

**EMERGENCY CONTRACEPTIVE PILLS: KNOWLEDGE,
ATTITUDES, AND PRACTICE PATTERNS AMONG
CERTIFIED NURSE-MIDWIVES IN NORTH CAROLINA**

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ABSTRACT

FRANCES E. LIKIS: Emergency Contraceptive Pills: Knowledge, Attitudes, and Practice
Patterns among Certified Nurse-Midwives in North Carolina

(Under the direction of Ruth Petersen)

Nearly half of the pregnancies in the United States each year are unintended, and emergency contraceptive pills (ECPs) have emerged as an important method for the prevention of unintended pregnancy. Despite the potential benefits of ECPs, they remain underused. The primary purpose of this study was to learn about ECP knowledge, attitudes, and practice patterns among certified nurse-midwives (CNMs) in North Carolina. The secondary purposes were to describe characteristics of CNMs practicing in North Carolina, and the contraceptive methods other than ECPs that they discuss with and prescribe for their patients. The study was conducted using a cross-sectional, confidential, self-administered mail questionnaire completed by 139 CNMs (73% response rate) in clinical practice in North Carolina.

The majority of the CNMs worked in private practice settings (67%) in urban areas (60%). The median number of women seen weekly for gynecologic care was 15 (range 0-80), and the discussion and provision of contraceptive methods by the CNMs was comprehensive. All of the CNMs reported being somewhat (49%) or very (51%) knowledgeable about ECPs. Accuracy of ECP knowledge, as determined by a seven-item index, was high among 59% of participants and low among 41%. A small percentage of CNMs thought that ECPs encourage irresponsible behavior (12%) and that women will rely on ECPs as a regular form of

contraception (4%). Half (50%) of the CNMs thought ECPs should be available over-the-counter. The majority of the CNMs discussed and prescribed ECPs (92%) though many did so only when the client requested. Over half (53%) of the CNMs identified one or more limitations to discussing ECPs. Attitudes toward ECPs and the frequency of ECP discussion and prescription were associated with accuracy of ECP knowledge.

The CNMs in this study frequently provided gynecologic care and offered a range of contraceptive options. Their ECP attitudes and practice patterns were associated with the accuracy of their ECP knowledge. The information gained from this study can be used to develop and evaluate an educational intervention to increase discussion and prescription of ECPs.

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LIST OF ABBREVIATIONS

ACNM: American College of Nurse-Midwives

CNM: Certified nurse-midwife

EC: Emergency contraception

ECP: Emergency contraceptive pill

FDA: Food and Drug Administration

CHAPTER I

INTRODUCTION

Nearly half of the pregnancies in the United States each year are unintended, and emergency contraceptive pills (ECPs) have emerged as an important method for the prevention of unintended pregnancy. Despite the potential benefits of ECPs, they remain underused. Certified nurse-midwives (CNMs) have the opportunity to increase women's use of ECPs, but there has been minimal study of ECP knowledge, attitudes, and practice patterns among CNMs. The primary purpose of this study was to learn about ECP knowledge, attitudes, and practice patterns among CNMs in North Carolina, and the factors that influence their ECP knowledge, attitudes, and practice patterns. The secondary purposes were to describe characteristics of CNMs practicing in North Carolina, and the contraceptive methods other than ECPs that they discuss with and prescribe for their patients. This study was conducted using a cross-sectional, confidential, self-administered mail questionnaire completed by CNMs in clinical practice in North Carolina. Univariate, bivariate, and multivariable statistical analyses were conducted to investigate the research questions.

This chapter describes the study's specific aims and research questions, conceptual model, and significance. The second chapter provides a review of relevant literature. The third chapter describes the research design and methods. The fourth chapter presents the study results. The final chapter discusses the study findings, the implications and limitations of the study, and recommendations for future research.

Specific Aims and Research Questions

Specific Aim 1

The first specific aim was to describe characteristics of CNMs practicing in North Carolina. These characteristics were used not only to learn more about the study participants, but also as variables hypothesized to be associated with ECP knowledge, attitudes, and practice patterns. The research questions for the first specific aim were:

Research Question 1.1: What are the types and locations of practices in which CNMs in North Carolina work?

Research Question 1.2: What are the other types of clinicians with whom CNMs in North Carolina practice?

Research Question 1.3: How experienced are CNMs in North Carolina?

Research Question 1.4: What is the weekly volume of gynecologic care that CNMs in North Carolina provide?

Specific Aim 2

The second specific aim was to describe the contraceptive methods other than ECPs that CNMs in North Carolina discuss with and prescribe or provide for their patients. This information depicts a context of the contraceptive services CNMs in North Carolina offer, within which ECP practice patterns occur. The research questions for the second specific aim were:

Research Question 2.1: Which contraceptive methods do CNMs in North Carolina discuss with their patients?

Research Question 2.2: Which contraceptive methods do CNMs in North Carolina prescribe or provide for their patients?

Specific Aim 3

The third specific aim was to assess ECP knowledge among North Carolina CNMs. Both self-perceived ECP knowledge and an objective measurement of accuracy of ECP knowledge were evaluated. Assessment of knowledge is important for identifying education needs. Knowledge was also hypothesized as a factor influencing ECP attitudes and practice patterns. The research questions for the third specific aim were:

Research Question 3.1: What level of knowledge about ECPs do CNMs in North Carolina perceive that they have?

Research Question 3.2: What are North Carolina CNMs' sources of ECP education?

Research Question 3.3: How accurate is North Carolina CNMs' knowledge about ECPs?

Research Question 3.4: Does the accuracy of North Carolina CNMs' ECP knowledge vary by practice characteristics, midwifery experience, weekly volume of gynecologic care, self-perceived level of ECP knowledge, and/or sources of ECP education?

Specific Aim 4

The fourth specific aim was to assess attitudes toward ECPs among North Carolina CNMs. Selected attitudes toward the effects of ECPs on women's behavior and the availability of ECPs were assessed. These attitudes were hypothesized as factors that influence ECP practice patterns. The research questions for the fourth specific aim were

Research Question 4.1: Do CNMs in North Carolina think ECPs encourage irresponsible behavior?

Research Question 4.2: Do CNMs in North Carolina think women will rely on ECPs as a regular form of contraception?

Research Question 4.3: Do CNMs in North Carolina think that ECPs should be available only by prescription, over-the-counter, or not all?

Research Question 4.4: Do North Carolina CNMs' attitudes toward ECPs vary by accuracy of knowledge about ECPs?

Research Question 4.5: Does North Carolina CNMs' attitude toward ECP availability vary by practice characteristics, midwifery experience, weekly volume of gynecologic care, and/or accuracy of ECP knowledge?

Specific Aim 5

The fifth specific aim was to assess ECP practice patterns among North Carolina CNMs. Practice patterns were defined as the frequency of discussion and the frequency of prescription of ECPs, which directly influence women's access to ECPs. The research questions for the fifth specific aim were

Research Question 5.1: How frequently do CNMs in North Carolina discuss and prescribe ECPs?

Research Question 5.2: What are the limitations to CNMs in North Carolina discussing ECPs?

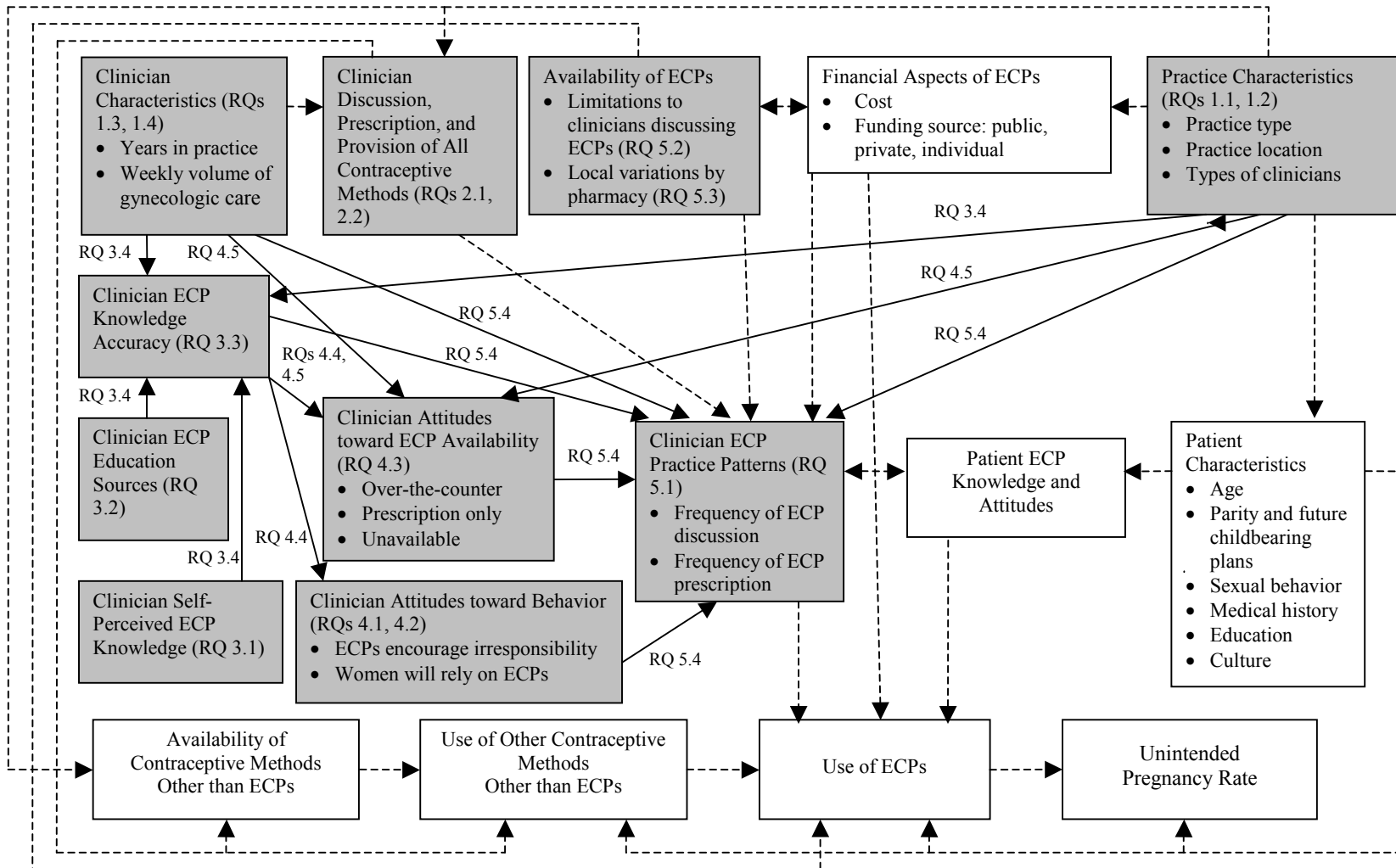
Research Question 5.3: How many pharmacies keep ECPs in stock in the communities in which CNMs in North Carolina practice?

