Knowledge about Nexplanon among adolescents in an urban pediatric emergency room

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KNOWLEDGE ABOUT NEXPLANON AMONG ADOLESCENTS IN AN URBAN PEDIATRIC EMERGENCY ROOM

by

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INTRODUCTION

Adolescent (14-17 year-olds) and young adult (18-20 year-olds) women account for a disproportionate 20% of the total number of unintended pregnancies that occur among women of all reproductive ages (14-55 year-olds) each year in the US. Nearly half (41%) of all unintended pregnancies result from the 18% of women who report inconsistent, incorrect, or no use of their contraceptive method. Evidence shows that a large proportion of these young women, especially those who are sexually active, come to the emergency department for their core sexual and reproductive health care needs. By obtaining a better understanding of the sexual and reproductive health needs and preferences of an urban population that is disproportionately low income and ethnically and racially diverse, our hope is to maximize adolescent and young adult accessibility to contraceptive services most feasible in the PED environment such as Nexplanon®, in addition to the provision of comprehensive contraceptive counseling and education.

OBJECTIVES

The first objective of this subgroup analysis is to determine the percentage of adolescent and young adult females presenting to an urban PED who are familiar with Nexplanon® and to describe the demographic, sexual health, and contraceptive use characteristics of these young women. The second main objective of our study is to
evaluate the sources of Nexplanon®-related information reported by respondents familiar with Nexplanon®. In addition to the main objectives, we also determine participant willingness to initiate or switch to Nexplanon® and receptivity to learning about contraceptive methods during a related or nonrelated visit to the PED.

**METHODS**

This is a cross-sectional descriptive study using a paper-based anonymous questionnaire distributed to female patients, ages 16-21 years, presenting to a Boston urban pediatric emergency department (PED). This is a sub-group analysis of a larger study aimed at describing the contraceptive use history of young women who present to the PED. To identify if any statistically significant categorical variables existed between the two assigned groups, univariate analysis was performed using Chi-squared tests. Odds ratios with 95% confidence intervals (CIs) were obtained for the relationship between participants who have heard of Nexplanon® and the three statistically significant variables: history of STDs, gravidity, and prior sexual intercourse with a male. Mean and Standard Deviation were used to describe the one continuous variable, age, followed by univariate analysis using independent t-test. Statistical significance was indicated using p-values for the categorical variables and odds ratio with 95% CI for the continuous variable—age.

**RESULTS**

Of the 366 adolescent and young adult females included in our subgroup analysis, 230 (62.8%) indicated they were familiar with Nexplanon®. We found that female participants familiar with Nexplanon® were 1.3 times more likely to have had a prior
STI, twice as likely to have had one or more previous pregnancies, and 3.5 times more likely to have previously engaged in sexual intercourse with a male compared to those female participants unfamiliar with Nexplanon®. We also found that most (42.2%) female participants familiar with Nexplanon® obtained their contraceptive information from their family and friends only, while about a third obtained their contraceptive information from medical professionals only. Among our total population of respondents, 6% (22/366) of our sub-group participants identified the contraceptive implant as their current method of contraception. Lastly, approximately 21% of female participants familiar with Nexplanon® indicated current use of a long-acting reversible contraceptive method at the time of the survey.

CONCLUSION

Overall, our study findings are supportive of and consistent with the provision and education of Nexplanon® in the PED. This would be a crucial opportunity to provide comprehensive contraceptive counseling and convenient access to the most effective method of contraception among a population that disproportionately affected by unintended pregnancy. This can be made possible by enabling PED health care providers with the proper access to and training in Nexplanon®. By adapting these patient-centered practices and techniques, the PED setting can contribute to the notable reduction in teen pregnancy seen in a variety of similar clinic-based interventions. The PED atmosphere has enormous potential to serve young women as an additional venue for contraception education and access.
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LIST OF ABBREVIATIONS

AAP      American Academy of Pediatrics
ACOG    The American College of Obstetricians and Gynecologists
BMC     Boston Medical Center
CDC     Centers for Disease Control and Prevention
CHOICE The Contraceptive CHOICE Project
DMPA    Depot medroxyprogesterone acetate
ED      Emergency department
FDA     Food and Drug Administration
HCP     Health care providers
IUD     Intrauterine device
LARC    Long-acting reversible contraception
LNG-IUS Levonorgestrel-releasing intrauterine system
NCHS    National Center for Health Statistics
NSFG    National Survey of Family Growth
OCP     Oral contraceptive pills
PCP     Primary care physician
PED     Pediatric emergency department
SRH     Sexual and reproductive health
STI     Sexually transmitted infection
US      United States
INTRODUCTION

Although the national rate of unintended pregnancy among women of all reproductive ages (14-55 years) decreased by an encouraging 18% between 2008 and 2011 (Finer & Zolna, 2016), unintended pregnancies still account for just over half (51%) of all pregnancies each year in the United States (US) (Birgisson, Zhao, Secura, Madden, & Peipert, 2015). Adolescent (14-17 year-olds) and young adult (18-20 year-olds) women account for a disproportionate 20% of the total number of unintended pregnancies that occur among women of all reproductive ages (14-55 year-olds) each year in the US (Craig, Dehlendorf, Borrero, Harper, & Rocca, 2014). Young women among racial and ethnic minorities are especially disproportionately affected by unintended pregnancies with Hispanic and African American adolescent and young adult women being twice as likely to become pregnant and give birth compared to white adolescent and young adult women (Martinez, Copen, & Abma, 2011). Overall, this translates into approximately 553,000 teen pregnancies occurring each year in the US, of which an alarming 75% are reported to be unintended or unplanned (“American Teens’ Sexual and Reproductive Health,” 2016).

Despite an over 50% decline in the teen pregnancy rate in 2011 and a 57% decline in the teen birth rate in 2014 compared to the peak rates that occurred in the early 1990’s, disparities in unintended pregnancy by race, ethnicity, and age are still very much a public health concern (Craig et al., 2014). In 2010, 60% of all teen pregnancies resulted in births, 26% resulted in abortions, and 15% resulted in miscarriages (Sedgh, Finer, Bankole, Eilers, & Singh, 2015). Unintended pregnancies lead to significant negative
health and socioeconomic outcomes among these disproportionately affected populations (Parks & Peipert, 2016). Because unintended pregnancies can be associated with a delay in prenatal care, teen births are threatening to young mothers and their infants (Finer & Zolna, 2016). Some adverse health outcomes of teen births include: higher rates of depression among teen mothers, premature and low-birth weight infants, long-term behavioral and physical deficits among children, and lower rates of breastfeeding (Parks & Peipert, 2016). Some negative socioeconomic effects of teen births include: higher rates of intimate partner victimization, attainment of only lower level educational advancement, limited career progression, and poverty (Parks & Peipert, 2016). In addition to threatening young women and their families with negative health and socioeconomic outcomes, teen births also generate substantial national public health costs (Sonfield, Kost, Gold, & Finer, 2011). In 2010, the national cost of unintended pregnancies amounted to $9.4 billion (Raidoo & Kaneshiro, 2015).

Nearly half (41%) of all unintended pregnancies result from the 18% of women who report inconsistent use of their contraceptive method (Frost & Darroch, 2008). In addition to inconsistent use of contraceptive methods, incorrect and no use of contraceptive methods also contribute to the high incidence of unintended pregnancies in the US (Daniels, Daugherty, & Jones, 2014). In the past two decades, there have been numerous studies and local initiatives in the medical and public health communities to better understand and address the extensive impact that varying degrees of contraceptive use has on the disproportionately high unintended pregnancy rate in the US (Foster et al., 2015).
As a result, the recent notable progress made in the decline of unintended pregnancies among adolescent and young adult females can be largely attributed to the increased use of more effective reversible contraceptive methods and concurrent decreased use of less effective reversible contraceptive methods (Abraham, Zhao, & Peipert, 2015).

In order to continue the advancements made in the reduction of the national unintended pregnancy rate, it is important to be able to reach the populations that are considered among the highest risk for unintended pregnancy—adolescent and young adult females among racial and ethnic minorities (Chernick, Kharbanda, Santelli, & Dayan, 2012). Evidence shows that a large proportion of these young women, especially those who are sexually active, come to the emergency department (ED) for their core sexual and reproductive health (SRH) care needs. In a study based in suburban and urban pediatric emergency departments (PED), it was found that 51% of sexually experienced young women were more likely to have more than one ED visit within the past year (Miller, Pickett, Leisner, Sherman, & Humiston, 2013). As such, the PED should be considered a crucial setting in which contraceptive counseling and provisional practices are implemented and disseminated (Fine & Mollen, 2010).

