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## Contraceptive Education Module Intervention

Rachel Cox

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Contraceptive Education Module Intervention

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## Abstract

**Background and Review of Literature:** Unplanned pregnancy is associated with poor mother and child outcomes physiologically and psychologically. Since contraception is an integral piece of family planning, ensuring that patients have quality information to make an informed decision about their birth control choices is important. **Purpose.** This intervention sought to increase women's contraceptive knowledge, correct use of their chosen birth control methods, and the number of women using birth control through an evidence-based interactive computer-based education. **Methods:** 20 participants were administered a pretest to assess their utilization, correct usage, and knowledge of contraception. Then, participants watched an interactive computer based educational module and were administered a first posttest immediately. Participants returned 1-3 months later to take a final posttest. **Results:** There was a statistically significant increase in knowledge scores between the pretest and the first posttest (paired  $t(19)=5.12$ ,  $p < .001$ ) and between the pretest and final posttest (paired  $t(19)=3.85$ ,  $p = .001$ ). There was, however, no significant difference in knowledge scores between the first posttest and second posttest (paired  $t(19)=-0.58$ ,  $p = .568$ ). There was a significant increase in self-reported correct use behavior scores (paired  $t(18)=3.63$ ,  $p = .002$ ). The number of women using contraception increased from 18 (90%) to 19 (95%) after the intervention. **Conclusions:** This computer-based education intervention increased knowledge about birth control, correct use of their chosen birth control method, and the number of women using contraception. Computer based education is a promising avenue for influencing contraceptive use behaviors and contraception knowledge.

*Keywords: Contraception, Birth Control, Unplanned Pregnancy, Computers, Education*

## Contraceptive Education Module Intervention

### **Introduction**

In the United States, approximately 45% of pregnancies are unintended (Finer & Zolna, 2016). Because births that are unintended or spaced too closely are associated with poorer maternal and child outcomes, preventing unplanned pregnancy is a public health goal (Healthy People 2020, 2011). A goal of Healthy People 2020 is to increase the proportion of intended pregnancies by 10% by 2020 (Healthy People 2020, 2011). Approximately 68% of women at risk for unintended pregnancy use contraceptives regularly and consistently and only account for 5% of the unintended pregnancies (Sonfield et al, 2014). Women who use contraceptives inconsistently or incorrectly account for 41% of unintended pregnancies. The 14% of women who do not use any form of contraception account for 54% of unintended pregnancies. (Sonfield et al, 2014)

According to Finer and Zolna (2014), the rates of unintended pregnancy are highest among “poor and low income women, women age 18-24, cohabitating women, and minority women.” Additionally, the rates are lowest among “high income women, white women, college graduates, and married women.” Because the rates of intended pregnancy are highest among low income and poor women, many unintended pregnancies (68%) are paid for by public insurance programs like Medicaid. It is estimated that that total public expenditure on unintended pregnancies totals approximately \$21 billion dollars (Sonfield & Kost, 2015).

Because 95% of unintended pregnancies are attributed to women who inconsistently and incorrectly used contraception and women who did not use contraception at all, a solution must be implemented to mitigate this issue.

**GAP Analysis**

According to Guttmacher Institute (2017), in 2010, “47% of all pregnancies (54,000) in Massachusetts were unintended” which is higher than the national average of 45% of all pregnancies being unplanned. Contraceptive failure was attributed to be the cause of approximately 50% on unintended pregnancies in the United States (Kost, 2008). Healthy People 2020 has set a goal of reducing the number of pregnancies that occur despite reversible contraceptive use. Additionally, Healthy People 2020 has set a goal of increasing the proportion of intended pregnancies.

In 2017, the ACCESS law was passed in Massachusetts to ensure that all Massachusetts residents continue to have access to affordable birth control (Guttmacher, 2017). The public cost of unplanned pregnancies in 2010 was \$264 per woman age 15-44 compared to \$201 per woman nationally (Guttmacher, 2017). Although legislature reform in Massachusetts has resulted in increased access to contraception, there are still barriers in place that inhibit care especially for low income women in the state (Dennis, 2012). The high rate of unintended pregnancies in the United States results significantly impacts women, families, and the health care system (Kost, 2008).

**Problem Statement**

Chance of unplanned pregnancy for at-risk women is indicated by delayed prenatal care, increased maternal suicide rate, intimate partner violence (IPV) or miscarriages, poor psychological health, and nutrition. Additionally, children born from unplanned pregnancies have poorer physiological and psychological outcomes. Unplanned pregnancy results from lack of knowledge of and provider support in use of contraceptives leading to poor adherence, misuse, or non-use of contraception. The computer based intervention screened for need for

contraceptive knowledge and provide education. The goal was to increase correct contraceptive use behaviors in women of childbearing age who are at highest risk of unplanned pregnancy.

### **Review of the Literature**

A comprehensive search of the literature was performed for contraceptive interventions using the University of Massachusetts Library, PubMed, and Cochrane Reviews. The goal of the search was to find research concerning the effectiveness of interventions implemented to either increase use of contraception or increase adherence to contraception. The search terms “contraceptive” or “contraception,” and “intervention” were used. “Meta-analysis” and “Randomized control trial” were also listed. On PubMed, results were limited to English language, a 10-year range, and full text. Only 13 articles were derived from this search. Four of these articles were duplicates and were excluded. Only 2 studies were relevant to this topic.

Through the University of Massachusetts library, a search was performed using the key words. The search was limited to scholarly peer reviewed articles published in the past 10 years. This search produced 18 results. All but 3 of the studies were excluded based off of relevance to this review.

Through the Cochrane Library, a search was performed to identify systematic reviews that addressed contraception. The keywords “contraception” and “intervention” were used and the search produced 55 results. Of the 55 results, 2 of the systematic reviews were applicable to this review of literature. In this paper, 7 studies were reviewed.

### **Contraceptive Counseling Intervention**

In the past, the United States Preventative Screening Task Force (USPSTF) has recommended that health care providers provide routine counseling to patients about contraceptives and methods to reduce unplanned pregnancy, however, this recommendation was



later withdrawn due to insufficient evidence to justify the cost and time (USPSTF, 2006). Lee et al (2011) examined the association between contraceptive counseling administered by a health care provider and patients' contraceptive use by performing a retrospective data analysis and survey. There were 386 participants at a health care clinic in Western Pennsylvania. The authors concluded that counseling provided by health care providers was associated with increased contraceptive use at the most recent intercourse. As a result, the author was hopeful that implementing counseling in the primary care setting could lead to a reduction in unintended pregnancies. This was a level 3A, grade B study.

