

# An Evaluation of An Extension for Community Healthcare Outcomes (ECHO) Intervention in Cancer Prevention and Survivorship Care

**Zheng Milgrom**

Indiana University Richard M. Fairbanks School of Public Health

**Tyler Severance**

Indiana University School of Medicine

**Caitlin Scanlon**

Riley Hospital for Children

**Any'e Carson**

Indiana University Richard M. Fairbanks School of Public Health

**Andrea Janota**

Indiana University Richard M. Fairbanks School of Public Health

**Terry Vik**

Indiana University School of Medicine

**Joan Duwve**

Kansas Department of Health and Environment

**Brian Dixon**

Indiana University Richard M. Fairbanks School of Public Health

**Eneida Mendonca** (✉ [emendonc@iu.edu](mailto:emendonc@iu.edu))

Indiana University School of Medicine

---

## Research Article

**Keywords:** Telemedicine, Education, Continuing, Population Health, Cancer Control, Evaluation

**Posted Date:** November 19th, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-1065059/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

To address the increasing cancer burden in Indiana, a telementoring program using the Extension for Community Healthcare Outcomes (ECHO) model focusing on cancer prevention, screening, and survivorship care, was deployed in September 2019 to guide best-practice care to primary care providers (PCPs). We utilized Moore's Evaluation Framework for Continuing Medical Education to evaluate the program's educational outcomes. We collected 22 semi-structured interviews and 30 anonymous one-time surveys from the program participants (hub and spoke members) and the target audience. During the first year, there was an average of 12 non-PCP professionals and 2.5 PCPs come to each session. In spite of a relatively low PCP participation, the program overall received very positive satisfaction and feedback of their improvement in knowledge, confidence and practice. There are three features that both program participants and target audience valued in the Cancer ECHO: a conversational format, gaining real-life experiences, and support from a professional interdisciplinary community. Our study also discovered the PCP's resistance to didactics focused on prevention and screening, their preference on case discussion part about survivorship care but they do not have enough cases to present. Our study showed that the Cancer ECHO program could be an effective educational means in improving the cancer control capacity, especially to the PCPs. The program strengths suggested a unique role of the ECHO model among the existing physician-targeting cancer control interventions. A further study is warranted to explain the discrepancy between the program's strengths and a relatively low PCP adoption.

## Introduction

It is estimated that two in five Indiana residents will be diagnosed with cancer in their lifetime.<sup>1-3</sup> With ongoing efforts to provide community resources and expand care coverage for cancer screening and prevention, especially for tobacco cessation and breast and cervical cancers, cancer incidence has been gradually decreasing in Indiana. However, cancer is still the second leading cause of death in Indiana.<sup>3</sup> At the same time, the population of cancer survivors in Indiana continues to grow from a total of 298,425 in 2015.<sup>3</sup> It was estimated that \$2.76 billion would be spent on the cancer care related direct costs.<sup>4</sup> Cancer burden remains a significant issue that requires a collective effort.<sup>1</sup> Previous studies found a recommendation from a patient's physician to be the primary influence factor on whether a patient is screened for cancers.<sup>5-7</sup> Whereas, primary care providers (PCP), including physicians and advance practitioners, face various challenges to provide primary prevention of cancer. Their barriers involved lacking adequate resources to keep up to date with emerging evidence and a dynamically changing set of available community resources, and experiencing the highest burnout rate among physicians.<sup>8,9</sup> Educating Indiana's healthcare workforce to implement evidence-based strategies and convening a multi-sectored discussion on cancer-related challenges arose to be two priorities of the Indiana Cancer Consortium.<sup>1</sup>

To date, 52 institutions globally and 34 institutions in the United States have adopted the Extension for Community Healthcare Outcomes (ECHO®) model to provide remote cancer-related education.<sup>10</sup> The

