

Increasing Cervical Cancer Screening in a Federally Qualified Health Center

Maria Babb

Arizona State University

## Abstract

Routine cervical cancer screening has significantly decreased the mortality rate of cervical cancer. Today, cervical cancer predominantly affects those who are rarely or never screened. Government programs are in place to provide cervical cancer screening at little to no cost, yet screening rates remain suboptimal. This project evaluated an evidence-based intervention to increase cervical cancer screening among underserved women in a federally qualified health center (FQHC). Female patients ages 21 to 65 years without history of hysterectomy ( $n=1,710$ ) were sent reminders to their phones through the electronic health record (EHR). The message included educational material about the screening process and an announcement regarding government aid for free or reduced cost screening. The number of patients who made an appointment after receiving the message was assessed two months later. In total, 156 responses were collected, and 28 patients made an appointment for screening. The most frequently observed category of Ethnicity was Hispanic/Latina ( $n = 24, 86\%$ ). The most frequently observed category of Insurance was Title X ( $n = 13, 46\%$ ). The observations for Age had an average of 41.04 ( $SD = 9.93$ ). Using an EHR communication function to send motivational reminders has shown some promise for increasing cervical cancer screening, thereby reducing cervical cancer mortality among the underserved.

*Keywords:* Cervical cancer screening, Papanicolaou Test, Federally Qualified Health Clinic, underserved women

### Increasing Cervical Cancer Screening in a Federally Qualified Health Center

Most women with cervical cancer are asymptomatic until the disease is clinically apparent (Canavan & Doshi, 2000). Routine screenings help detect early abnormal cytologic changes and can prevent their progression from preinvasive to invasive (Canavan & Doshi, 2000). Although routine screening has decreased the mortality rate of cervical cancer, many women do not get screened often enough, if at all. To further decrease the mortality rate, women must be screened according to clinical practice guidelines.

### **Problem Statement**

Cervical cancer is the third most common gynecologic cancer diagnosis and cause of death among gynecologic cancers for women in the United States (Boardman, 2019; Centers for Disease Control and Prevention [CDC], 2018a; Frumovitz, 2020). From 2011 to 2015, cervical cancer deaths increased 2.3% annually (Weir, Thompson, Soman, Miller, & Leadbetter, 2015). An estimated 570,000 new cases of cervical cancer were diagnosed in 2018, representing 6.6% of all female cancers (World Health Organization [WHO], 2019). The American Cancer Society (ACS) (2020b) estimates that in 2020 13,800 cases of invasive cervical cancer will be diagnosed and approximately 4,290 women will die from cervical cancer in the United States. Incidence for cervical cancer is more prevalent among Hispanic and African American women, and the underinsured are most likely to develop cervical cancer (ACS, 2020b; Boardman, 2019; Frumovitz, 2020). The Papanicolaou (Pap) smear detects cytological abnormalities microscopically and can reduce the incidence of cervical cancer by up to 80% (ACS, 2020b; Arbyn et al., 2010).

The United States Preventive Service Task Force (USPSTF) (2018) recommends cervical cytology every three years for women aged 21 to 29 years of age. For women aged 30 to 65

years, the recommendation is to screen every three years with cytology alone, every five years with HPV alone, or every five years with cytology and HPV cotesting (USPSTF, 2018).

Healthy People 2020 has set a goal of reducing cervical/uterine cancer to 2.2 deaths per 100,000 women compared to a goal of 2.4 deaths per 100,000 women in 2007 (Office of Disease Prevention and Health Promotion [ODPHP], 2020). It is estimated that the lower death rate could be achieved through attaining a 93% screening level and applying the USPSTF guidelines (Hall et al., 2018; ODPHP, 2020). According to the CDC (2017), 69% of women 18 years of age and over received the Pap test within the past three years. Over 50% of new cervical cancer cases are estimated to occur in women who are rarely or were never screened (Crawford, Benard, King, & Thomas, 2016).

Despite the effectiveness of routine screening in the early detection of treatable dysplasia and reduced mortality from cervical cancer, many women are either not screening often enough or at all (Levano et al., 2014). To reach the Healthy People 2020 cancer reduction goal, women must be screened according to clinical practice guideline.

A Federally Qualified Health Center (FQHC) in Phoenix, Arizona provides comprehensive care to predominantly uninsured individuals of all ages. The FQHC offers primary care, prenatal care, acute and chronic illness management, and preventive care. Although the clinic makes every effort possible to deliver comprehensive care to all patients regardless of financial situation, it has struggled to meet its goal for Title X-funded cervical cancer screenings. The clinic goal is a screening rate of 65%, but they have fallen short with a rate of 54%. This may lead to undetected cancers and a preventable increase in mortality. The low screening rate could also impact funding by Title X, leading to a loss of benefit for patients.

### **Purpose and Rationale**

The purpose of this project was to identify and implement a tested intervention that has been demonstrated to increase cervical cancer screening rates in low income, medically underserved women. The overall goal is early identification and treatment of cervical dysplasia that, left undetected and untreated, could progress to cervical cancer.

### **Literature Review**

Many women are resistant to receive cervical cancer screening despite the its effectiveness in reducing risk of mortality. Reduced awareness of cancer and preventive screening tests, fear of out-of-pocket costs, anxiety regarding the procedure, and lack of time for women to make an appointment are common barriers to routine screening.

#### **Awareness**

Minority women are often unaware of cervical cancer and screening practices (Nardi, Sandhu, & Selix, 2016). Strohl et al. (2015) found that 74% of women knew that the Pap test screened for cervical cancer, but only 35% of them could accurately recognize the risk factors. Providers acknowledge that there is a lack of comprehension about what testing is being done during the pelvic exam, with some women believing the Pap is testing for sexually transmitted infections (STIs). Some also believe that the Pap test is completed with every pelvic exam (Nardi et al., 2016). Women were unaware of the recommended frequency for screening while some believed that screening was ineffective (Baezconde-Garbanati, Murphy, Moran, & Cortessis, 2013; Flores & Acton, 2013). Inadequate knowledge of the cervical cancer screening process and possible treatment options leaves women reluctant or fearful of routine testing. Nardi et al. (2016) found that many women believe that an abnormal Pap test inevitably results in a hysterectomy, or worse, death.

The CDC developed the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) to improve screening among medically underserved populations (Levano et al., 2014). The NBCCEDP works to provide low-cost cervical cancer screening to low-income, uninsured, and underinsured women (Levano et al., 2014). Although the NBCCEDP has provided more than 10 million Pap tests and diagnosed thousands of cervical cancers and precancerous cervical lesions, many women remain unaware of this benefit and consequently decline or miss opportunities for screening (Levano et al., 2014).

### **Insurance**

A data source for appraising Healthy People targets in cancer is The National Health Interview Survey (NHIS) (Brown et al., 2014). NHIS highlights a convincing association between health insurance and cancer screening completion. Zhao, Okoro, Li, and Town (2017) used the Behavioral Risk Factor Surveillance System collected data on healthcare access and cancer screenings. Participants' health insurance status was categorized as adequately insured, underinsured, or never insured. Compared to adequately insured adults, underinsured and never insured adults were 19% less likely to receive cervical cancer screening (Zhao et al., 2017). Health disparities persist despite attempts to increase health insurance coverage across the nation (Brown et al., 2014; Zhao et al., 2017).

Among insured women, 78.2% had a Pap test within the past three years; however, only 57.3% of uninsured women had a Pap test (CDC, 2017). The rates of both insured and uninsured women receiving Pap tests fall short of the Healthy People 2020 goal, but it is particularly low among the under- and uninsured. In a survey of 524 women residing in 17 counties in Texas, 61.6% of the participants claimed that out-of-pocket costs was an impediment to screening (Akinlotan et al., 2017). Likewise, in another survey of 43 participants in Britain, out-of-pocket

costs were also a barrier to obtaining the Pap test (Marlow, Waller, & Wardle, 2015). In their study, Studts and colleagues identified the circumstances that could discourage women from completing routine cervical cancer screening (Studts, Tarasenko, & Shoenberg, 2013). Of the 543 participants (67%) stated that they would be more likely to complete screening if it were covered by their insurance (Studts et al., 2013).

