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ARTICLE

Pilot implementation study of a default genetic referral process for patients with early-onset colorectal cancer

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ABSTRACT

Purpose: Early-onset colorectal cancer (CRC) diagnosed under age 50 is increasing at alarming rates, with >75% of early-onset cases occurring in patients between 40 and 49 years old. Germline genetic risk evaluations are key to delivering high-quality care to these patients.
Methods: We conducted a single-arm pilot implementation study of a default genetic referral process for patients diagnosed with CRC between ages 40 and 49 at 5 hospitals in an academic health system. A research coordinator notified patients and their oncologists of their eligibility for a default genetic referral, after which all patients who did not opt out were referred for genetic counseling, testing, and result disclosure as per usual care. The primary outcome was the genetic referral rate; secondary outcomes included the percentage of eligible patients who were scheduled for a genetic evaluation, completed genetic counseling, and underwent testing within 3 months of the initial referral. We conducted semistructured exit interviews with a subset of patients and oncologists to elicit feedback on the intervention.
Results: We included 53 patients, of whom 49 (92%) were referred to genetics, 38 (72%) were scheduled, 22 (42%) completed genetic counseling, and 13 (25%) underwent testing within 3 months of the initial referral. In exit interviews ($n = 10$ patients and 10 oncologists), participants reported finding the default genetic referral process acceptable and feasible to implement.
Conclusion: A default genetic referral process is acceptable, feasible, and associated with a high referral rate for patients with early-onset CRC; however, subsequent scheduling, evaluation, and testing rates remain suboptimal.

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Introduction

The incidence of early-onset colorectal cancer (CRC)—defined as a diagnosis of CRC before age 50—has increased at alarming rates in recent years.[1] Over 75% of early-onset cases occur in patients diagnosed between 40 and 49 years old, a group that is not traditionally included in young adult cancer initiatives that are tailored only for patients up to 39 years of age.[2,3] Young age of CRC onset is a defining feature of hereditary CRC syndromes; as such, the National Comprehensive Cancer Network recommends germline genetics evaluations for all patients diagnosed with CRC under the age of 50 to identify patients with Lynch syndrome, familial adenomatous polyposis, and other inherited cancer predisposition syndromes who may benefit from additional screenings, prophylactic and therapeutic interventions, and cascade testing of at-risk family members.[4] However, multiple studies have shown suboptimal referral rates and racial and socioeconomic disparities in guideline-recommended genetics evaluations.[5-8]

In the field of behavioral economics, defaults are preselected choices that are applied unless an individual actively changes them.[9] Defaults work by leveraging what is known as status quo bias—one's preference to maintain the current state of affairs rather than take an action that may require additional time or effort—and are thought to represent the most potent of behavioral interventions that can nudge individuals toward evidence-based decisions while minimizing cognitive effort and preserving freedom of choice.[10-12] Defaults have previously been shown to be effective in promoting high-value health care practices, such as increased generic medication prescribing and referral for cardiac rehabilitation after myocardial infarction.[13,14] We conducted a pilot implementation study to determine the impact of applying defaults on genetic referral rates among patients with CRC diagnosed between ages 40 and 49, the most common age range for early-onset CRC.

Materials and Methods

Study design

We conducted a single-arm pilot implementation study of a default genetic referral process for patients with early-onset CRC at 5 hospitals within an academic hospital network. The Institutional Review Board of the study site approved the protocol with a waiver of informed consent because the intervention aimed to improve adherence to the guideline-recommended standard of care. The subset of patients and oncology clinicians who were recruited to participate in exit interviews at study completion provided verbal informed consent before proceeding with their interviews. All study procedures were conducted between December 2021 and May 2022 with data collection extending to May 2023.