A Cochrane systematic review was performed by Lopez et al. (2016) to examine the effect of theory based interventions on contraceptive use. This study included 25 randomized control trials that involved theory based counseling interventions. Many of the interventions were school or community based. Several of the studies involved motivational interviewing. The results were inconclusive as many of the studies failed to elucidate the connection between the theory supporting the intervention and the design of the study. This was a level 1A, grade B study.

### **Computer Based Intervention**

With the creation and proliferation of computers, technology has been integrated slowly and cautiously into medicine and health care. Technology provides limitless options for customization and dissemination of knowledge and accumulation of data. Creation and implementation of a computer based module to increase use of contraceptives has been studied.

Garbers et al. (2012) implemented a three-arm randomized control trial at New York family planning clinics and had 2231 participants. This study was performed to test the effectiveness of a computer module on effective contraceptive choice. The study concluded that

participants in the study groups who participated in the computer-based education and received either tailored or generic information after were more likely to choose the more effective birth control options such as long acting reversible contraceptives (IUD, implant) than the participants in the control group who only received generic information without access to the computer-based education ( $p=.001$ ). This study was very large in size. This was a level 1B study with Grade A rating.

Schwarz et al (2013) performed a randomized control trial at an urgent care in West Pennsylvania with 814 participants. This study tested whether or not a computer based module increased prescription of birth control. The authors concluded that the computer based education did in fact lead to a higher rate of birth control prescriptions than the control group who were not given the computer based education ( $p<.001$ ). This was a large study. This was a level 1B study with a Grade A rating.

### **Mobile Phone Intervention**

We are increasingly attached to our mobile phones and rely on them in almost every aspect of our lives. It seems reasonable to create and test an intervention that involves the mobile phone or texting to increase contraceptive initiation and adherence.

Castano et al (2012) created an intervention that involved daily text messages to remind women to use their birth control. A randomized control trial was performed involving 962 participants at a family planning health center in Brooklyn, New York. The control and study arm were masked. The results demonstrated a statistically significant increase in daily contraceptive use after 6 months of daily text messages when compared to the control arm ( $p<.001$ ). This was a level 1B, grade A study.

Hou et al (2010) performed a randomized control trial evaluating the effectiveness of a daily text message based intervention to increase adherence to contraception. This study was performed at Planned Parenthood in Boston, MA and had 103 participants. This trial did not demonstrate a statistically significant increase in contraceptive adherence in the intervention group ( $p=.60$ ). Both the intervention and the control group demonstrated an unacceptably high number of missed birth control pills. This was a level 1B, grade A study.

A Cochrane Systematic Review identified five randomized control trials concerning mobile phone based interventions for increasing use of contraceptives (Smith et al., 2015). This systematic review demonstrated a striking lack of evidence to support the use of mobile phone based interventions and concluded that further robust RCTs was needed in order to determine the effectiveness of this intervention. This was a level 1A, grade C study.

The literature supports that interventions increase the likelihood that women use contraception and may impact how women use their contraception. A computer based intervention shows promising results so performing a quality improvement intervention based on this information may provide valuable insight into the feasibility and efficacy of such intervention in the primary care setting.

### **Evidence Based Practice: Verification of Chosen Option**

After reviewing the literature, it was determined that a computer based intervention has promising evidence to support increasing patient knowledge about contraception and possibly influencing behavior concerning contraception use. Despite the substantial effect of unintended pregnancy on women and children in the United States, it is clear that not enough is currently being done to ensure that women have the knowledge they need to make informed choices about how to use their contraception correctly. However, the computer module based intervention has

some promising evidence to support potential effectiveness. Utilizing a computer based module could prove to be a useful solution to the issue of non-adherence to contraception

In order to reach the Healthy People 2020 goal of reducing the proportion of unplanned pregnancy by 10%, more work will need to implement evidence-based solutions to make sure that women have the knowledge they need to use their contraception effectively.

### **Theoretical Framework**

The Health Belief Model (HBM) is a social framework that was developed by Rosenstock and colleagues (Hall, 2011, Appendix A). This framework views humans as rational people who use a multifactorial method to guide decision-making and ultimately behaviors. This model can be applied to contraception related decision-making and behaviors. Motivation to prevent unwanted pregnancy must be influenced by several factors in order to generate sufficient reason to act upon a contraception intervention (Hall, 2011)

The educational module for the quality intervention addressed several of the motivators that contribute to the greater motivation of using contraception and preventing an unplanned pregnancy. The module provided information of the “Perceived Threat” of unwanted pregnancy with background information about how common unplanned pregnancy is and the risks associated with poor adherence or nonuse of contraception. The module provided an expectation analysis of contraception for patients so they can make an informed choice about the birth control choice. Additionally, it provided education and encouragement to use contraception to spur conscious decisions to follow medical advice. Furthermore, the module provided education to help mitigate additional factors such as demographics, social, psychological, reproductive etc. By touching upon multifactorial reasons for preventing pregnancy, the module provided sufficient motivation to create a behavioral change to initiate contraception.

## **Methods**

The quality improvement project aimed to provide technology-based (or computer-based) interactive high quality education about contraception to women who are of childbearing age in order to increase knowledge about birth control and likelihood of contraception use.

### **Project Design**

This was an ‘Educational Intervention’ to determine whether a computer based intervention increased knowledge about contraception and overall correct usage of contraception for women of childbearing age. A one group pre- and post-test design was used to conduct this project.

Before the intervention, participants received a computer based pretest and screening questionnaire. The screening questionnaire asked questions about patient information including age, short-term (2 year) fertility goals, and contraceptive choice. The pretest asked about current contraceptive use, their current knowledge about contraception, and if they were using their chosen choice correctly. The computer based education module was administered at the primary care clinic (following the screening questionnaire and pretest) that provided easy to understand information about birth control options, risks, benefits, and effective use. A post module test was administered after the education module intervention to determine if contraception knowledge score had increased. They were given access to the education module at home as well.