### **Anxiety**

In a survey of 524 women receiving grant-funded cervical cancer screening in Texas, 38.7% reported feeling anxious about the Pap test (Akinlotan et al., 2017). In the same survey, 53.1% of participants were nervous regarding the possibility of finding cancer, 25.6% reported feeling embarrassed by having the procedure done, and 23.6% anticipated a painful experience, and therefore did not follow through with screening (Akinlotan et al., 2017). Marlow et al. (2015) found that participants reported similar negative emotions regarding the screening as reasons why they have rarely or never had a Pap test.

In the Netherlands, 789 female participants 30 to 60 years of age measured health-related quality of life (HRQoL) using the EuroQol (European quality of life) classification (EQ-5D) and the 12-item Short-Form Health Survey (SF-12) (Korfage et al., 2012). More than 20% of participants reported feeling shame and apprehension during the procedure and 25% of participants viewed screening as burdensome (Korfage et al., 2012).

Studts et al. (2013) found that 78% of participants reported that fear of cancer being found made them reluctant to test at all. Additionally, 64% were hesitant to have the Pap test because their provider was male, and 56% felt embarrassed to have the test (Studts et al., 2013).

In an exploration of psychosocial barriers to cervical cancer screening of women in Mexico, researchers found that 36.9% of women reported being too embarrassed to receive

testing, 31.4% reported the Pap test makes them worry, and 24.1% were afraid the test would be too painful (Marvan, Ehrenzweig, & Catillo-Lopez, 2013).

### **Time Limitation**

Crawford et al. (2016) examined of nonfinancial barriers to civilian women in the United States meeting cervical cancer screening recommendations using the Behavioral Risk Factor Surveillance System (BRFSS). Higher percentages of never-before or rarely screened women reported multiple comorbidities such as depression, diabetes, and heart disease and cited them as a reason for not having the Pap test completed (Crawford et al., 2016). These women received routine care for their comorbidities but did not schedule extra appointments for cervical cancer screening (Crawford et al., 2016).

Women in the metropolitan Chicago area were enrolled in a qualitative study and interviewed with questions guided by the Theory of Reasoned Action to elucidate personal viewpoints that influence cancer screening decision-making (Nonzee et al., 2015). Participants mentioned work conflicts and accompanying loss of wages as a causative factor to delaying or cancelling appointments. Women also reported that the inability to find childcare was an impediment to screening (Nonzee et al., 2015).

Participants in the interviews completed by Marlow et al. (2015) identified full-time jobs and the inability to find the time to make an appointment for screening as barriers. Akinlotan et al. (2017) found that 13% of survey participants indicated lack of time as a barrier.

### **Efforts to Improve**

The Affordable Care Act (ACA) includes numerous provisions to increase cancer screening (Sabik & Adunlin, 2017). The ACA authorizes coverage for cervical cancer screenings. Medicare also offers coverage for biannual screening Pap tests and pelvic exams. A

woman of childbearing age and at high-risk for cancer with an abnormal Pap test within three years would qualify for yearly screening without copayment or deductible if her provider accepts Medicare (ACS, 2020a). As previously mentioned, the NBCCEDP provides cervical cancer screening to women without health insurance for little to no cost (CDC, 2019b). The Well-Woman Healthcheck program is a state-wide service that provides eligible women with free cervical cancer screening at community health centers and federally qualified health centers. It is part of the Bureau of Health Systems Development through the Arizona Department of Health Services, with cooperation of the CDC (Arizona Department of Health Services [AZDHS], 2020).

The Title X Family Planning Program assists with the provision of comprehensive family planning and preventive health services (Fowler et al., 2017). In 2015, 3.6 million female clients obtained care in a Title X-funded facility. Of that, more than 743,000 were screened for cervical cancer (Fowler et al., 2017). Although Title X was created to bridge the gap between the insured and uninsured receiving care, the percentage of Title X clients screened for cervical cancer declined from 51% in 2005 to 21% in 2015 (Fowler et al., 2017).

Regardless of the political, national and state actions to make insurance and cost irrelevant, women are still not screened according to guidelines. Possible remaining barriers are anxiety and inadequate funding for programs. These consistent and persistent gaps in screening have led to the clinically relevant PICO question: In the underserved female population (P), will text and online messaging reminders (I) compared to no reminders (C) affect cervical cancer screening rates (O)?

### **Search Strategy**

The databases searched for this literature review included PubMed, CINAHL, and the Cochrane Library. Initial search strategy included the keywords: *Pap smear, cervical cancer screening, reminder, phone call, compliance, and outreach*. The Boolean connector “or” was used for the main aspects of the PICO question including the intervention and the outcome. Intervention was defined as *reminder, outreach, or phone call* and the outcome of interest included *Pap smear or cervical cancer screening*. To yield a manageable search, limitations of humans and female were applied to the keywords. This modified search generated 8,798 references in PubMed; 1,875 references in CINAHL; and 70 references in the Cochrane Library.

By setting limits to English language, humans, 18 years of age or older, publication date from 2013-1019, and combining terms the results yielded were decreased to a final yield of 874 references in PubMed; 78 references in CINAHL; and 44 in the Cochrane Library. Ancestry searches led to studies published greater than five years ago or studies that had already been reviewed and deemed inappropriate for this literature review.

After critical appraisal of 24 studies, ten have been chosen for inclusion in this literature review. Exclusion criteria included unclear documentation, inconclusive evidence, or irrelevant to the project aim. Inclusion criteria were that an article evaluated the relationship between phone calls and clinic-provided reminders with cervical cancer screenings.

### **Critical Appraisal and Synthesis**

The rapid critical appraisal process described by Melnyk and Fineout-Overholt (2015) was used to evaluate the quality of the 10 articles selected for the literature review. Five of the studies were found to provide high-level evidence RCTs (Appendix A). Four articles were cohort studies, and the remaining study was a quasi-experimental study (Appendix A). All researchers

in the selected studies reported their funding source and denied any bias. All 10 studies had large sample sizes. The literature review includes an international sampling, with only four studies originating in the United States (Appendix A). Six of the interventions were executed in patient care clinics, three were based on samples of large databases, and the remaining study was executed at a school (Appendix A).

Slight heterogeneity was observed in the measurement tools and intervention designs. Interventions included letters, phone calls, and texts. One study included an educational pamphlet with a reminder call and text, while another study included a motivational interview with a reminder call (Appendix A; Appendix B). The researchers assessed completion of the Pap smear or intention to treat as a dependent variable.

In eight of the studies, researchers reported a significant increase or a moderate level of evidence suggesting an increase in Pap smear completions or intention to treat following the interventions. All intervention types had a positive effect on outcomes. The remaining two studies had an inconclusive effect (Appendix B). Strong reliability and validity can be assumed for all the selected studies due to high-quality measurement tools, rigorous methodology, and prevalence of statistically significant results (Appendix A).

### **Conclusion**

Cervical cancer remains a life-threatening disease for women. The Pap test is an effective screening method to detect cancer cells early enough for treatment. Although mortality rates have decreased since the implementation of the pap test, screening rates remain lower than the Healthy People 2020 goal (ODPHP, 2020). National funding is in place to ensure women receive this life-saving screen at little to no cost. Clinics must find a way to encourage their patients to be screened. This literature review demonstrates the range of interventions being explored to

address low cervical cancer screen rates. While there are different approaches to increase Pap smear completion, current evidence suggests that phone call or text reminders are effective interventions to motivate women to receive screening (Appendix A; Appendix B). There is evidence in the studies included in this review that letters and educational pamphlets may motivate, empower, and encourage women to make an appointment for this potentially life-saving test (Appendix B).

