]

In particular, our findings revealed that self-management discussions, particularly concerning lifestyle management, are explored in great detail. This is in contrast to findings of Blakeman et al.[27] which found a tension between doctors and patients whereby GPs were reluctant to address self-management for fear of disrupting the professional relationship. In another study, Abdelgadir et al.[33] examined doctor–patient communication to identify whether they resulted in improvements in T2DM care. They highlighted that preparing patients to identify their priorities, and learning to ask more questions, were key strategies for improving diabetes outcomes in primary care.[33]

Our research also highlighted areas where digital technology could help patients with self-management during or after GP consultation. Eikelenboom et al.[34] conducted a randomised controlled trial that demonstrated personalised self-management support could enhance patient's self-management behaviours. A number of systematic reviews have demonstrated that digital interventions can improve self-management and health outcomes for patients with these conditions.[35–40] Further research is required to investigate whether these digital interventions actually address the needs and concerns raised between patients and GPs during their consultation, as well as ways to integrate the use of these interventions during and/or after GP consultations.

Implications for digital health

Digital health to support self-management discussion during consultations. This study indicates that self-management tasks performed during consultations include *seeking clarification about current condition*, *monitoring clinical measures*, *discussing medication*, *discussing referrals*, and *listening to GP explanations*. In addition, this analysis revealed three emergent gaps in self-management *during* consultations, including the *subjective nature of lifestyle inquiry*, *patients being overwhelmed by self-man*agement, and *expectations that ancillary services will perform more in-depth examinations*. Researchers working in the digital health space need to be mindful that for digital technology to be effective, it will have to address these common tasks discussed, as well as 'emergent gaps' concerning self-management *during* consultations between GPs and patients.

This study also identified that some T2DM and CVD patients feel overwhelmed by self-management but may only have sporadic encounters with primary care. These patients are at heightened risk of poor health outcomes,[41] and there is a need for digital technology that can keep patients who struggle with self-management linked to the health system.

In fact, the most common 'patient-perceived' self-management tasks discussed during consultations to a large extent involve objective measurements (e.g. weight and BP) or discussions about treatment, results or medication. It is imperative that digital technology designed for patients and consumers can support the collection of daily activities data in order to facilitate these discussions with

Table 4. Emergent gaps in self-management for digital health.

Emergent gaps in self-management for digital health	Patient-centred activity code & frequency count n/19 (%) Transcript reference Supporting quotes from the consultation transcript	Author's observations	Insights for digital health
Lifestyle discussions are prone to subjective inquiry and objective measures	Lifestyle choices 15/19 (79%)		
	P7GP9R277	Patient is urged for a significant portion of the consultation to change diet and increase exercise. Interestingly, the patient has a Fitbit and as a result, the discussion surrounding exercise is prompt, whereas the discussion on diet is extensive.	There is potential for digitalisation to streamline these discussions. If the patient had a digital record of food consumption, a more objective analysis is taking place, and less detailed interrogation is required.
	Pt: No, no. I, I've tried the, as you say, the, the, to cut down on the, uh, um, oh, on the ... ***Dr: Carbohydrates.*** *Pt: Carbohydrates.* ***Dr: Right.*** *Pt: But, you know, it's very difficult, you know.* ***Dr: It is difficult.*** *Pt: 'Cause you have a sandwich and it's ...* ***Dr: But, you know, a lot fat Greek – Uh, sorry, a full fat Greek yoghurt****. Pt: Yeah.* ***Dr: Or a natural yoghurt with your banana, that would be a really good breakfast****. Pt: Yeah.* ***Dr: Um, but the biscuits ...*** *Pt: Yeah.* ***Dr: Honestly, if you drop just the*** *– Pt: I just –* ***Dr: Two biscuits a day****. Pt: Yeah.* ***Dr: You drop them your, your sugar will be much better****. Pt: I usually have that when I'm taking the tablets, you know, so ...* ***Dr: Right, yeah ... But, yeah, if you can cut those ...*** *Pt: Yeah, yeah.* ***Dr: That's literally, probably all you need to do.*** ..... ***Dr: And, obviously, I'd encourage you to keep walking and keep mobile, you know?*** *Pt: Oh, yeah.* ***Dr: And again, you know, 20 min walking a day on top of what you're already doing*** *... Pt: Yeah,* ***Dr: And you've got a Fitbit on.*** *Pt: Yeah.* ***Dr: That would be enough to do it.***		
	Lifestyle choices 15/19 (79%)		
	P4GP6173	Patient is encouraged repeatedly about quitting smoking and given information about smoking cessation services. The patient is also unsure about when she managed to cut down her cigarette intake.	Digital records could improve this self-management aspect and the measures would be less prone to recall bias.
	Dr: And then, um ... But it does worry me about your smoking. *Pt: I know, it's bad.* ***Dr: Do you want to stop, or ...?*** *Pt: I'd like- I, I'd love to, because I'm the first to admit it's a filthy, dirty habit. You know, I, I, I'd admit that.* ..... *Pt: I tried, I don't think it was last year, I think it was the year before, and I got down to one a day.* ..... ***Dr: But, the research tells us that there's, you're about five times more likely to give up if you go into a regular clinic rather than just trying on your own.*** *Pt: Yeah.* ***Dr: So, I think if we do anything to reduce your risk of heart disease that's the most significant thing.***		
Overwhelmed by self-management	Condition monitoring 19/19 (100%)		
	P4GP6R162	Patient struggles to manage her medical appointments and feels overwhelmed by the range of self-management actions required. This inability to adhere to self-management is compromising her health. She is having irregular encounters with the health system.	Patients like this are potential targets for digitalisation – as a way to keep them tethered to the health system, as well as for making self-management simpler.