Research Question 5.4: Does North Carolina CNMs' discussion and prescription of ECPs vary by practice characteristics, midwifery experience, weekly volume of gynecologic care, accuracy of ECP knowledge, and/or attitudes toward ECPs?

Conceptual Model

The conceptual model for this study is presented in Figure 1. The specific aims and research questions of the current study are identified by the gray boxes and solid lines. The content related to the study but outside of its scope is depicted by the white boxes and dashed lines. This additional content is provided to place the study in a larger context and will be the subject of future research.

Figure 1. Conceptual Model



ECP=emergency contraceptive pill
 Clinicians in the current study will be limited to certified nurse-midwives

Current study: Gray boxes and solid lines
 Outside scope of current study: White boxes and dashed lines

Significance

Increasing the use of ECPs is an important step toward decreasing the very high rate of unintended pregnancy in the United States. Clinicians are crucial to increasing ECP use. The current study, with its multiple and unique specific aims, will provide information regarding CNMs' level and accuracy of ECP knowledge, attitudes regarding ECPs, practice patterns, and factors that might negatively or positively influence ECP knowledge, attitudes, and practice patterns among CNMs. Findings from this project will be useful in developing future training modules for CNMs and other health care providers, not only in North Carolina but also nationally, to address the factors that limit their knowledge, positive opinion, and related discussions and prescriptions of ECPs. Identifying organizational and community barriers to ECP discussion and prescription, such as clinical protocols and availability of ECPs in pharmacies, will provide evidence that can be used in the development of policies to eliminate these barriers. Future trainings for health care providers and strategies to remove limitations to ECP discussion and prescription, informed by these critical and informative results, could increase the provision of ECPs and thus put women at decreased risk of unintended pregnancy and its associated adverse outcomes.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter provides a review of literature relevant to the study. The purpose of ECPs is to prevent unintended pregnancy, and the prevalence, effects, and etiology of this problem are presented. Next, there is a discussion of ECP history, regimens, effectiveness, mechanisms of action, safety, side effects, availability, and advance provision. This is followed by an overview of nurse-midwifery, as members of this profession are the focus of this study. The chapter concludes with a description of previous research about ECP knowledge, attitudes, and practice patterns among clinicians.

Unintended Pregnancy

An estimated 49% of pregnancies in the United States are unintended, and unintended pregnancies occur among women of all ages and all socioeconomic groups.¹ Although the rate of unintended pregnancy is highest among 15- to 19-year-old women, the only age group in which the unintended pregnancy rate is less than 40% is women ages 30 to 34 years.¹ Based on the rates of unintended pregnancy in 1994 (the most recent year for which comprehensive data are available), it is estimated that the average woman can anticipate having 1.42 unintended pregnancies by age 45.¹ Approximately 47% of unintended pregnancies end in abortion, 40% result in live births, and 13% end in miscarriage.¹

When the decision is made to continue an unintended pregnancy and parent, the consequences include potential adverse effects for children and their parents.² Unintended pregnancy is associated with later entry into prenatal care, a lower number of total prenatal visits, tobacco and alcohol use during pregnancy, low birthweight, preterm birth, infant mortality, child abuse, and insufficient resources for child development.^{2, 3} Unintended pregnancy precludes the opportunity to receive preconception care that may improve pregnancy outcomes. The woman with an unintended pregnancy is at greater risk for physical abuse and depression. Couples experiencing unintended pregnancy are more likely to end their relationship, and they may forfeit their educational and professional aspirations.²

The most obvious reason why unintended pregnancies occur is inconsistent and/or incorrect use of contraception. Contraceptive non-use and misuse result from numerous causes, including lack of knowledge, barriers to access, and complex personal, interpersonal, socioeconomic, and cultural factors.² Even perfect contraception use does not guarantee avoiding pregnancy because inherent method failures are possible. A recent study of over 10,000 women who had abortions found that 54% were reportedly using a contraceptive method in the month they conceived.⁴ According to the Alan Guttmacher Institute, “the typical American woman spends roughly three decades—or about 75% of her reproductive life—trying to avoid unintended pregnancy.”⁵ Preventing pregnancy requires prolonged and concerted effort. The scale of this task, the obstacles to perfect contraceptive use, and the unavoidable failures of contraceptive methods contribute to the prevalence of unintended pregnancies.

Emergency Contraceptive Pills

Ideally all pregnancies would be wanted and planned. The primary way to prevent unintended pregnancy is for couples to use contraception with every act of intercourse during which they do not want to get pregnant. Emergency contraception (EC) has emerged as an important method for the prevention of unintended pregnancy because perfect contraceptive use is unrealistic. EC prevents pregnancy after intercourse has occurred through the post-coital use of estrogen and/or progestin (as emergency contraceptive pills [ECPS]) or a copper intrauterine device. ECPs are used much more frequently for EC than the copper intrauterine device. EC has been proposed to have the potential to prevent half of the unintended pregnancies in the United States, and EC is estimated to have prevented 51,000 abortions in this country in 2000.^{6, 7}

History

High-dose estrogen was first used for postcoital contraception in the 1960s. Initially either diethylstilbestrol (DES) or ethinyl estradiol was given, but the high dosages of these medications required caused significant nausea. The combined estrogen and progestin ECP regimen, referred to as the Yuzpe regimen for the physician who first described it, was developed in the 1970s.⁸⁻¹⁰ The progestin-only ECP regimen was developed in the early 1990s.¹¹ Regular oral contraceptives (birth control pills) were used as ECPs for many years. This use was not included in the FDA-approved labeling and was thus unlabeled or off-label use. Clinicians frequently prescribe medications for conditions other than those for which they have FDA approval, and this off-label use is within the scope of prescriptive privilege when sound rationale and evidence are used.¹²

In 1997, the Food and Drug Administration (FDA) published a notice in the *Federal Register* stating that “the Commissioner of Food and Drugs has concluded that certain combined oral contraceptives containing ethinyl estradiol and norgestrel or levonorgestrel are safe and effective for use as postcoital emergency contraception, and requests submission of new drug applications for this use.”¹³ In this notice, the FDA “encouraged manufacturers to make this additional contraceptive option available.” The first dedicated ECP product in the United States that was labeled, packaged, and marketed specifically for EC was the combined ECP Preven, which was approved by the FDA in 1998. The FDA approved Plan B, a progestin-only dedicated ECP product, in 1999.

ECPs have been called “morning after pills.” This name is a misnomer in that the window for ECPs is longer than the morning following unprotected intercourse. The word emergency is used to emphasize that EC is not an ongoing method of contraception.

Regimens

The traditional ECP regimen is two doses of ECPs taken 12 hours apart. Each dose for progestin-only ECPs is 0.75 milligrams of levonorgestrel, and each dose for combined ECPs is 100 micrograms of ethinyl estradiol and 0.50 milligrams of levonorgestrel. Recent research has demonstrated that both doses of progestin-only ECPs can either be taken simultaneously in a single dose^{14, 15} or taken 24 hours apart instead of 12.¹⁶ Women should take ECPs as soon as possible after unprotected intercourse although they can be efficacious up to 120 hours (5 days) after intercourse.^{17, 18}

Effectiveness

ECPs are an effective contraceptive method. If 100 women have a single act of unprotected intercourse in the middle of their menstrual cycle, when the likelihood of conception is highest, eight would get pregnant. The number of pregnancies is reduced from eight with no contraception, to two with combined ECPs, to one with progestin-only ECPs. Therefore, the risk of pregnancy is decreased 75% with combined ECPs, and 88% with progestin-only ECPs.¹⁹⁻²¹

Mechanisms of Action

The mechanisms of action of ECPs are not completely understood, and ECPs may work through multiple mechanisms. The primary mechanism of action is preventing or delaying ovulation.²²⁻²⁴ Other potential mechanisms of action include alterations of the endometrium making it inhospitable to implantation of a fertilized egg, interference with corpus luteum function, thickening of the cervical mucus preventing sperm from reaching the ova, inhibition of fertilization, and altered tubal transport of the sperm, egg or embryo.²⁵ ECPs cannot interrupt an implanted pregnancy, and there is no evidence to date that ECPs prevent pregnancy after fertilization has occurred.^{24, 26}