**Sexual & Reproductive Health Characteristics and Behavioral Patterns of US Adolescents & Young Adults**

The adolescent and young adult years are a transitional time period in which vital sexual and reproductive developmental changes occur (Society for Adolescent Health and Medicine et al., 2014). In addition to undergoing emotional and physical changes,
adolescents and young adults are also susceptible to external environmental social and peer pressures that can ultimately lead to uncharacteristic high-risk sexual behaviors (Miller et al., 2013). High-risk sexual behaviors have been found to be prevalent among adolescent and young adult females who rely on the ED for their health care needs (Fine & Mollen, 2010). A recent study that took place in the PED defines high-risk sexual behaviors to include: sexual debut before age 15, no condom use at last sexual intercourse, substance use before last sexual encounter, having greater than three sexual partners in the past three months and having greater than 4 lifetime sexual partners (Miller et al., 2013).

According to data obtained from the 2011-2013 National Survey of Family Growth (NSFG), 4.3 million (44%) never married 15-19 year-old females and 4.8 million never married (47%) 15-19 year-old males have experienced sexual intercourse in the US. Approximately half of all never married 15-19 year olds have initiated sexual intercourse by the age of 17 (Finer & Philbin, 2013). Some characteristics associated with early initiation of sexual intercourse and the progression of sexual activity among adolescents and young adults that remain fairly similar across developed countries (Sedgh et al., 2015) include a greater number of lifetime sexual partners and increased odds of contracting an STI (Miller et al., 2013). However, in contrast to these characteristics, contraceptive use is a characteristic of early initiation of sexual intercourse that differs between the United States and other developed countries (Sedgh et al., 2015).

Contraceptive Use among US Adolescents & Young Adults
Of the 4.3 million never married 15-19 year-old female population in the US, 79% report using a contraceptive method during their first sexual intercourse: 93% among 18-19 year-old females and 77% among 15-17 year-olds (Finer & Philbin, 2013). The most common contraceptive methods used among young adult and adolescent females continue to be the methods considered least or at best, moderately effective against pregnancy prevention: condoms (97%), withdrawal (60%), and oral contraceptive pills (OCP) (54%) (Daniels et al., 2014). Over the past decade, the use of condoms has increased while the use of the withdrawal method has remained mostly unchanged among young women in the US (Finer, 2010). The contraceptive methods that young women continue to rely on the most have some of the highest typical use effective rates during the first year of use: condoms (18%) and OCPs (9%) (Martinez et al., 2011). There is an inconsistency between their use of the least effective contraceptive methods and their desire to not become pregnant, reported by 95% of young women presenting to a PED (Miller et al., 2014).

This inconsistency might be addressed by the various factors that influence a young woman’s contraceptive choice (Hoopes, Gilmore, Cady, Akers, & Ahrens, 2015). An important term that summarizes the contraceptive decision-making process for any woman is contraceptive understanding, which includes a combination of knowledge, attitudes, and beliefs regarding contraceptive methods (Carter, Bergdall, Henry-Moss, Hatfield-Timajchy, & Hock-Long, 2012). These are three components of any woman’s contraceptive understanding that have a significant impact on the ultimate decision made, whether they are misconceptions or accurate information (Spies, Askelson, Gelman, &
Losch, 2010). Several studies on young women’s attitudes and beliefs about various contraceptive methods show more misconceptions and a general lower level of accurate knowledge and information about LARC methods in particular.

**Long-acting Reversible Contraception**

Currently, there are three long-acting reversible contraceptive methods available in the US that include: the levonorgestrel-releasing intrauterine system (LNG-IUS), the copper T380A intrauterine device, and finally the single rod etonogestrel subdermal implant (Parks & Peipert, 2016). LARC is designed so that once the LARC method of choice is inserted; women no longer have to worry about daily, weekly, or even monthly maintenance of contraception coverage—making the effectiveness of LARC independent from the human error associated with user adherence (Fontenot & Fantasia, 2015). Due to the forgettable manner in which LARC is designed, LARC method perfect use effectiveness rates are essentially equivalent to those for typical use (Winner et al., 2012). In other words, all of the LARC methods are greater than 99% effective (Secura, Madden, et al., 2014). The cumulative contraceptive failure rate for combined LARC methods over the past 3 years amount to less than 1% and is 20 times lower than the cumulative contraceptive failure rate for combined hormonal methods including the patch, ring, and OCP (Birgisson et al., 2015). Another benefit associated with LARC is convenience. One-time placement of a method provides extended periods of continuous pregnancy prevention with greater than 99% efficacy (Parks & Peipert, 2016). The Food and Drug Administration (FDA) has approved contraceptive coverage of 3 years for the
subdermal implant, 5 years for the LNG-IUS, and 10 years for the copper IUD (Winner et al., 2012).

Increased awareness of these advantages associated with LARC use is crucial in improved LARC uptake among the adolescent and young adult populations. This important association was most clearly displayed in the Contraceptive CHOICE Project (CHOICE) model of contraceptive provision (Frost, Lindberg, & Finer, 2012).

**Evidence from the Contraceptive CHOICE Project**

CHOICE—an observational cohort study of 9256 14-45 year-old women in the St. Louis region—aimed to decrease the incidence of unintended pregnancies by eliminating financial, educational, and access barriers to all contraceptive methods available in the US (Mestad et al., 2011). After receiving tier designed counseling on all reversible contraceptive options available in the US, participants were provided with the reversible contraceptive method of their choice at no cost for 2-3 years (Birgisson et al., 2015). All participants were provided with standardized and comprehensive tier structured counseling on all contraceptive methods, starting with the most effective methods: long-acting reversible contraception (LARC) (Madden, Mullersman, Omvig, Secura, & Peipert, 2013). The contraceptive counseling design used in CHOICE served as a tool to increase awareness of LARC, in addition to providing comprehensive, accurate, and unbiased information on all reversible forms of contraception (Secura, Adams, Buckel, Zhao, & Peipert, 2014).

The CHOICE model of contraceptive method provision had a significant influence on the increased uptake of LARC (Birgisson et al., 2015). Among all of the
CHOICE participants, 75% chose one of the three LARC methods: 46% LNG-IUS, 12% copper IUD, and 17% implant (Birgisson et al., 2015). Of all the women who chose a LARC method, 69% were between the ages of 14-25 years (Birgisson et al., 2015), indicating a prevalence of LARC uptake among adolescent and young adult women. Among the younger CHOICE participants who chose a LARC method, 65.5% of the 14-17 year-olds chose the implant and 61.4% of the 18-20 year-olds chose the IUD (Mestad et al., 2011).

In addition to the notable shift seen in LARC use among the CHOICE participants, evidence from CHOICE also indicates that the continuation rates among LARC users at 12 and 24 months were greater (87% and 77%, respectively) than those among non-LARC users (57% and 41%, respectively) (O’Neil-Callahan, Peipert, Zhao, Madden, & Secura, 2013). Although slightly less than the continuation rates among all CHOICE participants that chose a LARC method, the continuation rates of LARC users among 14-19 year-old CHOICE participants were still greater (82% and 67%, respectively) than those among non-LARC users (49% and 37%, respectively) at the 12 and 25 month point (Rosenstock, Peipert, Madden, Zhao, & Secura, 2012). All in all, the increased uptake of LARC methods with associated high continuation rates and low discontinuation rates (7% within the first 6 months) demonstrated in CHOICE translated to a 79% reduction in teen pregnancy (Secura, Allsworth, Madden, Mullersman, & Peipert, 2010).

The CHOICE model demonstrated that LARC uptake can be optimized and even preferred among most women when financial, accessibility, and counseling barriers are
removed from providing reproductive health care to women of all ages—especially among adolescent and young adult women who are disproportionately effected by unintended pregnancies (Secura et al., 2010). This is encouraging since the unique multifaceted approach used by CHOICE is adaptable and can be implemented in a variety of clinical settings (Birgisson et al., 2015).

As a result, the American College of Obstetricians and Gynecologists (ACOG), the American Academy of Pediatrics (AAP), and the Society for Adolescent Health and Medicine (SAHM) recommend LARC as top tier contraception for all women, but especially among adolescent and young adult women (Foster et al., 2015). However, despite the official recognition of long-acting reversible contraceptive methods as the most effective contraceptive methods in pregnancy prevention, LARC methods remain underutilized among adolescent and young adult female populations (Denno, Hoopes, & Chandra-Mouli, 2015).

