



Addressing cervical cancer disparities in Texas: Expansion of a community-based prevention initiative for medically underserved populations

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ARTICLE INFO

Keywords:

Cervical cancer prevention
Disparities
Screening
Public health
Community interventions
Implementation science

ABSTRACT

Although cervical cancer is preventable, significant disparities exist in access to screening and prevention services. In medically underserved areas (MUAs) of Texas, these rates are 55% higher compared to the remainder of the US. In 2019, we expanded a multicomponent, comprehensive program to improve cervical cancer prevention in partnership with 13 clinics and mobile vans in MUAs of Texas. Our multicomponent intervention program consists of community education and patient navigation coupled with a training/mentoring program for local medical providers to perform diagnostic procedures and treatment for patients with abnormal screening results. Hands-on training courses to learn these skills are coupled with biweekly telementoring conferences using Project ECHO® (Extension for Community Healthcare Outcomes). This program was implemented in 2015 and expanded to other MUAs in Texas in 2019. From March 2019 to August 2022, 75,842 individuals were educated about cervical cancer screening and HPV vaccination. A total of 44,781 women underwent screening for cervical cancer, and 2,216 underwent colposcopy and 264 underwent LEEP. High-grade cervical dysplasia was diagnosed in 658 individuals and invasive cervical cancer in 33 individuals. We trained 22 providers to perform colposcopy and/or LEEP. In addition, 78 Project ECHO telementoring sessions were held with an average of 42 attendees per session, with 72 individual patient cases discussed. Our comprehensive community-based prevention initiative for medically underserved populations has led to a significant number of individuals undergoing cervical cancer screening in MUAs, as well as improved access to colposcopy and LEEP services.

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<https://doi.org/10.1016/j.pmedr.2023.102486>

Received 24 July 2023; Received in revised form 15 October 2023; Accepted 16 October 2023

Available online 31 October 2023

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1. Introduction

Although preventable, cervical cancer remains the fourth most common cancer among women globally, (Buskwofie et al., 2020) disproportionately affecting minority women. Black, Hispanic, and American Indian/Alaska Native (AI/AN) women experience incidence and mortality twice that of their White counterparts. (Temkin et al., 2018) This is, in part, due to lack of screening access and inadequate follow-up of abnormal results, which have been associated in the literature with lack of insurance and immigrant status, non-White race or ethnicity, and low socioeconomic status (SES). (Buskwofie et al., 2020; Temkin et al., 2018).

These disparities are notable in the Rio Grande Valley (RGV), along the Texas-Mexico border. Roughly one-third of its inhabitants, 88–96 % of whom identify as Hispanic or Latinx, (Quick Facts: Willacy County, Starr County, Cameron County, Hidalgo County. United States Census Bureau. Accessed March 11, 2022) live below the federal poverty level and 60 % lack health insurance. (Gatta, 2022; Fisher-Hoch et al., 2015; Fisher-Hoch et al., 2010) The cervical cancer incidence and mortality rates are roughly 25 % higher than the rest of Texas, and 55 % higher than the remainder of the US. (Salcedo et al., 2021) Furthermore, women living along the border consistently report lower rates of cervical cancer screening than women living in other areas of the US. (Herrera et al., 2012) This large disparity in cervical cancer care is noted within other areas of rural Texas and in 2019, the age-adjusted mortality rate for cervical cancer was higher in Northeast Texas than the remainder of Texas. (The Health Status of Northeast Texas. University of Texas System. Published, 2021).

We seek to describe our experience and results of the expansion of a multicomponent intervention designed to increase access to cervical cancer screening and treatment of pre-invasive disease in medically underserved regions of Texas. The primary outcome was the number of women screened for cervical cancer. Secondary outcomes included the number of women educated, number of women undergoing cervical procedures (colposcopy and LEEP), cervical screening and diagnostic testing results, and Project ECHO participation.