ECHO model is a telementoring intervention design that connects the frontline healthcare workers from various locations (“Spokes”) with experts at an academic center (“Hub”) at regularly scheduled times. The “Hub” experts facilitate and guide the “Spokes” frontline participants through two capacity-building components in each session: Hub-led didactics on the curriculum topics and Spoke-led case discussions regarding de-identified patient cases. The first ECHO program, which focused on the care of patients with Hepatitis C, successfully demonstrated that Hepatitis C care delivered by ECHO-trained rural physicians was equally effective as that given at the University of New Mexico.<sup>11</sup> Early evidence of the feasibility of the ECHO model as a cost-effective intervention on specific cancers in the United States and on general cancer-related topics overseas are emerging.<sup>12–15</sup> To educate statewide PCPs and connect them with the resources in the Indiana Cancer Consortium and Fairbanks School of Public Health as well as their partnerships, the multi-point teleconferencing technology in the ECHO model makes it possible to move the collaborative support within the reach of PCPs and to have a continuous statewide conversation on the cancer-related challenges.

In September 2019, the Indiana Cancer Consortium collaborated with the Richard M. Fairbanks School of Public Health, Indiana University Purdue University at Indianapolis (IUPUI) ECHO Center and launched the Cancer Screening, Prevention, and Survivorship ECHO (Cancer ECHO) program. Our study objective is to evaluate the outcomes of the Cancer ECHO program, explore the mechanisms that contribute to and limit the effectiveness of ECHO model in the context of reducing the general statewide cancer burden in the United States and determine if the program achieves its intended role in cancer control, based on the opinions of participants.

## Methods

This study used a mixed-method approach. To evaluate the learning outcomes, we adopted the Moore’s Evaluation Framework for Continuing Medical Education.<sup>16</sup> Moore’s framework is a 7-level pyramid model that is used to assess the outcomes of continuing education activities for clinicians. In our study, we assessed the first five levels in Moore’s framework, including program participation (Level 1), satisfaction (Level 2), the program’s impact on knowledge (Level 3), confidence (Level 4), and professional practice (Level 5). We also measured the program’s additional impact on professional burnout, with the two single-item measures on burnout (emotional exhaustion and sensitivity to patients’ feelings) which are adapted from the full Maslach Burnout Inventory (MBI).<sup>17–19</sup>

This study was approved by IU Institutional Review Board. We analyzed the administrative data from the IUPUI ECHO Center to determine the program participation (Level 1). We collected 22 semi-structured interviews and 30 anonymous one-time surveys with questions developed from Moore’s framework and two single-items of MBI. In an attempt to have a more comprehensive understanding of applying the ECHO model to the specific context of cancer control, we recruited across the Spokes members who have at least attended the program once, the Hub team, and the Potential Spokes (PS) that are aware of the Cancer ECHO program but never participated in a live session. The PSs are recruited from the registrants

of the Cancer ECHO program and the participants of the Indiana University (IU) PCP-targeting ECHO programs on other topics.

In the survey, we sought to compare the self-rated changes on Likert scales between the program Spokes' from any source, including the Cancer ECHO, with the PS's from other routine sources during the first-year implementation period of the Cancer ECHO program. Due to the broad types of the actual Spokes' professions, we recruited both PCPs and non-PCPs in the PS group accordingly as a control to answer the survey. (see Additional file 1) In the interview, we aimed to first deductively analyze the program impact on the actual Spokes, which include PCPs and non-PCPs. To explore the mechanisms that contribute to and limit the program effectiveness, we also analyzed the qualitative data in an inductive manner and compared the perspectives of the actual Spokes' and the program's target audience. Thus, we recruited the PS interviewees with a focus on the target audience, PCPs. (see Additional file 1) The Spoke and PS groups were selected based on purposeful sampling and recruited dynamically. We used this approach to mitigate the limitations from the roles of the study population and to triangulate the quantitative and qualitative data from different roles.