Study participants

Eligible patients were diagnosed with early-onset CRC between ages 40 and 49 between January 1, 2019 and April 30, 2022. Patients who were diagnosed in or after December 2021 were identified prospectively, whereas those who had been diagnosed before study initiation were identified retrospectively. Patients were excluded if they had previously been referred to cancer genetics. We also elected to exclude patients under 40 years old because of a competing germline genetic testing study among young adult patients with cancer that was ongoing at the time of this study.

A research coordinator (RC) identified potentially eligible patients using an automated electronic-health-record-based algorithm that incorporated age and diagnosis (International Classification of Diseases, Tenth Revision, Clinical Modification) codes consistent with CRC. The RC then manually reviewed each patient's medical record, including documentation of any prior genetic referrals, to confirm study eligibility.

Default genetic referral process

The default genetic referral process comprised sequential notifications to the patient's oncology team followed by the patient themself. First, the RC sent a message in the electronic health record (EHR) to the patient's medical, radiation, and/or surgical oncologist regarding the patient's eligibility for a default genetic referral (Appendix 1). If any clinician on the team disagreed, they were offered the option to cancel the referral and indicate a reason for cancellation. If the oncology team did not cancel the referral within 1 week, the RC directly notified the patient via their preferred method of contact listed in the EHR (eg, electronic patient portal or telephone call). The message included names of the patient's oncology team members to encourage adherence and invited the patient to indicate whether they (1) were interested in proceeding with a genetic evaluation, (2) were not interested in proceeding, (3) wanted to discuss further with their oncology team before deciding, or (4) had already undergone genetic testing (Appendix 2). All patients interested in proceeding with an evaluation, and those who did not opt out within 2 weeks, were referred to their local hospital's cancer genetics program for contact and scheduling. The cancer genetics programs were all integrated within the same academic hospital network and as such, followed similar procedures with respect to having a scheduler contact referred patients up to 3 times via telephone and/or the electronic patient portal for scheduling. Patients who

scheduled an appointment then received pretest genetic counseling, testing, and result disclosure as per usual care, including the option for virtual visits and saliva-based genetic testing specimen collection given that this study took place during the COVID-19 pandemic.

Data collection

We collected the following baseline characteristics from the EHR: age, sex (eg, female or male), race (eg, Asian, Black or African American, White, other, or unknown), ethnicity (eg, Hispanic or Latino, not Hispanic or Latino, or unknown), electronic patient portal status (eg, active, pending, activation code expired, or not enrolled), CRC diagnosis year (eg, 2019-2022), tumor location (eg, right-sided colon cancer, left-sided colon cancer, or rectal cancer), initial stage (eg, stage I-III, stage IV, or unknown), mismatch repair (MMR) status (eg, MMR proficient, MMR deficient, or unknown), and Eastern Cooperative Oncology Group performance status at the time of diagnosis (eg, 0, 1, or unknown).

We also reviewed the EHR to abstract data about genetic referrals, scheduling, appointment completion, and testing results. Our primary outcome was the percentage of eligible patients who were referred to cancer genetics. Secondary outcomes included the percentage of eligible patients who were scheduled for an evaluation, completed genetic counseling and underwent testing within 3 months of referral. Because of potential barriers to appointment scheduling and completion within 3 months, we also conducted a post-hoc analysis in which we extended our follow-up time frame to 12 months after the initial referral.

At study completion, we recruited a sample of patients who had undergone genetic testing, and oncology clinicians to participate in exit interviews to assess their attitudes toward the default genetic referral process. Because this study focused on the process of using default referrals to improve germline genetic testing rates, only those patients who completed the full genetic testing process were invited to participate in an exit interview. We used a semistructured interview guide based on the Consolidated Framework for Implementation Research[15,16] to examine factors related to (1) characteristics of individuals involved in implementation (eg, genetic testing beliefs), (2) inner setting factors (eg, implementation climate), (3) outer setting factors (eg, genetic testing costs), (4) intervention characteristics (eg, factors related to genetic evaluation and testing), and (5) implementation process (eg, nonstudy conditions related to the delivery of care). After each interview, we collected baseline demographic data and surveyed participants on the acceptability and feasibility of the default genetic referral process using validated measures assessed on a 5-point Likert scale, with higher scores indicating higher acceptability and feasibility.[17] A study investigator conducted the interviews via videoconference. Interviews lasted approximately 30 minutes and were audio recorded with permission from study participants.

