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Improving uptake of colorectal cancer screening by complex patients at an academic primary care practice: a feasibility study

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ABSTRACT

Background Regular screening reduces mortality from colorectal cancer (CRC). The Canton of Vaud, Switzerland, has a regional screening programme offering faecal immunochemical tests (FITs) or colonoscopy. Participation in the screening programme has been low, particularly among complex patients. Patient navigation has strong evidence for increasing the CRC screening rate.

Design and objective This feasibility study tested patient navigation performed by medical assistants for complex patients at an academic primary care practice.

Baseline measurements A review of 328 patients' medical charts revealed that 51% were up-to-date with screening (16% within the programme), 24% were ineligible, 5% had a documented refusal and 20% were not up-to-date, of whom 58 (18%) were complex patients.

Intervention (February 2023 to May 2023) We tried to help complex patients participate in the screening programme using either in-person or telephone patient navigation. Each intervention was piloted by a physician-researcher and then performed by a medical assistant. Based on the reach, effectiveness, adoption, implementation, maintenance framework, we collected: Intervention participation and refusal, screening acceptance and completion and both patients and medical assistant acceptability (ie, qualitative interviews).

Results Only 4/58 (7%) patients participated in the in-person patient navigation test phase due to scheduling problems. All four patients accepted a prescription and 2/4 (50%) completed their test. We piloted a telephone intervention to bypass scheduling issues but all patients refused a telephone discussion with the medical assistant. At two months after the last intervention, the proportion of patients up-to-date increased from 51% to 56%.

Conclusion Our overall approach was resource-intensive and had little impact on the overall participation rate. It was likely not sustainable. New approaches and reimbursement for a specific patient navigator role are needed to increase CRC screening of complex patients.

PROBLEM

Colorectal cancer (CRC) is a major health burden, especially in high-income countries.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Tested the feasibility of having medical assistants perform patient navigation for complex patients, not done previously in Switzerland.
⇒ Provided information about non-participants in the colorectal cancer screening programme, showing many are already up-to-date with screening.
⇒ Lack of a control group, as reliable information on other patients' screening status would require chart review.
⇒ Only persons who accepted patient navigation subsequently participated in qualitative interviews.

It was the third leading cause of cancer-related death worldwide in 2018 and in Switzerland between 2015 and 2019.[1–3] Incidence and mortality from CRC are effectively reduced by regular screening using a faecal immunochemical test (FIT) or a colonoscopy.[4–7] We faced two problems. First, unpublished analyses in 2020 revealed that only 13–30% of eligible patients from our institution had completed their screening through

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Complex patients are less likely to complete colorectal cancer (CRC) screening. Patient navigation has strong evidence for increasing CRC screening uptake rate.

WHAT THIS STUDY ADDS

⇒ In-person navigation was acceptable and often resulted in the completion of a screening test but could only be performed with a small portion of patients. Many patients refused telephone navigation.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ While patient navigation has proven efficacy in randomised trials, it was difficult to implement with complex patients in an urban, academic clinic.

the regional programme. This is far below the European recommended screening completion rate of 65%.[8] The second problem we faced was the lack of reliable information about our patients' screening status. Estimates were based on our regional CRC screening programme data which did not include tests performed prior to or outside of the programme. Therefore, the screening completion rate was likely to be an underestimation of the actual rate as opportunistic and diagnostic screening are common.

Unisanté (Canton of Vaud) is a Swiss academic institution that has a primary care outpatient unit with a long tradition of caring for patients with complex conditions (ie, multiple socioeconomic or psychosomatic needs).[9] Extensive research has shown that these patients participate less in cancer screening programmes.[10–15]

The current study aimed to test the feasibility of a patient navigation performed by medical assistants to assist complex patients completing CRC screening. We adapted and pilot-tested a patient navigation intervention to our specific setting and needs in order to improve access to CRC screening for complex patients. Before testing the intervention, we did a manual verification of the screening status of potentially eligible patients (ie, Vaud citizens aged 50–69 years).