### **Conceptual Framework and Quality Improvement Model**

The *Interactive Model of Client Health Behavior* (IMCHB), developed by Cheryl Cox, is intended to address individual behavior through the uniqueness of the client (termed the client singularity element) and the influence of the healthcare provider through the client-provider element (Mathews, Secrest, & Muirhead, 2008). The purpose of the IMCHB is to identify the relationship between client singularity, client-provider relationship and ensuing client health care behavior (Mathews et al., 2008). A visual representation of the model demonstrates the variables that influence each element (Appendix C).

The IMCHB suggests that providers should first assess client background variables such as access to healthcare, demographics, and previous experience with health care (Mathews et al., 2008). These variables affect client motivation and cognitive perception of health. The client-professional interaction has a major influence on healthcare behavior, involving four components: health information, affective support, decisional control, and professional competencies (Mathews et al., 2008).

The *ACE Star Model of Knowledge Transformation* (Appendix D) offers a simple yet comprehensive approach to translate evidence into practice (Stevens, 2012). The *Star Model* emphasizes crucial steps to convert one form of knowledge to the next and incorporates best

research evidence with clinical expertise and patient preferences (Stevens, 2012). Represented as a five-point star, the model defines various forms of processing evidence: discovery, summary, translation, integration, and evaluation (Stevens, 2012). The goal of knowledge transformation is quality improvement of healthcare processes and outcomes.

When applied to cervical cancer screenings, providers should assess the variables that may affect the client's ability to receive care, and their beliefs associated with receiving a Pap smear. With this information, the provider can evaluate patient hesitancy or barriers to screening, select and implement a tested intervention, and assess the outcome for further practice.

### **Implications for Practice Change**

Cervical cancer is a preventable and treatable disease that remains a threat to female health and mortality. The Pap smear is recommended as part of routine gynecological screening to detect abnormal cells early and intervene appropriately before they become a malignancy. The impacts of cervical cancer are numerous; therefore, key stakeholders in proactive cervical cancer screening include: The female population in the United States, healthcare providers, insurance companies, government officials, and the public that ultimately bears the cost of cervical cancer treatment and the emotional impact when loved ones are involved.

Heterogeneity in program design implies that different kinds of interventions can effectively increase cervical cancer screening rates. Though heterogeneity is seen in the evidence, patient reminders involving phone calls, texts, and education have proven to be most effective (Appendix F). Healthcare systems across the United States should design and implement feasible reminder systems that will empower the patient to obtain routine, potentially life-saving screenings.

Patients should have access to culturally and linguistically appropriate educational material in the clinic to provide information on the importance and value of screening. Clinics should complete phone calls and text reminders that include accommodations for the visually and hearing impaired before USPSTF recommended patient screening is due. Recording pap smear completion percentages is recommended to monitor outcomes of the reminder strategy. Following the intervention, details outlining the program design and results should be published to guide further practice.

## **Methods**

### **Inclusion and Exclusion Criteria**

Inclusion criteria were female patients aged 21 to 65 years who have had an office visit in the past 2 years but have not had a pap test in the past 3 years. Patients involved are English and Spanish speaking and registered onto the messaging system.

Exclusion criteria were patients who have opted out of being contacted via electronic messages, patients who have not been to the clinic in over 2 years, patients with a history of hysterectomy, and female patients who had a pap test within 3 years. Minors and women under age 21 were excluded because the standard of care is to initiate cervical cytology screening until age 21. Pregnant women not included because a pap test is routinely performed as part of prenatal care. Women who were prisoners, Native Americans, and undocumented were not specifically included or excluded.

### **Ethical Considerations**

The Arizona State University Institutional Review Board approved this project as exempt. Patients specify how they prefer to be contacted when they register to the clinic. De-identified data was obtained using the clinic EHR. Data was stored on a password protected

server at the project site. Because the collected data will be part of the routine reporting of uniform data system (UDS) required by federal agencies, the data will be stored for up to 7 years under the usual processes for the maintaining the security of patient health information (PHI). Those who had access to the data include Maria Babb (project director), the primary investigator and faculty mentor, Dr. Denise Link, the Arizona State University Graduate Research Support Department, the patient advocate at Wesley Community Health Center, Gabby Hernandez, the quality improvement registered nurse, Lisa Carranza, and the project champion at Wesley, Dr. Caitlin Lee. Other clinic personnel concerned with cervical cancer screening had access to the de-identified data. No personal identifiers will be collected or stored with the data.

### **Project Description**

Patients from Wesley Health Center specify when first registered to the clinic the method of communication by which they would like to be contacted, if any. The staff sent out a motivational message with educational resources to patients via text message or health portal message, depending on the patients' stated preferred method of contact. Materials used to remind patients were notice of overdue screening (per USPSTF guidelines), a motivational message, and educational material regarding cervical cancer screening. The educational material was provided by the National Cancer Institute (2019), and the reminder message was uploaded from the EHR.

The message was sent instantly through the EHR. Patients that met the eligibility criteria to receive the messages were identified by the EHR through a pre-set process that selects the appropriate patients. The reminder utilized mass motivational messaging to enhance the strength of patients' attitudes toward potentially avoiding cancer, prompting them to stay up to date on screening, and improve overall screening rates at the clinic.

The number of patient appointments made following the reminder text were collected two months after the message is sent. The staff will query the EHR to determine the number of patients that successfully received the message, the number of patients that made an appointment for a pap smear after receiving the message, and then number of patients that did not respond and/or did not successfully receive the message. The data was assessed using established Uniform Data System for coding visits that include a pap test among women who met the criteria for receiving the message. No patient records were queried to determine if specific individuals scheduled or completed appointments for a pap test.

Age, ethnicity, and insurance status of patients who made an appointment following the reminder were collected and reported in aggregate to assess and compare the response to the intervention based on the three identified demographic characteristics. No individual patient records were accessed. There was no long term follow up. There was no compensation for patients who obtain a pap test during the project period.

There were no costs to patients other than what they would otherwise incur as a result of obtaining a pap test during the project. The cost of the reminder system through E-Cerner Works (ECW) cost \$0.15 per patient, or \$216 total. Costs of the project were offset through Title X and Well Woman HealthCheck Program funding (Appendix E).

## **Results**

In total, 1,710 patients successfully received the message, 156 responses were collected, and 28 patients made an appointment for screening. This represents a 2% improvement from previous months. Summary statistics were calculated for each interval and ratio variable. Frequencies and percentages were calculated for each nominal variable.

### **Frequencies and Percentages**

The most frequently observed category of Ethnicity was Hispanic/Latina ( $n = 24$ , 86%). The most frequently observed category of Insurance was Title X ( $n = 13$ , 46%). The average age of patients included in the data report was 41.04 with a range of 21 years to 58 years of age ( $SD = 9.93$ ). The summary statistics can be found in Appendix F.

### **Discussion**

Unlike the studies in the literature review, this project was completed at a FQHC where patients are mostly uninsured, underinsured, and may not have ever received a Pap test before. The project brought awareness to patients about the importance of screening and the availability of government assistance programs to help them receive screening at little to no cost. The project also helped expedite reminders to patients, saving staff time and resources. Although the number of appointments made in response to the message were small, the number of patients responding to the message was significant, suggesting the potential to have a greater impact if changes are made to the intervention. The project can be sustained if patient overdue screening statuses were updated in the EHR and the patient response to the reminder message were more interactive.

### **Limitations and Barriers**

Patients at Wesley do not exclusively obtain their recommended cervical cancer screenings at that site. Many patients seek care at other Maricopa County clinics, and staff at Wesley are often left with the task of requesting outside records. An interactive type of message may be more useful and enable Wesley to document that the women are being appropriately screened and improve the accuracy of their compliance with pap testing standards.

The message was unclear. Patients were given the option to reply 'yes' or 'no' if they were up to date on testing. Upon data analysis, it appeared many patients were responding 'yes' to needing an appointment when they were responding that they were already up to date.