Safety and Side Effects

There are no evidence-based contraindications to the use of ECPs.²⁷ They are a one-time, rather than ongoing, dose of hormones so the usual contraindications to oral contraceptive use do not apply. If there is any concern that a woman has a condition with which the use of estrogen or progestin is undesirable, it is likely that the prolonged highly hormonal state of

pregnancy is more dangerous than a single use of ECPs, which could prevent pregnancy. Pregnancy is often cited as a contraindication not because ECPs will be harmful but because they will not be effective. ECPs will not adversely affect a pregnancy or fetus once implantation has occurred.^{26, 27} Side effects reported with ECPs include nausea, vomiting, dizziness, fatigue, weakness, headache, breast tenderness, abdominal pain, and menstrual irregularities.^{14, 21, 28, 29} The incidence of side effects is lower with progestin-only ECPs than combined ECPs.²¹

Availability

ECPs are currently available only by prescription in most of the United States, but pharmacists are able to dispense ECPs without a prescription in six states.³⁰ In February 2001, the Center for Reproductive Law and Policy (now the Center for Reproductive Rights), on behalf of over 60 organizations, petitioned the FDA to switch ECPs from prescription to over-the-counter status.³¹ ECPs meet the criteria of the FDA for an over-the-counter product, and requiring a prescription presents a barrier to their use because women often need ECPs at times when health care providers are unavailable, such as in the evening or on a weekend.³² The ability of women to understand the information in a prototype over-the-counter label³³ and to safely use ECPs with simulated over-the-counter provision²⁸ have been demonstrated.

Barr Laboratories submitted an application to the FDA in April 2003 to make Plan B, the dedicated progestin-only ECP product, available over-the-counter. The FDA has indefinitely deferred a decision about switching the status of Plan B to over-the-counter, despite the recommendation of the Nonprescription Drugs Advisory Committee and the Advisory Committee for Reproductive Health for this change. The Center for Reproductive Rights

filed a lawsuit against the FDA in January 2005 alleging that the organization has violated the Administrative Procedures Act and the United States Constitution by denying women access to Plan B without a prescription and by failing to follow organizational procedures and statutory and regulatory mandates.³⁴ As of March 2006, the FDA has still not made a decision about over-the-counter availability of ECPs.

Advance Provision

Providing ECPs or ECP prescriptions to women routinely, at encounters such as health maintenance gynecologic or contraceptive visits, has been suggested as a practice to ensure that women have access to ECPs when they need them. Women who receive ECPs or ECP prescriptions in advance are more likely to use ECPs than women who do not receive advance provision. Research indicates that advance provision does not lead to repeated ECP use, more frequent unprotected intercourse, or decreased use of regular contraception.³⁵⁻⁴¹ However, the effectiveness of advance provision has been questioned by recent studies in the United States,⁴² Scotland⁴³ and China,⁴⁴ which found that advance provision of ECPs did not reduce pregnancy⁴² or abortion^{43, 44} rates.

Nurse-Midwifery

A certified nurse-midwife (CNM) “is an individual educated in the two disciplines of nursing and midwifery, who possesses evidence of certification according to the requirements of the American College of Nurse-Midwives (ACNM).”⁴⁵ There are approximately 8,250 CNMs in the United States, and 85% of CNMs belong to the ACNM.^{46,}
⁴⁷ Midwifery practice by CNMs “is the independent management of women's health care

focusing particularly on common primary care issues, family planning and gynecologic needs of women, pregnancy, childbirth, the postpartum period and the care of the newborn.”⁴⁵

According to ACNM membership surveys from 2000-2003, approximately 96% of CNMs who identify clinical midwifery practice as their primary employment responsibility provide gynecologic care.⁴⁸ In a 2001 national survey, 94% of CNMs reported providing family planning services and 92% reported providing gynecologic or well woman care.⁴⁹ Thus, nurse-midwifery care is not limited to pregnancy and birth, as is commonly believed by those outside of the profession. Despite the frequency with which it is provided, gynecologic care in nurse-midwifery practice has been a neglected study topic.

Nurse-Midwifery in North Carolina

CNMs have been practicing in North Carolina since 1977, and there are currently approximately 200 CNMs practicing in the state. Nurse-midwifery practice is authorized by state law in North Carolina and overseen by a Midwifery Joint Committee of the North Carolina Medical Board and the Board of Nursing.⁵⁰ The scope of CNM practice in North Carolina includes gynecologic care, and CNMs have prescriptive authority. Approval to practice as a CNM is contingent upon certification by the ACNM¹ and arrangements for supervision by a physician who is actively engaged in the practice of obstetrics in North Carolina.^{50, 51} In a 1999 survey, CNMs in North Carolina reported seeing an average of 41 pregnant women and 21 other women weekly.⁵² Based on these findings, CNMs in North Carolina are estimated to have 200,000 visits with non-pregnant women annually, which provides numerous opportunities to discuss and prescribe ECPs. North Carolina is an ideal

¹ Although North Carolina law states CNMs must be certified by the ACNM, that is not technically correct as the national organization does not offer certification. The American Midwifery Certification Board (AMCB) is the national certifying body for CNMs.

site for this study because of the availability of a comprehensive and current list of CNMs in the state and previous high rates (55-80%) of participation in CNM mail surveys conducted in the state.⁵²⁻⁵⁵

Nurse-Midwifery and Emergency Contraception

A core competency of basic midwifery practice is “knowledge of the essentials of barrier, hormonal, mechanical, chemical, physiologic, and surgical conception control methods.”⁵⁶ The ACNM was one of the organizations represented in the Citizens’ Petition supporting over-the-counter ECP availability that was sent to the FDA by Center for Reproductive Law and Policy in 2001.³¹ The ACNM has the following position statement on emergency contraception:

While respecting the values and beliefs of the individual client and professional, ACNM supports removing barriers to the immediate availability of emergency contraception through: increased education for consumers and professionals, advance prescription of emergency contraceptive pills, direct pharmacy access, FDA approval of over-the-counter distribution, and insurance coverage for all prescriptive methods of contraception. ACNM also opposes any laws or regulations that would prohibit CNMs from prescribing ECPs.⁵⁷

Previous Research

Several previous studies in the United States have assessed clinicians’ EC knowledge, attitudes, and practice patterns,⁵⁸⁻⁷⁶ which are important to understand in developing strategies to increase the use of ECPs. The participants and designs of these studies are

summarized in Table 1, and their key findings are presented in Table 2. Only five of these studies included CNMs, and among those studies four had 20 or fewer CNM participants.⁵⁸⁻⁶¹ The one previous study that included only CNMs⁶² was specific to adolescent emergency contraception, and was conducted in 1998 prior to widespread availability of dedicated ECP products. Research about clinicians' EC knowledge, attitudes, and practice patterns has also been conducted outside the United States,⁷⁷⁻¹⁰⁰ and a few of these studies included midwives.⁶³⁻⁶⁸ However, the scope of midwifery practice in other countries differs from that of nurse-midwifery practice in the United States thus results from other countries cannot be accurately compared.

Table 1. Participants and Designs of Previous Studies of Emergency Contraception Knowledge, Attitudes, and Practices among Clinicians in the United States

Author(s)	Date^a	N	Participants	Design
Beckman et al. ⁵⁹	1996-1998 ^b	102	Physicians (n=65), nurse practitioners (n=24), physician assistants (n=7), and CNMs (n=6) at a California health maintenance organization	Self-administered questionnaires prior to and one year after an educational program about EC
Brening et al. ⁶⁹	2001	139	National sample of university and college health centers	Mail survey
Brown & Boulton ⁷⁰	1996	53	Family planning coordinators at Michigan agencies receiving Title X funds	Mail survey
Cheng ⁷¹	1998	55	Final-year residents in obstetrics-gynecology (n=25) and family practice (n=30) in Maryland	Mail survey
Chuang & Freund ⁷²	2002-2003 ^b	56	Physicians (n=50), advanced practice nurses (n=8), physician assistants (n=2) in Massachusetts	Self-administered questionnaires prior to and six months after a lecture on EC
Chuang et al. ⁷³	2000	282	General internal medicine (n=86), family medicine (n=96), and obstetrics and gynecology physicians (n=100) in Massachusetts	Mail survey
Delbanco et al. ⁷⁴	1995	307	Nationally representative sample of obstetrician-gynecologists	Telephone survey
Delbanco et al. ⁷⁵	1997	754	Nationally representative sample of obstetrician-gynecologists (n=305), family physicians (n=236), and nurse practitioners and physician assistants (n=229)	Telephone survey
Gold et al. ⁷⁶	1994	167	Random national sample of physicians with adolescent health expertise (identified by membership in professional societies related to adolescent health), including pediatricians (n=112), obstetrician-gynecologists (n=38), and internal and family medicine physicians (n=37)	Telephone interviews
Golden et al. ⁷⁷	1999	233	Pediatricians in four New York counties	Mail survey