The data was collected between May 2020 and September 2020. \$10-40 incentives were provided to study participants to promote recruitment during the pandemic. The survey was administered through Qualtrics and analyzed on SPSS. The interviews took place via the internet and telephone. A single independent researcher (Z.M.) conducted all the interviews. NVivo machine-transcription service was used to transcribe the recorded interviews and pair them with manual audits for accuracy. Using NVivo 12, the Spoke interviews were coded deductively with Moore's framework, then inductively together with Hub and PS interviews for theme development. Two research team members (Z.M. and E.M.) met regularly to discuss and organize the emerging themes iteratively until a code consistency was achieved. Findings across groups were compared within and across the interviews and surveys to ensure the consistency of the evaluations. The recommendations to the Cancer ECHO program were generated through the study findings.

## Results

### 1. Program Settings and Participation

#### Moore's Level One: The Cancer ECHO Program Participation

In the first year of Cancer ECHO (from September 17, 2019, to September 16, 2020), 22 Cancer ECHO sessions were held. Each typical 1.5-hour session consists of a 20-minute didactics and a 1-hour case discussion. There was a total of 22 didactics delivered by the Hub team with a blend of topics in screening, prevention, and survivorship. All but one of the 17 case discussions were regarding cancer survivorship. 147 unique individuals attended the Cancer ECHO at least once during this period. Among the 147 attended individuals, 16 (10.8%) were PCPs (physicians and advanced practice providers). There was an average of 2.5 PCPs (17.2%) and 12 other professionals participating in each session. 90.9% of

sessions had at least one PCP spoke participant. The most common non-PCP attendees were cancer educators, navigators, public health workers, or administrators.

### Study participation

We interviewed 15 program participants (12 Spokes and 3 Hub members) and 7 PS. Among them, 5 Spoke, and 6 PS were PCPs. 90.9% sessions had at least one of the 12 Spoke interviewees, and 63.6% of sessions had at least one of our 5 Spoke PCP interviewees. We surveyed 14 Spoke and 16 PS members. 9 of the survey respondents participated in interviews. Additional file 1 summarized the demographics of the interview and survey participants.

### 2. Moore's Level Two: Satisfaction

14 Spokes rated their satisfaction with the program in the survey on a scale of 1 to 5 (1=far short of expectations, 2=short of expectations, 3=equals expectations, 4=exceeds expectations, 5=far exceeds expectations). The program met 100% of and exceeded 88.9% of both of PCPs and non-PCPs' expectations. The overall satisfaction from 11 program participants was  $3.9 \pm 0.7$ . (See Table 1)

Table 1  
Survey Results of The Self-Reported Outcomes

Framework		Role	Overall <sup>a</sup> : Mean (SD)	PCP <sup>a</sup> : Mean (SD)	Non-PCP <sup>a</sup> : Mean (SD)	Range
Moore's Level 2 <sup>b</sup>	Satisfaction	Spoke	3.9 (0.7)	3.8 (0.9)	4.0 (2.9)	1-5  1 = far short of expectations  5 = far exceeds expectations
		PS	3.7 (1.1)	2.8 (0.7)	4.1 (2.1)	
Moore's Level 3 <sup>b</sup>	Knowledge Improvement	Spoke	4.3 (0.8)	3.8 (0.8)	4.5 (2.9)	1-5  1 = definitely not  5 = definitely yes
		PS	3.7 (1.1)	2.8 (0.7)	4.1 (2.1)	
Moore's Level 4 <sup>b</sup>	Confidence Improvement	Spoke	3.7 (1.1)	3.8 (0.8)	3.7 (1.5)	
		PS	3.1 (1.0)	2.6 (0.7)	3.6 (1.6)	
Moore's Level 5 <sup>b</sup>	Practice Improvement	Spoke	3.7 (1.1)	4.0 (0.8)	3.6 (1.6)	
		PS	3.3 (1.0)	2.8 (0.7)	3.8 (2.0)	
Maslach Burnout Inventory (MBI) <sup>c</sup>	Emotional exhaustion	Spoke	4.2 (1.3)	4.0 (0.8)	4.3 (1.8)	1-7  1 = strongly improved  7 = strongly worsened
		PS	4.3 (1.3)	4.0 (1.1)	4.2 (1.6)	
	Insensitivity	Spoke	3.3 (1.6)	3.3 (1.0)	3.3 (1.8)	
		PS	3.3 (1.4)	3.2 (1.6)	3.3 (1.4)	
<sup>a</sup> The sample size (N of Spoke =14, N of PS =16) was too small to demonstrate any statistical significance.						
<sup>b</sup> Moore's Evaluation Framework for Continuing Medical Education.						
<sup>c</sup> Maslach Burnout Inventory 2 single-items adapted measures.						
PCP, primary care provider; PS, potential spoke.						