(continued)

Table 4. Continued.

Emergent gaps in self-management for digital health	Patient-centred activity code & frequency count n/19 (%) Transcript reference	Author's observations	Insights for digital health
	Supporting quotes from the consultation transcript		
	Dr: Yeah. Erm, and then, yeah, I booked you an appointment, but you didn't come. *Pt: Erm, I.* *Cmp: [Companion laughs] I had to make sure she comes today. Pt: I don't cancel on purpose, that appointment I had to cancel that because my sister had an emergency. So, like, last minute I had to cancel. Then I booked another appointment and what happened then? Why did I cancel then?* ..... ***Dr: Erm, but looking back it's- your control's been pretty shocking for a long time, if I'm honest.*** *Pt: Yeah.* ***Dr: Yeah. When was the last time you actually were taking your tablets?*** *Pt: Oh it's been years.* ..... ***Dr: Okay. Well, well done for coming in.*** *Pt: Thank you.* ***Dr: It's the first step but don't disappear off again for months on end.***		
	Medication 18/19 (95%)		
	P4GP6R170	Patient is feeling overwhelmed by the number of medications required for self-management and is unsure of what Blood Pressure (BP) medication he is currently on.	Digital technology has the potential to manage medication use more effectively and make accessing appropriate records more streamlined.
	Pt: [Non-English speech] *Cmp2: It's already too many tablets, uh, they feel, or he feels that, uh, you know, prefers to try this, uh, non-aggressive methods.* ***Dr: No, I can understand that. Um, so I think, um, you know, the tablets are not going to make you lose weight, they're not going to, you know, improve all of those things.*** *Cmp2: No.* ..... ***Dr: So, what tablets are you taking now?*** *Cmp2: [Translates. The patient and Companion 1 reply.] Four milligrams, anyway, he, she doesn't remember the name, they're. [Companion 1 continues] A Polish name, probably, or maybe there is one in England, but it's four, four, four milligrams.*		
	Health literacy 17/19 (89%)		
	P8GP10R300	Patient has uncontrolled diabetes and has infrequent encounters with the primary care system. This doctor spends a significant portion of the consultation trying to motivate the patient to manage his health and attend appointments.	Digital records and/or apps could be used to keep this patient linked to the health system. For instance, the patient could be reminded about upcoming appointment(s) through a digital app and more effectively manage their health appointments.
	Dr: When do you think would be good to come and see me again? *Pt: No, I wouldn't remember. Five years?* ..... ***Dr: Okay. I mean, I seriously do mean it, I think that until your sugar's better controlled...*** ..... ***Dr: Uh, yes, you can. Don't forget, do it straight away the appointment, yeah? Now.***		
Expectation that ancillary services will perform more in-depth examinations	New signs and symptoms 15/19 (79%)		
	P3GP5R158	The GP performs a basic foot examination	There is potential for digital health to

(continued)

Table 4. Continued.