Grossman & Grossman ⁶⁰	1993	294	Stratified national sample of obstetrician-gynecologists (n=114), family physicians (n=80), emergency physicians (n=61), nurse practitioners (n=3), physician assistants (n=3), CNMs (n=2) and other providers (n=4)	Mail survey
Karasz et al. ⁷⁸	2002	25	Physicians (n=24) and a nurse practitioner (n=1) in New York	Qualitative semistructured interviews
Keshavarz et al. ⁷⁹	2000	600	Emergency medicine physicians attending a national meeting	Self-administered questionnaire
Kettle & Klima ⁶²	1998	146	Random national sample of CNMs	Mail survey
Kumar et al. ⁶¹	ND ^c	495	Pharmacists (n=160), physicians (n=162, includes obstetrician-gynecologists, family physicians, internists, emergency medicine physicians, and pediatricians), physician assistants (n=35), CNMs (n=19), and nurse practitioners (n=119) in Minnesota	Mail survey
McCarthy ⁸⁰	1999	358	National sample of university and college health centers	Mail survey
Sherman et al. ⁵⁸	1996	164	Physicians (n=104), nurse practitioners (n=32), physician assistants (n=19), and CNMs (n=9) in a health maintenance organization in California	Self-administered questionnaire
Sills et al. ⁸¹	1998	121	Pediatricians in the District of Columbia	Mail survey
Wallace et al. ⁸²	2003	78	Attending physicians (n=43), resident physicians (n=20), nurses (n=13) in a Midwestern department of family medicine (n for provider types=76 due to missing data)	Mail survey

^aThis is the year the study was conducted, not the date of publication

^bMultiple years due to baseline and follow-up surveys

^cNo date reported

Table 2. Key Findings of Previous Studies of Emergency Contraception Knowledge, Attitudes, and Practices among Clinicians in the United States

Author(s)	Key Findings
Beckman et al. ⁵⁹	The frequency of EC prescription and knowledge about ECPs improved significantly ($p < 0.001$ for both) from baseline to follow-up. The percentage of providers who prescribed ECPs at least once a year increased from 30% to 49% after the educational intervention. Among those who reported prescribing ECPs prior to the intervention, the percentage who prescribed them monthly increased from 7% at baseline to 26% at follow-up. The average score on an eight-item knowledge scale increased from 3.00 at baseline to 4.29 at follow-up. Attitudes about ECPs did not change significantly after the educational intervention.
Brening et al. ⁶⁹	The majority (67%) of the college health centers prescribed ECPs, but there were numerous barriers to access such as requiring pregnancy testing prior to prescribing and unavailability of ECPs on nights, weekends, and holidays.
Brown & Boulton ⁷⁰	ECPs were provided at 60% of the facilities, but only 16% of the programs providing ECPs did so for more than one woman per month. Numerous barriers to ECP provision were identified including the logistics of providing walk-in care, legal and political concerns, and lack of guidelines and requests.
Cheng ⁷¹	37% of the family practice residents and 16% of the obstetrics-gynecology residents had no clinical experience with EC during residency. Only 3% of family practice residents and 32% of obstetrics-gynecology residents had managed more than 10 cases involving EC.
Chuang & Freund ⁷²	EC knowledge was high (mean 5.8 ± 1.2 out of 7 items) prior to the educational intervention. After the intervention, significant increases occurred in the percentage who agreed with advance provision (36% to 66%, $p = 0.0006$), the percentage who disagreed with restricting the number of times EC should be dispensed to an individual patient (64% to 84%, $p = 0.04$), and the percentage who disagreed that repeated EC use over time poses health risks (55% to 86%, $p < 0.0001$). A significant increase in those who reported ever having prescribed EC in advance (18% to 41%, $p = 0.007$) also occurred after the intervention.
Chuang et al. ⁷³	The majority (75%) of the physicians reported prescribing ECPs five or fewer times per year. Family physicians (adjusted OR 2.5, 95% CI 1.2-5.2) and obstetrician-gynecologists (adjusted OR 11.2, 95% CI 4.0-31.3) were more likely to report having ever prescribed ECPs than internists.
Delbanco et al. ⁷⁴	The majority of the physicians reported being very familiar (77%) or somewhat familiar (22%) with ECPs and did not have objections or concerns about prescribing them (70%). Most of the physicians thought ECPs were very safe (84%) and very effective (78%). Only 7% of the physicians usually discussed ECPs during routine contraceptive counseling. Among the participants who had prescribed ECPs in the last year, 77% did so five or fewer times.

Delbanco et al. ⁷⁵	The majority of the providers (85% of obstetrician-gynecologists, 50% of family physicians, and 78% of nurse practitioners and physician assistants) had prescribed ECPs in the last year, but most (62% of obstetrician-gynecologists, 43% of family physicians, 54% of nurse practitioners and physician assistants) had done so five or fewer times. More than 70% of the providers discussed ECPs in response to an emergency rather than as a routine part of contraceptive counseling. Advance provision of ECPs was reported by less than 10% of the providers. All of the providers considered ECPs safe and effective.
Gold et al. ⁷⁶	Attitudes toward ECPs were generally favorable although 77% of participants did not think they should be available over-the-counter. Among the physicians who provided contraception, 80% prescribed ECPs. Among those who prescribed ECPs, 28% counseled about it at routine health visits, 41% at visits for contraception, and 16% at visits with adolescents who were not yet sexually active.
Golden et al. ⁷⁷	Only 17% of the physicians counseled adolescents about the availability of EC. Most of the physicians could not identify any FDA-approved EC regimens and did not know the maximum time frame EC could be prescribed after unprotected intercourse. Over half of the physicians felt somewhat or very uncomfortable prescribing ECPs. The majority of the physicians would restrict the number of times they would prescribe ECPs for an individual patient (52%) and did not think or were unsure of whether ECPs should be available over the counter (80%).
Grossman & Grossman ⁶⁰	Approximately half of the participants had prescribed ECPs in the 12 months prior to the survey. The mean number of prescriptions in the past 12 months per respondent was 3.4, and the median was one. The majority of respondents (90%) reported never or rarely speaking to their patients about EC.
Karasz et al. ⁷⁸	Most of the clinicians had sufficient knowledge to prescribe EC. Although the majority (44%) prescribed EC only when patients requested it rather than counseling routinely or offering advance provision, attitudes toward routine counseling were favorable. Serious reservations about advance provision of EC were expressed by 40% of the participants. The most frequently expressed concern was that advance provision would increase rates of unprotected intercourse.
Keshavarz et al. ⁷⁹	More of the physicians were willing to offer EC to women who had been sexually assaulted (88%) than to women who had consensual sex (73%). Resident physicians, those in practice fewer than six years, and female physicians were more willing to offer EC than attending physicians, those in practice for longer, and male physicians.

Kettye & Klima ⁶²	Most of the CNMs (58%) prescribed EC a few times a year. Use was restricted by policies such as requiring pregnancy tests and evaluation of menstrual timing before offering EC. CNMs with favorable attitudes toward EC tended to have less restrictive practice policies than those with less favorable attitudes. Practice type and location were not associated with the frequency of EC prescription.
Kumar et al. ⁶¹	More physicians (61%) than nurse practitioners, physician assistants, and CNMs (44%) had ever prescribed ECPs, although nearly half (47%) of participants had some reluctance about prescribing ECPs. While the majority of participants agreed access to ECPs was constrained (43%) and underutilized by patients (59%) and providers (54%), most disagreed with advance provision of ECPs at routine exams (47%) and over-the-counter availability of ECPs (74%).
McCarthy ⁸⁰	More than half (52%) of the student health centers offered ECPs, and availability was associated with the geographic region and type of institution as well as the size and residency status (on-campus or commuter) of the student population. The majority of the health centers (73%) did not offer advance provision of ECPs.
Sherman et al. ⁵⁸	Nearly half (42%) of the providers had prescribed ECPs and most of the providers had positive attitudes toward providing ECP information and prescriptions. The majority of the providers did not know the time frame within which ECPs must be initiated after unprotected intercourse (65%).
Sills et al. ⁸¹	Less than one-quarter of the pediatricians had prescribed ECPs in the previous 12 months (20%) or had counseled their patients about ECPs (24%). There was a significant association between the practice outcomes of prescribing and counseling about ECPs and knowledge of the timing of ECPs (OR 10.87, 95% CI 2.79-32.89 for prescribing; OR 3.73, 95% CI 1.38-10.33 for counseling) and FDA-labeling of ECPs (OR 4.98, 95% CI 1.58-16.71 for prescribing; OR 3.41, 95% CI 1.27-9.44 for counseling). Attitudes toward ECPs were not associated with the practice outcomes.
Wallace et al. ⁸²	Most of the participants had prescribed (74%) and reported familiarity with ECP indications (96%) and protocols (78%). Objective assessment revealed knowledge deficits, and ECP knowledge was significantly lower (p<0.001) among those who had not prescribed ECPs. Attitudes toward ECPs were generally favorable. Women's lack of awareness about ECPs and unwillingness to ask about ECPs were identified as barriers to ECP use.

CHAPTER III

RESEARCH DESIGN AND METHODS

This study used a cross-sectional, confidential, self-administered mail questionnaire completed by CNMs in clinical practice in North Carolina to investigate the specific aims and research questions. The Principal Investigator for the study was Frances E. Likis. Patricia A. Payne and Ruth Petersen were the Co-Investigators, and Jennifer Albright was the Project Manager. This chapter describes the research design and methods. The participants, measures, procedures, protection of human subjects, and statistical analysis are discussed.

Participants

Potential participants were all CNMs approved by the Midwifery Joint Committee to practice in the state of North Carolina at the time of the study. CNMs are required to update their approval to practice annually, which allows the Midwifery Joint Committee to maintain a current and comprehensive list of the CNMs in North Carolina. CNMs had to be in active clinical practice in North Carolina at the time of the study to be eligible to participate. Eligibility was confirmed by the first question on the survey, which asked if the respondent was a CNM in clinical practice in North Carolina.