Data analysis

We evaluated baseline patient characteristics and study outcomes using standard descriptive statistics. We also used semistructured exit interviews to elicit feedback from patients and clinicians regarding the default genetic referral process. We used demographic survey data to characterize the patient and clinician interview samples. We then uploaded interview transcripts to NVivo to support coding and analysis. Two coders used an inductive content analysis approach to iteratively analyze the initial interview transcripts and develop separate coding schemes for the patient and clinician interviews.[18] They applied the codebook to the data and established strong interrater reliability with $K > 0.8$ for 2 (20%) patients and 2 (20%) clinician interviews. The remaining interviews were coded independently by 1 coder. We then triangulated the interview data with participant survey data on the acceptability and feasibility of the default genetic referral process, which we calculated separately among patients and clinicians as mean ratings with SDs.

Results

Study participants

Our automated EHR-based algorithm identified 160 patients between 40 and 49 years old who had documented International Classification of Diseases, Tenth Revision, Clinical Modification codes consistent with CRC. After a manual review of their medical records, 107 patients were excluded, including 79 who had previously been referred to cancer genetics (Figure 1). Among the 53 patients in the study cohort, the median age was 45 years, and most were male (58%), White (74%), not Hispanic or Latino (92%), and active on the electronic patient portal (96%) (Table 1). Patients had been diagnosed a median of 447 days (interquartile range [IQR] 186-855) before being included in the study. Most patients had stage I to III CRC (62%), MMR proficient disease (91%), and an Eastern Cooperative Oncology Group performance status of 0 (60%) at the time of diagnosis.

Study outcomes

We sent notifications about default genetic referral eligibility to the oncology team for all 53 eligible patients and confirmed receipt for 46 (87%) of our messages (Figure 1). One oncologist opted out of a default referral on behalf of an international patient because of financial concerns. We then notified the remaining 52 patients of their eligibility for a

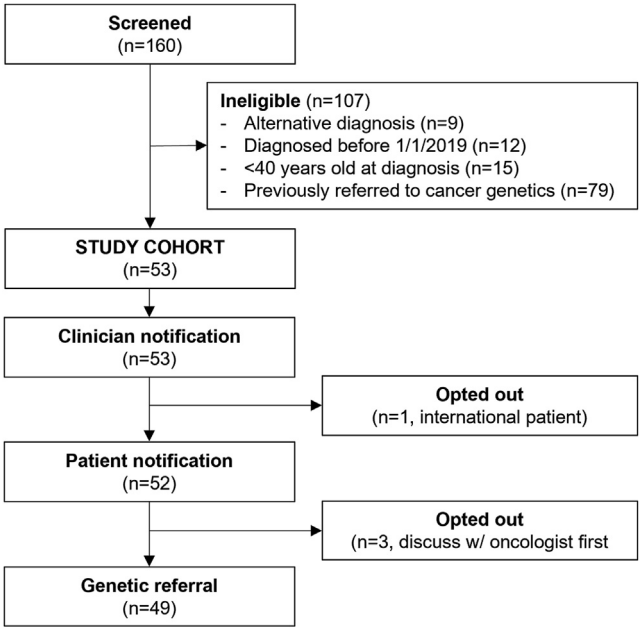

Figure 1 **Patient flow diagram.**

default genetic referral via the electronic patient portal (n = 50, 96%) or telephone call (n = 2, 4%) and confirmed receipt for 43 (83%) of our messages. Three patients opted out because they wished to discuss with their oncology team in more detail before being referred. Ultimately, 49 patients were referred to cancer genetics through the default referral process, consistent with a genetic referral rate of 92%.