In addition, the women returned 1- 3 months later to measure if the number using contraception has increased. A final computer based posttest was administered and the scores were used to measure knowledge and correct usage.

### **Goals and Objectives**

The goal of this quality improvement project was to improve women's contraceptive use behaviors in women of childbearing age who are at highest risk of unplanned pregnancy. The objectives were:

1. To increase the number of women who were using a form of contraception. This was assessed by comparing pretest and final posttest data.
2. To increase contraception knowledge to ensure informed decision making. This was measured by comparing pretest and posttest knowledge test scores and examining a statistically significant difference before and after the education.
3. To increase the number of women who report compliance with their selected contraception method and increase the number of women who report that they were using their contraceptive correctly by a statistically significant percentage. This was measured by comparing pretest and final post test data.

The expected outcomes were that women would have higher scores on the posttests about contraception knowledge after the intervention and that women would test higher on posttest questions about how correctly they use their birth control choice. Additionally, the number of women using contraception was expected to increase after the intervention completion.

### **Project Site and Population**

This intervention took place at a small primary care clinic in Massachusetts. The target population of this intervention was all adult women of childbearing age (18-45). The clinic serves a population of low-income residents in Southern Massachusetts. In Bristol County Massachusetts, 11% of the population lives below the poverty line ("Bristol County," n.d.). "The largest demographic living in poverty is Female 25-34, followed by Female 55-64 and then Female 35-44" ("Bristol County," n.d.).

This primary care office sees a high percentage of patients with state provided insurance. The clinic provides care to adolescents, adults and geriatrics with the highest percentage being adults. The patient population includes a high number of patients with substance abuse problems and mental health concerns. At the clinic, there is a medium size panel of primary care patients who were recruited for this educational module intervention. All adult women of childbearing age (18-45) were invited to participate in this study. Women who were currently pregnant were excluded. Women who had cancer or were undergoing end of life care were excluded.

The primary care clinic had excellent and conscientious staff and administration who facilitated the administration of the educational module and screening questionnaire. The patient care coordinators assisted the nurse practitioner in identifying women of childbearing age who were eligible for the study. A trained medical assistant helped the nurse practitioner administer the quiz and educational module to women who consent to the study by gathering the necessary supplies. The Nurse Practitioner provided follow up information, prescriptions, and education.

### **Measurement Instruments**

In order to measure the outcomes of this quality improvement intervention the following instruments were used: computer-based pretest and two follow-up computer-based posttests. The pretest (appendix E) asked for demographic information, assessed fertility plans and current contraceptive use. The pretest also asked numerous knowledge based questions to assess general contraception knowledge. The first post-test was administered immediately following the module and asked only the knowledge based questions to determine if the women scored higher on the knowledge test immediately after the module. The second posttest assessments were measured 1-3 months later to assess if the women had retained the knowledge 1-3 months after viewing the educational module. Additionally, the second posttest assessed if, after 1-3 months, the

participants were using contraception and if they were using it correctly. The DNP student developed the pre-tests and post-tests in conjunction with information from the CDC evidence-based guidelines about how contraception should be used (Curtis et al., 2016).

### **Interactive Computer-based Educational Module**

The educational module was developed in conjunction with information from the Center for Disease Control (CDC) guidelines (Curtis et al., 2016). Information included barrier methods (i.e. condoms, diaphragm etc.), hormonal contraception (i.e. Oral combined hormonal pills, progesterone only pills, the hormonal patch, the hormonal ring, etc.), long acting reversible contraception (i.e. Intrauterine device, implant, etc.), permanent sterilization, and other methods (rhythm, withdrawal, etc.). For women who were intending to become pregnant, information was provided about routine prenatal care.

This module was computer based and interactive. The module and tests were on ContraceptionCare.com, a domain the DNP student purchased. The first aspect was the demographic and screening questionnaires to assess self-reported data about the patient's contraceptive choice and if they use their choice correctly. These questionnaires were hosted on Cognito Forms which is a HIPAA compliant form generator and all information are stored there. The second aspect was the educational multimedia presentation that explained why we were discussing birth control, who this was relevant to, what the options were, and how to use them correctly. The module was made on Prezi and was embedded into the website. It included an audio aspect for patients who struggle with literacy or sight. The third aspect was a posttest which repeats the questions from the pretest. The fourth aspect was the final posttest which was performed 1-3 months later and was an identical repeat of the first aspect to assess any changes



in knowledge or use. Patients had access to the computer education model website at home for further review.

### **Data Collection Procedure**

**Plan.** In conjunction with a computer scientist and a women's health nurse practitioner, a computer based educational module was developed. The module was reviewed by experts in family planning and a computer scientist. **Do.** The DNP student identified patients who were female and age 18-45. The DNP Student asked eligible patients if they would be interested in participating in this project. The DNP student administered the computer based pretest to the patients and the corresponding educational module using the designated tablet. The DNP Student then spoke to the patients to answer any questions, provide prescriptions, or conduct referrals. The DNP student then administered the first computer posttest to evaluate knowledge again. The patients returned in 1-3 months to participate in the final posttest and contraception analysis. The patients were given access to the website to review the module from home. **Check.** The data was analyzed to determine if the project was successful in meeting the expected outcomes. **Act.** Conclusions were drawn based on the results of the data about the effectiveness of the intervention.

### **Data Analysis Plan**

To compare scores of pretest and posttest knowledge of contraception, a paired t-test was conducted using MiniTab Express software. Then, the scores on the correct use survey before and after the intervention were compared using a paired t-test analysis. Finally, the number of women on birth control before and after the intervention were compared using a paired t-test of pretest efficacy scores and the final posttest efficacy scores.

### **Ethical Considerations**

The University of Massachusetts, Amherst (UMass) Internal Review Board (IRB) expedited approval was obtained prior to initiating the DNP Project (see Appendix D). All participants were protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) which protects the privacy of patients' health information (Modifications to the HIPAA Privacy, Security, Enforcement, and Breach Notification Rules, 2013). Additionally, all the participating staff and providers followed the Standards of Care for practice in a primary care office. Information about participants in this study were aggregated and coded and all identifiers were removed. The data will be collected on a HIPAA compliant website.