BACKGROUND

Most healthcare organisations in Europe, America and Oceania agree on the benefits of population-based CRC screening programmes and offer evidence-based tests to citizens aged 50–74 years old. Most countries in Europe have set up organised or opportunistic screening programmes.[8 16] Switzerland has no national programme as programmes are organised at the cantonal level. The Canton of Vaud implemented a programme in 2015 for citizens aged 50–69 years old. It offers the choice between FIT every 2 years and colonoscopy every 10 years. Eligible people are mailed an invitation to participate with an explanatory leaflet. They have the choice between obtaining a FIT from a pharmacy and making an appointment with their general practitioner (GP) to obtain a FIT or arrange a colonoscopy. Participants pay only 10% of the cost. Even when considering opportunistic screening, the completion rate remains under the recommendations. The 2017 Swiss Health Survey estimated that the country overall coverage was 48.4%.[17] We expected our patients' screening coverage to be comparable, as they benefit from the privilege of an organised programme.

Various initiatives have been tested in the Canton of Vaud to increase CRC screening completion rates, such as the translation of information leaflets into different languages or a provider feedback intervention.[18 19] A meta-analysis from the USA found that FIT outreach and patient navigation had the strongest evidence for increasing CRC screening rates.[20] Patient navigation was defined as a 'barriers-focused intervention whereby a trained individual guides a patient through a complex health care system, addressing sociocultural, educational and logistical barriers […]'[20] (p. 1647).

Several studies, including one in Switzerland, have found associations between complexity factors, such as lower socioeconomic status or marginalised ethnicity groups and a reduced participation in screening programmes. This results in later diagnoses and lower CRC survival rates.[10–14] Care of complex patients is often fragmented between different healthcare providers.[21 22] These patients benefit even more from a patient navigation programme which aims to ensure a continuum of care.

BASELINE MEASUREMENTS (NOVEMBER 2022 TO DECEMBER 2022)

At Unisanté, physicians in postgraduate training in general internal medicine are divided into four groups, each made up of six to nine residents, three to five chief residents, one senior physician and one medical assistant. Our project was conducted in one group which cared for 328 patients aged 50–69 years. We did not review the medical records of patients from the other three groups. 30% (98/328) of the patients were registered on the Vaud screening programme platform. Among them, 19% (61/328) were up-to-date with screening (ie, screening completed), 9% (30/328) registered but not up-to-date (ie, screening not completed or not up-to-date) and 2% (7/328) non-eligible (ie, at very high-risk for CRC).

We performed a medical chart review for the 230/328 (70%) patients unregistered on the programme platform. We classified them as: (1) up-to-date with screening, (2) non-eligible, (3) eligible but choose not to participate (ie, screening refusal) and (4) not up-to-date (ie, eligible but had not yet participated). Some patients (16% (53/328)) were excluded because they were not followed at our institution anymore, were not Vaud citizens, had died by the time of the study or were registered on the platform but had still not completed the screening (ie, non-eligible (other) in figure 1).

Finally, half of the patients were up-to-date via either screening within (16% (53/328)) or outside of the programme (35% (113/328)). Outside of the programme, colonoscopy (31% (102/328)) was strongly preferred over FIT (3% (11/328)). Within, tests were done nearly equally (9% FIT (29/328) vs 7% colonoscopy (24/328)). Only 20% (67/328) of patients were not registered on the platform, not up-to-date and eligible. The remaining were non-eligible (24% (79/328)) or eligible with a documented refusal (5% (16/328)).