2. Materials and methods

The initial program was implemented from November 2014 to October 2018 and was a collaborative effort between The University of Texas MD Anderson Cancer Center (MD Anderson), The University of Texas Health Science Center at Houston (UTHSC) School of Public Health including the Brownsville Regional Campus and the UTHealth McGovern Medical School mobile clinic, and two federally qualified health centers (FQHCs) in the RGV: Su Clínica and The Dysplasia & Cancer Stop Clinic. The project received approval from the MD Anderson Quality Improvement Assessment Board (QIAB) with a waiver of informed consent as data was being collected and reported on a population, rather than an individual, level. The program included community education, patient navigation, and a training/mentoring program for local medical providers for colposcopy and loop electrosurgical excision procedure (LEEP). Further description of these components has been described previously. (Salcedo et al., 2021) These efforts were complemented with Project ECHO® (Extension for Community Healthcare Outcomes) telementoring videoconferences. (Salcedo et al., 2021).

The expansion project began in March 2019 and consisted of similarly evidence-based, complementary interventions aimed at increasing participation in cervical cancer screening and expanding local capacity to diagnose and treat cervical pre-invasive disease. It included two of the three original sites (Su Clínica and the UTHealth McGovern mobile van) with eight new sites for a total of ten sites. The new sites included: UTRGV School of Medicine, UTHealth Brownsville Clinical Research Unit, Gateway Community Health Center of Laredo, UTHealth Science Center at Tyler's clinic and their partnering clinics – Genesis PrimeCare

and East Texas Community Health Services, Inc, UT Austin/Dell Medical School's partnering clinic CommUnity Care in Bastrop, and the Stephen F. Austin Community Health Network in Brazoria county (Fig. 1). All sites were chosen based on the recommendation from existing partners in the region.

The interventions included: (1) community outreach and education; (2) clinic in-reach and patient navigation; (3) clinical services including cervical cancer screening, colposcopy, cervical biopsy, and LEEP; (4) local provider training on colposcopy/LEEP through didactic lectures and hands-on courses; (5) financial support for clinical services for women in need; and (6) Project ECHO telementoring (Fig. 2).

2.1. Community outreach/patient navigation

Each participating site was provided funding to hire a patient navigator from the local community. These individuals received standardized training and ongoing mentoring led by the MD Anderson team. The navigators performed the community outreach and clinic in-reach activities. They also scheduled cervical cancer screening appointments for eligible women and helped to arrange follow-up and treatment for those with abnormal results.

The navigators delivered community outreach and cervical cancer prevention education on an individual level as well as to groups at community events such as health fairs, zumba classes, and school events. Women who were eligible for and interested in cervical cancer screening were navigated to a participating clinic or mobile van. For the in-reach component, eligible women attending non-gynecologic clinic appointments at participating sites (i.e. internal medicine, family medicine, dental) were approached in the waiting room by the navigators and provided education on cervical cancer screening and HPV vaccination with educational materials from MD Anderson, the American Cancer Society, and the Centers for Disease Control and Prevention (CDC). Those interested in screening were scheduled for a future appointment.