Overall, the interviewees were satisfied with the program. Of the 12 Spoke (S) and 3 Hub (H) members we interviewed regarding why they liked the program, 6 (4 PCPs) interviewees mentioned the conversational format, 3 (2 PCPs) connecting to the multidisciplinary community, and 5 (3 PCPs) the real-world experiences they gained from the program. In terms of the aspects of the program that did not meet their expectations, Spoke 4 [MD] said “it just didn't seem as engaging.” The Hub members also shared their side of challenges. H2 [MD]: “We're having a tough time getting spoke sites to find good cases to present.”

### 3. Moore's Level Three to Five: Effects on Knowledge, Confidence, and Practice

14 Spokes and 16 PSs self-rated their knowledge, confidence, and practice changes from any source during the period of the first year of the Cancer ECHO implementation (see Table 1). On a scale of 1 to 5 (1 = definitely not, 5 = definitely yes), the Spokes had higher ratings in their improvements in knowledge, confidence, and practice than the PS group (4.8 versus 3.7, 3.7 versus 3.1, 3.7 versus 3.3, respectively). Overall, the differences between Spokes and PSs were bigger among the PCPs (with an average increase of 1.1 points) than the non-PCPs (with an average increase of 0.1 points) for all three aspects. Of note, none of these differences were statistically significant.

S11 [MD] said “knowledge change, that is tremendous.” S12 [MD] said, “I can say that my knowledge, confidence has increased, has increased dramatically.” Their practice benefited from the program by having more options and developing a deeper empathy of what their patients were going through. S6 [FNP] shared how her practice changed through presenting a case discussion, “I think it's refreshing to hear a different perspective. So, in the case I actually presented...it was very challenging, and I was prepared to just say, OK, we've done all we can with this person, and now that the ball's in their court. But after talking with several people who participated [in the Cancer ECHO] that week, they really empathized and really brought forward potentially other barriers and other factors that I had not really considered. So, ...when I left that presentation, made me think, OK, I need to be more gracious and more patient, and stick with this case instead of at this point just kind of being done. So that was helpful.”

There are three themes that emerged from the interviews that described the strengths of the Cancer ECHO, which were consistent with the three themes from the interview answers for satisfaction. Table 2 shows quotes representative of these themes. Most of the participants highlighted their changes from learning from other participants, exploring more care options through collaboration, adapting the new resources and ideas into practice, and having better communications with patients. Some interviewees, especially PCPs, disproportionately favored the case discussion over the didactic component. Some interviewees did not think the Cancer ECHO changed their practice yet, citing several reasons: (1) their participation in the program was still too limited to see changes, and they faced barriers to maintain high participation, such as time commitment; (2) some of the topics were not directly pertinent to their practices; (3) since the learning happens from discussion with other participants, the quality of the program was related to the program participants. H3 [MD] mentioned: ‘I don't think we are capturing primary care providers.’ The

Spoke PCPs thought the didactics were less effective, which is consistent with the perspectives of PS PCPs that didactics were less engaging.