We also extracted information about possible contributors to the non-participation of the 67 patients who were not up-to-date but potentially eligible, hypothesising that many could be considered complex. We defined patients as complex if at least one complexity factor was found in the medical chart review using previously defined criteria and focusing on known contributors to lower participation in CRC screening.[9 15 23 24] These criteria factors
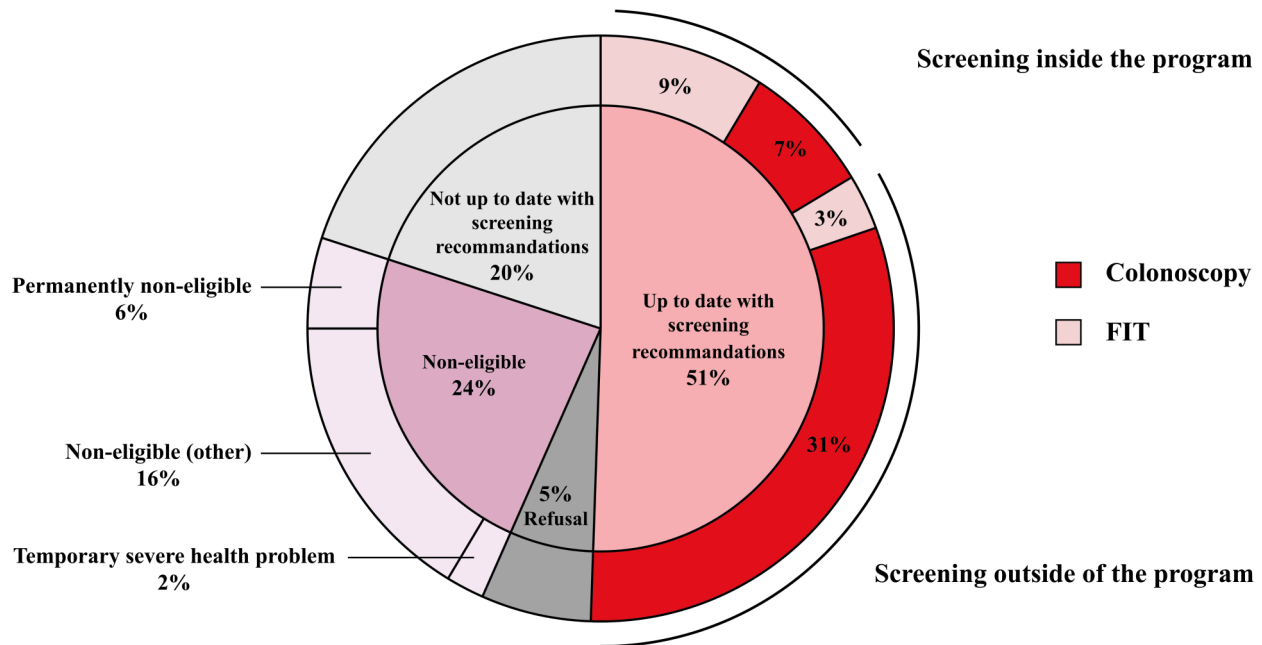
Figure 1 Summary of patients' screening status according to the medical chart review and the Vaud screening programme platform. Detailed data collected can be found in online supplemental appendix 1. FIT, faecal immunochemical test.

were somatic comorbidities (severe chronic disease, somatic comorbidity (ie, Charlson Comorbidity Index (CCI)>1, dementia not included)), mental health issues (psychiatric disorder (ie, depression, anxiety, personality, somatoform, post-traumatic or psychological development disorder and dementia), severe mental illness), behavioural disorders (substance abuse or active addiction (tobacco and cannabis not included)) or social determinants (no or inadequate housing, no insurance, precarious legal resident status (ie, illegal situation, F (provisionally admitted foreigners), N (permit for asylum-seekers), S (people in need of protection) permit or departure deadline certificate), complex or difficult family situation, social isolation or exclusion, complex or difficult financial situation (ie, unemployed and seeking employment, disability pension, welfare, retired), poor health literacy (ie, low level of education (ie, mandatory education or less),[25] language barrier (ie, need for an interpreter)), difficulties of communication (in terms of language)).[26]

We also kept a category 'Other' to record additional dimensions of complexity. 87% (58/67) of patients not up-to-date with screening could be considered complex, as they had at least one complexity criterion.

DESIGN

Baseline measurements revealed that not up-to-date with screening patients appeared to have a higher prevalence of some socioeconomic criteria. These were poor therapeutic adherence (13% in not up-to-date vs 2% in up-to-date), illegal residence status (6% vs 2%), inadequate housing (12% vs 6%) and the need for an interpreter (21% vs 8%). Also, severe psychiatric illnesses were more common in the not up-to-date group (13%) than in the

up-to-date group (6%). A patient navigation intervention focused on financial, relational or systemic barriers faced by our complex patients seemed most appropriate. Medical assistants in Swiss primary care are in frequent contact with patients making them suitable to be patient navigators.[27 28]

We conducted a series of open discussions with physicians in training as well as the medical assistants, the head nurse and the director of the Vaud CRC screening programme. The nurse and the medical assistant requested that our project not interfere with the medical assistant's existing duties (for example, scheduled and unscheduled blood draws) and part-time work. We also discussed the possibility of distributing FIT in our clinic but decided to maintain distribution through our pharmacy given its proximity and experience in providing FIT instructions.