### **Recommendations for Future Research**

The EHR reminder system allowed for the message to be revised. Instead of stating if they recently had testing, the patients should have simply been able to choose to make an appointment or not in response to the message to better determine the effectiveness of the message. A smaller sample size of active patients with known overdue Pap test status may have helped determine if the message prompted patients to make an appointment. After patients confirm an appointment date, reminders should be sent to ensure the patient arrives for their appointment.

### **Conclusion**

Cervical cancer remains a leading cause of gynecological death for women in the United States despite the availability and effectiveness of preventive screening. Populations most affected are minority and underserved women. Barriers to screening include anxiety, lack of awareness, and fear of out of pocket costs. A motivational message sent to patients at a FQHC with a notice of overdue screening, patient education regarding cervical cancer, and information about government assistance for free or low cost screening resulted in a 2% increase in screening. Further research is necessary to observe methods to improve cervical cancer screening among vulnerable, underserved women.

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Appendix A  
Evaluation Table

Citation	Theory/Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level of Evidence; Application to Practice
Broberg, et al. (2013). Increasing participation in cervical cancer screening; Telephone contact with long-term non-attendees in Sweden. Results from RACOMIP, a randomized controlled trial.	Health Promotion Model	<b>Design:</b> RCT  <b>Purpose:</b> To assess the effectiveness of a telephone call offering an appointment for a Pap smear or by mail offering a HPV home test.	N= 8,800  CG: 4,000  IG: 4,000  <b>Demographics:</b> M age: 46.8 yrs (9.42) G: female  <b>Settings:</b> NPR in Western Sweden  <b>Exclusion:</b> Hyst without hx abnormal pap,	CG: Mail reminder  IV: telephone call reminder  DV1: 3-month follow-up  DV2: 12-month follow-up	Difference in frequency of testing	SPSS, R ver. 2.11.1, Logistic regression model	DV1: IG-13.0% CG-3.9% (RR 3.37, 95% CI 2.83-4.01)  DV2: IG-18.0% CG-10.6% (RR 1.70, 95% CI 1.52-1.90)	LOE II  <b>Strength:</b> Cost-effective, RCT  <b>Weakness:</b> Reasons why declined testing not always documented; Calls only made during daytime business hours

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<p>Country: Sweden</p> <p>Funding: Swedish Cancer Society and the Health &amp; Medical Care Committee of the Regional Executive Board, Vastra Gotaland</p> <p>Bias: none</p>			<p>nonresident of western region</p> <p><b>Inclusion:</b> 30- 53 yrs old without pap &gt;6 yrs, &gt;54 without pap &gt;7 yrs, 55- 62 years old without pap &gt;8 yrs</p>					<p><b>Conclusion:</b> Increased pap smear rates with reminder calls</p> <p><b>Feasibility:</b> Recommend for use in practice, intervention effective</p>
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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentati on	Data Analysis	Findings / Results	Level of Evidence/ Application to Practice
<p>MacLaughlin, et al. (2018). Impact of patient reminders on Papanicolaou test completion for high-risk patients identified by a clinical decision support system</p> <p><b>Country:</b> United States</p> <p><b>Funding:</b> Mayo Clinic</p> <p><b>Bias:</b> None</p>	<p>Health Promotion Model</p>	<p><b>Design:</b> Prospective Cohort Study</p> <p><b>Purpose:</b> To compare response rates (Pap r Pap/HPV co-test completion) among women sent electronic or written reminders</p>	<p>N=773 <b>IV:</b> n=257 <b>CG:</b> n=516</p> <p><b>Demographi cs:</b> M age: 43.9yrs A: 2.5% AA: 7.0% C: 89.3% L: 1.2%</p> <p><b>Setting:</b> Three primary care sites associated with Mayo Clinic in Rochester, Minnesota</p>	<p><b>CG:</b> Mailed letter</p> <p><b>IV:</b> Electronic reminder</p> <p><b>DV:</b> Completion of Pap or Pap/HPV co-test</p>	<p>CDSS</p> <p>Response rates</p>	<p>mean (SD), count, percentages</p> <p>Generalized estimating equation extension</p> <p>Logistic regression model</p>	<p><b>DV:</b> IV: 23.7%, CG: 3.3%, OR 8.27, 95% CI (4.64-14.75), p&lt;0.001, significant</p>	<p>LOE: IV</p> <p><b>Strength:</b> Developed CDSS to improve patient care</p> <p><b>Limitation:</b> Primarily white and insured patients, distinctiveness of CDSS limit to only Mayo practice settings</p> <p><b>Conclusion:</b> Significant increase in test completion; CDSS enables delivery of individualizing care with reminders</p> <p><b>Feasibility:</b> CDSS may not be feasible in</p>

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			<p><b>Inclusion:</b> Women 18-65 yrs at high risk for CC</p> <p>High Risk: Women with hx abnormal pap test, HPV test, or colposcopy overdue for follow-up, and women with previous cancer, HIV, or other immunodeficiency with &gt;1yr since pap</p> <p><b>Exclusion:</b> Women with appointment, low life-expectancy,</p>					all practices, but electronic and written reminders were shown to be effective
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			Previous care at outside facility  <b>Attrition:</b> N/A					
<b>Citation</b>	<b>Theory/ Conceptual Framework</b>	<b>Design/ Method</b>	<b>Sample/Setting</b>	<b>Major Variables &amp; Definitions</b>	<b>Measurement/ Instrumentation</b>	<b>Data Analysis</b>	<b>Findings / Results</b>	<b>Level of Evidence/ Application to Practice</b>
Abdul Rashid et al. (2013). Is the phone call the most effective method for recall in cervical cancer screening? Results from a randomized control trial.  <b>Country:</b> Malaysia  <b>Funding:</b>	Health Promotion Model	<b>Design:</b> Prospective, randomized control study  <b>Purpose:</b> To compare the effectiveness of different methods of recall for repeat Pap smear among women who had normal	N=1,000  CG:250 IG1:250 IG2:250 IG3:250  <b>Demographics:</b> M age group: 35-44.9yrs Malaysian: 72% Chinese: 13% Indian: 15%	<b>CG:</b> Letters <b>IV2:</b> RL <b>IV3:</b> SMS <b>IV4:</b> Call  <b>DV1:</b> Pap smear completion <b>DV2:</b> No pap smear	OpenEpi Program, SIPPS, percentages	SPSS, $\chi^2$ test, binary logistic regression	<b>DV1:</b> CG: 18.8% IV1: 20.0%, IV2:21.6% IV3:34.4%  <b>DV2:</b> CG: 81.2% IV1: 80.0%, p>0.05,	<b>LOE:</b> II  <b>Strength:</b> RA blinded to intervention; RCT  <b>Weaknesses:</b> selection bias, only phone call yielded significant results, p>0.05 for SMS and registered letter, outreach only to women previously tested and more

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<p>University of Malaysia, Kuala Lumpur  <b>Bias:</b> selection bias: only chose women who had previous normal pap smear</p>		<p>smears in the previous screening.</p>	<p><b>Setting:</b> All community clinics in Klang under the MHMM</p> <p><b>Inclusion:</b> Responded to first email, no diagnosis of positive smear, due for next screening</p> <p><b>Exclusion:</b> Abnormal first pap smear</p> <p><b>Attrition:</b> 19%</p>				<p>OR 1.13, CI 0.72-1.77.                  IV2: 78.4%, p&gt;0.05, OR 1.20, CI 0.76-1.87                  IV3: 65.6%, p&lt;0.05, OR 2.38, CI 1.56-3.62</p>	<p>likely to come back on own</p> <p><b>Conclusion:</b> Significant positive feedback from phone call group</p> <p><b>Feasibility:</b> Phone call reminders can be done in office</p>
Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables/ Definitions	Measurement/ Instrumentation	Data Analysis	Findings / Results	Level of Evidence/ Application to Practice