Ultimately, 38 (72%) of patients in the study cohort were scheduled, 22 (42%) completed genetic counseling, and 13 (25%) underwent testing within 3 months of referral (Figure 2). In a post hoc analysis in which we extended the follow-up time frame to 12 months after the initial referral, 39 (74%), 28 (53%), and 23 (43%) of patients were scheduled, completed genetic counseling, and underwent testing, respectively. Of the 23 patients who ultimately underwent testing, 1 (4%) patient was found to have a pathogenic/likely pathogenic (P/LP) I1307K variant in the *APC* gene, and 6 (26%) were found to have variants of uncertain significance.

Table 1 Baseline characteristics (N = 53)

Characteristics	N = 53
Age, median (IQR)	45.4 (42.9-47.8)
Sex	
Female	22 (42)
Male	31 (58)
Race	
Asian	3 (6)
Black or African American	5 (9)
White	39 (74)
Other	2 (4)
Unknown	4 (8)
Ethnicity	
Hispanic or Latino	3 (6)
Not Hispanic or Latino	49 (92)
Unknown	1 (2)
Electronic patient portal status	
Active	51 (96)
Pending	1 (2)
Activation code expired	0 (0)
Not enrolled	1 (2)
Diagnosis year	
2019	15 (28)
2020	14 (26)
2021	21 (40)
2022	3 (6)
Colorectal cancer diagnosis	
Right-sided colon cancer	12 (23)
Left-sided colon cancer	22 (42)
Rectal cancer	19 (36)
Stage at diagnosis	
Stage I-III	33 (62)
Stage IV	19 (36)
Unknown	1 (2)
MMR status	
MMR deficient	0 (0)
MMR proficient	48 (91)
Unknown	5 (9)
ECOG performance status at diagnosis	
0	32 (60)
1	13 (25)
Unknown	8 (15)

All values are n (%) unless otherwise specified.
ECOG, Eastern Cooperative Oncology Group; *IQR*, interquartile range; *MMR*, mismatch repair.

Exit interviews

At study completion, we invited 21 patients who had completed genetic testing and 33 clinicians to participate in exit interviews, of whom 10 (48%) patients and 10 (30%) clinicians agreed to participate. Among participating patients, the median age was 46.0 years, 6 were female, and 6 identified as White (Table 2). Among participating clinicians, the median age was 46.0 years, 6 were male, and 9 identified as White. They had been in practice for a median of 12.5 years, 6 were medical oncologists, 4 were surgical oncologists, 6 practiced in academic settings, and 4 practiced in community settings.

Exit interview findings are summarized in Table 3. Patient and clinician participants viewed the treatment and family implications of genetic testing favorably and cited a clinician recommendation as a key facilitator to completing testing. However, they also cited multiple barriers to testing, including competing priorities, concerns about the misuse of genetic data, and concerns about potential high out-of-pocket costs associated with testing. Clinicians also cited insurance discrimination, challenges with communication