STRATEGY

We explored two patient navigation interventions. Each was first piloted by a physician-researcher, then tested by the medical assistant. Our outcomes were based on the RE-AIM framework (reach, effectiveness, adoption, implementation, maintenance).[29 30]

Planned measurements for each step were: intervention participation rate (ie, persons who received the intervention/persons on whom we planned to intervene), intervention refusal rate (ie, persons who refused the intervention/persons to whom we propose the intervention), screening programme acceptance (ie, persons who accepted the screening/persons who received the intervention), screening completion rate (ie, persons who completed the test between 3 February 2023 and 20 June 2023/persons who accepted the screening)

and colonoscopy completion rate after a positive FIT (ie, persons who had a colonoscopy/persons whose FIT returned positive), acceptability for the medical assistant (ie, open-ended interview with her). We also performed, after the intervention was completed, semistructured qualitative interviews by telephone with selected patients. The interview guide included six questions about trust in the patient navigator, clarity of the information given, usefulness of the intervention, maintaining of the intervention and finally an opening to suggestions. They were conducted by two researchers. We took notes but did not transcribe or perform full thematic analyses.

We refined our intervention at each step based on intervention participation and refusal rate and screening acceptance rate as it was the only information available in real-time.

Before intervening on a patient, the treating physician was contacted to ask if the intervention seemed appropriate. For each intervention, information about screening was provided to the patients using the six-page simplified leaflet of the programme (ie, price, risks, benefits).[31] The medical assistant was first trained by a member of the research team using the materials employed for physician in training. Following the interview, interested patients were registered on the programme platform.

Phase 1: in-person patient navigation (3 February 2023 to 31 April 2023)

The first intervention was an in-person, visit-based patient navigation. We focused on patients who had an appointment scheduled. The treating physicians invited their patients to meet the patient navigator at the end of the consultation.

Of the 58 eligible patients, 23 had an appointment between February 2023 and April 2023. The treating physician felt navigation was not appropriate for one patient (ie, the patient and the treating physician communicate in a foreign language) and two had exclusion criteria. We ran a brief pilot phase of 1 week. We offered the choice between FIT and colonoscopy to three patients. Overall, the participation rate was 5% (3/58), intervention refusal rate was nil and the screening programme acceptance rate was 66% (2/3). Of the two patients, one chose FIT and one colonoscopy.

During the test phase, the medical assistant attempted to intervene on the remaining 18 patients. We focused on offering FIT as colonoscopy is a medical prescription. The participation rate was 7% (4/58), the intervention refusal rate was 20% (1/5) and the screening programme acceptance rate was 100% (4/4). The low participation rate was mainly due to difficulty in coordinating the medical assistant's agenda with patients' appointments. It was also resource intensive, requiring a member of the research team dedicated to its coordination (figure 2).

Phase 2: telephone-based patient navigation (1 March 2023 to 16 May 2023)

To avoid the problem of coordinating schedules and optimising the participation rate, we attempted to intervene with non-visit-based patient navigation. It consisted of a telephone call for the 47 patients who had not yet participated in the in-person intervention. We continued to focus on FIT. Prescription for FIT was mailed to the patients interested in participating in the screening programme. We kept the pharmacy as an intermediary so they could give instructions on FIT use. We considered patients as 'unreachable' after four call attempts without an answer or as soon as patients hung up on the caller. Physicians felt the intervention was inappropriate for 9/47 patients. The main reasons mentioned were a fragile therapeutic bond or very poor health literacy, rendering a telephone explanation unsuitable. Another 15 patients had exclusion criteria and we encountered a logistical problem for one patient. During the pilot phase, the researcher attempted to reach 16 patients (13 French-speaking and three allophones) using call triangulation. Participation rate was 15% (7/47) and the intervention refusal rate (ie, active refusal or patients unreachable) was 56% (9/16). Note that two attempts to call by telephone with a certified interpreter failed due to difficulties coordinating agendas between the three stakeholders. The third allophone patient accepted the intervention but the interpreter was a family member (no need to triangulate the calls). The participation rate during the test phase was nil (2/6 refusal, 4/6 unreachable). We finally abandoned this method as we ran out of time and the participation rate was zero. The interpreter method was not maintained for this phase as it did not work in the pilot phase (figure 2).