The risks of participating in this educational module were equivalent or similar to the risks associated with standard contraception based care. Individual identification numbers were used to code data to ensure confidentiality and this data was kept under lock and key in the office and was accessible to the Nurse Practitioner leading this intervention. All electronic documents with identifiable patient information were password protected and encrypted.

### **Cost-Benefit Analysis**

The costs of this intervention included the time needed to create the computer based intervention and screening module, the time needed to administer the project at the clinic, and the time needed to analyze the results of the study. The financial expenses included the tablet used to administer the educational module and quizzes and the price of the domain used to host the website. The time associated with administering the quizzes for the clinic was offset by the financial benefits of the required follow up appointments to discuss the contraceptive choices. There were no other associated costs for this project. The benefit was that the intervention increased the number of women participating in contraceptive care thereby increasing the number of appointments for the clinic. See Appendix B for a breakdown of the costs.

## Timeline

Approval for this project was received in September of 2019. Recruitment of participants and administration of the intervention took place during the fall and winter of 2019. Follow up post intervention testing will be conducted in the winter of 2020. Analysis began in March of 2020. Please see Appendix C for further details about the timeline for this project.

## Results

### Demographics

This study took place at a small primary care clinic in southeastern Massachusetts beginning in November 2019 through March 2020. There were 20 participants who completed this study (Table 1). 27 participants took the original pretest however 2 did not complete the module and 5 participants did not come back for the final posttest due to time constraints. All participants in this study were female per the study purpose. The age range of participants were 19-45 with a mean age of 28 (SD=7.21) years. The majority (n=18, 90%) of the participants identified as White. We had one (5%) Black participant and one (5%) who chose not to self-identify. In the study, 11 (55%) of the participants had commercial insurance and 9 (45%) had state provided insurance (MassHealth). Of the participants, 14 (70%) were single, 4 (20%) were married, 1 (5%) was divorced, and 1(5%) was separated. The majority (n=14, 70%) of the participants did not have children, 14 (70%) did not have children and 6 (30%) did.

**Table 1**

*Participant Demographics*

Characteristics	n	Percent
Sex		
Female	20	100%
Male	0	0%
Age		
<20	1	5%
20-29	13	65%
30-39	4	20%
40-45	2	10%

Race		
White	18	90%
Black	1	5%
No answer	1	5%
Insurance Type		
Commercial	11	55%
State provided	9	45%
Marital Status		
Single	14	70%
Married	4	20%
Divorced	1	5%
Separated	1	5%
Has children		
Yes	6	30%
No	14	70%

**Contraceptive Education Intervention**

Before the educational module, 18 (90%) of the women reported contraceptive use (Table 2). At the final follow up posttest 1-3 months later 19 (95%) of the women reported contraceptive use. The one woman not using contraception had chosen to stop her birth control to become pregnant and the two women who were not using contraception at the time the pretest was collected were using contraception at the time of the final posttest.

**Table 2.**

*Participant answers to question about contraception use*

Participant ID	Question: "Are you using any form of contraception?"	
	Pretest	Final Posttest
1	NO	Yes
2	Yes	Yes
3	Yes	Yes
4	NO	Yes
5	Yes	Yes
6	Yes	NO
7	Yes	Yes
8	Yes	Yes
9	Yes	Yes
10	Yes	Yes
11	Yes	Yes

12	Yes	Yes
13	Yes	Yes
14	Yes	Yes
15	Yes	Yes
16	Yes	Yes
17	Yes	Yes
18	Yes	Yes
19	Yes	Yes
20	Yes	Yes
TOTAL "YES" (%)	18 (90%)	19 (95%)
TOTAL "NO" (%)	2 (10%)	1 (5%)

Note. Pretest (before module and Posttest #2 (1-3 months after module) scores are given.

**Knowledge scores.** To examine knowledge improvement, 3 paired t-tests were performed (Table 3 and 4). First, a paired t-test was conducted to compare pretest knowledge scores and posttest knowledge scores immediately after educational module. There was an improvement in the knowledge scores after the intervention (M=9.40 SD=1.76 for pre-test, M=11.85, SD=1.87 for post-intervention test; paired t (19)=5.12, p <.001). Second, a paired t-test was conducted to compare pretest knowledge scores and second posttest knowledge scores (collected 1-3 months later). There was a significant increase in the knowledge scores between the pretest knowledge scores (M=9.40, SD=1.76) and second posttest knowledge scores (M=11.65, SD=2.34); t(19)=3.85, p = .001. Third, a paired t-test was conducted to compare first post-intervention test knowledge scores (immediately after the module) and second posttest knowledge scores (collected 1-3 months after). There was not a significant difference in the knowledge scores between the first post intervention test knowledge scores (M=11.85, SD=1.87); and the second posttest knowledge scores (M=11.65, SD=2.34); t(19)=-0.58, p = .568.

**Table 3.**

*Knowledge Test Scores*

Participant ID	Knowledge Test Scores		
	Pretest	Posttest #1	Posttest #2

1	10	14	14
2	8	15	13
3	9	13	13
4	8	12	12
5	10	13	15
6	9	13	15
7	11	14	13
8	9	10	9
9	10	12	9
10	11	11	13
11	10	11	11
12	8	11	12
13	9	12	12
14	10	12	10
15	6	11	13
16	9	9	10
17	8	11	9
18	9	7	6
19	15	14	14
20	9	12	10
MEAN	9.40	11.85	11.65
SD	1.76	1.87	2.34

Note. Pretest (before module), Posttest #1(immediately after module), and Posttest #2 (1-3 months after module)

scores are given. These scores are out of 15.

**Table 4.**

*Paired T- Test Analysis of Pretest Versus Posttests Contraception Knowledge Scores*

Knowledge Scores	Paired Differences						df	t	Sig. 2 tailed
	Mean	Standard deviation	Standard error	95% Confidence Interval					
				Lower	upper				
Pretest v. posttest #1	2.45	2.14	.478	1.44	3.45	19	5.12	<.001	
	2.25	2.61	.584	1.07	3.47	19	3.85	.001	
Pretest v. posttest #2									
Posttest #1 v. Posttest #2	-0.20	1.54	.344	-0.092	.522	19	-.58	0.568	

**Correct use scores.** To analyze the scores on the tests that assessed whether women were using their birth control correctly (Table 5), a paired t-test was conducted to compare pretest correct use scores and final posttest correct use scores (Table 6). One participant was excluded from this section because she was actively trying to become pregnant. There was an increase in the correct use scores between the pretest scores (M=68.58, SD=40.01) and final posttest correct use scores 1-3 months after the module (M=94.94, SD=11.85);  $t(18)=3.30$ ,  $p = .0039$ .

