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Impact of financial incentives on electronic health record-driven recruitment of underrepresented communities in research: randomized controlled trial

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Impact of financial incentives on electronic health record-driven recruitment of underrepresented communities in research: randomized controlled trial

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Abstract

Background: Disparities in electronic health record (EHR) portal use exist. Thus, EHR-driven recruitment for research may exacerbate underrepresentation.

Objective: In this study, we evaluated whether a financial incentive improved response rates to recruitment messages in an equitable fashion.

Methods: A random sample of 1,200 patients with diagnoses of either breast, colorectal, prostate, or lung cancer received a recruitment message for a fictitious cross-sectional survey study, “The Social Aspects of Cancer Care” via their EHR portal. Two strata of patients were sampled, those who identify as non-Hispanic White (n = 600) and those with another race or ethnicity (n = 600) and randomized to receive an offer of a $20 monetary incentive (n=400) or no incentive (n=800).

Results: Overall, 39% of participants viewed the recruitment message and 13% responded that they were interested. Response rates were higher ($p < 0.001$) among non-Hispanic White patients (18%) than for African American or Black (7%) and members of other racial/ethnic groups (13%). No differences were observed in the response rate for the incentive cohort compared to no incentive (15% vs. 12%, $p = 0.206$).

Conclusions: Cancer patients who identify as a racial and ethnic minority were less likely to view and respond to recruitment messages for research studies through their EHR patient portal. The impact of a $20 financial incentive did not significantly impact patient participation.

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Title: Impact of financial incentives on electronic health record-driven recruitment of underrepresented communities in research: randomized controlled trial

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Ethical Considerations: This study was approved and supervised by the Washington University Human Research Protection office. As participation was deemed to be minimal risk and obtaining informed consent would have biased study results, a waiver of consent was granted.

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Abstract

Background: Disparities in electronic health record (EHR) portal use exist. Thus, EHR-driven recruitment for research may exacerbate underrepresentation. Objective: In this study, we evaluated whether a financial incentive improved response rates to recruitment messages in an equitable fashion. Methods: A random sample of 1,200 patients with diagnoses of either breast, colorectal, prostate, or lung cancer received a recruitment message for a fictitious cross-sectional survey study, “The Social Aspects of Cancer Care” via their EHR portal. Two strata of patients were sampled, those who identify as non-Hispanic White (n = 600) and those with another race or ethnicity (n = 600) and randomized to receive an offer of a $20 monetary incentive (n=400) or no incentive (n=800). Results: Overall, 39% of participants viewed the recruitment message and 13% responded that they were interested. Response rates were higher ($p < 0.001$) among non-Hispanic White patients (18%) than for African American or Black (7%) and members of other racial/ethnic groups (13%). No differences were observed in the response rate for the incentive cohort compared to no incentive (15% vs. 12%, $p = 0.206$). Conclusions: Cancer patients who identify as a racial and ethnic minority were less likely to view and respond to recruitment messages for research studies through their EHR patient portal. The impact of a $20 financial incentive did not significantly impact patient participation.

Keywords: Minority groups; electronic health records; research participation; patient portals; cancer

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Introduction

Progress in clinical research relies on effective recruitment to ensure adequate sample sizes and generalizability. Conventional recruitment strategies, such as mail/phone contact or in-person recruitment with coordinators, are costly, and time-intensive, which limits scalability. Electronic health record (EHR)–based recruitment strategies have emerged as scalable tools to identify and contact eligible patients asynchronously.

Prior studies have used EHR portals for diverse interventions, including improving uptake for preventative screening[1], vaccination reminders[2–4], and research participant recruitment[5]. These studies have also demonstrated that using EHR portals is a cost-effective, easy to implement method of recruiting patients[5].

However, EHR-based recruitment strategies may exacerbate the well-documented disparities in clinical research participation[6]. There is evidence which suggests that disparities exist in patient virtual care and portal use by age, race, and socioeconomic status[7–10]. Few studies of EHR-based recruitment strategies have compared the recruited patient sample to the overall population. Moreover, it is still unclear if disparities in clinical trial participation based on race exist with EHR-based recruitment strategies. Some studies have reported that Black patients are equally likely to participate when asked, and underrepresentation stems from lower access to research[11]. Other recent studies have found that Asian and Hispanic patients are less likely to view recruitment messages, but Black and male patients are less likely to actually participate[12]. Thus, whether EHR-based recruitment is an aggravator of or solution to disparities in underrepresentation of these groups is still unknown.