Patients public involvement

Six patients who received the intervention were contacted for brief qualitative interviews.

Ethical considerations

According to Swiss regulations, quality improvement projects do not require ethics approval as we intended to improve local care. We followed best practices regarding data protection. Concerning the qualitative interviews, patients were informed that it was not about their medical care and oral consent was requested. We conducted our project in accordance with the Declaration of Helsinki and the principles of Good Clinical Practice.[32]

RESULTS REACH

The intervention population included more men than women. More than half of the patients (55% (32/58)) were overweight (body mass index (BMI)>25) or obese (BMI>30) and most were not Swiss (table 1).

Frequent complexity factors found were CCI>1, severe chronic disease, difficult financial situation, psychiatric disorder, substance abuse or addiction and the need for an interpreter. 'Poor therapeutic adherence' (risk of breaking therapeutic bond, poor adherence to
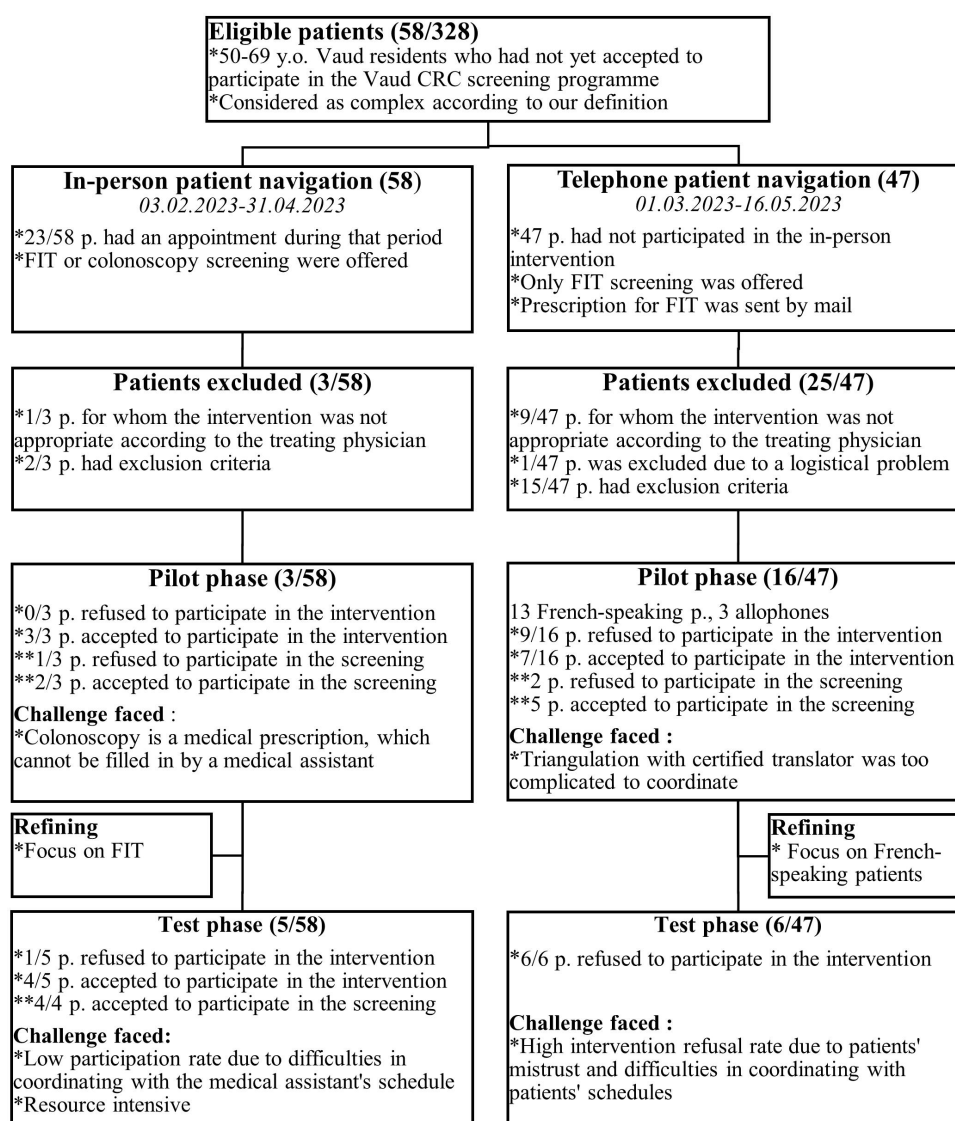
Figure 2 Flow chart presenting the progress of the patient navigation intervention. CRC, colorectal cancer; FIT, faecal immunochemical test.

medication, frequent unattended appointments) was another factor revealed during the medical chart review.