2.2. Cervical cancer screening

Screening was performed based on the US Preventive Services Task

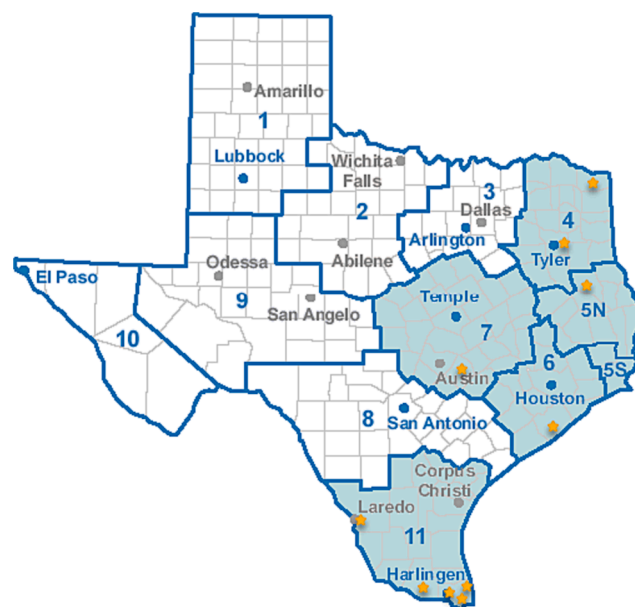


Fig. 1. Map of Participating Texas Public Health Regions and Collaborating Clinics, 2019–2022. PHR4: Genesis PrimeCare, UTHSC Tyler Clinic PHR5: East Texas Community Health Services PHR6: Community Health Network PHR7: CommUnity CarePHR11: Gateway Community Health Center, UTHSC Mobile Clinic, UTMcGovern Mobile Clinic, Su Clinica, UTRGV Clinics.

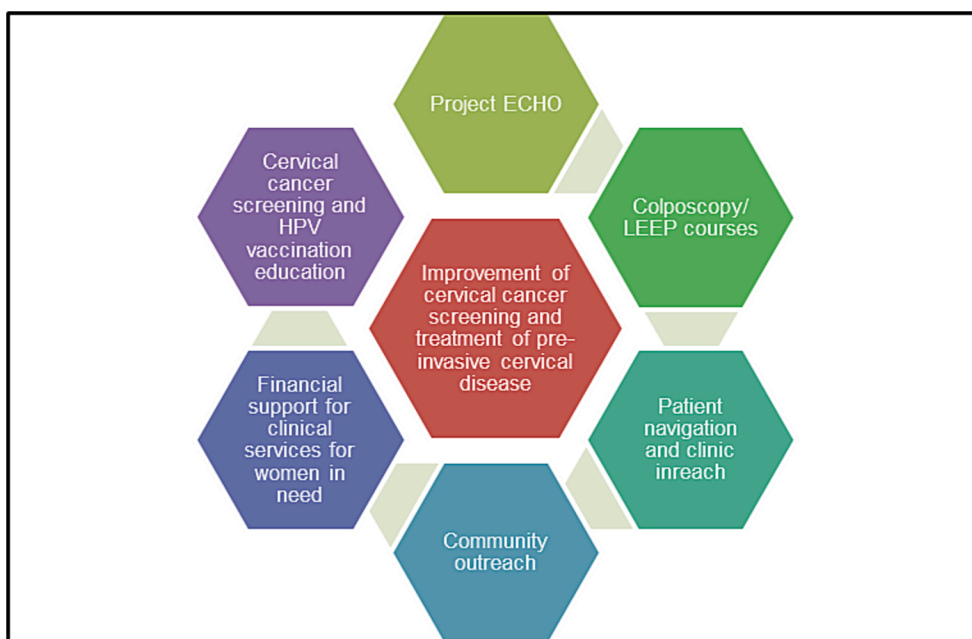


Fig. 2. Components of the program for reducing cervical cancer as implemented in participating centers, 2019–2022.

Force (USPSTF) guidelines (Curry et al., 2018), which have been endorsed by the American Society of Colposcopy and Cervical Pathology (ASCCP) and the American College of Obstetricians and Gynecologists (ACOG). Women with abnormal screening tests were contacted by their medical providers and, if available, the navigators then assisted with scheduling follow up appointments and sent appointment reminders. Women diagnosed with invasive cervical cancer were referred for further evaluation and treatment at UTRGV, UTMB, or MD Anderson.

2.3. Building local capacity

In terms of capacity building, local physicians and advance practice providers were invited to participate in colposcopy and LEEP trainings. This included locally held courses developed by MD Anderson consisting of didactic lectures and hands-on training stations using simulation models developed by bioengineering students at Rice University. (Parra et al., 2019) These courses are one to two days in duration and free-of-charge to participants. Providers were also invited to join Project ECHO sessions, which are held virtually every two weeks and consist of didactic lectures and case-based learning. These Project ECHO sessions provide ongoing telementoring and support between training courses. Furthermore, participating providers were financially supported to attend the national ASCCP colposcopy course and subsequently enroll in their mentorship program.