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<p>Ganta et al. (2017). Timely reminder interventions to improve annual Papanicolaou (pap) smear rates among HIV-infected women in an outpatient center of southern Nevada: A short report</p> <p><b>Country:</b> United States</p> <p><b>Funding:</b> HRSA Ryan White Part D Program and Healthy Sunrise Program</p> <p><b>Bias:</b> None</p>	<p>Health Promotion Model</p>	<p>Quasi-experimental</p> <p><b>Purpose:</b> To test the effectiveness of reminders by phone call or text on improvement of pap smear rates</p>	<p>N= 485</p> <p><b>Demographics:</b> M age: 46.7 years AA 54.6%</p> <p><b>Setting:</b> HIV wellness center in southern Nevada</p> <p><b>Inclusion:</b> No pap smear in past year, 18 yrs and older, HIV positive</p> <p><b>Exclusion:</b> hysterectomy, already diagnosed cervical carcinoma, male-to-</p>	<p><b>CG:</b> before communication effort</p> <p><b>IV:</b> Texts and phone calls</p> <p><b>DV:</b> pap smear completion</p>	<p>ACCESS database, percentages, response rates</p>	<p>McNemar’s test for marginal homogeneity. SAS version 9.2</p>	<p><b>DV:</b> CG: 2.5% IV: 11.8%, p&lt;0.0001</p>	<p><b>LOE:</b> III</p> <p><b>Strength:</b> Significant increase in pap smear completion with intervention</p> <p><b>Weakness:</b> Participants given \$10 gift card, did not specify if participants knew in advance; could have altered success of study</p> <p><b>Feasibility:</b> Intervention can be done in office. Most patients respond to communication via phone</p>
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			female transgender, moved out of country <b>Attrition:</b> 4%					
<b>Citation</b>	<b>Theory/ Conceptual Framework</b>	<b>Design/ Method</b>	<b>Sample/ Setting</b>	<b>Major Variables/ Definitions</b>	<b>Measurement/ Instrumentation</b>	<b>Data Analysis</b>	<b>Findings / Results</b>	<b>Level of Evidence/ Application to Practice</b>
Firmino-Machado et al. (2017). Stepwise strategy to improve cervical cancer screening adherence (SCANN-CC): Automated text messages, phone calls and face-to-face interviews: Protocol of a population based randomized controlled trial.	Health Promotion Model	RCT  <b>Purpose:</b> To test the effectiveness of invite to cervical cancer screen through low-cost, customized text messages, phone calls and reminders.	N=1220 CG: 615 IV: 605  <b>Demographics:</b> M age group: 25-34 yrs S: 4.6% E: 71.9% U: 22.1% R: 1.5%  <b>Setting:</b> 13 Portuguese primary care units	<b>CG:</b> Invitation by letter  <b>IV:</b> Phone call/text message  <b>DV:</b> ITT	1:1 Randomization sequence, percentages, ITT	Chi-squared tests, binary logistic regression, stratified analysis.	<b>DV:</b> CG: 25.7% IV: 39.0%, OR 1.85 (95% CI 1.45-2.36)	<b>LOE: II</b>  <b>Strength:</b> population-based RCT  <b>Weakness:</b> only included women under 50 years old, non-blinded study,  <b>Feasibility:</b> Can be done in office. Cost-effective.

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<p><b>Country:</b> Portugal</p> <p><b>Funding:</b> ACeS Porto Ocidental and Marão e Douro Norte and the Instituto de Saúde Pública da Universidade do Porto(ISPUP).</p> <p><b>Bias:</b> none</p>			<p><b>Inclusion:</b> Age 25-49yrs Female, Eligible for screening, member of primary care units that preform letter invitations</p> <p><b>Exclusion:</b> no mobile phone number on national database</p> <p><b>Attrition:</b> none</p>					
Citation	Theoretical/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables/ Definitions	Measurement/ Instrumentation	Data/ Analysis	Findings / Results	Level of Evidence/ Application to Practice

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<p>MacLaughlin et al. (2014). Cervical cancer screening: A prospective cohort study of the effects of historical patient compliance and population-based informatics prompted reminder on screening rates.</p> <p><b>Country:</b> United States</p> <p><b>Funding:</b> Mayo Clinic</p> <p><b>Bias:</b> None noted</p>	<p>Health Promotion, Transtheoretical Model</p>	<p>Prospective cohort study</p> <p><b>Purpose:</b> To assess the impact of historical screening compliance with the effectiveness of patient reminder letters on cervical cancer screening rates.</p>	<p>N=2,701</p> <p><b>CG:total 1,906</b></p> <p>NE UTD: 507</p> <p>NW UTD: 360</p> <p>NE OD: 1,106</p> <p>NW OD: 728</p> <p>IV: 795</p> <p><b>Demographics:</b> M age group: 35-39yrs C: 86.8%</p> <p><b>Setting:</b> MFC NE and MFC NW</p> <p><b>Definition:</b> UTD:</p>	<p><b>CG:</b> No letter</p> <p><b>IV:</b> Patient reminder letters</p> <p><b>DV:</b> ITT</p>	<p>Percentages of ITT</p>	<p><math>\gamma^2</math> test (Fisher's exact test for rare characteristics), Bonferonni correction, MLR, SAS 9.2,</p>	<p><b>DV:</b> CG: NE UTD: 80.3%, (p&lt;0.001) NW UTD: 75.1% (p 0.007) NE OD: 39.3% (p&lt;0.001) NW OD: 38.9% (p&lt;0.001)  <b>IV:</b> 39.0%, (p&lt;0.001)</p>	<p><b>LOE: IV</b></p> <p><b>Strength:</b> Produced statistically significant results</p> <p><b>Weakness:</b> More positive feedback from already-compliant group. Not significant ITT in OD groups.</p> <p><b>Feasibility:</b> Can be done in office</p>
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			<p>Last pap 3 years ago                  OD:                  Unknown last pap date</p> <p><b>Inclusion:</b>                  Women 21-64yrs, no cervical cancer screening within 3 yrs of study</p> <p><b>Exclusion:</b>                  Hx CC or hyst</p> <p><b>Attrition:</b>                  22.6%</p>					
<b>Citation</b>	<b>Theoretical/ Conceptual Framework</b>	<b>Design/ Method</b>	<b>Sample/ Setting</b>	<b>Major Variables/ Definitions</b>	<b>Measurement/ Instrumentation</b>	<b>Data/ Analysis</b>	<b>Findings / Results</b>	<b>Level of Evidence/ Application to Practice</b>

Key: **AA**- African American; **ACS**- American Cancer Society; **A**- Asian; **C**- Caucasian; **CC**- Cervical Cancer; **CDSS**- Clinical Decision Support System; **CG**-Control Group; **CI**- Confidence Interval- **DV**-dependent variable; **E**- Employed; **G**- Gender; **HIV**-Human Immunodeficiency Virus; **HL GOTT**-Hosmer-Lemeshow Goodness-of-Fit Test; **HPV**-Human Papilloma Virus; **Hyst**- Hysterectomy; **Hx**-History; **IG**- Intervention Group; **ITT**-Intention to Treat; **IV**- independent variable; **L**- Latina; **LOE**- Level of Evidence; **M**-Mean; **MFC**- Mayo Family Clinic; **MHM**- Ministry of Health Malaysia; **MLR**-Multivariate Logistic Regression; **N**-number of studies; **n**- number of participants; **NCI**- National Cancer Institute; **NE**- Northeast; **NPR**- National Population Register; **NW**- Northwest; **OD**-Overdue; **OR**-Odds Ratio; **Pap**- Pap smear; **R**-Retired; **RA**- Research Assistant; **RCT**-Randomized Controlled Trial; **RL**-Registered Letter; **RR**- Risk Reduction; **S**-Student; **SD**-Standard Deviation; **SIPPS**- Pap smear program information system; **SMS**- Short Message System; **U**-Unemployed; **UTD**- Up to Date; **Wks**-Weeks; **Yrs**- years