Effectiveness
Screening completion rate of the in-person patient navigation was 50% for both the pilot and test phases. Completion rate after the pilot telephone patient navigation was 0%. Screening completion rate of our group of patients was 51% (166/328) on 3 February 2023 and 53% (175/328) on 20 June 2023, 2 months after the last intervention. Including the eight people who turned out to be up-to-date with screening during the intervention through screening outside of the programme, the final screening participation rate was 56% (183/328).

Adoption
The medical assistant preferred the in-person patient navigation. 'Patients felt safer in a setting they knew.' What emerged from the telephone intervention was a certain mistrust and an impression of telemarketing.

While the telephone call seemed easier to coordinate with her schedule, it was much harder to coordinate with the patients' agenda who were often disturbed during working hours.

The two researchers tried to reach all participants to offer them a qualitative interview. Six accepted to participate, all of whom had agreed to screening during the intervention. Unfortunately, reflecting the limited literacy of our participants, the exchanges were quite superficial and three patients had a limited comprehension of the questions. Consequently, no clear leads for improvement emerged from our interviews. Two had received the tested in-person intervention and four had received the piloted telephone intervention (one with an interpreter of the family). They represented different genders (4 men and 3 women) and ages (2/6 were 50–54 years old, 2/6 were 60–64 years old, 2/6 were 65–69 years old). Of the six patients interviewed, only 1/6 patient had completed the screening. Interviews revealed that

Table 1 Characteristics of the intervention population (N=58)

Demographic characteristics	
Variable	n (%)
Sex	
Female	21 (36)
Male	37 (64)
Age (years)	
50–54	18 (31)
55–59	12 (21)
60–64	15 (26)
65–69	13 (22)
BMI (kg/m^2)	
<18.5	3 (5)
18.5–24.9	19 (33)
25–29.9	13 (22)
30–34.9	10 (17)
35–39.9	4 (7)
≥40	5 (9)
Missing data	4 (7)
Nationality	
Foreigner	36 (62)
Swiss	22 (38)
Marital status	
Married or cohabiting	33 (57)
Divorced, single or widow/widower	25 (43)
Complexity criteria	
Variable	M (SD)
Complexity criteria per person	4 (1.9)
Variable	n (%)
Frequent complexity factors (>20%)	
Charlson Comorbidity Index>1	42 (72)
Severe chronic disease	36 (62)
Complex or difficult financial situation	32 (55)
Psychiatric disorder (not severe)	26 (45)
Substance abuse or active addiction	14 (24)
Need for interpreter	14 (24)
Other dimension of complexity	
Poor therapeutic adherence	9 (16)

All percentage are rounded to the whole number and other value to the first decimal.
BMI, body mass index.

screening non-completion was often explained by intercurrent health or social problems that led to screening postponement (3/5). One patient also expressed a wish to change from FIT screening to a colonoscopy. The main theme that emerged, whether after an in-person or telephone navigation, was gratefulness for having received the intervention. They all agreed that the information given was clear, that they had felt confident with the patient navigator and recommended us to continue this approach in the future.

Implementation
Costs incurred by the institution for the intervention were not measurable as the Swiss tariff structure system (ie, TARMED, tariff structure for outpatient medical services) provides no points dedicated to medical assistants services.[33] There were no additional costs for patients. Both interventions included approximately 10 min with the patient (by telephone or in-person). However, the time taken to conduct the entire procedure per patient was unmeasurable as it consisted of scattered events (eg, waiting until the consultation is over to intervene, making repeated telephone call attempts). A physician reported that it took her 2.5 hours to see if the intervention was appropriate for her 21 patients. The medical chart review necessary as a baseline took approximately 20 hours.

Maintenance
No sustainability assessment was made as patient navigation was not implemented after the feasibility assessment. Both patient navigation programmes were too resource intensive requiring a member of the research team dedicated to its functioning and a medical chart review. It was not sustainable in the current context, especially as this type of work by medical assistants is not remunerated.