Measures

A self-administered questionnaire (Appendix A) was sent to all potential participants. The questionnaire was developed by the Principal Investigator and Co-Investigators after a review of several previous surveys, most notably one survey by the Program for Appropriate Technology in Health (PATH), the Population Council of Mexico, and the Family Planning Association of Sri Lanka,⁸³ and another survey by Wallace et al.⁸² The Project Manager, who has experience with and expertise in mail survey research, reviewed the questionnaire in the draft phase and provided helpful feedback. The questionnaire was designed to be completed in a brief period of time (10-20 minutes) to lessen the burden on participants and to maximize the response rate.

A pilot test of the questionnaire was conducted by asking five CNM colleagues of the Principal Investigator and one of the Co-Investigators (Patricia A. Payne) to complete the survey in November 2004. These CNMs lived outside of North Carolina, in order not to compromise the data collected for this study. These CNMs did not return their completed questionnaires but rather were asked after completing the survey if there were any questions that were unclear.⁸⁴ Information gathered from these CNMs was useful in revising the questionnaire by clarifying some of the items. The CNMs were also asked how long it took them to complete the questionnaire. All reported that it took less than 20 minutes, as had been estimated.

Procedures

A list of CNMs approved to practice in North Carolina was obtained from the Midwifery Joint Committee. This list is available for research studies. Each CNM on the list was sent a

cover letter (Appendix B), study information sheet (Appendix C), and copy of the questionnaire (Appendix A) with a postage-paid envelope for returning the survey. Several strategies that have been demonstrated to increase survey response rates⁸⁵ were used in this study. The cover letter and study information sheet were printed on letterhead stationery. The cover letters included the mailing date, and the dates were revised on the follow-up mailings described below. The name, address, and salutation on the cover letters were personalized for each recipient, and each cover letter was handsigned.

Multiple contacts, which have also been shown to increase survey response rates,⁸⁵ were made with potential participants. One week after the questionnaire was mailed, the CNMs were sent a postcard reminder about the study. The postcard requested that the questionnaire be completed and returned if the CNM had not done so already. The postcard included the telephone number and e-mail address of the Principal Investigator with instructions to contact her if the CNM had not received a questionnaire.

Three weeks after the initial mailing, another cover letter, study information sheet, and questionnaire were sent to CNMs who did not respond to the initial mailing. The second time the survey was sent, a brightly colored label was placed across the sealed flap of the envelope. This label indicated that this was the second request for the CNM to complete the questionnaire. The initial and follow-up mailings for the study were coordinated by the Project Manager.

Two weeks after the final mailing, all CNMs who had not returned a survey were contacted by telephone to confirm that they had received the questionnaire and to ask that they complete and return it. If potential participants indicated during these calls that they had not received or no longer had the questionnaire, they were asked if they were willing to

participate. If so, their current address was confirmed and a new copy of the cover letter, study information sheet, and questionnaire were sent to them. These telephone contacts were made by the Principal Investigator and one of the Co-Investigators (Patricia A. Payne). The CNMs were not asked any questions during these telephone calls, as it was thought they would be too busy at work to talk for the length of time required to read the questionnaire aloud and record their responses. In addition, some of the survey items asked about sensitive information that the CNMs might not feel comfortable answering via telephone. Up to three attempts were made to reach any individual potential participant by phone.

Human Subjects

This study was approved by the Public Health Institutional Review Board of the University of North Carolina at Chapel Hill. The involvement of the participants was to complete the self-administered questionnaire. The data obtained and recorded from the participants were their completed questionnaires.

Informed Consent

Each potential participant was sent a study information sheet, which they could keep for reference. The following statement was located at the beginning of the questionnaire: “By completing the survey, you are giving your consent to participate in this study.” The Institutional Review Board determined that these procedures were adequate for obtaining informed consent and waived the requirement for written informed consent. Informed consent was documented by the completion of a questionnaire.

Linkages to Participants and Access to Participant Identities

Each participant was randomly assigned an identification number unrelated to personal identifiers. The study identification number was used to track return of the surveys and identify participants for additional contacts (i.e., reminder postcards, follow-up mailings, and telephone calls). The list of the participant names, contact information, and study identification numbers was kept in a separate, locked location from the questionnaires. The Principal Investigator, Co-Investigators, and Project Manager had exclusive access to this list.

Potential Risks and Benefits

The study posed minimal risk to breach of confidentiality. The separate storage of the list of participant information and questionnaires and the limitation of access to the participant list were implemented to protect against this risk. In addition, participants' names and contact information were not included when the data were entered electronically, and results were reported only in the aggregate in order to prevent deductive disclosure of participants.

There is a potential benefit to the midwifery profession and health professional community from participants' participation, as the study furthered understanding of clinician knowledge, attitudes, and practice patterns. Those who participated in the study could potentially be motivated to discuss, prescribe, and provide additional contraceptive methods or to learn more about ECPs. Further, there is potential benefit to society through the ultimate goal of increasing ECP utilization.

Inclusion of Women and Minorities

There were no selection criteria for participants that imposed limitations by sex or gender and racial or ethnic group. The maximum number of male participants was one because there was only one male CNM practicing in North Carolina at the time of the survey. This reflects national findings that 95.9% of ACNM members in 2003 were female.⁴⁸ The participants were not asked to identify their racial/ethnic group. Minority groups were likely to be underrepresented because the national distribution of ACNM members indicates 88.8% were Caucasian in 2003.⁴⁸ The low numbers of minority CNMs limit the usefulness of this information in the current study. In addition, sex, gender, race, and ethnicity were not thought to be meaningful variables for the purpose of the study.

Statistical Analysis

Quantitative analysis of the data was conducted with SPSS 13.0 (SPSS, Inc., Chicago, IL) and Stata 8.2 (StataCorp, College Station, TX) statistical packages. First, the data were examined for missing values. The maximum number of participants who did not answer any single question was 5. No missing values were imputed; rather analyses were conducted only with valid responses. The *N* for each analysis is noted in the presentation of the results. An alpha level of .05 was considered statistically significant.

The frequencies, percentages, and validity of responses (e.g., a no=0, yes=1 variable can not have a response of 5) for the categorical variables were checked. All of the responses were valid. The single continuous variable resulted from item 8 on the questionnaire in which participants were asked the number of women seen for gynecologic care each week. In response to this question, 39 participants put a range of numbers (e.g., 0-10) rather than a

single number. The mean was calculated for those who voluntarily responded with a range so that all responses would be a point estimate. The distribution of this continuous variable was then examined for outliers, normality, and possible cut-points of the data using percentiles and plots of the distributions (including histograms, stem and leaf plots, and box plots). All of the responses but two ranged from 0-80 visits per week; the responses identified as outliers were 240 and 250 visits per week. These two responses were thought to be errors as they would correspond with seeing 48-50 patients per day. After thorough discussion with colleagues, it was decided the outlying responses measured patients per month rather than per week. The two responses identified as outliers were recalculated as per week by dividing by four. The new value was verified with the responses of other CNMs within the same practice of the participants who had given the responses identified as outliers.

After the data were prepared, new categorical variables were created. First, the continuous variable for the number of women seen for gynecologic care weekly was categorized as low (< 10 visits), medium (10-25 visits), or high (> 25 visits) volume. The cut-points were determined both by the distribution of the data and consideration of what constituted meaningful categories. The categorical variable for gynecologic care was used in bivariate analyses, and the continuous variable was used in multivariable analyses.

Next, an index of accurate ECP knowledge was created by summing the correct number of responses to seven statements about ECPs. The reliability of this summative scale was tested using Cronbach's alpha coefficient, which was found to be adequate at 0.720.⁸⁶ Knowledge accuracy was categorized as high (7 correct answers) or low (6 or fewer correct answers). This cut-point was based on the determination that the statements in the index were all basic facts about ECPs that clinicians should know.

Finally, variables with multiple response options were examined to see if the number of categories could be reduced by regrouping the categories in a meaningful way. The seven types of practice settings respondents identified were collapsed into two types: 1) public/other (federally funded community health centers, health departments, other publicly funded clinics, university practices, and other) and 2) private (private practices and freestanding birth centers). The seven categories of years practicing midwifery were collapsed into four categories (≤ 5 years, 6-10 years, 11-15 years, and ≥ 16 years). The five categories for frequency of ECP discussion and prescription were collapsed into two categories: 1) never or only when the client requests and 2) sometimes, most of the time, or always. After these procedures were completed, the specific analyses for each specific aim, which are described below, were performed.

Specific Aim 1

Frequencies and percentages were calculated to describe characteristics of CNMs practicing in North Carolina. These characteristics include the types (private or public/other) and locations (rural or urban) of practices in which CNMs in North Carolina work, the other types of clinicians (e.g., physicians, nurse practitioners, physician assistants) with whom CNMs in North Carolina practice, the years of midwifery experience of CNMs in North Carolina, and the weekly volume of gynecologic care CNMs in North Carolina provide.

Specific Aim 2

Frequencies and percentages were calculated to describe the contraceptive methods other than ECPs that CNMs in North Carolina discuss with and prescribe or provide for their

patients. The analysis includes physiologic (e.g., fertility awareness-based methods), barrier (e.g., condoms), sterilization, hormonal (e.g., oral contraceptive pills) and intrauterine contraceptive methods.