Financial incentives are another strategy that have been shown to improve research participation[13]. Previous studies found that financial incentives can improve response rates by a median of 12%[14], with the highest impact observed with direct monetary incentives[15]. However, their role in enhancing representativeness of participant samples, particularly for EHR-driven studies, remains uncertain[14.]

This study aimed to evaluate the effect of race and financial incentives on engagement with EHR portal recruitment messages among cancer patients and survivors. We hypothesized that (1) minority patients would be less likely to view and respond to recruitment messages and (2) a $20 incentive would improve engagement, particularly among minority patients.

Methods

Study Design and Participants

This randomized controlled study was conducted at the Siteman Cancer Center (SCC) under Protocol no. 202402076 through the Hope Foundation Pilot Grant. The SCC is a National Cancer Institute-Designated Comprehensive Cancer Center that serves a geographically diverse catchment area, spanning across eastern Missouri and western Illinois. Approximately 22% of SCC's catchment identifies as a racial and ethnic minority[16].

Eligible participants were defined as adults (≥18 years of age) with a diagnosis of breast, colorectal, lung, or prostate cancer documented in the EHR. Only patients with active EHR portal accounts as of July 2024 and at least one clinic visit with either a medical or radiation oncologist within the prior 60 days were included.

We identified 5,302 eligible patients, of which 4,399 identified as non-Hispanic white and 903 identified as racial/ethnic minority (African American/Black, Hispanic, Asian, Other/Unknown). From each race/ethnicity stratum, 600 patients were randomly selected. The purpose of oversampling patients who identify as a racial and ethnic minority was to ensure an effect size, if it existed, could be observed between the two groups. Within each stratum, patients were randomized 2:1 to receive either no incentive (n=800) or a $20 incentive (n=400) along with the recruitment message.

Intervention

Patients received a standardized EHR portal message inviting them to participate in a fictitious cross-sectional survey-based non-interventional study, “The Social Aspects of Cancer Care.” Patients received an email notifying them of the invitation, and an alert was displayed on their landing page when they logged in to their EHR portal. Portal messages included details about the voluntary nature of participation, estimated survey duration, and incentive (if applicable). All respondents who responded by clicking a button within the message stating, “I’m interested”, were subsequently debriefed about the sham nature of the study and provided the $20 incentive regardless of incentive group assignment. No additional data were collected from the patients who clicked on the link. Images of the email notification and portal alert can be found in the appendix (Supplemental Figure 1).

Outcomes

The primary outcomes included message view rate, which was defined as the proportion of patients who opened the message in their patient portal, and message response rate, which was defined as the proportion of patients responding to the message by clicking the “I’m interested” button embedded in the message. The secondary analyses examined demographic factors associated with engagement, as well as the potential impact of incentive on the primary outcomes.

Statistical Analysis

Descriptive and bivariate statistics were used to compare demographic characteristics by incentive and race groups. The primary endpoints were compared using Fisher’s Exact Tests. Multivariable logistic regression was also used to evaluate the independent associations between race, incentive, age, sex, and response outcomes. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were reported. Statistical significance was defined as $p<0.050$. Analyses were conducted using SAS Enterprise Guide 8.3 (Cary, NC).

Power and Sample Size Considerations

Based on a priori power calculations, we estimated that a sample size of 400 patients in the incentive cohort and 800 in the control would allow us to determine if there is >10% increase in response rate between each incentive level, compared to no incentives, with 80% power at one-sided 0.05 alpha, assuming an about 10% response rate in the control cohort.

Ethical Considerations

This study was approved and supervised by the Washington University Human Research Protection office. As participation was deemed to be minimal risk and obtaining informed consent would have biased study results, a waiver of consent was granted.