**Addressing the Barriers to Increased Uptake of LARC**

In addition to CHOICE, numerous studies and interventions focused on LARC provision have found supporting evidence that barriers to LARC provision and uptake exist on multiple levels involving clinical settings, providers, and patients (Murphy, Stoffel, Nolan, & Haider, 2016). It is important to address the biggest impediments that hinder the increase in LARC uptake among adolescent and young adult females in order to better understand the areas in need of improvement or change (Hathaway, Torres, Vollett-Krech, & Wohltjen, 2014).
The nationwide goal to reduce the unintended pregnancy rate through increasing LARC uptake starts with improved access to LARC devices at a variety of health care facilities throughout the US (Kavanaugh, Jerman, Ethier, & Moskosky, 2013). Without having LARC method devices in stock and available, health care providers (HCPs) cannot offer the most effective methods of contraception to eligible patients. In turn, this contributes to the overall lower LARC awareness among female populations at highest risk for unintended pregnancy—adolescent and young adult women (Murphy et al., 2016). In the case of the subdermal implant, the procurement of Nexplanon® requires the health care facility to undergo a company sponsored training program in which its’ providers are trained in the insertion and removal of the subdermal implant devices (Parks & Peipert, 2016). This requirement helps ensure the provision of Nexplanon® by ensuring that HCPs have the knowledge and training necessary to confidently offer these contraceptive methods to their patients, especially those known to be at high risk of unintended pregnancy. These positive consequences and outcomes were observed in a variety of Title-X funded facilities that had these implementations in place (Romero et al., 2015). Other clinic-based settings that were randomized to these interventions experienced twice as much LARC uptake and a resulting 50% reduction in their unintended pregnancy rate (Harper et al., 2015).

The barriers associated with health care providers include: lack of confidence and training in LARC device placement and method counseling, confusion about LARC eligibility among their patients, and practice of outdated clinical guidelines (Murphy et al., 2016). In addition to the updated Centers for Disease Control and Prevention (CDC)
issued recommendations for providing quality contraceptive services in a variety of clinical settings, potential solutions have also been suggested specifically for primary care clinicians through the adolescent medicine fellowship program curriculum (Potter, Koyama, & Coles, 2015). By implementing these suggestions at the provider level, there will be a greater number of HCPs who feel more comfortable providing same-day LARC methods to any and all eligible patients without hesitation (Biggs, Arons, Turner, & Brindis, 2013).

The barriers associated with adolescent and young adult female patients are largely related to the decreased awareness and knowledge of LARC methods discussed above (Spies et al., 2010). By increasing LARC awareness and knowledge through increased LARC placement and counseling by a variety HCPs, more young women will not only know to ask about these very methods when seeking contraceptive services, but also share accurate contraceptive information with their friends and family (Frost et al., 2012).

Overall, it is important to see the interdependent relationship among clinic, provider, and patient level barriers to increased LARC uptake (Murphy et al., 2016). By implementing multifaceted integration models in a variety of clinical settings, these barriers can be appropriately addressed and even provide solutions for the other barriers (Harper et al., 2015).

**Purpose of a Nexplanon®-specific Subgroup Analysis Study**
This is a sub-group analysis of a larger study aimed at describing the contraceptive use history of young women who present to the PED and their desire to initiate contraception in the PED. The purpose of this subgroup analysis is to explore the demographic and sexual health characteristics of females who have heard of the subdermal implant, Nexplanon®, as well as examine their reported sources of Nexplanon®-related information. By obtaining a better understanding of the sexual and reproductive health needs and preferences of an urban population that is disproportionately low income and ethnically and racially diverse, our hope is to maximize adolescent and young adult accessibility to contraceptive services most feasible in the PED environment such as Nexplanon®, in addition to the provision of comprehensive contraceptive counseling and education.

**Specific Aims & Objectives:**

To determine the percentage of adolescent and young adult females presenting to an urban PED who are familiar with Nexplanon® and to describe the demographic, sexual health, and contraceptive use characteristics of these young women.

- Hypothesis: We hypothesize that our population size and characteristics of participants familiar with Nexplanon® will be similar to those reported in the literature.

To evaluate the sources of Nexplanon®-related information reported by respondents familiar with Nexplanon®.
Hypothesis: We hypothesize that the majority of respondents familiar with Nexplanon® report medical professionals as their source of Nexplanon®-related information.

To evaluate the current methods of contraception methods used by adolescent and young adult females presenting to an urban PED.

Hypothesis: We hypothesize that the current methods of contraception reported by our population will be similar to those reported in the literature.

To determine the population size, demographic, sexual, and reproductive characteristics of adolescent and young adult females presenting to an urban PED who report current use of the subdermal implant.

Hypothesis: We hypothesize that our population size and characteristics of participants currently using Nexplanon® will be similar to those reported in the literature.

To determine willingness to initiate or switch to the subdermal implant if it was offered during a related or nonrelated visit among adolescent and young adult females presenting to an urban PED.

Hypothesis: We hypothesize that the proportion of our population that is willing to initiate or switch to the subdermal implant if offered in the PED will be similar to those reported in current literature.

To determine receptivity to learning about contraceptive methods during a related or nonrelated visit among adolescent and young adult females presenting to an urban PED.
- Hypothesis: We hypothesize that the proportion of our population that is receptive to learning about contraceptive methods in the PED will be similar to those reported in current literature.
METHODS

Study Design

This is a cross-sectional descriptive study using a paper-based anonymous questionnaire distributed to female patients, ages 16-21 years, presenting to a Boston urban pediatric emergency department (PED). This is a sub-group analysis of a larger study aimed at describing the contraceptive use history of young women who present to the PED and their desire to initiate contraception in the PED. The purpose of this subgroup analysis was to explore the demographic and sexual health characteristics of females who have heard of the subdermal implant, Nexplanon®, as well as the sources providing them with information on Nexplanon®. The Boston University Medical Campus’s Institutional Review Board (IRB) approved the study with a waiver of documentation of informed consent. According to Massachusetts state law, adolescents are able to consent for confidential care regarding their reproductive health, including pregnancy prevention and contraceptive counseling; therefore, adolescents provided consent to participate with a waiver of parental permission.

Study Population & Setting

This single-site research study was conducted in the pediatric emergency department of Boston Medical Center (BMC), an urban and academic facility located on the Boston University Medical Campus. BMC is the largest safety-net hospital in New England and serves a disproportionate number of low-income patients who are ethnically and racially diverse. The BMC pediatric emergency department sees approximately 27,000 children and young adults up to 22 years of age annually.
Survey Content & Development

The anonymous, 20-question survey included sections on demographic and background (6 questions), use of medical care (3 questions), sexual health and contraceptive history (5 questions), interest in contraceptive counseling and prescription availability in ED (3 questions), and knowledge of Nexplanon® (2 questions). The demographic and background questions were written to inquire about age, ethnicity, race, highest level of education completed, a parent's highest level of education completed, and highest level of education the subject planned to complete. The use of medical care questions were written to determine participants' use of primary care physicians (PCP), the time since last PCP visit, and if birth control options are discussed. The ED based questions investigates reason for current ED visit, likelihood of starting or changing to any type of birth control if available in the ED today, and which birth control methods would be chosen in the ED today. The sexual health and contraceptive history questions were asked in order to learn about sexual activity, current method of birth control, previous method of birth control, and happiness or reasons for unhappiness with current method of birth control, history of sexually transmitted infections, and parity/gravidity. The Nexplanon®-specific questions were chosen in light of the ultimate goal of the larger study, which is to determine the feasibility of providing certain types of contraception in a PED. The subdermal implant’s innovative design allows its administration to be quick and easy, making it the most reasonable LARC method to provide in an emergency room setting. The questionnaire was first piloted on 10 females presenting to the PED who provided oral feedback on their understanding of the
questions to help determine if question types and wording needed to be revised for clarity. The survey can be found in Appendix A.