<p>Bowles et al. (2016). Comparative effectiveness of two outreach strategies for cervical cancer screening</p> <p><b>Country:</b> United States</p> <p><b>Funding:</b> ACS, NCI</p> <p><b>Bias:</b> none</p>	<p>Health Promotion, Transtheoretical Method</p>	<p><b>Design:</b> Cohort study  <b>Purpose:</b> To compare the effectiveness of a birthday reminder letter to a cervical cancer screening-specific reminder letter on Pap test adherence</p>	<p>N=119,497                  IV1: 53,571                  IV2: 65,926</p> <p><b>Demographics:</b>                  M age group: 51-65 yrs                  C: 58.7%                  Not C: 14.9%                  Unknown: 26.4%</p> <p><b>Setting:</b>                  Group Health, healthcare delivery system in Washington State</p> <p><b>Inclusion:</b>                  21-64 yrs,</p>	<p><b>IV1:</b> Pap letters  <b>IV2:</b> Reminder Birthday Letters  <b>DV:</b> Adherence to CC screen</p>	<p>Percentages of pap completion</p>	<p>95% CI to unadjusted adherence to CC screen, SAS</p>	<p><b>DV:</b>                  IV1                  UTD: 46.8%, 95% CI (46.3, 47.4)                  IV1 OD: 22.1% 95% CI (21.7, 22.5)                  IV2                  UTD: 26.0%, 95% CI (25.7, 26.3)                  IV2 OD: 21.6%, 95% CI (21.2, 22.1), p&lt;0.001</p>	<p><b>LOE: IV</b></p> <p><b>Strength:</b> Can be done in office, cost-effective</p> <p><b>Weakness:</b> Lack of control group, UTD patients had highest adherence (unknown if intervention was the factor)</p> <p><b>Feasibility:</b> Provides insight which reminder interventions work</p>
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			Continuously enrolled in GH for 3 yrs before study.  <b>Exclusion:</b> Hysterectomy, multiple letters received, not enough time between letter and pap due date  <b>Attrition:</b> <b>59.4%</b>					
<b>Citation</b>	<b>Theoretical/ Conceptual Framework</b>	<b>Design/ Method</b>	<b>Sample/ Setting</b>	<b>Major Variables/ Definition</b>	<b>Measurement/ Instrumentation</b>	<b>Data/ Analysis</b>	<b>Results/ Findings</b>	<b>Level of Evidence/ Application to Practice</b>
Tavasoli et al. (2016). Impact of invitation and reminder letters on cervical	Transtheoretical Model; Health Promotion	Cohort study  <b>Purpose:</b> Explore the impact of	<b>N:</b> 229, 459 <b>CG:</b> 130,181 <b>IV:</b> 99,278	<b>IV:</b> Invitation to screen letter	Percentages of ITT	Cross-sectional analysis, Univariate analysis, chi-	<b>DV:</b> <b>CG:</b> 8.5% <b>IV:</b> 14.1%,	<b>LOE:</b> IV  <b>Strengths:</b> significant result, had

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<p>cancer screening participation rates in an organized screening program</p> <p><b>Country:</b> Canada</p> <p><b>Funding:</b> Cancer Care Ontario;</p> <p><b>Bias:</b> none</p>		<p>invitation and reminder letters on Pap uptake comparing women who received the intervention with a historical no-intervention group</p>	<p><b>Demographics:</b> M age group: 50-54yrs No pap &gt;5yrs: 76.9% Pap 3-5yrs: 23.1% Urban Lowest income: 19.2% Urban highest income: 15.8% Rural Lowest income: 0.01% Rural highest income: 0.02%</p> <p><b>Setting:</b> Ontario</p> <p><b>Inclusion:</b></p>	<p><b>DV:</b> Pap completion/ITT within 9 months</p>		<p>square test, sensitivity analysis, bivariate analysis</p>	<p>(OR=1.8, 95% CI 1.7-1.8)</p>	<p>a control group, large sample size</p> <p><b>Weakness:</b> could not randomize, unknown how many women did not receive letter, only returned letters were considered not received</p> <p><b>Application to Practice:</b> Can be done in office, cost-effective</p>
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			<p>Women 30-69yrs. No pap in 3 yrs. No colpo for dysplasia in 3 yrs.</p> <p><b>Exclusion:</b> Hysterectomy, recent pap</p> <p><b>Attrition:</b> 13.7%</p>					
Citation	Theoretical/Conceptual Framework	Design/Method	Sample/Setting	Major Variables/Definition	Measurement/Instrumentation	Data/Analysis	Results/Findings	Level of Evidence/Application to Practice
Abdullah, F., & Su, T.T. (2013). Applying the transtheoretical model to evaluate the effect of a call-recall program in enhancing pap	Transtheoretical Model	Two-armed, paralleled group, unblinded cluster randomized trial  <b>Purpose:</b>	<p><b>N= 398</b></p> <p>CG: 202 IV: 201</p> <p><b>Demographics:</b> M age: IV 36.1 ± 8.0</p>	<b>IV:</b> personal invitation letter with information pamphlet, followed by telephone reminder	Percentages of action stage	t-test for continuous variables, chi square test for categorical data. Multivariate logistic	<b>HL GOTT:</b> 3.74 (p=0.880) indicates well calibrated model	<b>LOE: II</b>  <b>Strength:</b> RCT, produced significant results  <b>Weakness:</b> unblinded, participants knew

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<p>smear practice: A cluster randomized trial</p> <p><b>Country:</b> Malaysia</p> <p><b>Funding:</b> University of Malaysia</p> <p><b>Bias:</b> none</p>		<p>To evaluate the effect of a call-recall approach in enhancing pap smear practice by changes of motivation stage among non-compliant women</p>	<p>CG 36.5 ±7.3, p =0.455</p> <p>Education IV: Graduate Degree 90.0</p> <p>CG: Graduate Degree 89.1, p=0.939</p> <p>Previous pap IV: 34.3 CG: 41.6 P=0.133</p> <p><b>Setting:</b> Public secondary schools</p> <p><b>Inclusion:</b> Female secondary teachers naïve to pap</p>	<p>CG: usual care/no intervention</p> <p><b>DV:</b> pap smear completion within 24 wks</p>		<p>regression, univariate analysis, HL GOTT, SPSSv15</p>	<p><b>DV:</b> IV: 18.1%</p> <p>Univariate modeling OR 1.98, 95% CI 1.1-3.5</p> <p>Multivariate modeling OR 2.44, 95% CI 1.29-4.62, p≤ 0.25</p> <p>CG:10.1 %</p>	<p>they were being studies which could have affected outcome</p> <p><b>Application to Practice:</b> Can be done in office, Shows promise in reaching normally hard-to-reach patients</p>
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			smear or had their last test >3 yrs <b>Exclusion:</b> no response  <b>Attrition:</b> 0.2%					
<b>Citation</b>	<b>Theoretical/ Conceptual Framework</b>	<b>Design/ Method</b>	<b>Sample/ Setting</b>	<b>Major Variables/ Definition</b>	<b>Measurement/ Instrumentation</b>	<b>Data/ Analysis</b>	<b>Results/ Findings</b>	<b>Level of Evidence/ Application to Practice</b>
Nicolau et al. (2017). Telephone interventions in adherence to receiving the pap test report: A randomized clinical trial.  <b>Country:</b> Brazil <b>Funding:</b> None specified	Transtheoretical Model/ Health Promotion Model	RCT  <b>Purpose:</b> To test the efficacy of the behavioral and educational interventions using the telephone for women’s attendance at the	<b>N=510</b> CG: 169 IV1: 171 IV2: 170  <b>Age:</b> CG: 36.4yrs IV1: 37.4yrs IV2: 37.9yrs  <b>Marital Status:</b> CG: With partner: 52%	<b>IV1:</b> telephone call/educational intervention (motivational interview)  <b>IV2:</b> Telephone call/reminder intervention	Frequencies and percentages	SPSS v20.0, mean, SD, CI 95%, frequencies and percentages, ANOVA, Pearson Chi-Squared Test	<b>DV:</b> CG: 66.9%, IV1: 91.8%, p=0.000, RR 1.39 CI 95% (1.24-1.55)  IV2: 93.5%, p=0.000, RR 1.40,	<b>LOE: II</b>  <b>Strength:</b> blinded RCT, significant results; simple and efficacious interventions  <b>Weakness:</b> Short time period for assessing return  <b>Application to Practice:</b>