Data were collected by clinic site in aggregate, and included the number of participants educated, number of participants screened, number of participants undergoing colposcopy and LEEP, as well as number of women diagnosed with cervical intraepithelial neoplasia (CIN) 1–3, adenocarcinoma in situ (AIS), and cancer. In addition, we collected data about the number of medical providers undergoing training and participating in Project ECHO. All data were collected and managed using REDCap (Research Electronic Data Capture) hosted at MD Anderson, a secure web-based application for data capture. (Harris et al., 2009; Harris et al., December 2018) Descriptive statistics were used to summarize the number of women educated, screened, and undergoing a procedure such as colposcopy or LEEP. Counts were reported in six month increments, so as to fully capture the impact over the duration of the program. Counts were first examined by sites that had no prior involvement with the program, and therefore data were excluded in the general counts from Su Clínica, the UTHealth McGovern mobile

van, and Gateway clinics (the latter had received prior trainings through the program before its formal involvement). The Chi-square test was used to compare groups.

3. Results

Between March 2019 and August 2022, 75,842 women were educated about cervical cancer prevention and 44,781 underwent screening for cervical cancer with cytology and/or HPV testing. A total of 2,216 women underwent colposcopy and 264 women underwent LEEP. Of the women screened, 1,244 were diagnosed with CIN 1; 564 with CIN 2, CIN 3, or CIN2/3; and 94 women with AIS. In total, 33 women were diagnosed with invasive cervical cancer (Table 1).

Fig. 3 shows data from the seven sites who had not participated in the program prior to March 2019 (UTRGV School of Medicine, UTHealth Brownsville Clinical Research Unit, UTHealth Science Center at Tyler’s clinic and their partners Genesis PrimeCare and East Texas Community Health Services, Inc, UT Austin/Dell Medical School’s partner clinic CommUnity Care, and Stephen F. Austin Community Health Network). The initial six months of program implementation (March 2019 – August 2019) were used as a baseline. When assessed over six-month increments, an overall increase in number of patients educated and screened was noted. The number of women educated across newly participating sites increased from 20 during the baseline period to 26,151 during the last six months of the program (130,655 % increase). A total of 2,837 women underwent screening during the baseline period compared with 3,473 in the last six months (22 % increase). Fig. 4 demonstrates the change over time in the number of women undergoing colposcopy and LEEP. During the baseline period, 116 women

Table 1

Descriptive statistics for colposcopic biopsy results for women across all participating regions, 2019–2022.

| Diagnosis | Total number of women diagnosed (% of all screened) |
|------------------------|---|
| CIN 1 | 1,244 (2.8 %) |
| CIN 2, CIN 3, CIN 2/3 | 564 (1.3 %) |
| Adenocarcinoma in situ | 94 (0.2 %) |
| Invasive cancer | 33 (0.07 %) |

Abbreviations: CIN = cervical intraepithelial neoplasia.