Emergent gaps in self-management for digital health	Patient-centred activity code & frequency count n/19 (%)		
	Transcript reference	Author's observations	Insights for digital health
	Supporting quotes from the consultation transcript		
		but does not perform Doppler ultrasound, and the patient is expected to see nurse separately to have a more thorough foot exam performed.	streamline GP consultations so that these investigations can be performed within a single consult and the patient does not require multiple appointments.
	Dr: It's a bit __[0:06:04] actually. Your feet aren't cold so I'm not too worried, but normally part of the diabetic is to check the pulses in the feet with the Doppler's, so just make sure she does that when you see her on Thursday. Can I check the other foot as well? *Pt: Sure*		
	Seek medical help – including referrals 16/19 (84%)		
	P4GP6162	The GP thinks patient might have asthma and does not perform spirometry – patient is expected to see an Asthma nurse separately.	Likely for lack of time, this patient is expected to see ancillary health professionals for spirometry and asthma diagnosis. Efficiency gains from digital technology could allow for these exams to be performed during primary care consultations.
	Dr: That's not always gonna be possible and it will mean you'll wait longer. And for things like that I was gonna recommend that we get you in with our asthma nurse because she can do some lung function tests, where you breathe into a, a machine. *Pt: Yeah.*		

their GPs during consultations. There is evidence that digital health interventions (e.g. mobile apps for diabetes self-management) that involve healthcare providers have better outcomes for self-management.[42] However, despite the numerous approaches for digitalisation to improve self-management, safety concerns arise from the abundance of unregulated apps and devices on the market. Greater research is needed on the safety of widescale adoption of digital health technologies for self-management. Further research should evaluate methods to integrate digital technology into the workflow of primary care consultations.

Digital health to support self-management tasks after consultations. There is often a discrepancy between the actions required of patients *during* and *after* their GP consultations. The most common post-consultation tasks include *organising administrative tasks* (e.g. booking appointments) and *following lifestyle recommendations* (e.g. making dietary changes). Furthermore, it is clear that after consultations, there is a significant burden on patients to perform administrative tasks, as well as following lifestyle recommendations. If digital technology is to assist in self-management in a meaningful way, it needs to reconcile this discord to ensure discussions or tasks discussed *during* consultations become actionable items, such that patients can follow through *after* consultations.

How diabetes and CVD primary care consultations would adapt in telehealth. For T2DM and CVD consultations, visits are commonly categorised into three visit types: medication review; results review; and condition review. As telehealth gets rapidly adopted in primary care, it is important to assess whether T2DM and CVD consultations can indeed be supported in Telehealth. One important aspect concerns physical examinations, which occur frequently across these three visit types for patients with diabetes and CVD. Future research should examine whether tasks (e.g. physical examination) observed during in-person consultations regarding T2DM and CVD are indeed translatable to telehealth. Additionally, further research is warranted to investigate whether there are significant differences in the quality of care and health outcomes amongst people with T2DM

and CVD in the long term, depending on whether they received care in-person or via telehealth. It is possible that the structure of consultations will need to adapt to telehealth, as in which steps of the consultation are either missing or added compared to in-person consultations, with reference to the different visit-types.

Conclusion

We performed a secondary multi-method analysis to understand how observation of in-person GP consultations could illuminate the nature of self-management discussions in primary care, and inform digital solutions for patients with T2DM and CVD. The results reveal disharmony between the self-management actions required of patients *during* and *after* consultations. Furthermore, this study revealed a number of emergent gaps for digital health to support patients with T2DM or CVD in self-management during and after their GP consultation. Further research is needed to explore the role of digital technology during primary care consultations, and to support the multitude of self-management tasks for patients with T2DM and CVD after consultation.

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