Specific Aim 3

Univariate, bivariate, and multivariable analyses were used to assess ECP knowledge among North Carolina CNMs. First, frequencies and percentages were calculated for North Carolina CNMs' self-perceived ECP knowledge, their sources of ECP education, their responses to questions about specific ECP knowledge, and the accuracy of their ECP knowledge. Next, the bivariate relationships between the accuracy of ECP knowledge (low or high) and practice type, practice location, years of experience, weekly volume of gynecologic care (categorical variable), self-perceived level of ECP knowledge, and sources of ECP education were examined using Pearson's chi-square test for the nominal independent variables with adequate cell sizes, Fisher's exact test for the nominal independent variables with small cell sizes, and the linear chi-square test for the ordinal independent variables.^{87, 88} Finally, the multivariable relationships between the index of ECP knowledge accuracy and practice type, practice location, years of experience, weekly number of gynecologic visits (continuous variable), self-perceived level of ECP knowledge, and sources of ECP education were examined using logistic regression. The logistic regression methodology was appropriate due to the dichotomous dependent variable.^{87, 88}

Specific Aim 4

Univariate, bivariate, and multivariable analyses were used to assess attitudes toward ECPs among North Carolina CNMs. First, frequencies and percentages were calculated for selected attitudes North Carolina CNMs have toward ECPs: (1) whether or not ECPs encourage irresponsible behavior; (2) whether or not women will rely on ECPs as a regular form of contraception; and (3) whether ECPs should be available over-the-counter, only by prescription, or not at all. Next, the bivariate relationships between these attitudes and the accuracy of ECP knowledge was examined using Pearson's chi-square test and Fisher's exact test for small cell sizes. Finally, the multivariable relationships between attitude toward over-the-counter or prescription only availability of ECPs and practice type, practice location, years of experience, weekly number of gynecologic visits (a continuous variable), and accuracy of ECP knowledge was examined using logistic regression. This analysis excluded CNMs who did not think ECPs should be available. The logistic regression methodology was appropriate due to the dichotomous dependent variable.^{87, 88}

Specific Aim 5

Univariate, bivariate, and multivariable analyses were used to assess ECP practice patterns among North Carolina CNMs. Frequencies and percentages were calculated for North Carolina CNMs' frequency of ECP discussion and prescription, the limitations to CNMs in North Carolina discussing ECPs, and the availability of ECPs in pharmacies of the communities in which North Carolina CNMs practice. Bivariate relationships between the frequency of discussion of ECPs and practice type, practice location, years of experience, weekly volume of gynecologic care (categorical variable), accuracy of ECP knowledge, and

ECP attitudes were examined using Pearson's chi-square test for the nominal independent variables with adequate cell sizes, Fisher's exact test for the nominal independent variables with small cell sizes, and the linear chi-square test for the ordinal independent variables.^{87, 88} Multivariable relationships between the frequency of discussion of ECPs and practice type, practice location, years of experience, weekly number of gynecologic visits (continuous variable), accuracy of ECP knowledge, and ECP attitudes were examined using logistic regression. Bivariate relationships between the frequency of prescription of ECPs and practice type, practice location, years of experience, weekly volume of gynecologic care (categorical variable), accuracy of ECP knowledge, and ECP attitudes were also examined using Pearson's chi-square test, Fisher's exact test for small cell sizes, and the linear chi-square test. Multivariable relationships between the frequency of prescription of ECPs and practice type, practice location, years of experience, weekly number of gynecologic visits (continuous variable), accuracy of ECP knowledge, and ECP attitudes were also examined using logistic regression. The logistic methodology was appropriate because the dependent variables in both models were dichotomous.^{87, 88}

CHAPTER IV

RESULTS

This chapter presents the study results, beginning with a report of the response rate to the survey. The remainder of the chapter is organized according to the specific aims of the research.

Response Rate

The survey was mailed to 194 potential participants. During the telephone follow-up, four of the CNMs were determined not to have been practicing in North Carolina at the time of the survey and thus were ineligible to participate. This reduced the number of potential participants to 190. Two CNMs declined to participate, 49 CNMs did not return the survey, and 139 CNMs completed and returned surveys. Therefore the response rate was 73.2% (139/190). The response rate is within the range of the three previous mail surveys of CNMs in North Carolina that used the same inclusion criteria, CNMs approved to practice by the Midwifery Joint Committee, as the current study. Those surveys had response rates of 66%,⁵⁴ 68.3%,⁵³ and 80%.⁵²

Description of the Study Participants

The first specific aim of the study was to describe characteristics of CNMs practicing in North Carolina. The participants' practice characteristics, midwifery experience, and volume of weekly gynecologic care are presented in Table 3. The CNMs' primary practice settings tended to be private (67%) and located in urban (60%) areas. There were obstetrician-

gynecologists (80%) or other CNMs (74%) in the majority of the participants' practice settings, and nearly half (48%) of the CNMs worked with nurse practitioners. Less than one-quarter of the CNMs worked with physician assistants (20%), family physicians (17%), or physicians in specialties other than family practice or obstetrics and gynecology (8%). Most (88%) of the CNMs identified obstetrician-gynecologists as their supervising physician. Family practice physicians (9%) and maternal-fetal medicine specialists (3%) were the supervising physicians of the remainder of the CNMs. Over half of the CNMs (61%) had been practicing midwifery for 10 or fewer years.

The number of women seen for gynecologic care by the CNMs each week ranged from 0 to 80 with a median of 15. The weekly volume of gynecologic care was categorized as low (< 10 visits), medium (10-25 visits), or high (> 25 visits) according to the number of women seen per week. The majority of CNMs (45%) had a medium weekly volume of gynecologic care while 25% had low volume and 30% had high volume.

Discussion and Provision of Contraceptive Methods

The second specific aim of the study was to describe the contraceptive methods other than ECPs that CNMs in North Carolina discuss with and prescribe or provide for their patients. The findings related to this specific aim are presented in Table 4. The CNMs most frequently discussed oral contraceptive pills (99%), the contraceptive patch (99%), intrauterine devices (99%), the contraceptive injection (98%), sterilization (96%), and male condoms (96%). The female condom (32%), cervical cap (31%), and vaginal sponge (23%) were the least frequently discussed methods.

All of the CNMs prescribed or provided oral contraceptive pills and contraceptive patches. The contraceptive injection was prescribed or provided by 97% of CNMs, intrauterine devices by 96%, diaphragms by 86%, and the contraceptive ring by 85%. Cervical caps (20%) were the least frequently provided method.

Emergency Contraceptive Pill Knowledge

The third specific aim of the study was to assess ECP knowledge among North Carolina CNMs. Findings related to CNMs' self-perceived level of ECP knowledge and sources of ECP education are presented in Table 5. All of the CNMs perceived that they were very (51%) or somewhat (49%) knowledgeable about the use of ECPs in clinical practice; none perceived that they were not at all knowledgeable. More than half of the CNMs (56%) had learned about ECPs in midwifery school. All of the CNMs with fewer than two years of midwifery experience (n=11) had learned about ECPs in midwifery school. The percentage of CNMs who had learned about ECPs in midwifery school decreased from 67% among those with 2-10 years to 34% among those with 11-20 years to 21% among those with more than 20 years of experience. Self-study of articles or books (54%), formal continuing education programs (50%), and colleagues (43%) were the other most frequently identified sources of ECP education. Only 2% of the midwives had never received any education about ECPs.

Table 6 presents the results about the accuracy of the CNMs' ECP knowledge. The CNMs were most likely to know that ECPs can be managed by the woman without the man's participation (93%), are easy to use (91%), provide an option when no contraception was used (90%), and do not protect against sexually transmitted infections (88%). The CNMs

were less likely to know that ECPs are effective for preventing pregnancy (81%), have few contraindications (68%), and have no serious side effects (57%). The accuracy of the CNMs' ECP knowledge was categorized according to the number of correct answers to the ECP questions as high (7 correct answers) or low (6 or fewer correct answers). More participants had low (59%), rather than high (41%), accuracy of ECP knowledge.

Bivariate analysis (Table 7) found that accuracy of ECP knowledge was significantly associated with years of midwifery experience ($\chi^2=4.796, p=0.029$), weekly volume of gynecologic care ($\chi^2=3.943, p=0.047$), and self-perceived level of ECP knowledge ($\chi^2=8.958, p=0.003$). In particular, the percentage of CNMs with high accuracy of ECP knowledge increased with years of experience from 32% among those with five or fewer years of experience to 39% among those with 6-10 years to 42% among those with 11-15 years to 59% among those with 16 or more years. A greater percentage of CNMs with a high weekly volume of gynecologic care (75%) had low accuracy of ECP knowledge than those CNMs with a low volume (53%) or medium volume (51%). More CNMs who perceived they were very knowledgeable about ECPs had high accuracy of ECP knowledge (54%) than those who perceived they were somewhat knowledgeable (28%). The relationships between accuracy of ECP knowledge and practice type, practice location, and sources of ECP education were not statistically significant.

Multivariable analysis (Table 8) found significant association between accuracy of ECP knowledge and weekly number of gynecologic visits and self-perceived level of knowledge. The odds of high accuracy of ECP knowledge decreased as the weekly number of gynecologic visits increased. CNMs who perceived they were very knowledgeable about ECPs had four times the odds of having high accuracy of ECP knowledge when compared to

CNMs who perceived they were somewhat knowledgeable. Midwifery experience was no longer statistically significantly associated with having high accuracy of ECP knowledge after adjusting for practice characteristics, weekly number of gynecologic visits, self-perceived level of ECP knowledge, and sources of ECP education.