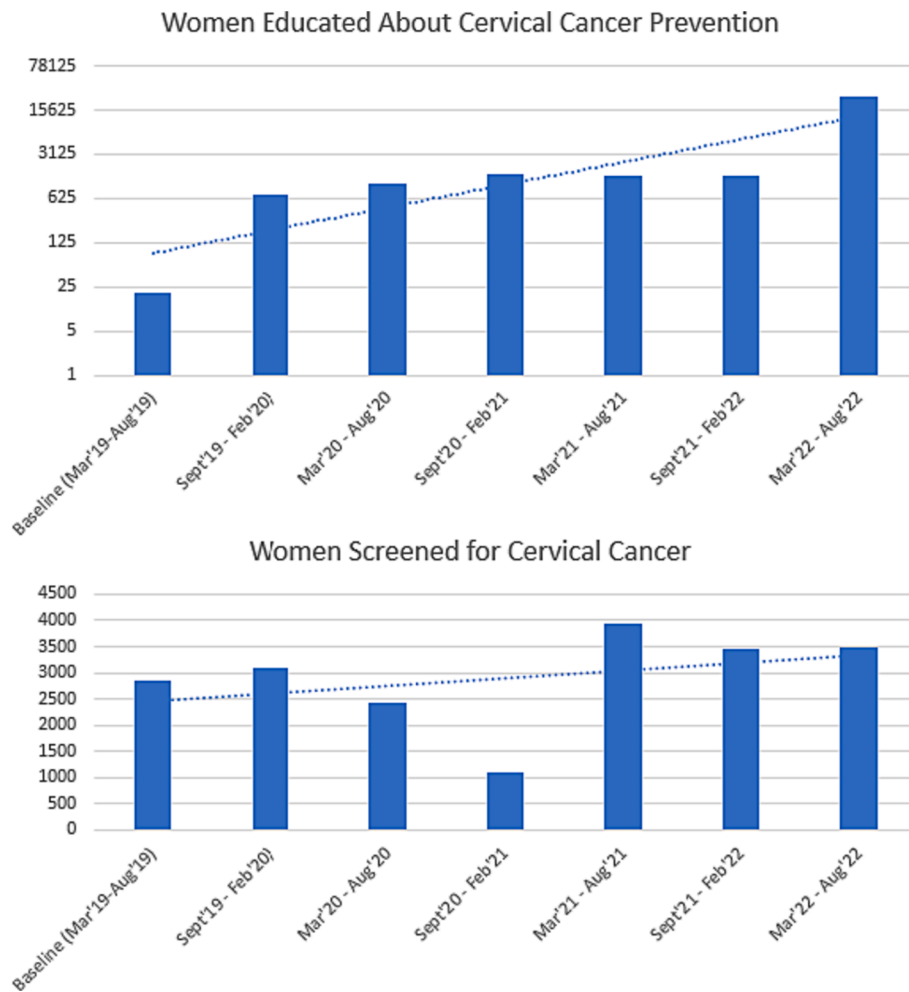


Fig. 3. Pattern of change from 2019 to 2022 in number of women educated and screened over time across all participating sites.