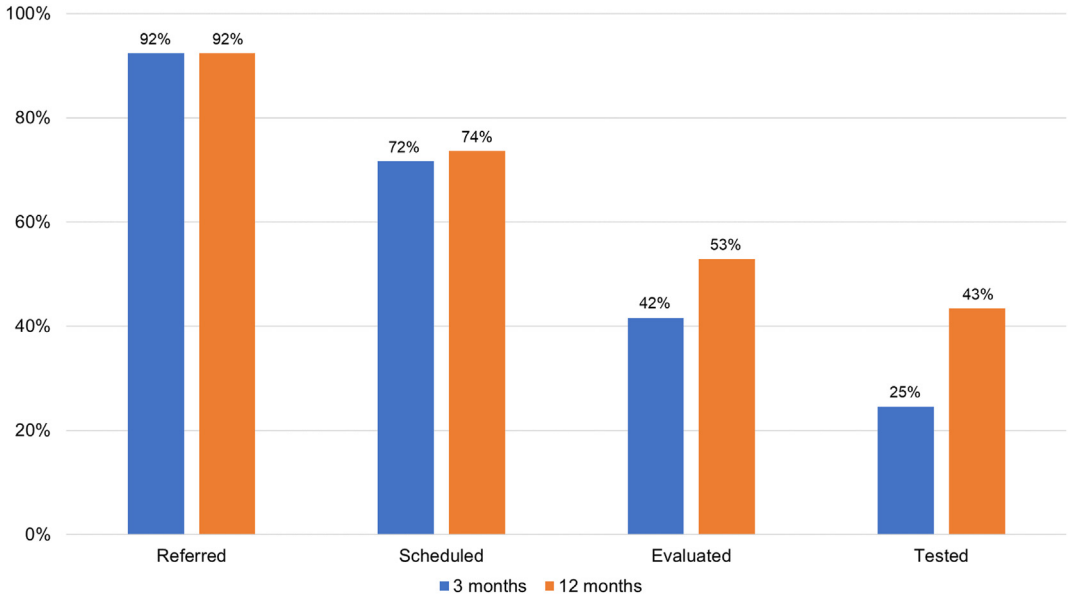

Figure 2 Genetic referral, scheduling, evaluation, and testing rates. The latter 3 outcomes were calculated within 3 (blue) and 12 (orange) months of the initial referral.

and scheduling, and failure to return saliva-based genetic testing kits as additional barriers to completing the genetic testing process.

Participants reported finding the default genetic referral process to be highly acceptable (mean rating 4.6 and SD 0.7 on a 5-point Likert scale among patients, mean 4.7/5 and SD 0.6 among clinicians) and feasible to implement (mean 4.9/5 and SD 0.5 among patients and mean 4.8/5 and SD 0.4 among clinicians). Patients reported that the automatic nature of the referral process helped them prioritize genetic testing rather than postponing it for later, whereas clinicians appreciated how the process facilitated their ability to systematically identify patients who were eligible for testing. However, many clinicians recognized that not all patients who had been referred to cancer genetics ultimately underwent testing, thereby highlighting the importance of coordinating these referrals with other elements of these patients' cancer care and ensuring follow-up throughout the entire germline genetic risk evaluation process.

Discussion

In this study, we demonstrated that a default genetic referral process was highly acceptable and feasible to implement for patients with CRC diagnosed between ages 40 and 49, which is the most common age range for early-onset CRC. Applying defaults in this clinical context resulted in a 92% genetic referral rate, but subsequent scheduling, evaluation, and testing rates were suboptimal.

This study adds to the growing body of literature on the use of behavioral nudges in health care. We observed that our default genetic referral process was highly acceptable and feasible to implement and resulted in a 92% referral rate, findings that are consistent with similar studies, which have demonstrated the benefit of default biomarker testing among patients with non-small cell lung cancer.[19,20] However, subsequent scheduling, evaluation, and genetic testing rates were suboptimal. Indeed, a recent randomized controlled trial of a default referral strategy for breast cancer screening similarly failed to demonstrate a significant difference in mammogram completion and instead led to a significantly increased number of canceled referrals among female veterans at a Veterans Affairs medical center.[21] It is well established that a physician's recommendation is the most influential determinant of whether patients receive genetic counseling and testing.[22-24] Although our study's default referral messaging to patients included the names of their oncology team members, it may not have been potent enough to nudge patient decision making compared with a more explicit discussion between a patient and their physician about the rationale, benefits, and drawbacks of genetic testing.