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<p><b>Bias:</b> None specified</p>		<p>consultation where they receive the pap test report</p>	<p>No partner: 48% IV1: Partner: 50.3% No Partner: 49.7% IV2: Partner: 55.8% No Partner: 44.2%</p> <p><b>Setting:</b> Ligia Barros Costa Natural Birth Center, Brazil</p> <p><b>Inclusion:</b> &gt;18yrs, Initiated sexual activities, to undertake pap test in data</p>	<p><b>CG:</b> comparison group</p> <p><b>DV:</b> Patient return rate</p>			<p>CI 95% (1.25-1.57)</p>	<p>Simple, low-cost, and fast intervention that can be done in office</p>
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Key: **AA-** African American; **ACS-** American Cancer Society; **A-** Asian; **C-** Caucasian; **CC-** Cervical Cancer; **CDSS-** Clinical Decision Support System; **CG-**Control Group; **CI-** Confidence Interval- **DV-**dependent variable; **E-** Employed; **G-** Gender; **HIV-**Human Immunodeficiency Virus; **HL GOTT-**Hosmer-Lemeshow Goodness-of-Fit Test; **HPV-**Human Papilloma Virus; **Hyst-** Hysterectomy; **Hx-**History; **IG-** Intervention Group; **ITT-**Intention to Treat; **IV-** independent variable; **L-** Latina; **LOE-** Level of Evidence; **M-**Mean; **MFC-** Mayo Family Clinic; **MHM-** Ministry of Health Malaysia; **MLR-**Multivariate Logistic Regression; **N-**number of studies; **n-** number of participants; **NCI-** National Cancer Institute; **NE-** Northeast; **NPR-** National Population Register; **NW-** Northwest; **OD-**Overdue; **OR-**Odds Ratio; **Pap-** Pap smear; **R-**Retired; **RA-** Research Assistant; **RCT-**Randomized Controlled Trial; **RL-**Registered Letter; **RR-** Risk Reduction; **S-**Student; **SD-**Standard Deviation; **SIPPS-** Pap smear program information system; **SMS-** Short Message System; **U-**Unemployed; **UTD-** Up to Date; **Wks-**Weeks; **Yrs-** years

			<p>collection period, and have mobile or telephone</p> <p><b>Exclusion:</b> Pathology related to mental processes, speaking, or hearing, which would make it difficult to respond to questionnaire</p>					
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Key: **AA-** African American; **ACS-** American Cancer Society; **A-** Asian; **C-** Caucasian; **CC-** Cervical Cancer; **CDSS-** Clinical Decision Support System; **CG-**Control Group; **CI-** Confidence Interval- **DV-**dependent variable; **E-** Employed; **G-** Gender; **HIV-**Human Immunodeficiency Virus; **HL GOTT-**Hosmer-Lemeshow Goodness-of-Fit Test; **HPV-**Human Papilloma Virus; **Hyst-** Hysterectomy; **Hx-**History; **IG-** Intervention Group; **ITT-**Intention to Treat; **IV-** independent variable; **L-** Latina; **LOE-** Level of Evidence; **M-**Mean; **MFC-** Mayo Family Clinic; **MHM-** Ministry of Health Malaysia; **MLR-**Multivariate Logistic Regression; **N-**number of studies; **n-** number of participants; **NCI-** National Cancer Institute; **NE-** Northeast; **NPR-** National Population Register; **NW-** Northwest; **OD-**Overdue; **OR-**Odds Ratio; **Pap-** Pap smear; **R-**Retired; **RA-** Research Assistant; **RCT-**Randomized Controlled Trial; **RL-**Registered Letter; **RR-** Risk Reduction; **S-**Student; **SD-**Standard Deviation; **SIPPS-** Pap smear program information system; **SMS-** Short Message System; **U-**Unemployed; **UTD-** Up to Date; **Wks-**Weeks; **Yrs-** years