**Table 5.**

*Paired T- test analysis of pretest versus posttests contraception knowledge scores*

Correct Use Scores		
Participant ID	Pretest	Posttest
1	0	100
2	100	100
3	54	80
4	0	56
5	100	100
6	n/a*	n/a*
7	100	100
8	0.46	100
9	0.5	75
10	93	100
11	100	100
12	73	100
13	37.5	100
14	100	92.8
15	75	100
16	100	100
17	100	100
18	90	100
19	93	100
20	86.6	100
<b>MEAN</b>	68.58	94.94
<b>SD</b>	40.01	11.85

*Note.* Pretest (before module and Posttest #2 (1-3 months after module). Participant 6 was not included in the analysis because she was planning to become pregnant.

**Table 6.**

*Paired T- test analysis of pre-module versus post-module contraception efficacy scores*

Efficacy Scores	Paired Differences						df	t	Sig. 2 tailed
	Mean	Standard deviation	Standard error	95% Confidence Interval					
				Lower	upper				
Pre-module v. post module	26.35	34.77	7.98	9.60	43.11	18	3.30	.0039	

### Discussion

The literature review demonstrated that a computer-based education module may be a promising method for increasing contraceptive knowledge and use of contraception, and increase the likelihood of using contraception correctly. The intervention sought to increase contraception knowledge by administering an online, interactive education module given before the post-tests. After 1-3 months, participants were given a posttest with no additional educational module to measure knowledge retention from the educational module. The results demonstrate a significant increase in participants’ knowledge after they completed the online education module. Additionally, there is a significant increase in correct usage of contraceptives after the educational module was administered. Furthermore, there as an increase in the number of women using contraception from 90% to 95% after the educational intervention. The results support the idea that a computer-based method for education could increase contraceptive knowledge and correct use similarly to the data collected by Schwarz et al (2013). However, the increase in knowledge gained immediately after the module persisted and did not decrease after 1-3 months indicating the participants retained the information from the module at the time of their second posttest. This suggests that the education module affected the retention of knowledge, possibly



because the module sought to address common misconceptions of contraceptive use which may have resonated with participants.

This intervention has several strengths. First, the intervention is able to be replicated with ease due to the availability of the pre- and post-test questions in this document and the fact that the online module is freely hosted online at <https://www.contraceptioncare.com>. This would allow colleagues to use the materials to further validate the results and obtain more samples. Second, the intervention is cost effective in that it only requires a low-monthly cost, HIPAA compliant data collection service for test administration, an inexpensive domain name to host the educational module, and a tablet available for patient use in the office. From a data collection standpoint, this intervention can be administered during a variety of appointment types in the primary care setting and thus increase the number of samples. This intervention could reasonably be offered to eligible patients during visits for yearly physicals, sexually transmitted disease (STD), menstrual issues, and contraceptive counseling.

This study demonstrated that patient knowledge attainment can happen in various ways. The use of an online and interactive learning module seems to have increased participant knowledge and retention. The nursing implication is that various media should be used when attempting to provide patient education aside from traditional face-to-face counseling by the nurse. Further nursing studies should be directed to online platforms to provide contraception education to patients in a way that promotes retention and perhaps can happen outside of the clinic. Additionally, this DNP student thinks it may be worth investigating the use of telephonic visits and the deployment of a HIPAA compliant platform to administer the pre- and post-test and provide the educational module online as a way to make this more accessible to patients and decrease the problem of a patient “no-showing” for a post-post-test appointment.

Patients also shared some interesting sentiments in regard to their experience with the intervention. Overwhelmingly, participants expressed being surprised about the fact that morning-after pill does not cause an abortion, that the pull-out method was more effective than they thought, and that it is possible to get pregnant after a vasectomy. Two patients disliked the length of the education module suggesting that it was difficult to coordinate an office visit and complete a module with their time constraints. Patients also indicated that there were some topics they wished went into more depth in the education module and desired a way during the module to review additional information.

Based on this DNP student's experience and the expressed experience of patients, there are some improvements that may improve and streamline this intervention. First, some participants found the educational module to be too long and thus shortening the module may facilitate completion of the module in a timely manner. Second, allowing the education module to provide more depth for participants who become interested in a particular topic may increase knowledge. Finally, facilitating a completely digital experience for the patient with no in-person meetings may help patients complete the tests and module at their own pace, eliminate "no-shows" for second post-test collection patients, and reduce the use of exam rooms by patients only participating in the intervention. One imagines that a tele-visit would be scheduled and the patient would be administered the pretest, education module, and posttest all online in the comfort of their own home.

This study was designed using the Health-Belief Model (Appendix A) as a framework. This intervention addressed both the "perceived costs" and "perceived benefits" of contraception by clearly addressing the most common types of contraception along with their risks and benefits of use. The statistically significant increase in knowledge scores supports this. Additionally, it

addressed the “perception of risk” of unplanned pregnancy by discussing the risk and statistics of unplanned pregnancy. By addressing several of the components that influence “contraceptive decision making,” the module increased the likelihood of using contraception correctly and the increase in efficacy use scores supports this.

### **Setting Facilitators and Barriers**

There were several barriers at this clinic. The clinic does not have a large patient panel and has a high “no-show” rate for appointments made data collection challenging. The criteria needed to be expanded early in the intervention to accommodate the number of eligible patients who did not come to their appointments or patient due for a post-test who no-showed. Additionally, requiring patients to come back in 3 months severely limited the data collection window. This was overcome by expanding the window to 1-3 months for final posttest collection. The flu season brought many of the participants in earlier than expected and they often chose to cancel their pre-scheduled follow up appointment. Furthermore, there are limited resources at the clinic currently for family planning education and this was overcome by reaching out to a women’s health nurse practitioner.

The facilitators at the practice were the well trained and conscientious staff who were eager and able to help arrange appointments and notify patients of their visits. Additionally, there are very few bureaucratic issues at the practice to inhibit this project due to high levels of clinical autonomy.