The patients and clinicians who participated in our study's exit interviews identified multiple additional barriers to testing, including competing priorities, perceived financial barriers, and fears about the potential misuse of genetic information, all of which have previously been reported in the literature.[25-29] Clinicians in our study also emphasized additional logistical challenges with contacting patients to schedule their cancer genetics appointments, requiring them

Table 2 Characteristics of patients and clinicians who participated in exit interviews

Characteristic	Patients (n = 10)	Clinicians (n = 10)
Age, median (IQR)	46.0 (45.0-49.0)	46.0 (38.0-54.0)
Gender		
Female	6	4
Male	4	6
Race[a]		
American Indian or Alaskan Native	1	0
Asian	3	1
Black or African American	1	0
White	6	9
Ethnicity		
Hispanic or Latino	1	0
Not Hispanic or Latino	9	10
Family history of colorectal cancer		
No	9	-
Yes	1	-
Highest level of education		
High school graduate	1	-
Some college	1	-
College graduate	3	-
Post-graduate	5	-
Type of health insurance		
Medicaid	1	-
Medicare	1	-
Private purchased by self	1	-
Private through employer or union	7	-
Years in Practice, median (IQR)	-	12.5 (4.0-21.0)
Specialty		
Medical oncology	-	6
Surgical oncology	-	4
Primary practice location		
Academic	-	6
Community	-	4
Number of early-onset CRC patients seen per month		
<5	-	5
5-10	-	3
≥10	-	1
Not able to estimate	-	1

CRC, colorectal cancer; *IQR*, interquartile range.
[a]Race categories were not mutually exclusive.

to attend visits outside of their routine oncology appointments, and asking them to collect and return saliva-based genetic testing kits, which our practice had prioritized at the time of this study because of the COVID-19 pandemic.[30] In recent years, mainstreaming—whereby nongenetics providers facilitate the germline genetic risk evaluation process without the direct involvement of genetic counselors or medical geneticists—has emerged as a promising genetic testing model to address the expanding number of patients for whom genetic testing is now being recommended.[31-36] Leveraging defaults to automatically offer point-of-care testing to patients through a mainstreaming model rather than a separate cancer genetics evaluation may overcome the communication, scheduling, and logistical challenges that we have identified in this study. Furthermore, it may offer a more direct avenue for clinicians to directly engage their patients in discussions about the role of germline genetic risk evaluations in their oncologic care.

Of the patients who ultimately underwent genetic testing in this study, only 4% were found to have a P/LP variant in contrast to a 12% to 15% P/LP rate that has been previously reported in patients with early-onset CRC.[37,38] We hypothesize that this difference was because patients with higher-risk features, such as MMR deficient tumors or positive family histories of cancer, had already been referred to cancer genetics before being screened for our study.[6,8] Our findings highlight ongoing debate about the prevalence of P/LP variants identified using universal vs criteria-based germline genetic testing approaches.[39] As patient eligibility for germline genetic risk evaluations continues to expand, additional research is needed to understand the real-world clinical and economic impact of these rapidly evolving guideline recommendations.

This study had multiple limitations. First, it was conducted in a single health care system among a population that was predominantly non-Hispanic and White and had a high rate of electronic patient portal engagement. As such, our study findings may not be generalizable to other practice settings. Second, our single-arm study design limited our ability to evaluate the true effect of our default genetic referral process. Third, the small nature of this pilot study limited our ability to determine whether certain patient subgroups may have been more or less likely to engage with genetic referrals, scheduling, evaluations, and testing. Fourth, the combined retrospective and prospective identification of eligible patients led to variable time intervals between initial diagnosis and our study's default genetic referral messaging, which may have influenced patients' interest in or willingness to engage in the genetic referral process. Finally, only patients who underwent genetic testing were invited to participate in exit interviews because it was outside the scope of this study to elicit feedback from patients who did not complete the full germline genetic risk evaluation process.