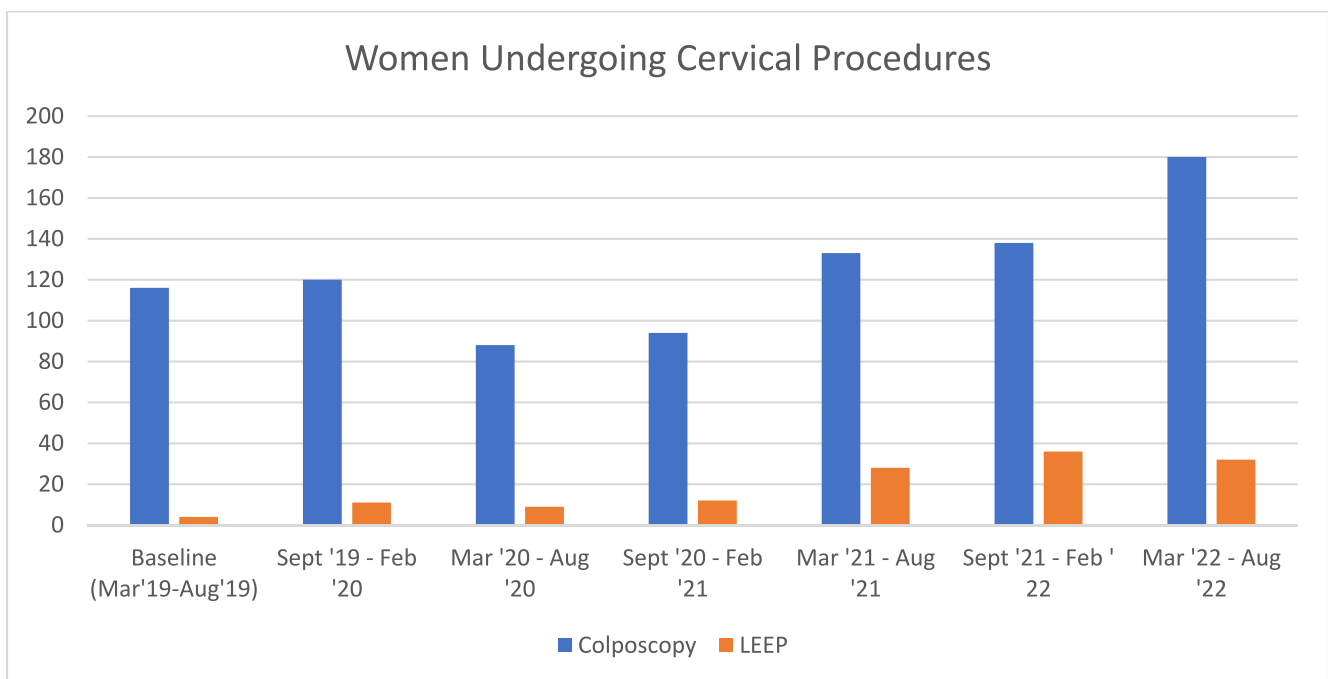


Fig. 4. Pattern of change in number of women at all participating sites receiving cervical procedures over time (2019–2022).

underwent colposcopy and 4 women underwent LEEP compared with the last six months when 180 women underwent colposcopy and 32 women underwent LEEP (55 % increase and 700 % increase, respectively).

The majority of sites had a dedicated navigator who provided community outreach, clinic in-reach, and patient navigation as described above. These included UTRGV School of Medicine, UTHealth Brownsville Clinical Research Unit, Gateway Community Health Center of Laredo, UTHealth Science Center at Tyler clinic, UT Austin/Dell Medical School’s partnering clinic CommUnity Care in Bastrop, and the Stephen F. Austin Community Health Network (“navigated” group). Unfortunately, four of the 10 participating sites were unable to hire and/or retain a patient navigator dedicated to the project activities. These included Su Clínica, Genesis PrimeCare, East Texas Community Health Services, and the UTHealth McGovern mobile van (“not navigated” group). Fig. 5 compares outcomes between the “navigated” and “not navigated” groups. Across all parameters – number educated, number screened, number undergoing colposcopy, and number undergoing LEEP – there was a significantly higher numbers of participants receiving services among the navigated group ($p < 0.001$ for all outcomes).

With respect to local capacity building and trainings, four hands-on training courses were held (two in-person and two virtual due to the COVID-19 pandemic). Twenty providers were funded through the program to attend the ASCCCP course to learn to perform colposcopy and/or LEEP. To provide ongoing mentorship and support, a total of 78 Project ECHO telementoring sessions were held during the project period (Fig. 6). There was an average of 42 attendees per session consisting of physicians, advanced practice providers (physicians assistants, nurse practitioners, midwives), nurses, and trainees. In total, 72 individual patient cases were discussed.

4. Comment

4.1. Principal findings

Our comprehensive community-based program was expanded beyond its initial sites in the RGV to include more MUAs in Texas. Over the 3.5-year project period, our navigators educated 75,842 women and screened 44,781 women. A total of 658 women were diagnosed with high-grade dysplasia (CIN 2/3 + or AIS) and navigated to follow up care, thereby receiving a timely intervention before possible disease progression. Additionally, 33 women were diagnosed with cancer and referred for further oncologic care.

4.2. Results in the context of what is known

Cervical cancer is a preventable disease whose screening and treatment programs are rife with great inequities. Although rates of cervical cancer have decreased in the US overall, both incidence and mortality rates continue to be elevated in Black and Hispanic/Latinx women. (Olusola et al., 2019) Black women have a 60 % higher incidence and twice the mortality rate compared to White women. Hispanic/Latinx women have the highest incidence rate of cervical cancer, and are often diagnosed with late stage disease. (Olusola et al., 2019).

Our results support previous literature utilizing patient navigation as an intervention to improve patient health outcomes, particularly for marginalized patients. (Nelson et al., 2020; Krok-Schoen et al., 2016; McBrien et al., 2018) In our program, we found having a dedicated navigator from the community led to an increase in patients undergoing screening and treatment services.