### **Limitations of the Study**

The module took participants longer to complete than expected and arranging follow up appointments was difficult. In retrospect, the study could have been designed to collect final posttest results over the phone or by email to ensure more participation. The sample size in the

study is small (n=20) which limits the generalizability of the data. Additionally, the module could have been shortened in length to be more usable in the clinic so that more patients could participate. Furthermore, the correct usage scores rely on participants' self-reported data. Self-reported data might be limited in terms of validity (e.g., social desirability bias due to responding to questions in a socially acceptable direction) (Lewis-Beck Bryman, & Liao, 2004). This may lead to over-reporting of positive behaviors and under-reporting of negative or undesirable behaviors (Vitolins, Rand, Rapp, Ribisl, & Sevick, 2000). Future investigators may want to incorporate ways of confirming that patients were using their birth control the right way such as asking them to take a picture of their pill package, confirming dates of LARC insertion with the OBGYN, obtaining records of timely birth control injections, and confirming that contraception methods were picked up from the pharmacy as prescribed.

### **Conclusions**

Unplanned pregnancy is a large issue in Massachusetts and nationwide. Contraception is one of the key tools for reducing the number of unplanned pregnancies and giving women control over their fertility. Since primary care clinics care for large numbers of women who are at risk of unplanned pregnancy, designing an intervention to mitigate this issue was important. The computer-based educational module with both audio and visual components increased both knowledge scores and self-reported efficacy use scores. Additionally, the increases in knowledge gained immediately after the educational module persisted for 1-3 months after the module. These results support the literature that suggests that computer-based resources are a promising tool (Schwarz et al., 2013) Future research should be performed to determine which methods are ideal for addressing preventing unplanned pregnancy in the primary care setting and methods for increasing the number of women who use birth control correctly.

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**Appendix A**

**Health Belief Model**

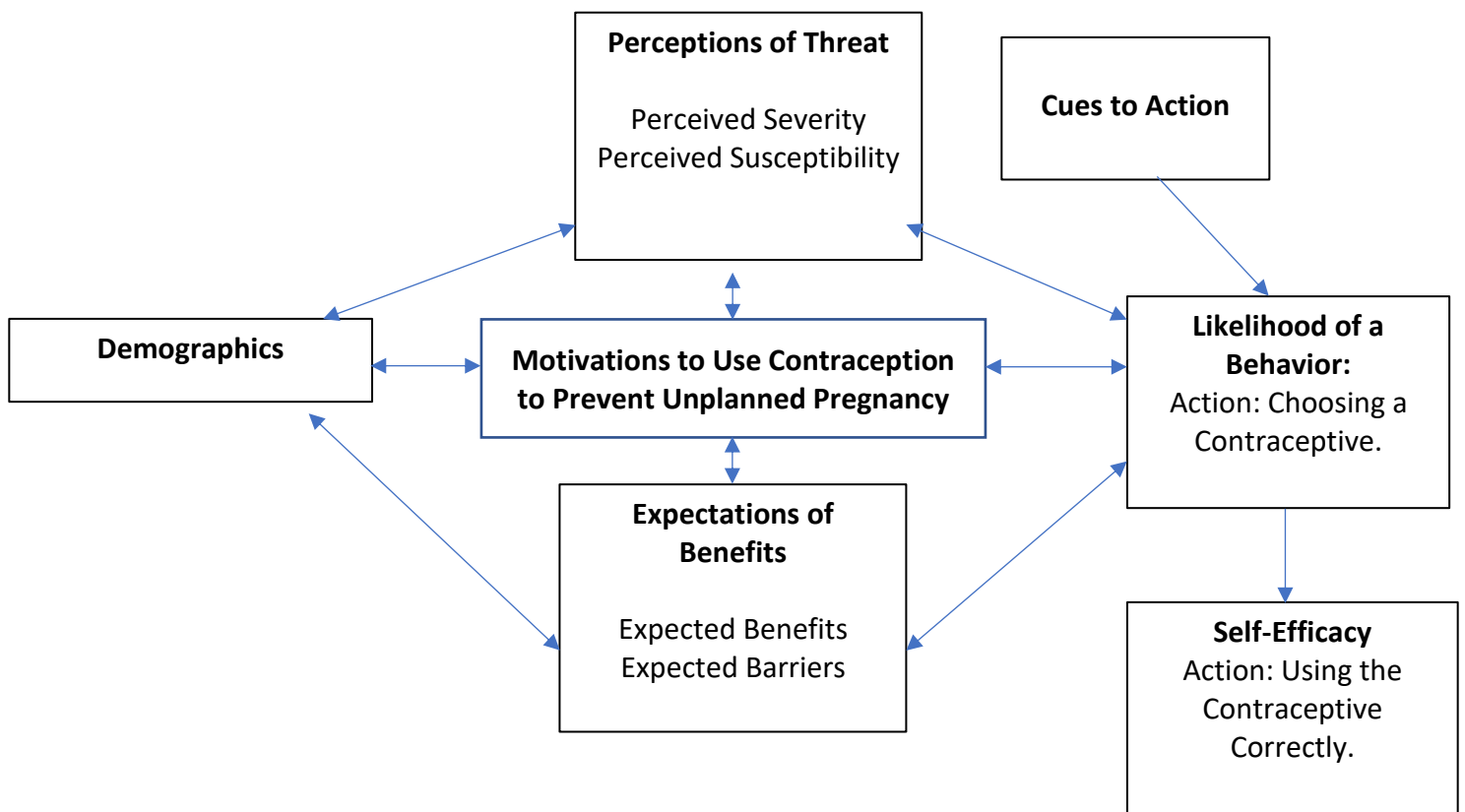


Fig 1. Health Belief Model of Contraceptive Use Adapted from Hall (2011).