In summary, we found a default genetic referral process to be acceptable, feasible, and associated with a high genetic referral rate for patients with early-onset CRC; however, subsequent scheduling, evaluation, and testing rates were suboptimal. Future work should seek to address the patient, clinician, and system-level barriers that we identified in this study, with a particular focus on the potential role of a mainstreaming genetic testing model to improve the uptake

Table 3 Patient and clinician exit interview findings

Theme	Patient Perspective	Clinician Perspective
Facilitators of germline genetic testing		
Clinician recommendation	"I think if they [my oncologist] hadn't mentioned it, I probably wouldn't have thought of it [genetic testing] or asked for it…Your brain is swimming with so many thoughts around your diagnosis and your treatments, and the concept of getting more information to be better prepared for potential other cancers or to talk to your family about–it didn't even enter my mind…It probably wouldn't have happened if they hadn't recommended it." [Patient 7]	"In a setting where I can sit down and have a conversation with the patient, I can manage their expectations, knowing that they're going to get a call from genetics, knowing what it may mean to them being able to answer questions. It also allows me to counsel them if there's any hesitation or misconception about testing." [Clinician 908, Surgical Oncologist]
Treatment implications	"It just is another tool in the toolbox for the oncology team, if something comes back [on genetic testing], to have treatment work out a little better." [Patient 79]	"Sometimes we get [genetic testing] not just on the tumor, but on the patient themselves, because it may influence what we do from a treatment perspective. For example, surgically, it may influence the amount of colon that I removed based on the germline mutations present in the patient. So there can be implications." [Clinician 901, Surgical Oncologist]
Family implications	"It was – it obviously was to benefit myself, but I also thought it was a very good idea because I do have two siblings, a brother and a sister – one older, one younger. I thought it would benefit them as well if something came back. If there's something of concern in the genetic testing, I could go to them and say, 'Listen, this is what showed up in my DNA, and you need to keep an eye on this.'" [Patient 145]	"Most of the genetic discussions that we have that are broader in an impact have to do with germline testing and what are the implications for their family members and screening guidelines and things like that." [Clinician 905, Surgical Oncologist]
Favorable testing experience	"It was fine. I met with the genetic counselor for half an hour or so beforehand. She went over kind of some more information about it. Then I had the blood test and that was it. It was quick and easy." [Patient 144]	"These patients have a lot of visits…and minimizing treatment-related burden is important. If I can…to do testing on site at the point of care rather than at a separate visit, that is very helpful. Similarly, having it done via telemedicine or kits by mail is the second-choice option." [Clinician 903, Medical Oncologist]
Barriers to germline genetic testing		
Competing priorities	"I think people who are starting out on their cancer journey probably think about it [genetic testing] more than people who are further along in the process…Your whole world is flipped upside down and you're just thinking about everything in the future, whereas once you get into your treatment, you kind of get your stride. You don't have as many things whirling around in your head." [Patient 19]	"Because I'm the oncologist, our visits are focused on management of the treatment part of things and not that I forget necessarily, but [genetic testing]'s not at the forefront of my mind…We just get wrapped up so much in the treatment and our visits are short." [Clinician 907, Medical Oncologist]

(continued)