LESSONS AND LIMITATIONS
Our project explored the feasibility of patient navigation by medical assistants to improve access to CRC screening for complex patients. Our 2-method/2-phase strategy allowed us to collect relevant information about the feasibility of patient navigation in our setting. Further, multifaceted, multidisciplinary feedback provided a clear picture of the long-term feasibility of this approach. Ultimately, caregivers expressed concerns about the sustainability of our approach until after the implementation of a new electronic health record with easier access to patients' screening status. Further, medical assistants have multiple tasks to perform making it difficult to schedule navigation visits.

The baseline medical chart review provided a reliable estimate of the CRC screening uptake among patients of the primary care outpatient unit of Unisanté. Our screening rate is better than we expected. It confirmed that clinicians do not inform the Vaud CRC screening programme platform about diagnostic colonoscopies and therefore provides an unreliable estimation of the actual screening participation rate. Finally, it identified 30 patients who agreed to participate in screening and were registered on the platform, but who never underwent screening.

Our patient navigation intervention encountered several organisational barriers. The in-person interview was personnel intensive and complicated to fit in with the

medical assistant's schedule. However, it presented the best screening completion rate. The second option, by telephone interview, was more suited to the medical assistant's daily tasks, but less suited to the patient's schedule with zero participation. This approach also encountered problems for non-French speaking patients or with poor health literacy. No statistical comparison was made to a control group of patients due to the lack of reliable information on actual screening rates in other groups and due to our small final sample size. No sustainability assessment was conducted as we did not collect detailed cost-time data and the intervention was not subsequently implemented. The results of the qualitative survey, although encouraging overall, were limited by a self-selection bias as only patients who accepted the screening accepted to answer our questions.

According to our different qualitative and quantitative results, in-person patient navigation appeared to be the best option. However, in light of the discussion we had with different healthcare providers and the low participation rate, we were not able to demonstrate its feasibility in the present context. An important limitation is the upfront need to obtain patients' current screening status which requires a time-consuming medical chart record. It cannot be achieved by the already overworked medical assistant or GP unless there were institutional support to create a new position. We need changes to our electronic health record to facilitate access to this information. Also, adding prevention work to the medical assistants' remit would mean redefining their role in the Swiss healthcare system. This would probably require new reimbursement codes dedicated to the medical assistants' tasks. A recent scoping review using an implementation lens reveals that most patient navigation programme focus on their impact at the patient level. However, setting up such programmes, as confirmed in our study, requires important resources. Further studies looking at both the system and caregiver-level impact are needed.[34] A systematic review identified nine studies between 2014 and 2017 stating that the implementation of a patient navigation programme for colorectal cancer screening is cost-effective. Eight of these studies were conducted in the USA which has a radically different healthcare system than the Swiss one.[35] A recent microstimulation study suggested mailed the FIT (ie, FIT outreach) cost less than patient navigation alone for the same benefit.[36] Additional cost-effectiveness study of patient navigation programme conducted in our specific setting are needed.

Our work in collaboration with the screening programme revealed that many patients do not complete screening after being included in the programme by their GP. Qualitative interviews revealed possible barriers to non-completion after registration, such as competing sociosomatic problems leading people to postpone the test and finally forget it. A clinical trial conducted in 2017 in the USA studied the effect of a combination of patient decision aid and visit-based patient navigation including telephone call reminders on colorectal screening rates.[37] Their results suggested that a combined approach is more effective than isolated approaches. A combination of our two interventions would probably have been more effective, especially in terms of completing the test after registration. Other projects are needed to identify barriers to completion after registration in order to design a recall system. Perhaps the screening programme could notify the ordering physicians. The recall to the physician would avoid disturbing people suffering from potential critical conditions.

CONCLUSION

In summary, this project showed that most patients who are not up-to-date with CRC screening in our practice are complex. Our patient navigation project allowed some patients to get screening despite the short follow-up period. However, the approach was very resource-intensive and will not be achieved without improved electronic tools or additional financial incentives. New payment models are needed to help complex patients access cancer screening in settings with fragmented care delivery. Electronic tools could include bidirectional texting so that patients can request FIT without needing a conversation or new chatbot technologies that can answer initial questions before interaction with a healthcare provider.

obtained. The nature of the project and the ethical considerations surrounding the lack of patient consent necessitate the confidentiality and restriction of the data to the internal team involved in the project.

