Pathways to Precision Cancer Care: Integrating Genetic Services into a Nationwide, Risk-Adjusted Cancer Program

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Introduction

Some common cancers are driven by hereditary risk factors, and clear guidance exists to inform risk-adjusted screening protocols for high-risk individuals. However, primary care providers may not always have the time, resources, or specialized training needed to identify key personal or family history indicators, to navigate genetic testing, or to develop personalized cancer screening plans.[1]

Here, we describe a model for a fully-supported, risk-informed approach to cancer screening and detection: the Color Virtual Cancer Clinic (VCC). The VCC integrates personal and family history evaluation, genetic testing, genetic counseling, risk-adjusted screening plans, active support for screening gap closure, and rapid follow-up for high-risk screening results. The program is offered as a health-care benefit by self-insured employers, labor unions to their members, and payers to their members.

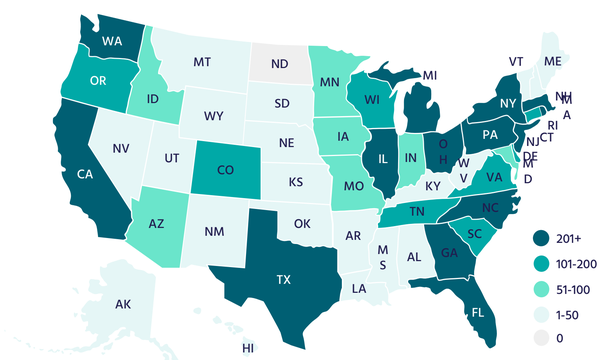
Below we detail the program implementation and the genetics-related health outcomes of the first 8617 program participants.

Table 1. Participant demographics

		All n (%)	Completed Genetic Testing	Positive Genetic Finding
Total		8617	2331	107
Sex assigned at birth	Female	4993 (57.9%)	1447 (62.1%)	65 (60.7%)
	Male	3624 (42.1%)	884 (37.9%)	42 (39.3%)
Age	18-29	1161 (13.5%)	326 (14.0%)	17 (15.9%)
	30-39	2625 (30.5%)	764 (32.8%)	29 (27.1%)
	40-49	2253 (26.1%)	643 (27.6%)	30 (28.0%)
	50-59	1741 (20.2%)	414 (17.8%)	20 (18.7%)
	60+	837 (9.7%)	185 (8.0%)	11 (10.3%)
Race/Ethnicity (self-reported)	Asian	753 (8.7%)	157 (6.7%)	6 (5.6%)
	Black	455 (5.3%)	91 (3.9%)	1 (0.9%)
	Hispanic	937 (10.9%)	246 (10.6%)	8 (7.5%)
	Multiethnic	268 (3.1%)	85 (3.6%)	2 (1.9%)
	AI/AN	12 (0.1%)	1 (0.0%)	0 (0.0%)
	Native Hawaiian or Pacific Islander	10 (0.1%)	4 (0.2%)	0 (0.0%)
	Unknown	916 (10.6%)	78 (3.3%)	2 (1.9%)
	White	5266 (61.1%)	1669 (71.6%)	88 (82.2%)

Of the 8,617 total participants, 2,331 (27.1%) completed genetic testing, which yielded a 4.6% positive rate (107) .

Figure 5. Nationwide reach



50 state medical group supports patients nationwide. In this study, patients were located in 49 states, the District of Columbia, and Puerto Rico, with the highest concentration in California and Pennsylvania.

Methods

Participants self-selected into Color's VCC, offered as a part of their employer-sponsored healthcare. They provided personal and family history through an online platform or in conversation with a Color Medical physician or genetic counselor. Patients who met NCCN testing criteria, or who were enrolled in a population-wide genetics program, were provided at-home clinical genetic testing for 29 genes associated with common hereditary cancers. Positive results were returned by a genetic counselor, who immediately provided an NCCN-informed, risk-adjusted cancer screening plan. Consultations were also optionally available to patients with negative genetic test results.

Cancer screening gaps were identified, and patients were directly supported in addressing those screening gaps through at-home testing (i.e. PSA testing for prostate cancer) or by ordering and scheduling support for in-person evaluations (i.e. mammograms or breast MRIs for breast cancer or colonoscopies for colorectal cancer). Care advocacy and telemedicine consultations were provided to make appointments and support patients in keeping them, and to provide appropriate follow-up for positive cancer screening results.