Table 3 Continued

Theme	Patient Perspective	Clinician Perspective
Distrust	"It [genetic testing] seems like it's a simple procedure, like why is someone being so defensive? But you kind of have to know where someone is coming from to understand the mindset and the why… Initially I had to take a deep breath, because that's initially where I was coming from– a place of, 'Why do you want my DNA?' You already know I have cancer, you already know. And then I was like wait a minute, this is to help me and this is just not information for them, it's also for me as well." [Patient 33]	"A lot of patients are reluctant to get tested, especially in the local community, there is somewhat of a distrust of the medical system and I think that people are worried that we're going to be, I don't know, inserting DNA into them or, finding out deep dark secrets…I don't know what people think genetic testing is about, but there are a lot of misconceptions about what it is." [Clinician 906, Medical Oncologist]
Cost	"I haven't gotten any bills yet. But, I'm assuming that what [the genetic counselor] said is correct. She said that the testing wouldn't cost me more than $100, which is fine. But if she told me it would cost $2,000, I probably wouldn't have looked at it." [Patient 40]	"I think a lot of [patients] are concerned about what their out-of-pocket cost is going to be when they get this testing. It's not something that they're worried about with the referral, but I think it is a barrier for some of them getting the subsequent testing and probably a reason that some of them ultimately don't follow through if they're worried that they're going to have an out-of-pocket cost for the visit or for the genetic testing." [Clinician 902, Medical Oncologist]
Insurance discrimination	-	"I've had several patients ask with the testing, what that would mean for their ability to get health insurance or life insurance…I don't know enough of that to counsel them." [Clinician 908, Surgical Oncologist]
Logistical challenges	-	"Sometimes I'll refer them, genetics will reach out to them, and if they don't reach them, they leave a message and it's sort of left there. I mean, I don't know how many attempts they try, but I'll see one message in [the EHR] that says 'attempted to reach patient, received voicemail, left message to call back' and that's kind of that." [Clinician 907, Medical Oncologist]
Default genetic referral process		
Acceptability[a] - Mean rating 4.6 (SD 0.7) among patients - Mean rating 4.7 (SD 0.6) among clinicians	"I was grateful because it gave a push for me to [get tested] a lot sooner. I used to say, I don't know when I'm going to do it. It could be six months from now, a year from now, or in time I might have forgot about it altogether." [Patient 149]	"I think it's good. I think it makes sure that we at least don't miss people. I think the key is to make sure that we know that it's happening. So, if patients ask us questions about it, we're not like, 'Oh, I didn't realize that you were referred.' Or when they ask about how that came to be, we at least have an understanding about it, because there's nothing that's more disconcerting when your patients who are putting a lot of trust and faith in you, when they ask you questions, and you don't know something about what's going on. That can be very anxiety producing." [Clinician 905, Surgical Oncologist]

(continued)

Table 3 Continued

Theme	Patient Perspective	Clinician Perspective
Feasibility[a] - Mean rating 4.9 (SD 0.5) among patients - Mean rating 4.8 (SD 0.4) among clinicians	"Our mind was very focused on treatments and recoveries and so forth…I definitely would not have thought of [genetic testing]. My husband didn't think of it. My sister who went through cancer with my mother and my father, she didn't ask that question. I just don't think people think of it. And so, if it can be an automatic recommendation that's an easy process for the doctors to advance, then I do think it's very beneficial." [Patient 7]	"I think that certainly it's fine. It works. I think the thing that makes it work the best is sort of follow through, in that someone is making sure that patients get established [with genetics], rather than me trying to remember whether they actually got there or not. So, I think it's not so much placing the referral. It's the follow through to make sure that the patient then went to a visit and testing." [Clinician 902, Medical Oncologist]

SD, standard deviation.
[a]Assessed on a 5-point Likert scale, with higher scores indicating higher acceptability and feasibility.

of germline genetic risk evaluations for patients with early-onset CRC.

Data Availability

The data that support the findings in this article are available on request from the corresponding author, K.S.L.-M.

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Author Contributions

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Ethics Declaration

This study was approved by the University of Pennsylvania Institutional Review Board with a waiver of informed consent for main study participation. Verbal informed consent was obtained from all exit interview participants.

Conflict of Interest

Kelsey S. Lau-Min has received honoraria from Wiley and has an immediate family member who is employed by and owns stock in GlaxoSmithKline. Danielle B. McKenna has received personal fees from Nest Genomics for serving as a scientific consultant. Katharine A. Rendle has received grants from Pfizer and AstraZeneca paid to her institution, personal fees from Merck for serving as a scientific consultant, and honoraria and travel paid as an invited speaker from MJH Life Sciences all outside of the submitted work. Katherine L. Nathanson has served on an advisory board for Merck within the past 2 years. All remaining authors declare no conflicts of interest.

Additional Information

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