Table 2  
EmergEd Themes of the Program Strengths in the Qualitative Results

Themes	Interviewees	Sample quotes
<p><b>Format:</b></p> <p><b>Conversational and interactive (in the case discussion component)</b></p>	<p>Providers<sup>a</sup>: 12 out of 13 (4/5 Spoke, 6/6 PS, 2/2 Hub)</p> <p>Non-Providers<sup>a</sup>: 7 out of 9 (Except S3 [MPH] likes didactics better, S9 [CHES] likes didactics and case discussion equally)</p>	<p>Spokes: 9 out of 12</p> <p>Potential Spokes: 7 out of 7</p> <p>Hubs: 3 out of 3</p> <p>S6 [FNP]: "It's been good to hear the (didactics) presentations, which is what I initially thought was gonna be the most helpful. But actually, the case presentation and discussion component where you have a question and answer has been surprisingly more beneficial, I think, at times and help create change to my practice."</p> <p>PS6 [DDS]: "It just seemed really interactive. "</p>
<p><b>Content:</b></p> <p><b>Real-world experiences</b></p>	<p>Providers<sup>a</sup>: 13 out of 13 (5/5 Spoke, 6/6 PS, 2/2 Hub)</p> <p>Non-providers<sup>a</sup>: 7 out of 9 (Except S3 [MPH] likes didactics better, PS2 [LCSW] did not mention this theme)</p>	<p>Spokes: 10 out of 12</p> <p>Potential Spokes: 6 out of 7</p> <p>Hubs: 3 out of 3</p> <p>S5 [MD]: "I probably like the case discussions the best, honestly, just because I think when you start with the case, it triggers a memory in my mind as a patient who is like that or something. Whereas if it's just a didactic session, it's helpful and nice, but it's harder to put into context. It's easier for me to lose interest."</p> <p>PS7 [MD]: "I like the idea of having a case presented, which is great."</p>

<sup>a</sup>Providers include the primary care providers and specialist physicians in the Spoke, Potential Spoke, and the Hub groups.

CHES, Certified Health Education Specialist; DDS, Doctor of Dental Surgery; ECHO, Extension for Community Healthcare Outcomes; FNP, Family Nurse Practitioner; MD, Doctor of Medicine; MPH, Master of Public Health; MCHES, Master of Certified Health Education Specialist; PS, potential spoke; S, spoke.

Themes	Interviewees	Sample quotes
<b>Participant and community:</b> <b>A nonjudgmental, safe learning environment and support from a multi-disciplinary community</b>	Providers <sup>a</sup> : 13 out of 13 (5/5 Spoke, 6/6 PS, 2/2 Hub) Non-providers <sup>a</sup> : 8 out of 9 (Except S7 [MCHES] did not mention this theme)	Spokes: 11 out of 12 Potential Spokes: 7 out of 7 Hubs: 3 out of 3 S11 [MD]: “So that's what I like about the ECHO, and they have a different perspective, and it's not just physicians. It's either a social worker, which I rarely hear in practice...and you get to understand how important they are, or your physical therapists or your rehab people. The nurse you see most of the time, but we don't really get their perspective on what's going on. That makes it more of a complete, almost team effect on the patient.” PS4 [MD]: “Everyone on is invited to talk, there is no judgment.”
<sup>a</sup> Providers include the primary care providers and specialist physicians in the Spoke, Potential Spoke, and the Hub groups.		
CHES, Certified Health Education Specialist; DDS, Doctor of Dental Surgery; ECHO, Extension for Community Healthcare Outcomes; FNP, Family Nurse Practitioner; MD, Doctor of Medicine; MPH, Master of Public Health; MCHES, Master of Certified Health Education Specialist; PS, potential spoke; S, spoke.		

#### 4. Additional Measurement of the Effects on Burnout

We used changes in emotional exhaustion and insensitivity to evaluate the program impact. (See Table 1) Though many PCPs did not report significant emotional exhaustion changes, they did speak highly of the program's potential to improve their burnout levels with features that contribute to the program effectiveness in Table 2. As H3 [MD] described, “medicine is draining when you feel like you have nothing else to offer.” S5 [MD] thought having a safe place, such as the Cancer ECHO program, to discuss the mistakes they have made or dealt with could help emotional exhaustion. Our study participants felt the program was helpful for them to empathize with patients and be more understanding and sensitive to what their patients were going through.