**Recruitment & Data Collection**

Co-Investigators and research assistants recruited patients from August to December 2014 with particular focus on periods of high eligible patient volume—1500 to 2300 hours—determined from the previous year’s patient volume data. Co-investigators or research assistants tracked eligible patients on the PED's real time electronic medical tracking system. All English-speaking females aged 16-21 years presenting to the BMC Pediatric ED during the hours that research assistants and co-investigators were available were approached for possible enrollment in this convenience sample study. Young women were excluded if they were under the custody of the Department of Children and Families or the Department of Youth Services, critically or significantly ill, and/or developmentally delayed. Once approached, eligible participants were greeted with a personal introduction, brief scripted description of the study, explanation of consent with participation, followed by instructions on completing the survey. Females who consented to participate were given a printed informational handout containing background about

The primary outcome for this subgroup analysis was to describe the characteristics of young women who have heard of the subdermal implant Nexplanon® compared to those who have not heard of Nexplanon® using the following variables: age, ethnicity, race, parent’s highest level of education, highest level of education planned to complete, access to a regular primary care provider, sexual activity, STD history, and number of pregnancies.
Young women who had heard of Nexplanon® were asked about their source(s) of information about Nexplanon® --medical professionals, family and friends, media, and other.

**Data Analysis**

Two trained research assistants separately entered the collected data into Microsoft Excel 2011 using a pre-determined coding system for responses to the survey questions. Data was randomly double entered. Data analysis was completed using SPSS Statistics 22 (IBM, Armonk, New York, USA). For the purpose of our sub-group analysis, participants were categorized into two groups: females who have heard of Nexplanon® and females who have not heard of Nexplanon®. Frequencies and percentages were used to describe categorical variables: demographic, sexual health, and contraceptive use characteristics. In order to identify if any statistically significant categorical variables existed between the two assigned groups, univariate analysis was performed using Chi-squared tests. Odds ratios with 95% confidence intervals (CIs) were obtained for the relationship between participants who have heard of Nexplanon® and the three statistically significant variables: history of STDs, gravidity, and prior sexual intercourse with a male. Mean and Standard Deviation were used to describe the one continuous variable, age, followed by univariate analysis using independent t-test. Statistical significance was indicated using p-values for the categorical variables and odds ratio with 95% CI for the continuous variable—age.
RESULTS

From August to December of 2014, a total of 383 participants completed surveys for the main cross-sectional study. This sub-group analysis focused on the percentage of participants who responded to the specific survey question that asked,

“Have you heard of the implantable birth control device Nexplanon® that goes under the skin in the upper arm (Previously known as Implanon), which is the size of a matchstick and lasts for 3 years)?”

☐ Yes  ☐ No (If no, skip to Question 19)

Of the 383 participants for the main cross-sectional study, 95.6% (N=366) responded to the survey question of interest for this sub-group analysis. Demographic, sexual health, and contraceptive use characteristics were examined for three specialized subset populations including: the total population of respondents to the survey question inquiring participant familiarity with Nexplanon®, the percentage of respondents who replied with a “yes” (n=230), and the percentage of respondents who replied with a “no” (n=136).

Due to this sub-group study’s specific focus on Nexplanon®, descriptive characteristics of the percentage of all respondents who listed Nexplanon® as their current method of contraception (n=22) were summarized.
<table>
<thead>
<tr>
<th></th>
<th>Yes HeardNex n=230</th>
<th>No HeardNex n=136</th>
<th>Total Population n=366</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± Standard Deviation</td>
<td>19.11 ± 1.55</td>
<td>18.9 ± 1.65</td>
<td>19.04 ± 1.04</td>
<td>0.22</td>
</tr>
<tr>
<td><strong>Ethnicity:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>59 (25.7)</td>
<td>38 (27.9)</td>
<td>97 (26.9)</td>
<td>0.49</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>171 (74.3)</td>
<td>93 (68.4)</td>
<td>264 (72.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Race:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>127 (55.2)</td>
<td>64 (47.1)</td>
<td>191 (52.2)</td>
<td>0.18</td>
</tr>
<tr>
<td>Asian/Caucasian/Other/Mixed</td>
<td>94 (40.9)</td>
<td>64 (47.1)</td>
<td>158 (43.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Parent Level of Education:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than High School</td>
<td>24 (10.4)</td>
<td>22 (16.2)</td>
<td>46 (12.6)</td>
<td></td>
</tr>
<tr>
<td>High School Diploma/GED</td>
<td>75 (32.6)</td>
<td>37 (27.2)</td>
<td>112 (30.6)</td>
<td></td>
</tr>
<tr>
<td>College (No Degree)/2-yr Assoc. Degree</td>
<td>47 (20.4)</td>
<td>19 (14.0)</td>
<td>66 (18.0)</td>
<td>0.19</td>
</tr>
<tr>
<td>4-yr BA/BS Degree or Grad/Prof School</td>
<td>51 (22.2)</td>
<td>30 (22.1)</td>
<td>81 (22.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Planned Level of Education:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School Diploma/GED</td>
<td>44 (19.1)</td>
<td>19 (14.0)</td>
<td>63 (17.2)</td>
<td></td>
</tr>
<tr>
<td>2-yr Associate’s Degree</td>
<td>121 (57.1)</td>
<td>70 (59.3)</td>
<td>191 (57.9)</td>
<td></td>
</tr>
<tr>
<td>4-yr BA/BS Degree</td>
<td>71 (30.9)</td>
<td>42 (30.9)</td>
<td>113 (30.9)</td>
<td>0.51</td>
</tr>
<tr>
<td>Graduate School / Professional School</td>
<td>6 (2.8)</td>
<td>3 (2.5)</td>
<td>9 (2.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Chief Complaint:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only Gyn/GU</td>
<td>30 (14.2)</td>
<td>18 (15.3)</td>
<td>48 (14.5)</td>
<td>0.93</td>
</tr>
<tr>
<td>Only GI</td>
<td>55 (25.9)</td>
<td>27 (22.9)</td>
<td>82 (24.8)</td>
<td></td>
</tr>
<tr>
<td>Only Other</td>
<td>121 (57.1)</td>
<td>70 (59.3)</td>
<td>191 (57.9)</td>
<td></td>
</tr>
<tr>
<td>Gyn/GU ± GI and/or ± Other</td>
<td>6 (2.8)</td>
<td>3 (2.5)</td>
<td>9 (2.7)</td>
<td></td>
</tr>
<tr>
<td><strong>PCP:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>191 (83.0)</td>
<td>108 (79.4)</td>
<td>299 (81.7)</td>
<td>0.54</td>
</tr>
<tr>
<td>No</td>
<td>34 (14.8)</td>
<td>23 (16.9)</td>
<td>57 (15.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Last PCP Visit:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within the past year</td>
<td>167 (72.6)</td>
<td>88 (64.7)</td>
<td>255 (69.7)</td>
<td>0.29</td>
</tr>
<tr>
<td>Between 1-2 years ago</td>
<td>27 (11.7)</td>
<td>23 (16.9)</td>
<td>50 (13.7)</td>
<td></td>
</tr>
<tr>
<td>Over 2 years ago</td>
<td>10 (4.3)</td>
<td>5 (3.7)</td>
<td>15 (4.1)</td>
<td></td>
</tr>
<tr>
<td><strong>History of STI:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>76 (33.0)</td>
<td>27 (19.9)</td>
<td>103 (28.1)</td>
<td>0.01</td>
</tr>
<tr>
<td>No</td>
<td>150 (65.2)</td>
<td>102 (75.0)</td>
<td>252 (68.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Gravidity:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>149 (64.8)</td>
<td>104 (76.5)</td>
<td>253 (69.1)</td>
<td>0.006</td>
</tr>
<tr>
<td>≥1</td>
<td>78 (33.9)</td>
<td>27 (19.9)</td>
<td>105 (28.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Sexual Activity:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>206 (89.6)</td>
<td>97 (71.3)</td>
<td>303 (82.8)</td>
<td>0.000</td>
</tr>
<tr>
<td>No</td>
<td>22 (9.6)</td>
<td>36 (26.5)</td>
<td>58 (15.8)</td>
<td></td>
</tr>
</tbody>
</table>
*History of STIs, Gravidity, and Sexual Activity were characteristics that varied between 16 to 21 year old females who were familiar with Nexplanon® and those who were not familiar of Nexplanon®

*Characteristics that were determined to be statistically significant in chi-square univariate analysis (p-value < 0.05)

**Total Population of Respondents (n=366)**

The mean age of all participants who responded to the survey question about Nexplanon® familiarity was 19.04 ± 1.04 years. Among the total respondent population, approximately three-fourths and half of the females identified with a Non-Hispanic ethnicity and the African American race, respectively. Roughly one-third of the respondents had a parent with a high school diploma or GED representing their highest level of education, but only 17% of the respondents themselves plan the same for their future educations. In fact the majority, roughly a combined 80%, of the respondents either plan to receive a degree from a 4-year college (42%) or graduate and professional schools (39%).