**Appendix B**

**Costs and Benefits**

<b>Costs</b>	<b>Who will Bear Costs</b>	<b>Benefits</b>	<b>Who will benefit</b>
Personal time to design, develop, and analyze	DNP student	Increase of number of visits with providers	The business
Use of my tablet or computer	DNP student	Increased education for patients	Patients
Patient appointment time and efficiency	Company	More time with the provider	Patients
Use of time of patient care coordinators and medical assistants	Company	TOTAL COST	\$300
Webhosting cost, server space, cloud storage, data analysis software	DNP student		



## Appendix D

## Human Subject Determination Form

**UMassAmherst**

Human Research Protection Office

Mass Venture Center  
100 Venture Way, Suite 116  
Hadley, MA 01035  
Telephone: 413-545-3428**Memorandum – Not Human Subjects Research Determination****Date:** September 23, 2019**To:** Rachel Cox, College of Nursing**Project Title:** Contraceptions Screening and Education Module**IRB Determination Number:** 19-159

The Human Research Protection Office (HRPO) has evaluated the above named project and has made the following determination based on the information provided to our office:

The proposed project does not involve research that obtains information about living individuals [45 CFR 46.102(f)].

The proposed project does not involve intervention or interaction with individuals OR does not use identifiable private information [45 CFR 46.102(f)(1), (2)].

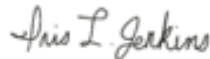
The proposed project does not meet the definition of human subject research under federal regulations [45 CFR 46.102(d)].

**Submission of an Application to UMass Amherst IRB is not required.**

Note: This determination applies only to the activities described in the submission. If there are changes to the activities described in this submission, please submit a new determination form to the HRPO prior to initiating any changes.

A project determined as "Not Human Subjects Research," must still be conducted in accordance with the ethical principles outlined in the Belmont Report: respect for persons, beneficence, and justice. Researchers must also comply with all applicable federal, state and local regulations as well as UMass Amherst Policies and procedures which may include obtaining approval of your activities from other institutions or entities.

Please do not hesitate to call us at 413-545-3428 or email [humansubjects@ora.umass.edu](mailto:humansubjects@ora.umass.edu) if you have any questions.



Iris L. Jenkins, Assistant Director  
Human Research Protection Office

**Appendix E:**

**Correct Use Questionnaire Information**

**Contraception Screening and Education - Step 1**

Rachel Cox UMass Amherst

**Name**

First

Last

**Date of Birth**

**Do you use any form of birth control?**

Yes  No

**Are you sexually active?**

Yes  No

**Are you planning to become pregnant in the next two years?**

Yes  No  Undecided

**Which form of birth control or contraception do you use?**

Birth Control Pill (the combined pill, progesterone pill)  Birth Control Patch  Birth Control Ring (ex. Nuva-Ring)  IUD (ex. Mirena)  Implant (ex. Nexplanon)  Injectable Contraception (ex. Depo Provera)  Barrier Method (ex. condoms, diaphragm, spermicide)  Emergency Pill (ex. Plan B)  Withdrawal Method (Pull-Out)  The Rhythm Method (aka Natural Family Planning)  Sterilization (tubal ligation, vasectomy)  Abstinence  None

**Which Type of Birth Control Pill do you take?**

Combined Oral Contraceptive (ex. junel, tri sprintec, etc)  Progesterone ONLY pill (ex. minipill, Micronor, Camila)

**I take my birth control pill on time (within 12 hours of expected time)**

Yes, always  Sometimes  No, never

**I take my pill every day**

Yes, always  Sometimes  No, never

**If I miss my pill or am late, I take it as soon as I remember to do so?**

Yes, always  Sometimes  No, never

**If I miss two or more birth control pills, I use emergency contraception (Plan B) if I am sexually active**

Yes, always  Sometimes  No, never

**I am aware that the birth control pill does not provide protection from STDs?**

Yes  No

**I am aware that missing a pill reduces protection against pregnancy and I could become pregnant if I have unprotected intercourse?**

Yes  No

**I know that some medications interfere with my birth control pill**

Yes  No

**I regularly use a backup form of birth control (or abstain from sex) any time I have taken medications that interfere with my pill**

Yes, always  Sometimes  No, never

**I regularly use a backup form of birth control (or abstain from sex) if I have episodes of vomiting or severe diarrhea**

Yes, always  Sometimes  No, never

**Which IUD do you have now?**

Paraguard (Copper IUD)  Mirena (hormonal IUD)  Kyleena (hormonal IUD)  Skyla (hormonal IUD)  Liletta (hormonal IUD)