## Discussion

Despite a relatively low PCP participation (Moore’s Level 1), the program overall received very positive satisfaction (Moore’s Level 2) and feedback from the Spokes regarding the Moore’s Level 3 to 5 outcomes. In the survey results, the program met or exceeded the expectations of 100% of both PCPs and non-PCPs (Moore’s Level 2). In the qualitative results, there were three features that all the interviewees valued in the Cancer ECHO: a conversational format, gaining real-life experiences, and support from a professional interdisciplinary community. Our results support previous assertions that Project ECHO is grounded in Situated Learning Theory and Communities of Practice.<sup>20,21</sup> The interviewees believed those features in the case discussion were or could be the mechanisms of their satisfaction and improvement in knowledge, confidence and practice. These features separated the Cancer ECHO from other continued

education activities on cancer control. However, not having cases from Spokes to present was a struggle to the program, which was also described in an ECHO program about tobacco cessation.<sup>14</sup> It is important to note the PCPs' resistance to the didactics component in the original ECHO model in the context of cancer control, which to our knowledge was not previously reported in any context. Of note, the cancer-related ECHO programs in previous literature have a narrower focus or was a one-time training outside of the United States.<sup>12-15</sup>

Unlike the non-PCPs, some PCPs felt they did not have a big knowledge gap in the didactics content on cancer control. They thought guidelines have a limitation on recognizing the nuances of individual health and social circumstances in their practice. These opinions were consistent with the physicians' resistance to the other guideline adherence efforts on cancer preventive medicine, such as electronic health record (EHR) alerts and automated guidelines.<sup>22</sup> Instead, EHR alerts as the primary tool for guideline dissemination and awareness reinforcement, were able to identify the cases not meeting with the guideline recommendations at the point of care. To implement prevention guidelines, Doherty et al. found communication means, such as clinician consensus-building working groups and meetings, beyond electronic medical records and didactics were necessary.<sup>23</sup> Indeed, the case discussion in Cancer ECHO offers a platform to learn case-specific strategies, share informal knowledge, and make collaborative decisions. These aspects set the program apart from other educational communication means, highlight its unique role in cancer control, and complement the limitations of regular didactics and EHR alerts.

Though never participating in the Cancer ECHO, the PSs also believed Cancer ECHO had the contributing features to its effectiveness which were desirable in the context of cancer control (see Table 2). We noticed the discrepancy between the desirability of, as well as the positive learning impact of the program with a relatively low PCP participation. The PSs' perspectives helped us understand that their participation decision was not due to a different understanding of the program strengths with the Spokes'. In addition, the Spoke-PCP-led case discussions disproportionately chose the topics around survivorship. These observations of PCPs' preference on case discussion and survivorship emphasize the importance of understanding the PCPs' unmet needs that influence their participation, which were not sufficiently understood in our results given the scope of this current study. According to our interviewees, the extent of PCP participation (Moore's Level 1) also had an impact on the session quality, motivated other PCPs to join, and was related to the longitudinal program impact. A further in-depth investigation into the PCP participation issue and their needs is warranted.

### Considerations for Future Program Development

In the future, we suggest the Cancer ECHO consider two different directions. The first direction is to change its original target of PCPs to a broader scope of health professionals. The current setting of the Cancer ECHO program gained interest from non-PCP professionals, who are also more open to the topics of cancer screening and prevention, as well as guideline reviewing activities in the didactics component. The second direction is to continue to target PCPs. Our results suggest the program is effective in training

PCPs. However, new strategies are needed to encourage their participation and balancing the PCPs' needs and the program aims.

### Study Limitations

First, we started our evaluation after the program launch. We were not able to design pre- and post-study tests to examine the quantitative changes of the same program participants. Second, our study recruitment was also impacted by the coronavirus pandemic and the PCPs' availability. The survey received limited responses (10% response rate among the Spokes) and could not represent the whole Spoke population. The survey sample size is too small to show statistical significance. The survey results should be interpreted as a supplement to the interview results. Third, the Cancer ECHO program recruitment was an ongoing process. Program participants joined the program at different times. Our interviewees and survey respondents did not necessarily enroll in the program at launch. Their experiences and self-perceived changes are limited to their participation.