The majority of participants (58%) presented to the PED for complaints that were unrelated to gynecological (GYN), genitoureteral (GU), and gastrointestinal (GI) concerns followed by roughly a quarter participants who presented to the PED for a GI-related complaint. The majority also reported seeing their primary care physician (82%) fairly regularly with a last visit having occurred within the past year (70%).

Sexual health characteristics that best describe the total population of respondents include: no previous history of STI’s (69%), sexually active (83%), and zero prior pregnancies (69%).

85% (311/366) of all the respondents shared their current method of contraception (at time of the study) in addition to their familiarity with Nexplanon®. 36% practiced
abstinence, 29% used a hormonal contraceptive method, 16% used a LARC, 4% used condoms, and lastly, 16% relied on male withdrawal or no contraceptive method at all (Table 2).

Table 2: Current methods of contraception reported by 16-21 year-old females in an urban PED

<table>
<thead>
<tr>
<th>Method</th>
<th>Heard of Nexplanon® n=230</th>
<th>Not Heard of Nexplanon® n=136</th>
<th>Total Population n=311</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstinence</td>
<td>66 (32.4)</td>
<td>45 (42.1)</td>
<td>111 (35.7)</td>
</tr>
<tr>
<td>Barrier Method (Condom)</td>
<td>8 (3.9)</td>
<td>4 (3.7)</td>
<td>13 (4.2)</td>
</tr>
<tr>
<td>Hormonal Methods (OCP &amp; Shot)</td>
<td>62 (30.4)</td>
<td>28 (26.2)</td>
<td>90 (28.9)</td>
</tr>
<tr>
<td>LARC Methods (Implant &amp; IUD)</td>
<td>42 (20.6)</td>
<td>7 (6.5)</td>
<td>49 (15.8)</td>
</tr>
<tr>
<td>Withdrawal and/or No Method</td>
<td>26 (12.7)</td>
<td>23 (21.5)</td>
<td>49 (15.8)</td>
</tr>
</tbody>
</table>

Respondents Familiar with Nexplanon® (n=230)

63% (230/366) of all respondents had heard of Nexplanon®. The mean age of these of these participants was 19.1 ± 1.55 years. An independent t-test, used for univariate analysis of continuous variables, indicated that the mean age of females did not significantly differ between respondents who had heard of Nexplanon® and those who had not (p-value = 0.22).

Other characteristics that did not significantly differ with familiarity of Nexplanon® included: ethnicity (p-value = 0.49), race (p-value = 0.18), a parent’s highest level of education (p-value = 0.19), personal highest level of education planned to complete (p-value = 0.51), chief complaint for ED visit (p-value = 0.78), having a primary care physician (p-value = 0.54), and when primary care physician was last seen (p-value = 0.30).
The three characteristics that did significantly vary with familiarity of Nexplanon® included: history of STI (p-value = 0.01 < 0.05), gravidity (p-value = 0.006 < 0.05), has been sexually active (vaginal sex) with a male before (p-value = 0.000 < 0.05).

In order to quantify the degree of association between the statistically significant characteristics and familiarity with Nexplanon®, odds ratios with 95% confidence intervals were calculated (Table 3).

Table 3: Odds Ratios for 16-21 year-old females presenting to an urban PED will be familiar with Nexplanon® over unfamiliar with Nexplanon®: adjusted analysis

<table>
<thead>
<tr>
<th>Heard of Nexplanon® vs. Not Heard of Nexplanon® (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History of STD:</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td><strong>Gravidity:</strong></td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>≥1</td>
</tr>
<tr>
<td><strong>Sexually Active:</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

**Current Implants Users**

6% (22/366) of our sub-group analysis population identified the contraceptive implant as their current method of contraception. The mean age of participants reporting current use of the contraceptive implant was 18.8. The majority (91%) of our implant using population racially identified as African American and 59% ethnically identified as Hispanic. Among our implant using participants, 90.9% reported having a primary care physician (PCP) of which 95% reported discussing contraceptive method options with
their PCP. A little over half (57.1%) of implant users reported having a history of an STI. 66.7% of implant users were nulliparous, while 23.8% reported having one previous pregnancy. The majority of implant users indicated that they were happy with their current method of contraception.

**Sources of Contraceptive Information**

In Table 4, the source(s) of Nexplanon®-related information was collated based on those respondents familiar with Nexplanon® (n=223) to the survey question asking, “How did you hear about Nexplanon®? (Check all that apply.)”

- Friends, family
- Medical (internet, magazines)
- Medical professional (School nurse, primary care doctor, etc.)
- Other

97% of the respondents who indicated familiarity with Nexplanon® also identified their source of information on Nexplanon® (Table 4). The majority of respondents (42%) reported family and friends as their only sources of information followed by 30% of respondents reporting medical professionals as their sole source of information.

**Table 4: Sources of contraceptive information reported by 16-21 year-old females in an urban PED**

<table>
<thead>
<tr>
<th>Source of Information</th>
<th>Heard of Nexplanon® n=223</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only Family &amp; Friends</td>
<td>94 (42.2)</td>
</tr>
<tr>
<td>Only Medical Professionals</td>
<td>66 (29.6)</td>
</tr>
<tr>
<td>Only Media</td>
<td>9 (4.0)</td>
</tr>
<tr>
<td>Only Other</td>
<td>12 (5.4)</td>
</tr>
<tr>
<td>Family/Friends + Medical Professionals</td>
<td>33 (14.8)</td>
</tr>
<tr>
<td>Family/Friends + Medical Professionals + Media</td>
<td>9 (4.0)</td>
</tr>
</tbody>
</table>
Willingness to initiate or switch to the Implant contraceptive method if offered in the PED

“Which birth control method(s) would you be willing to start or change to if it was offered to you here in the emergency room today. (Check all that apply.)”

- Birth control pills, ring, or patch
- Injectable (Depo- Provera shot)
- IUD (Intra uterine device: Mirena, Skyla, Copper Paragard)
- Implantable (Implanon/Nexplanon)
- I’m happy with my birth control method and wouldn’t change
- None
- Other: ___________________________

Table 5: Participant willingness to initiate of switch to the Implant if offered in the PED

<table>
<thead>
<tr>
<th>Willingness to Initiate or Switch to the Implant if Offered in PED</th>
<th>Heard of Nexplanon® (N=226)</th>
<th>Not Heard of Nexplanon® (N=129)</th>
<th>Total Population (N=355)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27 (11.9)</td>
<td>7 (5.4)</td>
<td>34 (9.6)</td>
</tr>
<tr>
<td>No</td>
<td>199 (88.0)</td>
<td>123 (95.0)</td>
<td>322 (90.7)</td>
</tr>
</tbody>
</table>

Only 9.6% of the participants in our overall sub-group analysis population reported that they would initiate or switch to the implant if it was offered to them in the PED. However, the proportion of participants who had heard of Nexplanon® who were willing to initiate or switch to the implant if it was offered in the PED was double the proportion of willing participants who had not heard of Nexplanon®.

Discussion about Contraceptive Method Options with a Doctor or a Parent

“Have you ever talked about birth control options with your primary care physician (regular doctor) and/or a parent?”

Your Doctor: ☐ Yes          A Parent: ☐ Yes
☐ No                        ☐ No

25
Table 6: Discussion about Contraceptive Method Options between Adolescent and Young Adult Females and their Doctor or Parent

<table>
<thead>
<tr>
<th>Discussion of Contraceptive Method Options</th>
<th>Heard of Nexplanon®</th>
<th>Not Heard of Nexplanon®</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>N=203</td>
<td>N=122</td>
<td>N=325</td>
</tr>
<tr>
<td></td>
<td>86.7%</td>
<td>66.4%</td>
<td>79.1%</td>
</tr>
<tr>
<td></td>
<td>13.3%</td>
<td>33.6%</td>
<td>20.9%</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>N=191</td>
<td>N=109</td>
<td>N=300</td>
</tr>
<tr>
<td></td>
<td>60.2%</td>
<td>42.2%</td>
<td>53.7%</td>
</tr>
<tr>
<td></td>
<td>39.8%</td>
<td>57.8%</td>
<td>46.3%</td>
</tr>
</tbody>
</table>

79.1% of the participants in our sub-group analysis population reported that they discussed birth control method options with a doctor, while only 53.7% of the participants in our sub-group analysis population reported that they discussed birth control method options with a parent.