4.3. Clinical implications

Our research team has previously evaluated the barriers to cervical cancer prevention and screening along the Texas-Mexico border. (Boom et al., 2019) On the provider/system level, these barriers included



Fig. 5. Trends in participant education, screening, and use of colposcopy/LEEP by patient navigation status for all participating sites ($p < 0.001$ for all outcomes).

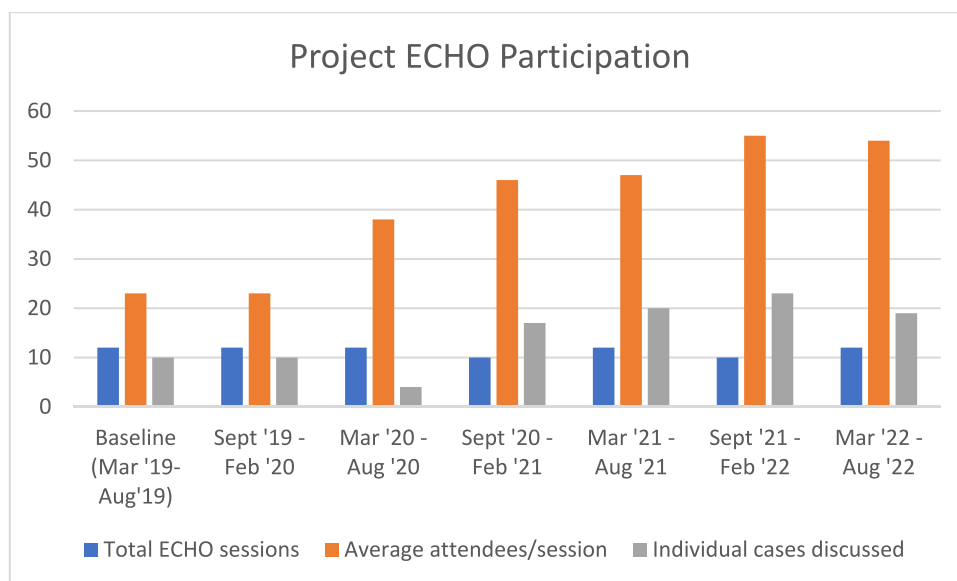


Fig. 6. Project ECHO telementoring participation across all participating sites over the project period (2019–2022).

limited number of trained healthcare personnel and insufficient funding to expand screening and prevention services. On the patient level, the most frequently reported barriers included difficulty navigating the healthcare system, inability to miss work, limited transportation and access to childcare, and fear of deportation. (Boom et al., 2019) Thus, our multicomponent program provides a possible blueprint for community-based programs aimed at reducing the large racial/ethnic and socioeconomic disparities that exist by addressing many of the barriers mentioned above.

4.4. Research implications

Due to the COVID-19 pandemic, our results provide an interesting lens through which to view the impact of the pandemic on prevention services. As shown in Figs. 3 and 4, the number of women screened and undergoing colposcopy/LEEP initially increased following the program start which was followed by a decrease from March 2020 through March 2021 during the height of the pandemic. This is consistent with prior data showing a decrease in cervical cancer screening during the pandemic. (Wentzensen et al., 2020;(January).) These parameters then increased as clinics re-opened. In contrast, Fig. 5 shows that Project ECHO participation increased steadily throughout the program period, including during the pandemic. This suggests that a virtual telementoring platform may be a useful modality to increase the reach of training in cervical cancer prevention, a finding further supported by our team's work in low- and middle- income countries during the pandemic. (Salcedo et al., 2021; Phoolcharoen et al., 2022) Further research is required to determine the full impact of telementoring platforms in this setting.