Results

Figure 1. Program process

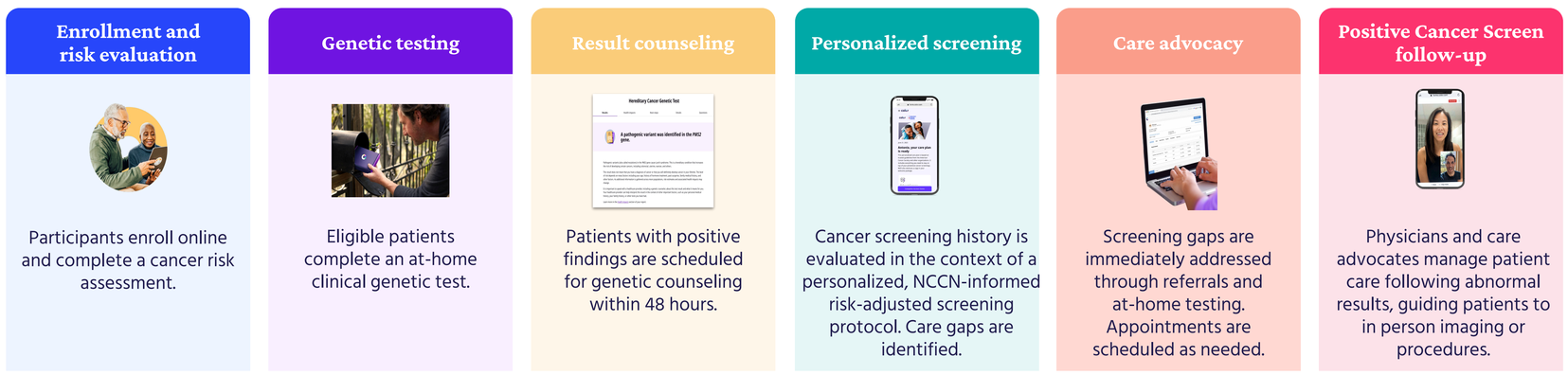
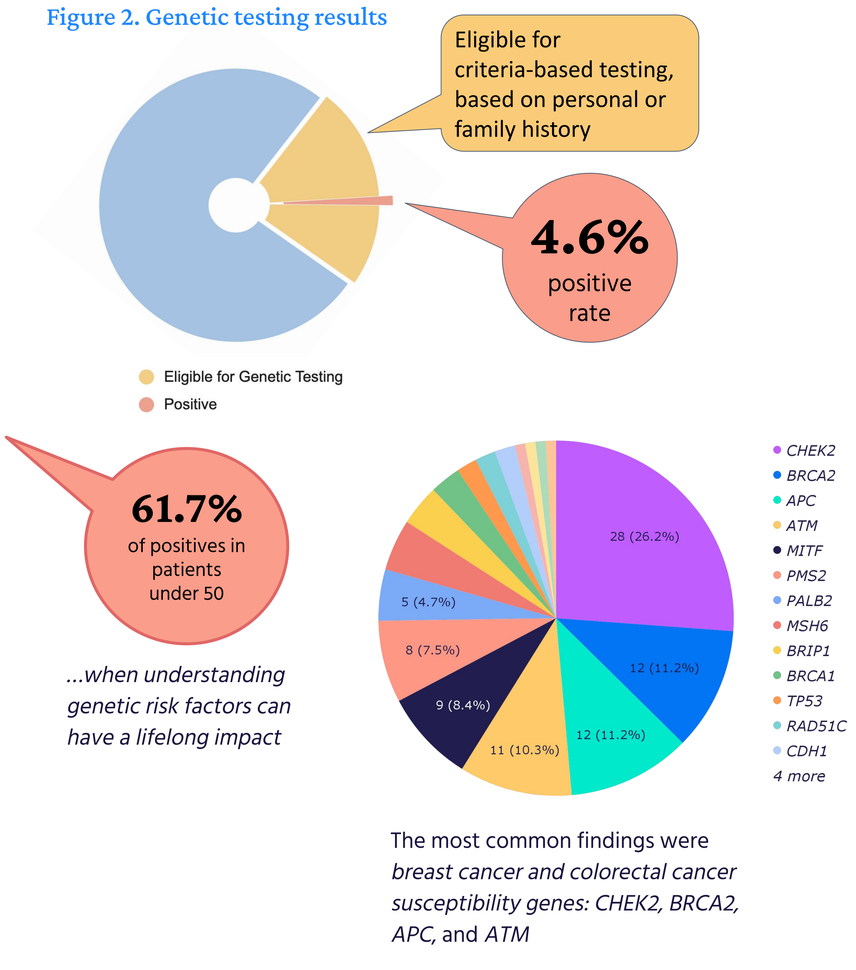
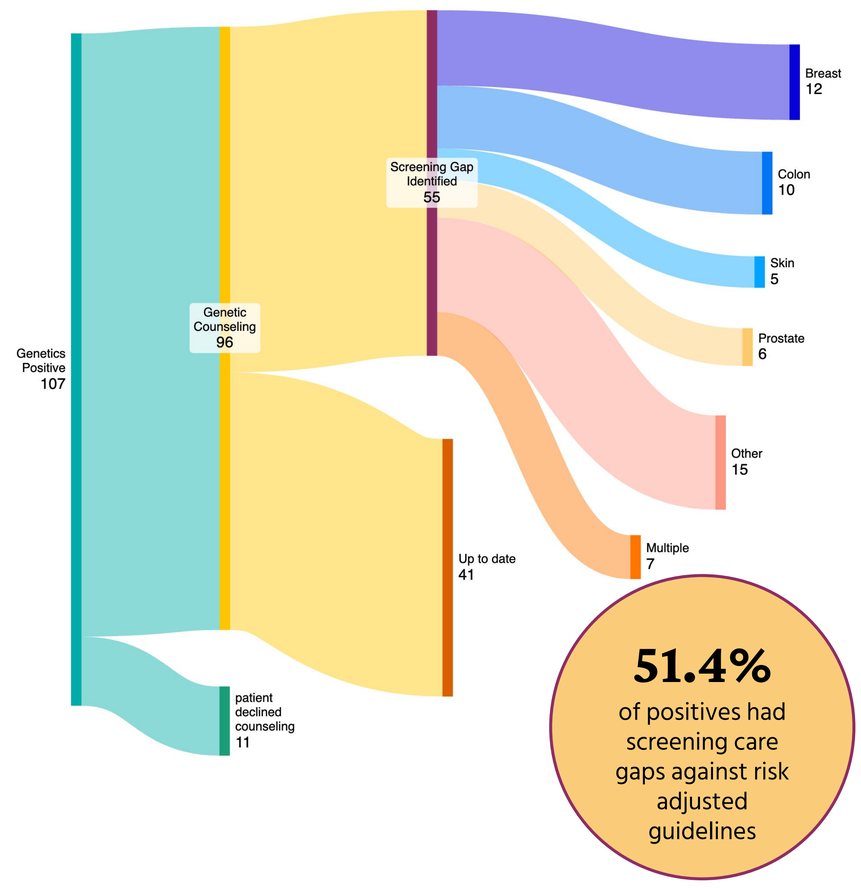