Receptivity to Learning about Birth Control in the PED

“If you were being seen in the emergency room for a problem, even if that problem was not related to your sexual health, would you be open to learning about birth control?”

☐ Yes
☐ No

Table 7: Receptivity to Learning about Birth Control in the PED

<table>
<thead>
<tr>
<th>Receptivity to Learning about Contraception in the PED</th>
<th>Heard of Nexplanon® N=229</th>
<th>Not Heard of Nexplanon® N=132</th>
<th>Total Population N=361</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>68.6%</td>
<td>66.0%</td>
<td>67.6%</td>
</tr>
<tr>
<td>No</td>
<td>31.4%</td>
<td>34.1%</td>
<td>32.4%</td>
</tr>
</tbody>
</table>
67.6% of the participants in our sub-group analysis population indicated that they were receptive to receiving contraceptive education and information during a current related or unrelated visit to the ED.
DISCUSSION

Participants Familiar with Nexplanon®

Our study found that 63% of the participants in our subgroup analysis population had heard of Nexplanon®. This is a drastic increase in Nexplanon® awareness among young women from previous similar studies in which only 41.1% (Bachorik et al., 2015) and 8.0% (Spies et al., 2010) of women reported any familiarity with Nexplanon®.

Our sub-group analysis identified three sexual and reproductive health characteristics strongly associated with the sub-group participants who had heard of Nexplanon®. These characteristics included: history of an STI, at least one previous pregnancy, and prior sexual (vaginal) intercourse with a male. Our study found that participants with a history of an STI, at least one previous pregnancy, and prior sexual (vaginal) intercourse with a male were more likely to have heard of Nexplanon® compared to those participants with no history of an STI, no previous pregnancies, and no prior sexual intercourse (vaginal) intercourse with a male. These finding are both similar and different from the findings of similar previous studies.

Our finding that participants with a history of an STI were 1.3 times more likely to have heard of Nexplanon® than those with no history of an STI was consistent with the findings of Mestad et al. in 2011. Mestad et al. found that having a history of an STI was significantly associated with selection of the implant over the IUD among adolescents aged 14-20 years who chose a LARC method in the CHOICE project.
Our finding that participants with at least one previous pregnancy were twice as likely to have heard of Nexplanon® than those participants with no previous pregnancies was inconsistent with the findings of Mestad et al. in 2011.

Our finding that participants with prior sexual (vaginal) intercourse with a male were 3.5 times more likely to have heard of Nexplanon® than those with no prior sexual (vaginal) intercourse with a male was consistent with findings of multiple previous studies. In a similar study conducted by Miller et al. in 2016, the proportion (91%) of the total population who reported having experience with vaginal sex was similar in size to the proportion (82.8%) of participants who reported having prior vaginal sexual intercourse in our subgroup analysis study.

Our subgroup analysis did not find any racial or ethnic disparities in participant knowledge of Nexplanon®. This is inconsistent with previous findings that suggested Hispanic women had lower awareness of contraceptives than Caucasian and African American women (Craig et al., 2014).

Sources of Contraceptive Information

The majority (42%) of our participants reported family and friends as their main sources of contraceptive information, closely followed by 30% of our participants reporting medical professionals as their sole source of information. Our findings are somewhat consistent with those of Khurana et al., who found doctors/nurses (26%) to be the most frequently reported source for contraceptive information. A combination of media sources (26%), including television/radio (14%) and Internet (12%), were also reported frequently, closely followed by the combined percentage (25%) of those who
reported parent (10%), friend (12%), and sibling/relative (3%) (Khurana & Bleakley, 2015).

Since family and friends were the sources most frequently reported by our participants, it is concerning that the lowest level of contraceptive knowledge was found to be associated with obtaining contraceptive information from parents (Khurana & Bleakley, 2015). Because our survey did not assess the level of contraceptive knowledge among our participants, we cannot determine if a lower level of contraceptive knowledge is associated with our sub-group analysis population, but it is important to point out that approximately half (53.7%) discussed contraceptive method options with a parent. The association between obtaining contraceptive information from parents and a lower level of contraceptive knowledge might be due to parents finding it more difficult to differentiate between providing accurate contraceptive information and sharing personal moral attitudes about contraceptive methods (Bader, Kelly, Cheng, & Witt, 2014). Since this is a plausible complication that can arise with parents providing contraceptive information, it is encouraging that many of our participants reported obtaining their contraceptive information from medical professionals. In contrast to what was found with parents, Khurana et al. found the highest level of contraceptive knowledge to be associated with obtaining contraceptive information from doctors/nurses, which was predominantly the case among females compared to males. Our data was consistent with these findings and showed that a significant proportion of our sub-group analysis population (79.1%) discussed contraceptive method options with their doctors.

**Current Contraceptive Method Use**
The majority (35.7%) of our sub-group analysis population indicated that they practiced abstinence, which is consistent with more recent evidence showing that teenagers are waiting longer to initiate sexual intercourse (Finer & Philbin, 2013). The practice of abstinence was more common among the participants who were not familiar with Nexplanon® (42.1%) compared to those who were familiar with Nexplanon® (32.4%). This might be indicative of a more sexually active population being familiar with Nexplanon® and is consistent with the strong association our sub-group analysis found between participants who have previously engaged in vaginal sexual intercourse and hearing of Nexplanon®.

Hormonal methods were the next most frequently used contraception reported by our participants. This is consistent with the overwhelming amount of evidence showing that OCPs continue to be the most prevalent contraceptive methods used by adolescent and young adult women (Finer & Philbin, 2013). Although this was consistently seen throughout our total sub-group population, the use of hormonal contraceptive methods was seen more among the participants who were familiar with Nexplanon® (30.4%) compared to those unfamiliar with Nexplanon® (26.2%).

Practicing withdrawal and not using a contraceptive method at all closely followed the use of hormonal methods among participants unfamiliar with Nexplanon® (21.5%) and was much less than the 53% of 14-19 year-old females who reported the same contraceptive decisions when presenting to a PED (Miller, Randell, Barral, Sherman, & Miller, 2016). In contrast, hormonal use among participants who were
familiar with Nexplanon® was followed by LARC use (20.6%) instead of withdrawal and no contraceptive method (12.7%). It was promising to see condoms used least throughout our sub-group analysis population (4.2%)—more than half of the current condom use reported by women nationally (9.2%) (Daniels et al., 2014). The patterns of use with less effective contraceptive methods seen among our sub-group analysis population might suggest that young women who are aware of Nexplanon® are also generally more aware of and prefer using alternative contraceptive methods as opposed to practicing withdrawal or not using a contraceptive method altogether.

LARC use among our total sub-group analysis population (15.8%) was three times greater than the current LARC use reported by 15-24 year-old females from the 2011-2013 NSFG cycle (5.0%) (Branum & Jones, 2015). In our study, LARC use among participants familiar with Nexplanon® (20.6%) was more than three times greater than LARC use among participants unfamiliar with Nexplanon® (6.5%). This data contributes to the large body of evidence supporting the vital role that LARC awareness has on increasing the uptake of LARC methods, especially Nexplanon® (Kavanaugh et al., 2013).

**Current Nexplanon® Users**

6% (22/366) of our sub-group analysis population identified the contraceptive implant as their current method of contraception at the time they completed the survey. This was an encouraging six times greater than the 0.8% using the contraceptive implant
among women of all reproductive ages from the 2011–2013 NSFG survey cycle (Branum & Jones, 2015) and twice as much as the 3% of young women aged 14-19 years presenting to a PED (Miller et al., 2016). Our results demonstrate an upward trend in implant uptake among US women of all reproductive ages (15-44), but also, suggests increased implant use among women disproportionately affected by unintended pregnancy—14-20 year-old adolescent and young adult women (Chernick et al., 2012).

**Willingness to Initiate or Switch to Nexplanon® during a PED Visit**

Only 9.6% of the participants in our overall sub-group analysis population reported that they would initiate or switch to the implant if it was offered to them in the PED. However, the proportion of participants who had heard of Nexplanon® who were willing to initiate or switch to the implant if it was offered in the PED was double the proportion of willing participants who had not heard of Nexplanon®. These findings suggest that the proportion of young women willing to initiate or switch to the implant if offered in the PED has the potential to increase if there were more efforts made to increase the awareness of Nexplanon®. These findings are consistent with those of a similar study that reported 28.8% of their study population expressing an interest in initiating the implant in the PED setting (Miller et al., 2016).