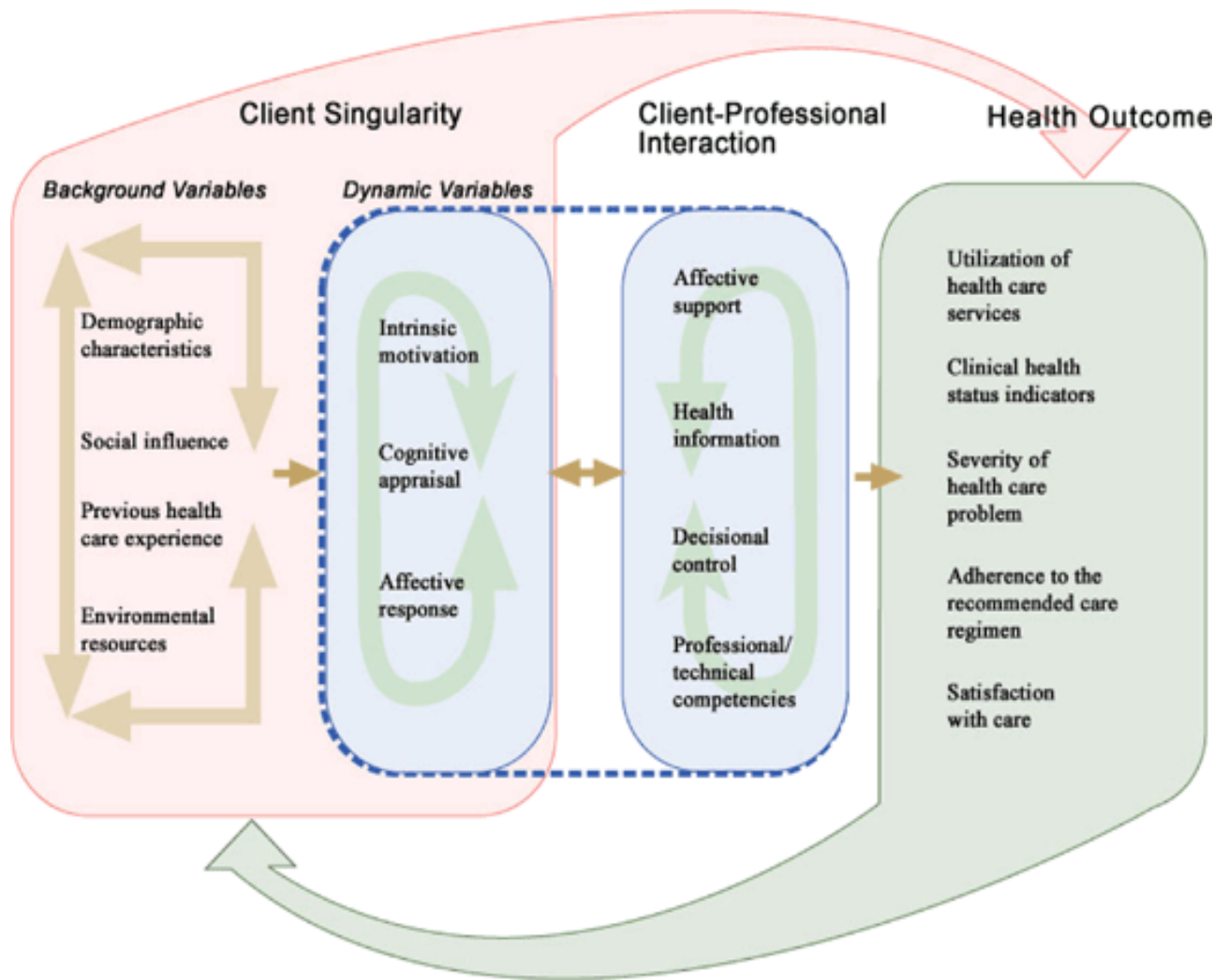
Appendix B  
Synthesis Table

	Studies	Brobeg et al.	MacLaughlin et al.	Abdul Rashid et al.	Ganta et al.	Firmino-Machado et al.	MacLaughlin et al.	Bowles et al.	Tavasoli et al.	Abdullah & Su	Nicolau et al.
<b>Basics</b>	Year	2013	2018	2013	2017	2017	2014	2016	2016	2013	2017
	LOE	II	IV	II	III	II	IV	IV	IV	II	II
	Design	RCT	PCS	PRCT	QE	RCT	PCS	CS	CS	TAPG, UCRT	RCT
	Number of Participants	8,800	773	1,000	485	1,220	2,701	119,497	229,459	398	510
<b>Interventions</b>	Call	X		X	X	X					X
	ER		X								
	SMS			X	X	X					
	Letter			X			X	X	X		
	L/P/T									X	
	MI										
	BL							X			
<b>Outcomes</b>	Significant Pap smear increase	X	X	X	X	X			X	X	X
	Small pap smear increase						X	X			
	No pap smear increase										

Key: **LOE**- Level of Evidence; **ER**- Electronic Reminder; **SMS**- text; **L/P/T**- Letter/Pamphlet/Telephone; **MI**- Motivational Interview; **BL**- Birthday Letter

Appendix C

Interaction Model of Client Health Behavior



Appendix D

ACE Star Model of Knowledge Transformation



Appendix E  
Budget Plan

**Budget**

<b>Phase</b>	<b>Activities</b>	<b>Cost</b>	<b>subtotal</b>	<b>Total</b>
<b>Direct Costs</b>	Specimen collection devices for pap smear (Sonora Quest lab)	\$0		
	Gloves (\$2.95/100 gloves)	\$84.96		
	Plastic disposable speculum (\$5.00/10)	\$720		
	Blue Chux (\$24.59/pack of 50)	\$708.19		
	Wipes (\$6.28/240 pack)	\$37.68		
	Reminder system use through EClinical Works(\$0.15/patient)	\$216		
	EHR Build	\$96		
	Reminder system use	\$160	\$2,022.83	
<b>Indirect Costs</b>	EMR reminder system training: Medical Assistant	\$240		
	Translator training	\$160		
	Front desk staff training	\$240	\$640	
<b>Funding</b>	Title X		Offsets costs	\$0
	Well Woman Health Check Program (WWHCP)		Offsets costs	\$0
<b>Potential Revenue</b>	Title X (\$124.78/patient)	\$17,968.32		
	WWHCP (\$73.81/patient)	\$95,657.76		\$113,626.08

**Budget Justification:** The project is creating a mass reminder system through the EHR, EClinical Works, to encourage patients who are overdue for cervical cancer screenings to make an appointment for updated screening.

The budget is based on the 1,440 patients who are overdue. The staff involved are the ones carrying out the intervention (IT support, medical assistants, front desk staff, and translators).

A. Direct Costs

- a. Materials used to collect cervical cancer screening specimen.
- b. Reminder system is using the EMR portal to send reminder messages to patients to make an appointment for screening. The system charges \$0.15 per patient when sending a mass message
- c. EHR build based on \$24/hr average pay for IT support. Estimate 4 hours for EHR build.
- d. Reminder system use: Assuming it will take 1 hour to send mass reminder message per MA, front desk staff, and translator.

B. Indirect costs

- a. Average medical assistant and front desk staff pay \$15/hr. Estimate 4hrs to complete training for new EHR reminder system. Cost is based on 4 employed medical assistants and 4 front desk staff
- b. Average translator pay \$20/hr. Estimate 4hrs to complete EHR training. Cost based on 2 employed translators.

C. Funding

- a. Provided by Title X and WWHCP. The amount given to the clinic will cover the costs of the project.

D. Potential Revenue

- a. Title X allots \$218,375 for 1,750 patients. This comes out to \$124.79 per patient. ( $124.79 \times 1,440 = 179,691$ )
- b. WWHCP reimburses \$73.81 for each well woman exam.
- c. If the reminder system is successful and all overdue patients come in for their cervical cancer screening, the clinic would receive extra reimbursement money

Appendix F  
Descriptive Statistics

*Frequency Table for Nominal Variables*

Variable	<i>n</i>	%
<b>Ethnicity</b>		
Hispanic/Latina	24	85.71
Declined to Specify	4	14.29
Missing	0	0
<b>Insurance</b>		
Insured	2	7.14
Well Woman Health Check	8	28.57
Title X	13	46.43
Insured; Title X	1	3.57
Title X; Insured	1	3.57
Sliding Fee	2	7.14
Title X; Well Woman Health Check	1	3.57
Missing	0	0

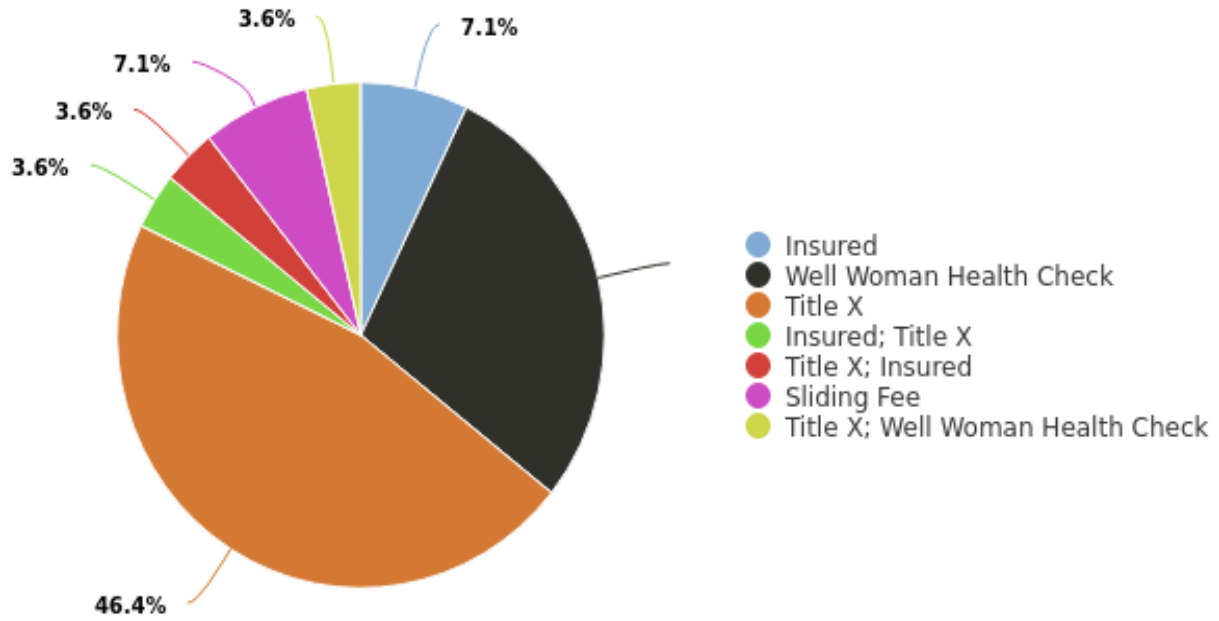
*Note.* Due to rounding errors, percentages may not equal 100%.

*Summary Statistics Table for Interval and Ratio Variables*

Variable	<i>M</i>	<i>SD</i>	<i>n</i>	Min	Max
Age	41.04	9.93	28	21.00	58.00

*Note.* '-' denotes the sample size is too small to calculate statistic.

*Pie Chart of Insurance*



*Pie Chart of Ethnicity*