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Supplemental material

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Appendix

Appendix 1 Screening status	
Variable (person)	**n (%)**
A. According to the Vaud CRC screening program platform (N=328)	
Not registered on the platform (person)	230 (70 %)
Registered on the platform (person)	98 (30 %)
Up to date with screening recommendations	61 (19 %)
Prior screening inside the program	53 (16 %)
FIT	29 (9 %)
Colonoscopy	24 (7 %)
Prior colonoscopy outside of the program	8 (2 %)
Permanently non-eligible (polyp or adenoma history)[1]	7 (2 %)
Registered but screening not completed	30 (9%)
B. According to the medical chart review (N = 328)	
Eligible but had not yet participated	67 (20%)
Reason for non-participation	
No discussion about screening	55 (17%)
Discussion about screening but reason non mentioned	4 (1%)
Need for reflexion	5 (2%)
Other reason	3 (1%)
Non-eligible	147 (45%)
Temporarily non-eligible[2]	111 (34%)
Up to date with screening recommendations (*i.e. outside of the program*)	105 (32%)
FIT	11 (3%)
Colonoscopy	94 (29%)
Temporary severe health problem (including CRC symptoms)	6 (2%)
Permanently non-eligible[1]	13 (4%)
CRC history	1 (<1%)
Polyp history	11 (3%)
Not mentioned	1 (<1%)
Non-eligible (other)[3]	23 (7%)
Deceased	6 (2%)
Not patient anymore /not Vaud resident	14 (4%)
No capacity for discernment	2 (1%)
Screening failure	1 (<1%)
Refusal	16 (5%)
C. According to the medical chart review and the program platform (N = 328)	
Eligible but had not yet participated	67 (20%)
Non-eligible	261 (80 %)
Temporarily non-eligible[2]	
Up to date with screening recommendations	166 (51%)
Prior screening inside the program	53 (16 %)
FIT	29 (9%)
Colonoscopy	24 (7%)
Prior screening outside of the program	113 (35%)
FIT	11 (3%)
Colonoscopy	102 (31%)
Temporary severe health problem	6 (2%)
Permanently non-eligible[1]	20 (6%)
Non-eligible (other)[3]	53 (16%)
Registered but screening not completed	30 (9%)
Refusal	16 (5%)

*All percentage are rounded to the whole number and other value to the first decimal

[1]Permanent: History of CRC or polyp (>1cm, tubular-cell adenoma, villous adenoma, high-grade dysplasia), chronic bowel inflammatory disease

[2]Temporary: up to date with screening recommendations (or ongoing screening process), temporary severe health problem

[3]Non-eligible (other): not a Vaud citizen, no longer patient of the primary care outpatient unit of Unisanté, no capacity for discernment, screening failure

Appendix 2 Outcome of attempts to contact patients to complete navigation either in-person or by telephone

	In-person navigation	Telephone navigation
Variable (person)	**n (%)**	**n (%)**
People on whom we planned to intervene	**(N=58)**	**(N=47)**
No intervention		
No appointment	35 (60%)	-
Exclusion criteria	2 (4%)	15 (32%)
Intervention not appropriate	1 (2%)	9 (19%)
Medical assistant not available	9 (16%)	-
Informatic problem/logistic problem	3 (5%)	1 (2%)
Pilot phase	**(N=3)**	**(N=16)**
Intervention refusal	0 (0%)	3 (19%)
Translator		2
Patient unreachable		6 (38%)
Test phase	**(N=5)**	**(N=6)**
Intervention refusal	1 (20%)	2 (33%)
Patient unreachable		4 (67%)
People who received the intervention	**(N=7)**	**(N=7)**
Pilot phase	**(N=3)**	**(N=7)**
Acceptance	2 (67%)	5 (71%)
Translator		1
Refusal	1 (33%)	2 (29%)
Test phase	**(N=4)**	**(N=0)**
Acceptance	4 (100%)	
Refusal	0 (0%)	
People who accepted the screening	**(N=6)**	**(N=5)**
Screening completion	3 (50%)	0
Pilot phase	1 (50%)	0
Test phase	2 (50%)	0
People whose FIT returned positive	**(N=0)**	

[*] All percentage are rounded to the whole number and other value to the first decimal