**Receptivity to Learning about Birth Control in the PED**

The majority (67.6%) of our sub-group analysis total population expressed an interest in learning about contraceptive methods in the PED. These findings are consistent with the attitudes of many adolescent and young adult females concerning
contraceptive education and information (Bachorik et al., 2015). This openness to learning more about contraceptive methods in the PED will hopefully translate into an increased uptake of one of the most effective methods of contraception, especially the subdermal implant, and its continued use and satisfaction (Obijuru, Bumpus, Auinger, & Baldwin, 2016).

**Limitations**

There are several limitations to our subgroup analysis study. Since our study analyzed a sub-group of a population selected by a larger cross-sectional study, our results cannot be generalized to describe the overall adolescent and young adult women populations. The associations identified may only be used to describe the 16-21 year-old adolescent and young adult females who responded to the survey questions of interest to our subgroup analysis. Again, due to the cross-sectional nature of our sub-group analysis, any associations identified through our survey should not be construed as causal relationships. Further studies are required in order to establish any temporal relationships between variables.

Another factor that should be considered is that the females that participated in our subgroup analysis were part of a larger population that represented a convenience sample. Thus, our subgroup analysis may exclude young women who are knowledgeable about Nexplanon®, but chose not to participate in the study.
Due to the low statistical power associated with small sample sizes, characteristics found to be statistically significant and therefore strongly associated with our sub-group analysis population might be overestimations and not reflect true effects. As a result of the anonymous completion of our surveys, all collected data was self-reported and, therefore, subject to recall bias. Also, since respondents were left alone in a PED exam room to complete the survey, it is possible that respondents interpreted survey questions differently from what was originally intended when survey questions were written.

Another limitation of our subgroup analysis refers to the difference in being knowledgeable and familiar with Nexplanon®. Since our survey did not ask any qualitative questions testing the accuracy of the participants’ knowledge about Nexplanon®, the degree to which these young women are familiar with Nexplanon® is not determinable from our analysis.

Lastly, this subgroup analysis was part of a one-time survey that has not followed up on any of the participants. Therefore, any clarifications or comments regarding the questions answered by the participants are not applicable to the date we collected.

Clinical Implications and Contributions to Existing Literature

Despite the limitations associated with our sub-group analysis, there any many clinical implications that are supported by our findings. An overwhelming amount of the literature has proven that accessibility and education are among the largest barriers to the increase of LARC uptake among adolescent and young adult women (Murphy et al., 2016). In response to this evidence, there have been a number of clinic-based
interventions, in addition to CHOICE, that have provided further support of the importance of convenient access and proper contraceptive knowledge in the contraceptive method decision-making process for young women (Harper et al., 2015). In a study that examined contraceptive method use among females aged 15-19 years seeking contraceptive services at Title X funded sites from 2005 to 2013, Romero et al. found a fifteen-fold increase in the uptake of the most effective methods of reversible contraception in the setting of increased health care provider awareness of LARC clinical guidelines and device training as well as patient-centered contraceptive counseling. One out of every fourteen 15-19 year-old females chose one of the most effective LARC methods over other moderately and least effective methods (Romero et al., 2015). In light of the encouraging increase in LARC uptake displayed in a wide variety of health care facilities, ED-based interventions should also be considered.

In an ED-based study conducted by Miller et al., only 27% of the adolescents and young adults presenting to a PED reported having any previous counseling on contraceptive methods. This is a concerning statistic that can be addressed by implementing comprehensive contraceptive counseling in the PED environment. This implementation is supported by additional evidence from previous ED-based studies and interventions that suggest how instrumental the PED can be in providing comprehensive contraceptive services among adolescent and young adult women in the US (Fine & Mollen, 2010).

In addition to providing complete and accurate information on contraceptive
method options, PEDs should be included in the list of clinical settings that are optimized to implement LARC provision—especially in the case of Nexplanon®. The potential of increased LARC uptake through the PED is supported by a recent study that found the increase in implant uptake to surpass the increase in IUD uptake among young women between 2005 and 2013 (Romero et al., 2015). These findings suggest that young women are choosing the most effective contraceptive methods in clinical settings where LARC devices are conveniently offered.

Although there have been many previous studies that have focused on adolescent awareness and knowledge of LARCs, this sub-group analysis contributes to a small pool of existing studies based in the PED (Miller et al., 2014). Overall, our study findings are supportive of and consistent with the provision and education of Nexplanon® in the PED. This would be a crucial opportunity to provide comprehensive contraceptive counseling and convenient access to the most effective method of contraception among a population that disproportionately affected by unintended pregnancy. This can be made possible by enabling PED health care providers with the proper access to and training in Nexplanon® which showed twice as much LARC uptake among women at clinics randomized to these types of intervention (Harper et al., 2015). By adapting these patient-centered practices and techniques, the PED setting can contribute to the notable reduction in teen pregnancy seen in a variety of similar clinic-based interventions (McNicholas, Madden, Secura, & Peipert, 2014). The PED atmosphere has enormous potential to serve young women as an additional venue for contraception education and access.
## APPENDIX

### A. Study Questionnaire

#### Section A: Background Information

1. How old are you? __________________ years old

2. Are you Hispanic, Latina or of Spanish origin?
   - [ ] Yes
   - [ ] No

3. What is your race/ethnicity? *(Check all that apply.)*
   - [ ] Black or African American
   - [ ] White or Caucasian
   - [ ] Asian
   - [ ] Other: __________________________________

4. What is the highest level of education you have completed?
   - [ ] Junior high school
   - [ ] Some high school
   - [ ] High school graduate or GED
   - [ ] Some college but no degree
   - [ ] 2-yr college (Associates) degree
   - [ ] Other: __________________________________

5. What is the highest level of education completed by your parent(s)?
   - [ ] Less than high school
   - [ ] High school graduate or GED
   - [ ] Some college but no degree
   - [ ] 2-yr college (Associates) degree
   - [ ] 4-year college graduate (BA, BS)
   - [ ] Graduate or professional school
   - [ ] Don’t know

6. What is the highest level of education you plan to complete?
   - [ ] High school graduate or GED
   - [ ] 2-year college degree (Associates degree)
   - [ ] 4-year college graduate (BA, BS)
   - [ ] Graduate or professional school
   - [ ] Don’t know

7. Do you have a primary care physician (regular doctor)?
   - [ ] Yes
   - [ ] No *(If no, skip to question 9B)*

8. When is the last time you saw your primary care physician (regular doctor)?
   - [ ] Within the last year
   - [ ] Between 1- 2 years ago
   - [ ] Over 2 years ago

9. Have you ever talked about birth control options with your primary care physician (regular doctor) and/or a parent?
9A) Your doctor: ☐ Yes ☐ No

9B) A parent: ☐ Yes ☐ No

10. What brought you to the ER today? (Examples: sore throat, fever, abdominal pain):
_________________________________________________________________________

Section B. Sexual Health History and Birth Control

11. If you were being seen in the emergency room for a problem, even if that problem was not related to your sexual health, would you be open to learning about birth control?
☐ Yes
☐ No

12. Have you ever been sexually active with boys? (By this, we mean vaginal sex)
☐ Yes
☐ No (If no, skip to question 15)

13. What type of birth control are you using now? (Check all that apply.)
☐ Abstinence
☐ Birth control pills, ring, or patch
☐ Injectable (Depo-Provera shot)
☐ IUD (Mirena, Skyla, Copper Paragard)
☐ Implantable (Implanon/Nexplanon)
☐ Withdrawal method (“pulling out”)
☐ Condoms
☐ None
☐ Other: _____________________

Birth control in the past? (Check all that apply.)
☐ Abstinence
☐ Birth control pills, ring, or patch
☐ Injectable (Depo-Provera shot)
☐ IUD (Mirena, Skyla, Copper Paragard)
☐ Implantable (Implanon/Nexplanon)
☐ Withdrawal method (“pulling out”)
☐ Condoms
☐ None
☐ Other: _____________________

14 A. Are you happy w/ your current method of birth control?
☐ Yes (If yes, skip to Question 15)
☐ No (If no, continue to Question 14B)

14 B. If no, why not? (Examples: requires a doctor visit, irregular bleeding, weight gain, can’t remember to take/use.)
_________________________________________________________________________

15. If you could start or change to any type of birth control of your choice here in the emergency room, how likely would you be to start it today?