**I know when I need to replace my IUD**

Yes  No

**My IUD needs to be replaced in:**

10 years  5 years  4 years  3 years

**I know that some medications may reduce the effectiveness of my IUD**

Yes  No

**I am aware that the IUD does not protect me from STDs**

Yes  No

**I always remember to get my birth control injection**

Yes, always  Sometimes  No, never

**I never get my birth control injection too late or too early**

Yes, always  Sometimes  No, never

**I know that some medications may reduce the effectiveness of my birth control injection**

Yes  No

**I use back up contraception when I am too late or too early for my injection.**

Yes, always  Sometimes  No, never

**I am aware that the birth control injection does not provide protection from STDs.**

Yes  No

**I always replace my birth control patch on time every week.**

Yes, always  Sometimes  No, never

**I use back up protection when I forget to replace my birth control patch on time**

Yes, always  Sometimes  No, never

**I know that some medications can reduce the effectiveness of my birth control patch**

Yes  No

**I am aware that the birth control patch does not provide protection from STDs.**

Yes  No

**I remember that I should not place the birth control patch on my breast**

Yes, always  Sometimes  No, never

**I remember to change my ring on time every month**

Yes, always  Sometimes  No, never

**I use back up protection if I take my ring out for longer than 3 hours at a time**

Yes, always  Sometimes  No, never

**I use back up protection if I leave the ring in too long or take the ring out too early**

Yes, always  Sometimes  No, never

**I am aware that the birth control ring does not provide protection from STDs**

Yes  No

**I know that some medications can reduce the effectiveness of my birth control ring**

Yes  No

**I know when my implant needs to be removed and replaced**

Yes  No

**I know that some medications may reduce the effectiveness of the implant**

Yes  No

**I am aware that the implant does not provide protection from STDs.**

Yes  No

**I use**

Male Condom  Spermicide  Diaphragm  Cervical Cap

**I am aware that only condoms and dental dams provide protection from STDs.**

Yes  No

**I use a condom every time I have sexual intercourse**

Yes, always  Sometimes  No, never

**We put the condom on before sexual activity starts**

Yes, always  Sometimes  No, never

**If the condom breaks, I use emergency contraception**

Yes, always  Sometimes  No, never

**When I use a condom, pinch the top of the condom before rolling it on.**

Yes, always  Sometimes  No, never

**I am aware that condoms DO provide protection from STDs**

Yes  No

**We use a new condom every time we have sex.**

Yes, always  Sometimes  No, never

**If we make a mistake while putting a condom on, we throw it away and use a new one.**

Yes, always  Sometimes  No, never

**I wait 10-15 minutes after inserting spermicide to have sexual intercourse.**

Yes, always  Sometimes  No, never

**If the condom breaks during sexual intercourse, we use a new one and consider using emergency contraception**

Yes, always  Sometimes  No, never

**When using spermicide, I have sex within the effective window of 30-60 minutes after insertion.**

Yes, always  Sometimes  No, never

**I am aware that spermicide does not provide protection from STDs.**

Yes  No

**I add spermicide to my diaphragm every time I have sex**

Yes, always  Sometimes  No, never

**After inserting the diaphragm and spermicide, I have sex within 2 hours of insertion**

Yes, always  Sometimes  No, never

**I leave my diaphragm in for at least 6 hours after sex**

Yes, always  Sometimes  No, never

**I remember to take my diaphragm out within 24 hours of sexual intercourse**

Yes, always  Sometimes  No, never

**I use emergency contraception if I make a mistake with my diaphragm**

Yes, always  Sometimes  No, never

**I am aware that the diaphragm does not provide protection from STDs.**

Yes  No

**I use my Plan B pill within 3 days (72 hours) of having unprotected intercourse**

Yes, always  Sometimes  No, never

**I am aware that I can use Plan B up until 5 days after unprotected sex**

Yes  No

**If I vomit within 2 hours after taking Plan B, I take another Plan B pill.**

Yes, always  Sometimes  No, never

**I am aware that Plan B does not provide protection against STDs.**

Yes  No

**When using the withdrawal (pull-out) method, I ensure that my partner has urinated since his most recent ejaculation before sexual intercourse.**

Yes, always  Sometimes  No, never

**My partner withdraws (pulls out) before ejaculation**

Yes, always  Sometimes  No, never

**If my partner does not withdraw (pull-out) before ejaculating, I use emergency contraception**

Yes, always  Sometimes  No, never

**I am aware that the withdrawal method (pull-out) does not provide protection from STDs.**

Yes  No

**I insert spermicide in my cervical cap before use**

Yes, always  Sometimes  No, never

**I leave my cervical cap in for at least 6 hours after intercourse**

Yes, always  Sometimes  No, never



**I take my cervical cap out within 48 hours of insertion**

Yes, always  Sometimes  No, never

**I am aware that the cervical cap does not provide protection from STDs.**

Yes  No

**I use emergency contraception if I make a mistake with my cervical cap**

Yes, always  Sometimes  No, never

**I check to make sure my cervical cap is in place before sexual intercourse**

Yes, always  Sometimes  No, never

**I am aware that abstinence is 100% effective at preventing STDs and pregnancy**

Yes  No

**The sterilization method I (or my partner uses) is**

Vasectomy  Tubal ligation  Hysterectomy

**My partner had his sperm count tested after the procedure at the required intervals to ensure that the vasectomy was a success**

Yes  No

**I am aware that it is rare (but possible) to get pregnant after tubal ligation or vasectomy**

Yes  No

**I am aware that I cannot get pregnant after a hysterectomy**

Yes  No

**I am aware that permanent sterilization methods do not provide protection from STDs.**

Yes  No

**I tracked my menstrual cycle for 6-12 months before using the Rhythm Method as my primary form of contraception**

Yes  No

**I am aware that the Rhythm Method can only be used effectively by women with regular periods**

Yes  No

**I am aware that stress and/or illness can impact my menstrual cycle and the effectiveness of the Rhythm Method**

Yes  No

**I am aware that I am not protected from pregnancy or STDs**

Yes  No

**Which Type of Birth Control Pill do you take?**

Combined Oral Contraceptive (ex. junel, tri sprintec, etc)  Progesterone ONLY pill (ex. minipill, Micronor, Camila)

**I am aware that the birth control pill does not provide protection from STDs?**

Yes  No

**I take my pill at the same time every day (within 3 hours of expected time)?**

Yes, always  Sometimes  No, never

**If I am more than 3 hours late with the minipill, I take the next pill as soon as I remember and use back up protection for 48 hours?**

Yes, always  Sometimes  No, never

**I am aware that missing a pill reduces protection against pregnancy and I could become pregnant if I have unprotected intercourse?**

Yes  No

**I know that some medications interfere with my birth control pill**

Yes  No

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**I regularly use a backup form of birth control (or abstain from sex) any time I have taken medications that interfere with my pill**

Yes, always  Sometimes  No, never

**I regularly use a backup form of birth control (or abstain from sex) if I have episodes of vomiting or severe diarrhea**

Yes, always  Sometimes  No, never

## Appendix F

### Knowledge Questions: Pretest and Posttests

The Nuva Ring (birth control ring) is changed daily. True or False?

True  False

Hormonal based contraceptives protect against sexually transmitted diseases (STDs). True or False?

True  False

"Progesterone-only" birth control pill is safer to take if you smoke or have a history of blood clots or hypertension. True or False?

True  False

Oral Combined Pills (with estrogen and progesterone) are safe for women with history of migraines with auras. True or False?

True  False

The birth control patch is changed once weekly for 3 weeks. True or False?

True  False

Depo-Provera is injected every 11-13 weeks True or False?

True  False

Hormonal contraceptives can increase the risk of blood clots. True or False?

True  False

The "Progesterone-only" pill must be taken within 6 hours of expected dose. True or False?

True  False

The "morning after pill" (Plan B) can cause the termination of a viable pregnancy if taken within 72 hours after unprotected sex. True or false?

True  False

The "morning-after" (Plan B, ella) pill must be taken the morning after unprotected sex to be effective. True or False?

True  False

The copper IUD (Paraguard) can be used as emergency contraceptive if administered within 5 days of unprotected sex. True or false?

True  False

The withdrawal method (the pull-out method) is less than 55% effective at preventing pregnancy. True or false?

True  False

It is possible to get pregnant after a vasectomy. True or false?

True  False

The rhythm method (fertility awareness, calendar method) is 99% effective. True or false?

True  False

Nexplanon lasts for 3 years. True or False?

True  False