Results

Participant Characteristics

A total of 1,200 patients were randomized to receive a recruitment message through the EHR portal. The mean age was 65.7 years (SD 12.3), and 54% were female. Half of the cohort (50%) identified as non-Hispanic White, while 38% identified as African American or Black, and 12% as other or unknown race/ethnicity. The most common cancer diagnosis was breast at 31% of all patients. Prostate, lung, and colorectal cancer represented 28%, 25%, and 16% of patients, respectively. There were no statistically significant differences in age, sex, cancer type, or race distribution between incentive groups (all $p > 0.050$). Table 1 provides detailed demographic characteristics on study participants.

Table 1. Participant Characteristics

	Cohort	No Incentive	$20 Incentive	P
Age (Mean, SD)	65.7 (12.3)	65.7 (12.0)	65.7 (12.9)	0.989
Younger than 65	40%	41%	39%	0.453
65 and older	60%	59%	62%	
Race				
Non-Hispanic White	50%	50%	50%	0.831
African American / Black	38%	38%	39%	
Other/Unknown	12%	12%	11%	
Sex				
Male	46%	49%	42%	0.027
Female	54%	52%	58%	
Cancer Type				
Breast	31%	31%	31%	0.630
	16%	17%	15%	

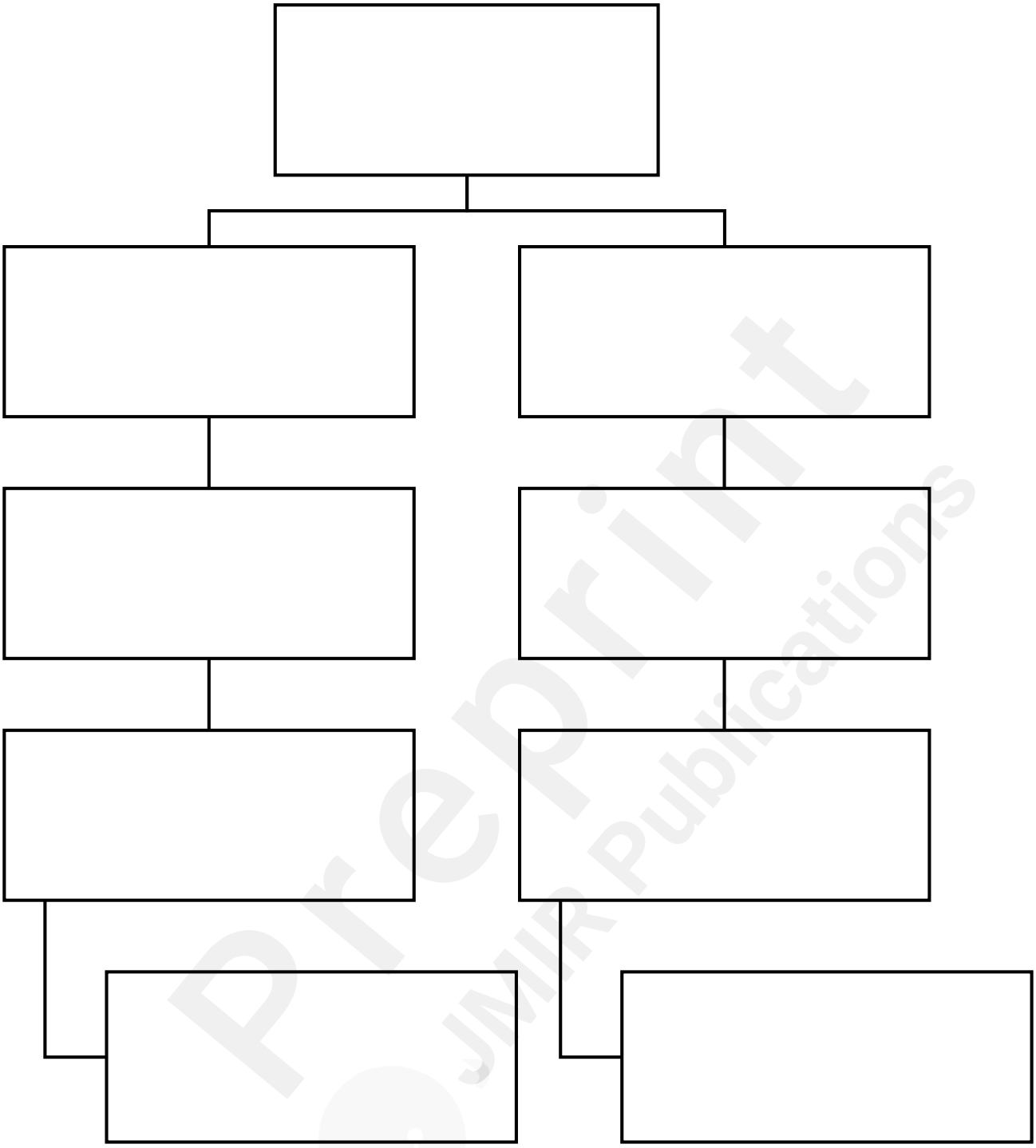
Colorectal Lung Prostate	25% 28%	24% 29%	27% 28%	