## Conclusion

Though the program has gained higher participation from non-PCPs than its target, PCPs, our study showed that the Cancer ECHO program is an effective educational means in improving the cancer control capacity, especially for PCPs. Its strengths suggest a unique role for the ECHO model among the existing physician-targeting cancer control interventions. A further investigation is warranted to explain the discrepancy of the program's strengths and a relatively low PCP adoption.

## Declarations

Ethics approval and consent to participate

This study and the consent procedure was approved by Indiana University Institutional Review Board on 4/7/2020 [Protocol number 2002472006]. Participation was voluntary, the participants responded to the study invitation via emails and confirmed their interest. A written Study Information Sheet was given to the participants at the beginning of the survey and before the interviews. Verbal consent was confirmed again at the beginning of the interviews. The participants had the right to withdraw the study without affecting their ability to participate in the Cancer ECHO program at anytime without prejudice. All methods were performed in accordance with the relevant guidelines and regulations.

Consent for publication

Not applicable.

Availability of data and materials

The data supporting the findings are contained within the manuscript and its Additional files 1. The surveys and verbatims analyses of the semi-structures are stored at the Indiana University Purdue

University Indianapolis. They are available from the corresponding author on reasonable request.

### Competing interests

The authors declare that they have no competing interest.

### Author's contributions

All authors contributed to the conception, design, and implementation of the study. Dr. Milgrom conducted the interview and survey data collection. Dr. Milgrom and Dr. Mendonca performed analysis and interpretation together. Dr. Milgrom wrote the initial draft, which was reviewed and revised by all authors. All authors have approved the final manuscript.

### Acknowledgements

This work was supported by the U.S. National Library of Medicine [grant number: T15LM012502]. The Cancer Prevention, Survivorship and Prevention ECHO, a program of the IUPUI ECHO Center at the Indiana University Richard M. Fairbanks School of Public Health, described in this study received funding from Indiana Cancer Consortium, and in-kind support from the Indiana Department of Health, specifically the Division of Chronic Disease, Primary Care, Rural Health, the Indiana Immunization Coalition, Riley Children's Hospital, American Cancer Society, and the Indiana Clinical and Translational Sciences Institute. The authors wish to thank all the study participants who dedicated their time and efforts during the pandemic to this project. Your feedback is an inspiration. We also want to thank the Cancer ECHO hub team members, IUPUI ECHO Center, Harold Kooreman, Dr. John Agle, and the researchers who are evaluating the other IUPUI ECHO programs that generously gave of their insights.

## References

1. Indiana Cancer Consortium. *Indiana Cancer Control Plan Report 2021-2022*. Indiana Cancer Consortium; 2021. <https://indianacancer.org/iccp-report/>. Accessed July 4, 2021.
2. American Cancer Society. *Indiana Cancer Facts & Statistics*. <https://cancerstatisticscenter.cancer.org/#!/state/Indiana#>. Published 2020. Accessed April 15, 2021.
3. Indiana State Department of Health. *Cancer In Indiana Factsheet 2017*. in.gov; 2017. [https://www.in.gov/isdh/files/cancer\\_in\\_indiana\\_factsheet\\_2017.pdf](https://www.in.gov/isdh/files/cancer_in_indiana_factsheet_2017.pdf). Accessed July 5, 2021.
4. DeVol R. An Unhealthy America: The Economic Burden of Chronic Disease. Presented at the: Stakeholder Forum; October 11, 2007; Santa Monica, CA.
5. Sarfaty M, Wender R. How to increase colorectal cancer screening rates in practice. *CA Cancer J Clin*. 2007;57(6):354–366. doi:10.3322/CA.57.6.354
6. O'Malley AS, Forrest CB, Mandelblatt J. Adherence of low-income women to cancer screening recommendations. *J Gen Intern Med*. 2002;17(2):144–154. doi:10.1046/j.1525-1497.2002.10431.x