Emergency Contraceptive Pill Attitudes

The fourth specific aim of the study was to assess attitudes toward ECPs among North Carolina CNMs. The minority of the CNMs agreed that ECPs encourage irresponsible behavior (12%) or that women will rely on ECPs as a regular form of contraception (4%). Half (50%) of the CNMs thought ECPs should be available over-the-counter, 47% thought they should be available only by prescription, and 3% did not think ECPs should be available.

Bivariate analysis (Table 9) found that all three measured attitudes toward ECPs were associated with accuracy of ECP knowledge. In particular, low accuracy of ECP knowledge was associated with the attitudes that ECPs encourage irresponsible behavior ($\chi^2=12.693$, $p<0.001$), that women will rely on ECPs as a regular form of contraception (Fisher's exact, $p=0.042$), and that ECPs should be available by prescription only ($\chi^2=24.986$, $p<0.001$).

Among those who thought ECPs should be available, multivariable analysis (Table 10) found that the attitudes toward over-the-counter versus prescription only availability were significantly associated with practice type, more years of experience, and accuracy of ECP knowledge after controlling for practice location and weekly number of gynecologic visits. CNMs in private practice had less than half the odds of favoring over-the-counter availability than did CNMs in public or other types of practices. CNMs with 11 or more years of experience had more than four times the odds of favoring over-the-counter availability than

did CNMs with 5 or fewer years of experience. CNMs with high accuracy of ECP knowledge had more than seven times the odds of favoring over-the counter availability than did CNMs with low accuracy of ECP knowledge.

Emergency Contraceptive Pill Practice Patterns

The fifth specific aim of the study was to assess ECP practice patterns among North Carolina CNMs. The frequency with which CNMs discussed and prescribed ECPs are presented in Table 11. ECPs were included in a discussion of contraception always by 4% of CNMs, most of the time by 23%, sometimes by 32%, when the client requests information by 33% and never by 8%. When providing gynecologic care to women of childbearing age, ECPs are prescribed always by none of the CNMs, most of the time by 4%, sometimes by 29%, when the client requests a prescription by 59%, and never by 8%.

Half of the CNMs (53%) cited one or more limitations to discussing ECPs (Table 12). Among the potential limitations listed on the survey, lack of ready availability at community pharmacies (17%) and insufficient time for adequate patient counseling and education (13%) were the most frequently identified limitations. One-fifth of the participants identified other limitations and made comments. Some of these comments related to the limitations that had been listed on the survey. Additional limitations that were identified included personal and religious beliefs of the clients and community; discussion of ECPs is a nursing staff rather than CNM responsibility; ECPs are “easily abused” and “misused” by clients; ECPs are not provided by the practice (a health department); it is not the responsibility of the CNM to inform clients of the option of ECPs; concerns about ECP effectiveness and use as primary birth control; discussion of ECPs depends on timing of request (ECPs prescribed only prior to ovulation); ECPs are discussed only for emergency purposes (rather than as part of routine

contraceptive counseling); limited gynecologic care provided in practice; clients wish to avoid hormones; clients present too long after unprotected intercourse for ECPs to be effective; clients have misinformation (think ECPs are an abortifacient); and ECPs are rarely requested or needed.

The CNMs were asked about the availability of ECPs in their community pharmacies (Table 13). The majority of the CNMs (43%) did not know how many pharmacies keep ECPs in stock. ECPs were estimated to be kept in stock in all pharmacies by 2% of the CNMs, most pharmacies by 30%, few pharmacies by 23%, and no pharmacies by 2%.

Bivariate analysis (Table 14) found that the frequency of ECP discussion was significantly associated with years of experience ($\chi^2=7.240, p=0.007$), accuracy of ECP knowledge ($\chi^2=20.597, p<0.001$), attitude toward ECPs encouraging irresponsible behavior ($\chi^2=7.760, p=0.005$), and attitude toward over-the-counter versus prescription only availability of ECPs ($\chi^2=32.030, p<0.001$). Higher years of midwifery experience and high accuracy of ECP knowledge were associated with more frequent discussion of ECPs. The percentage of CNMs discussing ECPs sometimes, most of the time, or always was 45% among CNMs with 5 or fewer years of experience, 54% among those with 6-10 years, 71% among those with 11-15 years, and 73% among those with 16 years or more. Among CNMs with high accuracy of ECP knowledge, 80% discussed ECPs sometimes, most of the time, or always compared to 41% of CNMs with low accuracy of ECP knowledge. The attitudes that ECPs encourage irresponsible behavior and should be available by prescription only were associated with less frequent discussion of ECPs. Practice type, practice location, weekly volume of gynecologic care, and attitude toward women's reliance on ECPs as a regular form

of contraception were not significantly associated bivariately with frequency of ECP discussion.

Multivariable analysis (Table 15) found significant associations only between frequency of ECP discussion and accuracy of ECP knowledge and attitude toward ECP availability after controlling for practice type, practice location, midwifery experience, weekly number of gynecologic visits, and attitudes toward ECPs encouraging irresponsible behavior and women's reliance on ECPs as a regular form of contraception. CNMs with high accuracy of ECP knowledge had over three times the odds of more frequent discussion of ECPs than CNMs with low accuracy of ECP knowledge. CNMs who favored over-the-counter availability of ECPs had over five times the odds of more frequent discussion of ECPs than CNMs who believed ECPs should be available by prescription only.

Bivariate analysis (Table 16) found that the frequency of ECP prescription was significantly associated with practice type ($\chi^2=5.537, p=0.019$), years of experience ($\chi^2=4.376, p=0.036$), accuracy of ECP knowledge ($\chi^2=3.935, p=0.047$), and attitude toward over-the-counter versus prescription only availability of ECPs ($\chi^2=10.076, p=0.002$). In particular, 46% of CNMs in public or other types of practices prescribed ECPs sometimes or most of the time compared to 26% of CNMs in private practice. Higher years of midwifery experience and high accuracy of ECP knowledge were associated with more frequent prescription of ECPs. The percentage of CNMs prescribing ECPs sometimes or most of the time was 27% among CNMs with 5 or fewer years of experience, 19% among those with 6-10 years, 50% among those with 11-15 years, and 43% among those with 16 or more years. Among CNMs with high accuracy of ECP knowledge, 41% prescribed ECPs sometimes or most of the time compared to 25% of CNMs with low accuracy of ECP knowledge. CNMs

who thought ECPs should be available over-the-counter prescribed ECPs sometimes or most of the time more frequently (46%) than CNMs who thought ECPs should be available by prescription only (20%). Practice location, weekly volume of gynecologic care, and attitudes toward ECPs encouraging irresponsible behavior and women's reliance on ECPs as a regular form of contraception were not significantly associated with frequency of ECP prescription. Multivariable analysis (Table 17) found no significant associations between frequency of ECP prescription and practice characteristics, midwifery experience, weekly number of gynecologic visits, accuracy of ECP knowledge, and attitudes toward ECPs.

Table 3. Participants' Practice Characteristics, Midwifery Experience, and Weekly Volume of Gynecologic Care

	N	n (%)
Practice Type	139	
Private		93 (67)
Public or other		46 (33)
Practice Location	139	
Urban (population \geq 50,000)		83 (60)
Rural (population < 50,000)		56 (40)
Clinicians in Practice Setting ^a	139	
Obstetricians-gynecologists		111 (80)
Other CNMs		103 (74)
Nurse practitioners		66 (48)
Physician assistants		28 (20)
Family physicians		23 (17)
Physicians in other specialties		11 (8)
Primary Supervising/Collaborating Physician	139	
Obstetrician-gynecologist		122 (88)
Family physician		13 (9)
Other ^b		4 (3)
Years Practicing Midwifery	139	
\leq 5 years		44 (32)
6-10 years		41 (29)
11-15 years		24 (17)
\geq 16 years		30 (22)
Weekly Volume of Gynecologic Care	134	
Low (< 10 visits)		33 (25)
Medium (10-25 visits)		61 (45)
High (> 25 visits)		40 (30)

^aPercentages total greater than 100 because respondents could choose multiple answers

^bAll respondents who chose other indicated maternal-fetal medicine specialist

Table 4. Contraceptive Methods Discussed and Prescribed or Provided (N=137)

	Discussed		Prescribed or Provided	
	n	(%) ^a	n	(%) ^a
Oral contraceptive pills	136	(99)	137	(100)
Contraceptive patch	136	(99)	137	(100)
Intrauterine device	136	(99)	132	(96)
Contraceptive injection	134	(98)	133	(97)
Sterilization	132	(96)	n/a ^b	n/a ^b
Male condom	131	(96)	n/a ^b	n/a ^b
Contraceptive ring	124	(91)	116	(85)
Diaphragm	116	(85)	118	(86)
Abstinence	114	(83)	n/a ^b	n/a ^b
Fertility awareness-based methods	112	(82)	n/a ^b	n/a ^b
Vaginal spermicides	107	(78)	n/a ^b	n/a ^b
Female condom	44	(32)	n/a ^b	n/a ^b
Cervical cap	43	(31)	28	(20)
Vaginal sponge	31	(23)	n/a ^b	n/a ^b

^aPercentages total greater than 100 because respondents could choose multiple answers

^bMethods prescribed or provided were limited to those that require a prescription or clinician insertion (intrauterine device) or fitting (diaphragm and cervical cap)

Table 5. Self-Perceived Level of ECP Knowledge and Sources of ECP Education (N=136)

	n (%)
Knowledge of the Use of ECPs in Clinical Practice	
Very knowledgeable	69 (51)
Somewhat knowledgeable	67 (49)
Not at all knowledgeable	0 (0)
Sources of ECP Education ^a	
Midwifery school	76 (56)
Reading articles or books	74 (54)
Formal continuing education program	68 (50)
Colleagues	59 (43)
Online sources	20 (15)
Other ^b	15 (11)
Never received education about the use of ECPs	2 (2)