<table>
<thead>
<tr>
<th>Unlikely</th>
<th>Neutral</th>
<th>Likely</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>5</td>
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<tr>
<td>2</td>
<td>4</td>
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</tbody>
</table>
16. Which birth control method(s) would you be willing to start or change to if it was offered to you here in the emergency room today. *(Check all that apply.)*

- Birth control pills, ring, or patch
- Injectable (Depo-Provera shot)
- IUD (Intra uterine device: Mirena, Skyla, Copper Paragard)
- Implantable (Implanon/Nexplanon)
- I’m happy with my birth control method and would not change to a different kind
- None
- Other: ____________________________

17. Have you heard of the implantable birth control device Nexplanon that goes under the skin in the upper arm (Previously known as Implanon), which is the size of a matchstick and lasts for 3 years)?
- Yes
- No *(If no, skip to Question 19)*

18. How did you hear about Nexplanon? *(Check all that apply.)*

- Friends, family
- Medical professional (School nurse, Primary Care Doctor, Nurse, clinic)
- Other _______________________

19. Have you ever been diagnosed with a STD (sexually transmitted disease)? (Examples: Gonorrhea, Chlamydia, Herpes, Trichomoniasis)
- Yes
- No

20. How many times have you been pregnant? _____________ (List # of times pregnant)

*Thank you for taking the time to complete this survey.*
B. Participant Informational Handout

Birth Control and Sexual Health Survey

This is a research study about birth control use and sexual health among 16 to 21 year old females. It is an anonymous questionnaire, meaning, no information that could identify you will be associated with the questionnaire that you will be asked to fill out. There are 20 questions that should take about 5-10 minutes to complete. The information you give will be used to help us better understand the birth control needs of adolescents and young women who come to our emergency room. The only risk in participating is the potential for loss of confidentiality.

No one will know if and how you answered the questions because we are not collecting any personal information; this is an anonymous survey. DO NOT write your name on this survey. Answer the questions based on how you really feel. There are no right or wrong answers to the questions. By completing the survey, you are indicating your willingness to participate in this study.

If you are uncomfortable answering a question, just leave it blank.

Whether or not you answer the questions will not affect your treatment in the emergency room. Completing the survey is voluntary. The questions that ask about your background will be used only to generally describe the people who are taking part in this study. Once the study is completely done, we will make a report summarizing what we learned from the answers provided in the questionnaires. All surveys collected will be kept in a secure, locked location and any data will be stored in a secure database.

When you are finished, please place your completed survey in the unmarked envelope and place it in the box marked “Survey.”

You may contact Atsuko Koyama, MD at 617-414-6334, if you have any questions about the study.

The Institutional Review Board at the Boston University Medical Campus oversees all research studies at Boston Medical Center. Please contact them at 617-638- 7207 or medirb@bu.edu if you have any questions about being a research subject in this study.

Thank you for your time.

BUMC/BMC Institutional Review Board
IRB NUMBER: H-32850
IRB APPROVAL DATE: 04/16/2014
IRB EXPIRATION DATE: 04/15/2015
C. Guardian Informational Handout

Birth Control and Sexual Health

What is the research study that my daughter has volunteered for?
Your daughter has volunteered to participate in a research study that lasts just for the period of time she is visiting the Pediatric Emergency Department at Boston Medical Center. State of Massachusetts guidelines indicate that minors can provide their own consent or permission, without parental input, for health-care related decisions regarding matters of reproductive health. Along these lines, your daughter was asked if she would be willing to fill out a research questionnaire about questions regarding reproductive health choices. The survey is strictly anonymous. No identifying information is provided on the survey, meaning that it will be impossible for anyone to know who the answers belong to.

What is the study about?
This is a research study focusing on adolescents’ and young women’s thoughts about birth control and their sexual health. The study is being conducted at Boston Medical Center. The purpose of this study is to find out more about adolescents’ and young women’s contraceptive needs, including whether or not young women may desire contraception from the emergency department. The hope is that your daughter’s participation will ultimately help improve medical care. About 300 women between the ages of 16 to 21 are being asked to take part in this study.

What will my daughter be doing?
We are asking young women to complete an anonymous questionnaire with 20 questions.

What happens to the information my daughter provides?
We will not record any identifying information. The completed anonymous questionnaires will be stored in a safe and secure location in a research study office at Boston Medical Center. Information from this study may be reviewed and photocopied by state and federal regulatory agencies such as U.S. Government’s Office of Human Research Protection and the Institutional Review Board of the Boston University Medical Campus, which oversees the conduct of all human subject research at Boston Medical Center.

Who can I contact for more information?
The Institutional Review Board at the Boston University Medical Campus oversees all research studies at Boston Medical Center. Please contact them at
617-638-7207 or medirb@bu.edu if you have any questions about your daughter being a research subject in this study.
REFERENCES

http://doi.org/10.1097/AOG.0000000000001036


http://doi.org/10.1016/j.jpag.2014.08.002

http://doi.org/10.1111/jmwh.12149

http://doi.org/10.1016/j.contraception.2013.05.012


http://doi.org/10.1097/GRF.0000000000000070


http://doi.org/10.1016/j.contraception.2011.03.001


http://doi.org/10.1097/PEC.0000000000000076

Miller, M. K., Pickett, M., Leisner, K., Sherman, A. K., & Humiston, S. G. (2013). Sexual Health Behaviors, Preferences for Care, and Use of Health Services Among Adolescents in Pediatric Emergency Departments:
Pediatric Emergency Care, 29(8), 907–911.

http://doi.org/10.1097/PEC.0b013e31829ec244


http://doi.org/10.1016/j.jadohealth.2015.10.254


http://doi.org/10.1097/AOG.0b013e3182a91f45

http://doi.org/10.1016/j.ajog.2016.02.017


http://doi.org/10.1001/jamapediatrics.2014.2812


http://doi.org/10.1016/j.ogc.2015.08.004


http://doi.org/10.1097/AOG.0b013e31827499bd


http://doi.org/10.1097/AOG.0000000000000184


http://doi.org/10.1016/j.ajog.2010.04.017


http://doi.org/10.1016/j.jadohealth.2014.09.007


VITA

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Year of Birth: 1989

Education: Auburn University
          Bachelor of Arts in Chemistry, December 2011
          Boston University School of Medicine, Boston, MA
          Candidate for Master of Arts of Medical Sciences, May 2016
          Coursework: Biochemistry and Cell Biology,
          Pharmacology, Pathology, Human Physiology, Cellular Organization of Tissues

Research Experience:

01/2010- 05/2010 Undergraduate Research Program
  • Using Acyclic 1, 3- Dienes as Models for the Photoisomerization of Retinal

05/2010- 12/2010 Cellular and Molecular Biology Fellowship
  • Continuation of Research on: Using Acyclic 1, 3-Dienes as Models for the Photoisomerization of Retinal

Medically Relevant Experiences:

05/2007- 12/2013 Independent Shadowing
  • Primary Care
  • OB-GYN
  • Cardiology
• General Surgery
• Cardiac Vascular and Thoracic Surgery
• Neurosurgery
• Orthopedics
• Emergency Medicine

10/2010-05/2011 Medical D Volunteer Auburn, AL
• Magnolia Place Senior Citizen Service Organization

06/2011-08/2011 Georgetown Summer Medical Institute
• 6 week Intensive Gross Anatomy Course
• Cadaver Lab Experience

01/2012-03/2013 Emergency Department Medical Scribe
• Emergency Medical Associates: Reston Hospital Center Reston, VA
• Scribe America: Virginia Hospital Center Arlington, VA

03/2016-08/2016 Emergency Department Medical Scribe
• Scribe America: Massachusetts General Hospital Boston, MA
• Scribe America: Brigham and Women’s Hospital Boston, MA

Awards:

09/2009-12/2012 Dean’s List

05/2010-12/2010 Cellular and Molecular Biology Fellowship

10/2012-12/2012 Phi Kappa Phi Honor Society

Graduated 12/12/11 Summa Cum Laude

Volunteer Work:

08/2010-05/2011 Project Uplift
• Agency with goal to help children develop happy and constructive lives through positive role models
08/2010-12/2011  Auburn Athletic Department Tutor
  • Tutored student-athletes in organic chemistry and biochemistry