Figure 2. Genetic testing results



The most common findings were *breast cancer and colorectal cancer susceptibility genes: CHEK2, BRCA2, APC*, and *ATM*

Figure 3. Screening Gaps identified in Genetics positive patients



NCCN guidelines recommend risk-adjusted screening for individuals with positive findings in cancer susceptibility genes, often involving alternate screening technologies (i.e. breast MRI vs mammograms) and an earlier or more frequent screening intervals. Among 96 participants with positive genetic test results who completed a risk consult, 55 (57.3%) had gaps in their personalized, guidelines-based cancer screening plans. These included outstanding needs for colonoscopies, breast imaging, PSA testing, dermatology consults and others. The care team helped schedule screenings or consults for 28 of these patients (58.3%), including 4 mammograms, 10 breast MRIs, 8 colonoscopies, 4 upper endoscopies, and 5 at-home PSA tests. Additionally, 13 referrals were made to local high-risk specialists including breast and gynecologic surgeons, dermatologists, gastroenterologists, and genetics clinics. All participants received counseling and a written, multi-year genetics-informed cancer screening plan (Figure 4). 19 individuals chose to pursue follow-up independently, and one declined the recommended screening.

Figure 4. Genetics-informed cancer screening plan

Conclusions

Taken together, these data suggest that a virtual, personalized cancer management model enables broad access to risk assessment and follow-up care. Integrating genetics into a cancer clinic enables a novel access point to comprehensive cancer risk assessment. The participant support services made available through this clinic – namely, genetic counselors, physicians, and care advocates – can help minimize health system burden and expedite risk-adjusted cancer screening and prevention for patients.

- Through this program to date, about one quarter of participants (27.1%) were eligible for and completed genetic testing, and about 4.6% received a positive genetic test result that could inform their cancer screening plans and care management.
- About half of participants (51.4%) with positive genetic findings had gaps in their genetics-informed cancer screening, highlighting the need for personalized risk assessment and education. Participants were able to pursue follow-up testing independently or through the clinic care team who helped to schedule screenings or consults.

References

1. Dusic EJ et. al. Barriers, interventions, and recommendations: Improving the genetic testing landscape. *Front Digit Health.* 2022 Nov 1:4:961128.

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