4.5. Strengths and limitations

A strength of our study is the large sample size of 75,842 women educated and 44,781 women screened. Our results from this large group add to the body of literature that demonstrates the impact of patient navigation as a tool to decrease health disparities within cancer care. (Nelson et al., 2020; Krok-Schoen et al., 2016; Falk et al., 2022) Our study has several limitations. First, we utilized the first six months of data collected as a baseline for comparison but it is possible that the trainings and efforts of the navigators were already in effect by this time, thus underestimating the impact of the program. We are also limited by the lack of a control group against whom to compare the impact of the

program. Furthermore, due to the multicomponent nature of our intervention, it is difficult to assess the impact of individual components. Lastly, data were collected in aggregate, and therefore detailed information for individual patients was not available for analysis. Data on loss to follow up were similarly not available for analysis due to the aggregate nature of data collection, though patient navigators were trained to contact patients by both telephone calls and certified letter if they were felt to be lost to care. Of note, the available funding for this study which enabled such interventions such as the hiring of key personnel (i.e. patient navigators) and the purchase of supplies for trainings may limit the generalizability of these results. However, our study may also provide guidance as to effective ways to use otherwise limited resources/funding.

5. Conclusions

In summary, our multicomponent comprehensive cervical cancer prevention program led to significant increases in women educated about cervical cancer prevention and undergoing cervical cancer screening, colposcopy, and LEEP. This was despite program implementation challenges associated with the COVID-19 pandemic. Furthermore, an additional 20 providers were newly trained to perform colposcopy/LEEP. These efforts were supplemented with Project ECHO telementoring, which saw a sustained increase in participation through the entire program period. Our group is currently expanding these efforts across other MUAs of Texas, with an additional component of one-day events combining cervical cancer screening and HPV vaccination services for women and their family members. Through the continuation and expansion of these efforts, we hope to decrease the burden of cervical cancer in MUAs of Texas and to address the significant disparities in access to cervical cancer prevention services in this region.

CRedit authorship contribution statement

Samantha H Batman: Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing. **Melissa L Varon:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Supervision, Project administration. **Maria Daheri:** Conceptualization, Methodology, Validation, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Tony Ogburn:** Conceptualization, Methodology, Validation,

Formal analysis, Investigation, Resources, Data curation, Writing – review & editing, Supervision, Project administration. **Saul D Rivas:** Investigation, Resources, Writing – review & editing. **Laura Guerra:** Investigation, Resources, Writing – review & editing. **Paul A Toscano:** Investigation, Resources, Writing – review & editing. **Monica Gasca:** Investigation, Resources, Writing – review & editing. **Lori Campos:** Investigation, Resources, Writing – review & editing. **Savanah Foster:** Investigation, Resources, Writing – review & editing. **Melissa Martin:** Investigation, Resources, Writing – review & editing. **Marian Yvette Williams-Brown:** Conceptualization, Methodology, Validation, Investigation, Resources, Writing – review & editing, Supervision, Project administration. **Yvette Poindexter:** Conceptualization, Methodology, Validation, Investigation, Resources, Writing – review & editing, Supervision, Project administration. **Belinda Reininger:** Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Mila P Salcedo:** Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Supervision, Project administration. **Andrea Milbourne:** Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Bryan Fellman:** Conceptualization, Methodology, Validation, Formal analysis, Data curation, Writing – review & editing. **Maria E Fernandez:** Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Ellen Baker:** Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Supervision, Project administration. **Rose Gowen:** Conceptualization, Methodology, Investigation, Resources, Writing – review & editing, Supervision, Project administration. **Susan Fisher-Hoch:** Conceptualization, Methodology, Validation, Formal analysis, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Ana M Rodriguez:** Conceptualization, Methodology, Validation, Writing – review & editing. **Jessica Milan:** Writing – review & editing, Project administration. **Monica Pippin:** Resources, Writing – review & editing, Supervision, Project administration. **Ernest Hawk:** Conceptualization, Methodology, Validation, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Kathleen M Schmeler:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Funding

This research was supported in part by the Cancer Prevention Research Institute of Texas (CPRIT) (PP190014); the National Institutes of Health (NIH) through MD Anderson's Cancer Center Support Grant P30CA016672; The Raul Tjerina Foundation, The Joe Family Fund, The Giles-O'Malley Foundation, The Dunaway Family Fund, and the NIH/NCI under award number T32 CA101642 Training of Academic Gynecologic Oncologists.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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