Participant Flow

Figure 1 shows the participant flow diagram. Message delivery was successful for 1,174 of 1,200 participants (98%). Unsuccessful deliveries were due to patient deaths (n=23) or changes in account settings between participant identification and message send (n=3). Overall, 471 patients (39%) viewed the recruitment message, and 159 patients (13%) responded by clicking the “I’m interested” button embedded in the message. Among those who viewed the message, the conditional response rate was 34%.

Figure 1. Participant Flow

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Relationship between Demographics and Response Rates

Table 2 details the results of our multivariable analyses on the effects of sex, race, and age on the primary outcome measures. Race was strongly associated with response to the recruitment message. Response rates were significantly higher ($p < 0.001$) among non-Hispanic White patients (18%) than for non-White participants (10%). Amongst non-White participants, African American or Black (7%) participants had lower response rates than members of other racial/ethnic groups (13%; $p = 0.021$). This finding was consistent for patients who did not receive an offer of an incentive (18% compared to 9% and 10%; $p <0.001$) and for those who did (19% compared to 9% and 20%; $p = 0.028$). In multivariable logistic regression adjusting for age, sex, and incentive assignment, minority patients had significantly lower odds of viewing the message (aOR 0.39; 95% CI, 0.31–0.50; $p < 0.001$) and responding (aOR 0.38; 95% CI, 0.27–0.55; $p < 0.001$). Among patients who opened the message, the

conditional response rate remained significantly higher among non-Hispanic White patients compared to minority patients (40% vs. 22%; p < 0.001).

Older patients (≥65 years) were less likely to view the recruitment message (34% vs. 48%; p = 0.001) and respond (10% vs. 17%; p = 0.002). In multivariable models, older age remained associated with lower odds of message viewing (aOR 0.66; 95% CI, 0.52–0.85; p = 0.001). Sex was not significantly associated with viewing the message nor response outcomes.

Table 2. Multivariable Analysis of Factors Impacting Patient Response

	Message Viewed (471 of 1200)		Responded (159 of 1200)		Responded (159 of the 471 who viewed)	
	aOR (95% CI)	P	aOR (95% CI)	P	aOR (95% CI)	P
Incentive 0 $20	REF 1.07 (0.88-1.78)	0.989	REF 1.25 (0.88-1.78)	0.211	REF 1.31 (0.87-1.96)	0.198
Race Not-Hispanic White Other	REF 0.39 (0.31-0.50)	<0.001	REF 0.38 (0.27-0.55)	<0.001	REF 0.64 (0.42-0.97)	0.036
Age Less than 65 65 and older	REF 0.66 (0.52-0.85)	0.001	REF 0.57 (0.40-0.81)	0.002	REF 0.68 (0.45-1.02)	0.059
Sex Female Male	REF 0.91 (0.71-1.16)	0.448	REF 0.79 (0.55-1.12)	0.186	REF 0.80 (0.53-1.20)	0.283