7. Seeff LC, Nadel MR, Klabunde CN, et al. Patterns and predictors of colorectal cancer test use in the adult U.S. population. *Cancer*. 2004;100(10):2093–2103. doi:10.1002/cncr.20276
8. Rinne ST, Mohr DC, Swamy L, Blok AC, Wong ES, Charns MP. National burnout trends among physicians working in the department of veterans affairs. *J Gen Intern Med*. 2020;35(5):1382–1388. doi:10.1007/s11606-019-05582-7
9. Olayiwola JN, Willard-Grace R, Dubé K, et al. Higher Perceived Clinic Capacity to Address Patients' Social Needs Associated with Lower Burnout in Primary Care Providers. *J Health Care Poor Underserved*. 2018;29(1):415–429. doi:10.1353/hpu.2018.0028
10. University of New Mexico PE. ECHO Data Marketplace. <https://hsc.unm.edu/echo/data-marketplace/interactive-dashboards/>. Published 2021. Accessed July 4, 2021.
11. Arora S, Kalishman S, Thornton K, et al. Expanding access to hepatitis C virus treatment—Extension for Community Healthcare Outcomes (ECHO) project: disruptive innovation in specialty care. *Hepatology*. 2010;52(3):1124–1133. doi:10.1002/hep.23802
12. Nathan ST, Hariprasad R, Babu R, Kumar V, Sharma S, Mehrotra R. Project ECHO: a Potential Best-Practice Tool for Training Healthcare Providers in Oral Cancer Screening and Tobacco Cessation. *J Cancer Educ*. May 2019. doi:10.1007/s13187-019-01549-8
13. Hariprasad R, Arora S, Babu R, et al. Retention of knowledge levels of health care providers in cancer screening through telementoring. *J Glob Oncol*. 2018;4:1–7. doi:10.1200/JGO.18.00048
14. Cofta-Woerpel L, Lam C, Reitzel LR, et al. A tele-mentoring tobacco cessation case consultation and education model for healthcare providers in community mental health centers. *Cogent Medicine*. 2018;5(1). doi:10.1080/2331205X.2018.1430652
15. Lopez MS, Baker ES, Milbourne AM, et al. Project ECHO: A Telementoring Program for Cervical Cancer Prevention and Treatment in Low-Resource Settings. *J Glob Oncol*. 2017;3(5):658–665. doi:10.1200/JGO.2016.005504
16. Moore DE, Green JS, Gallis HA. Achieving desired results and improved outcomes: integrating planning and assessment throughout learning activities. *J Contin Educ Health Prof*. 2009;29(1):1–15. doi:10.1002/chp.20001
17. Zhou C, Crawford A, Serhal E, Kurdyak P, Sockalingam S. The impact of project ECHO on participant and patient outcomes: A systematic review. *Acad Med*. 2016;91(10):1439–1461. doi:10.1097/ACM.0000000000001328
18. Byrne B. Different Measures and Ways to Conceptualize Burnout. Presented at the: 2019 Pediatric Academic Societies Annual Meeting.; 2019. <https://www.aap.org/en-us/professional-resources/Research/research-findings/Pages/Different-Measures-and-Ways-to-Conceptualize-Burnout.aspx>. Accessed March 7, 2020.
19. West CP, Dyrbye LN, Satele DV, Sloan JA, Shanafelt TD. Concurrent validity of single-item measures of emotional exhaustion and depersonalization in burnout assessment. *J Gen Intern Med*. 2012;27(11):1445–1452. doi:10.1007/s11606-012-2015-7
20. Vygotsky LS. Mind in society (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). 1978.

21. Bloch M, Lave J, Wenger E. Situated learning: legitimate peripheral participation. *Man*. 1994;29(2):487. doi:10.2307/2804509
22. Litzelman DK, Tierney WM. Physicians' reasons for failing to comply with computerized preventive care guidelines. *J Gen Intern Med*. 1996;11(8):497–499. doi:10.1007/BF02599049
23. Doherty JA, Crelia SJ, Smith MW, et al. Large health systems' prevention guideline implementation: A qualitative study. *Am J Prev Med*. 2018;54(1S1):S88-S94. doi:10.1016/j.amepre.2017.07.025

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Additionalfile1.StudyParticipantDemographics.docx](#)