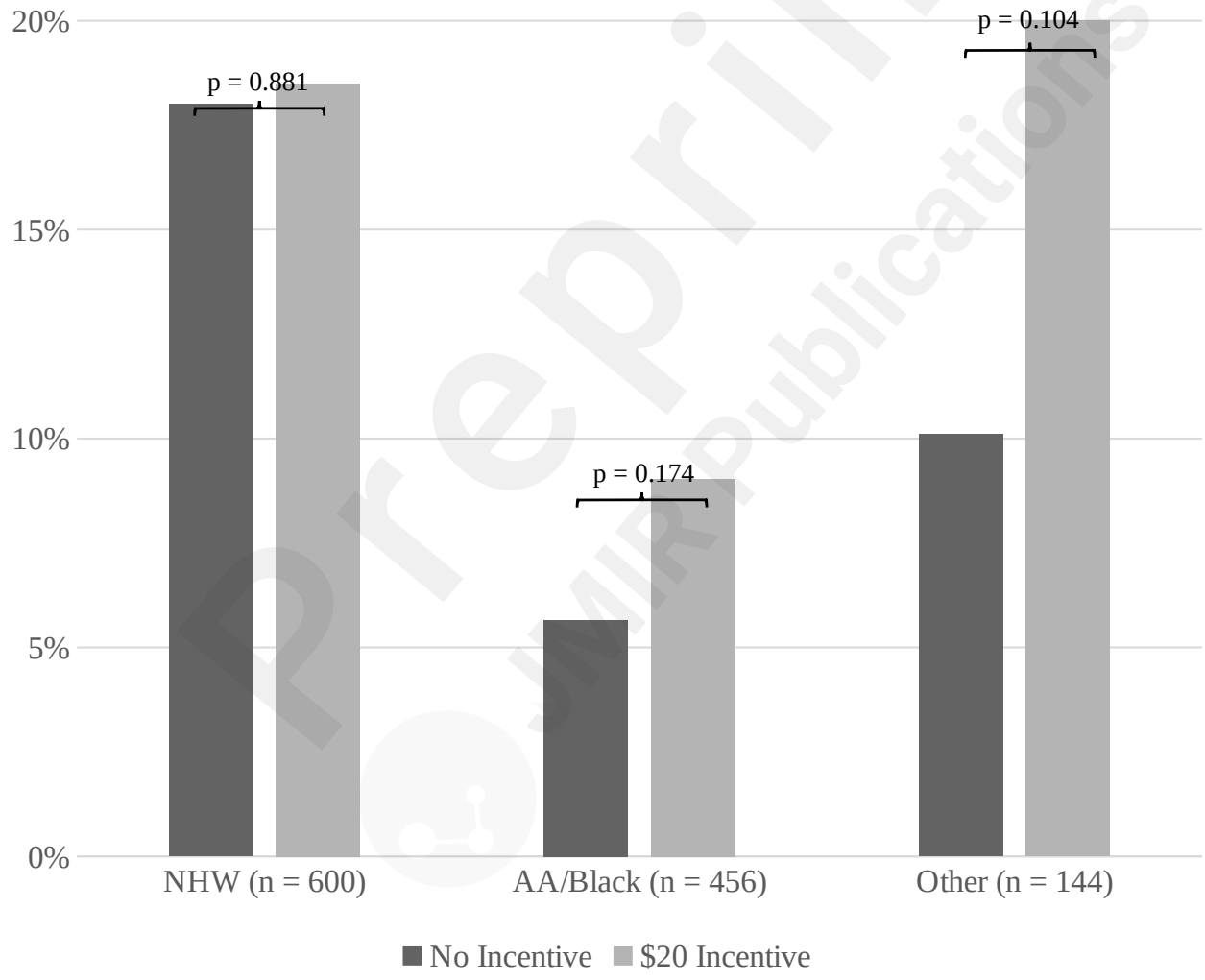
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Effect of Incentives

Offering a $20 incentive modestly increased the overall response rate (15% vs. 12% in the no-incentive group), but this difference was not statistically significant (p=0.206) (Figure 2). Among patients who viewed the message, the response rate was similar across incentive groups (37% vs. 32% in the no-incentive group, p=0.198).

Exploratory subgroup analyses examined whether the incentive effect differed by race. Among racial and ethnic minority patients, the response rate increased from 7% in the no-incentive group to 13% in the incentive group. Among non-Hispanic White patients, the response rate was similar at 18% in the no-incentive group to 19% in the incentive group. However, there was not a statistically significant interaction between race and incentive assignment (interaction p = 0.129).

Figure 2. Response Rate by Race and Incentive



NHW = non-Hispanic White, AA = African American

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Discussion

We performed a randomized trial to examine the impact of EHR-based clinical trial recruitment with financial incentives on improving equitable representation in cancer research. We found that even amongst cancer patients and survivors who have active patient portal accounts, those who identified as racial and/or ethnic minorities were less likely to view and respond to recruitment messages for research studies, as we hypothesized. The results indicate that EHR-based recruitment may exacerbate disparities in research participation.

Asynchronous portal recruitment does not address previously identified barriers to participation amongst racial and ethnic minorities, such as mistrust, low health literacy, or logistical challenges to enrollment, such as transportation[17,18]. Other mechanisms of recruitment which specifically target these are needed. These additional interventions are needed as lack of diversity in clinical research limits the generalizability of trial results[6]. Unfortunately, representation in research has only worsened over time in both industry funded and academic center-sponsored trials[19]. The current study suggests they may continue to worsen if EHR-recruitment strategies are expanded.

In this study, we also found the impact of the $20 incentive on response rates was modest, suggesting that small, monetary incentives are insufficient to meaningfully improve recruitment. While there was a trend toward greater improvement in response rates among patients of other racial and ethnic backgrounds (increasing from 8% to 20% with the incentive), this did not reach significance in our sample (p=0.129). However, this suggests that incentives may have differential effects depending on cultural context, perceived relevance of the study, or financial burden among underrepresented populations. Larger incentive amounts or more targeted financial incentives could potentially be more effective in mitigating barriers to participation, such as incentives directly tied to transportation difficulties or food insecurity.

This study also suggests that an EHR-based recruitment approach may be unsuccessful for older populations. Our findings demonstrated an impact of age on patient response, even among patients with active user accounts. The mean age of included participants was 65.7 years of age, and our results may have been skewed by this older patient base. It is possible that patient portal recruitment could have been more successful if performed in a younger, and likely more technologically adept, population. This is in line with prior literature which has indicated that technological comfort and access decrease with age[20]. Recruitment for disease conditions that predominantly exist in older populations will likely need to employ alternate recruitment strategies given this reduced comfort with technology.

This study has a few limitations. The single-center design may limit the generalizability of our findings when extrapolated to other populations as the demographic of patients in our catchment area is not necessarily representative of all U.S. hospitals. Additionally, we specifically selected for patients with active portal accounts. We have previously reported that patients who identify as a racial or ethnic minority are less likely to have a patient portal account[9]. Therefore, the current study likely underestimates disparities in EHR-based recruitment.

While this study specifically focused on patients with a history of cancer, these findings may be generalizable beyond this patient population. Prior research has demonstrated that while cancer patients are equally as likely to enroll in clinical trials as the average U.S. adult[21–23], they are less likely to have active patient portal accounts compared with the average U.S. adult[24,25]. However, as our study only included patients with active portals, the findings related to disparities in response are

likely generalizable to other groups. This study contributes important evidence that EHR-based recruitment with or without modest financial incentives do not meaningfully reduce disparities in study enrollment, although our study suggests that the EHR could facilitate targeted recruitment of specific populations, including underrepresented communities.

Although our study focused on using patient portals for trial recruitment, these results may also suggest similar limitations when adapting the patient portal for other use cases, such as behavioral interventions[26], telerehabilitation[27], or screening alerts[3]. Ultimately, we suspect similar dynamics in message opens and patient response will persist in other clinically adjacent contexts. We recommend that future work should investigate larger or targeted incentives, personalized outreach, and community-engaged recruitment and outreach approaches to enhance diversity and inclusion in both clinical research and therapy.

Conclusions

In this randomized study, we found that patients with a history of cancer who identify as racial and ethnic minorities were significantly less likely to view or respond to EHR portal–based research invitations. These findings reinforce longstanding concerns that digital tools alone, particularly those reliant on patient portals, may inadvertently perpetuate or even exacerbate inequities in clinical trial participation. More robust, culturally sensitive, and community-engaged approaches are needed to foster trust and facilitate participation with these populations. A small financial incentive only slightly increased overall response rates and did not meaningfully improve equity in research participation in a survey-based study. Future research should focus on identifying and testing scalable, equity-focused recruitment models that balance efficiency with inclusivity, ensuring that all patients have a fair opportunity to contribute to and benefit from scientific progress.

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