^aPercentages total greater than 100 because respondents could choose multiple answers

^bOther sources identified included conferences (n=6), Planned Parenthood (3), nurse practitioner programs attended prior to midwifery school (2), patients (1), reading (1), update to introduce and encourage ECP use received in the mail (1), and working (1)

Table 6. Accuracy of ECP Knowledge (N=136)

	n	(%)
Agree with Correct Information about ECPs ^a		
Can be managed by the woman without the man's participation	126	(93)
Easy to use	124	(91)
Provide an option when no contraception was used	123	(90)
Do not protect against sexually transmitted infections	120	(88)
Effective for preventing pregnancy	110	(81)
Few contraindications	93	(68)
No serious side effects	77	(57)
Number of Correct Answers to ECP Knowledge Questions		
1	5	(4)
2	3	(2)
3	8	(5)
4	10	(8)
5	21	(15)
6	34	(25)
7	56	(41)
Index of Accurate ECP Knowledge		
Low (6 or fewer correct answers)	80	(59)
High (7 correct answers)	56	(41)

^aPercentages total greater than 100 because respondents could choose multiple answers

Table 7. Bivariate Analysis of Accuracy of ECP Knowledge and Practice Characteristics, Midwifery Experience, Weekly Volume of Gynecologic Care, Self-Perceived Level of ECP Knowledge, and Sources of ECP Education

	N	ECP Knowledge		Test statistic	df	p-value
		Low n (%)	High n (%)			
Practice Type	136			0.120 ^a	1	0.729
Private		52 (58)	38 (42)			
Public or other		28 (61)	18 (39)			
Practice Location	136			2.275 ^a	1	0.132
Urban		44 (54)	38 (46)			
Rural		36 (67)	18 (33)			
Years of Experience	136			4.796 ^b	1	0.029
≤ 5 years		30 (68)	14 (32)			
6-10 years		25 (61)	16 (39)			
11-15 years		14 (58)	10 (42)			
≥ 16 years		11 (41)	16 (59)			
Weekly Volume of Gynecologic Care	131			3.943 ^b	1	0.047
Low (< 10 visits)		17 (53)	15 (47)			
Medium (10-25 visits)		30 (51)	29 (49)			
High (> 25 visits)		30 (75)	10 (25)			
Self-Perceived Level of ECP Knowledge	136			8.958 ^a	1	0.003
Very knowledgeable		32 (46)	37 (54)			
Somewhat knowledgeable		48 (72)	19 (28)			
Learned about ECPs in Midwifery School	136			1.336 ^a	1	0.248
Yes		48 (63)	28 (37)			
No		32 (53)	28 (47)			
Learned about ECPs from Reading Articles or Books	136			1.524 ^a	1	0.217
Yes		40 (54)	34 (46)			
No		40 (65)	22 (35)			
Learned about ECPs from Formal Continuing Education Program	136			1.093 ^a	1	0.296
Yes		37 (54)	31 (46)			
No		43 (63)	25 (37)			
Learned about ECPs from Colleagues	136			1.341 ^a	1	0.247
Yes		38 (64)	21 (36)			
No		42 (55)	35 (45)			
Learned about ECPs Online	136			0.013 ^a	1	0.908
Yes		12 (60)	8 (40)			
No		68 (59)	48 (41)			

Table 5 (continued)

	N	ECP Knowledge		Test statistic	df	p-value
		Low n (%)	High n (%)			
Learned about ECPs from Other Sources	136			2.466 ^a	1	0.116
Yes		6 (40)	9 (60)			
No		74 (61)	47 (39)			
Never Learned about ECPs	136			n/a ^c	n/a	0.512
Yes		2 (100)	0 (0)			
No		78 (58)	56 (42)			

Bold type indicates statistical significance at alpha=0.05

^aPearson's χ^2

^bLinear χ^2

^cFisher's exact test for small cell sizes

Table 8. Results of Logistic Regression Model of Accuracy of ECP Knowledge as a Function of Practice Characteristics, Midwifery Experience, Weekly Number of Gynecologic Visits, Self-Perceived Level of ECP Knowledge, and Sources of ECP Education (N=131)

	OR	(95% CI)	p-value
Practice Type			
Public or other	Referent		
Private	1.62	(0.65-4.04)	0.298
Practice Location			
Rural	Referent		
Urban	1.55	(0.67-3.62)	0.309
Years of Experience			
≤ 5 years	Referent		
6-10 years	1.02	(0.35-2.92)	0.976
11-15 years	0.78	(0.22-2.77)	0.702
≥ 16 years	2.36	(0.66-8.43)	0.186
Weekly Number of Gynecologic Visits	0.97	(0.94-0.99)	0.013
Self-Perceived Level of ECP Knowledge			
Somewhat knowledgeable	Referent		
Very knowledgeable	4.02	(1.59-10.12)	0.003
Learned about ECPs in Midwifery school			
No	Referent		
Yes	0.77	(0.32-1.89)	0.570
Learned about ECPs from Reading Articles or Books			
No	Referent		
Yes	1.46	(0.61-3.51)	0.398
Learned about ECPs from Formal Continuing Education Program			
No	Referent		
Yes	0.76	(0.30-1.94)	0.566
Learned about ECPs from Colleagues			
No	Referent		
Yes	0.55	(0.24-1.29)	0.169
Learned about ECPs Online			
No	Referent		
Yes	1.11	(0.33-3.71)	0.870
Learned about ECPs from Other Sources			
No	Referent		
Yes	1.67	(0.49-5.72)	0.415

Bold type indicates statistical significance at alpha=0.05

Table 9. Bivariate Analysis of Accuracy of ECP Knowledge and Attitudes toward ECPs

	N	ECP Knowledge		Test statistic	df	p-value
		Low n (%)	High n (%)			
ECPs encourage irresponsible behavior	136			12.693 ^a	1	<0.001
Agree		16 (100)	0 (0)			
Disagree		64 (53)	56 (47)			
Women will rely on ECPs as a regular form of contraception	136			n/a ^b	n/a	0.042
Agree		6 (100)	0 (0)			
Disagree		74 (57)	56 (43)			
ECPs should be available	130			24.986 ^a	1	<0.001
Over-the-counter		24 (36)	42 (64)			
By prescription only		51 (80)	13 (20)			

Bold type indicates statistical significance at alpha=0.05

^aPearson's χ^2

^bFisher's exact test for small cell sizes

Table 10. Results of Logistic Regression Model of Attitude toward ECP Availability as a Function of Practice Characteristics, Midwifery Experience, Weekly Number of Gynecologic Visits, and Accuracy of ECP Knowledge (N=126)

	OR	(95% CI)	p-value
Practice Type			
Public or other	Referent		
Private	0.34	(0.13-0.88)	0.026
Practice Location			
Rural	Referent		
Urban	1.23	(0.51-2.95)	0.650
Years of Experience			
≤ 5 years	Referent		
6-10 years	2.87	(0.99-8.38)	0.053
11-15 years	4.61	(1.38-15.39)	0.013
≥ 16 years	4.69	(1.30-16.87)	0.018
Weekly Number of Gynecologic Visits	1.02	(1.00-1.04)	0.115
Accuracy of ECP Knowledge			
Somewhat knowledgeable	Referent		
Very knowledgeable	7.91	(3.15-19.88)	<0.001

Bold type indicates statistical significance at alpha=0.05

Table 11. Frequency of ECP Discussion and Prescription (N=139)

	n	(%)
Discussion of contraception includes ECPs		
Always	5	(4)
Most of the time	32	(23)
Sometimes	44	(32)
When the client requests information	46	(33)
Never	12	(8)
ECPs are prescribed when providing gynecologic care to women of childbearing age		
Always	0	(0)
Most of the time	5	(4)
Sometimes	40	(29)
When the client requests a prescription	82	(59)
Never	12	(8)

Table 12. Limitations to Discussion of ECPs (N=136)

	n	(%)^a
None	64	(47)
ECPs are not readily available at pharmacies in community	23	(17)
Insufficient time for adequate patient counseling and education	18	(13)
Personal beliefs prohibit discussing ECPs	11	(8)
Clients cannot afford ECPs	10	(7)
Lack sufficient knowledge to feel comfortable discussing ECPs	4	(3)
Institution does not allow discussing ECPs	2	(2)
Supervising physicians do not allow discussing ECPs	1	(1)
Practice does not provide contraceptive services	0	(0)
Other	27	(20)

^aPercentages total greater than 100 because respondents could choose multiple answers

Table 13. Estimated Availability of ECPs in Community Pharmacies (N=139)

	n	(%)
All pharmacies keep ECPs in stock	3	(2)
Most pharmacies keep ECPs in stock	42	(30)
Few pharmacies keep ECPs in stock	32	(23)
No pharmacies keep ECPs in stock	3	(2)
Does not know how many pharmacies keep ECPs in stock	59	(43)

Table 14. Bivariate Analysis of Discussion of ECPs and Practice Characteristics, Midwifery Experience, Weekly Volume of Gynecologic Care, Accuracy of ECP Knowledge, and Attitudes toward ECPs

	N	Discuss ECPs		Test statistic	df	p-value
		Never or only when client requests n (%)	Sometimes, most of the time, or always n (%)			
Practice Type	139			1.363 ^a	1	0.243
Private		42 (45)	51 (55)			
Public or other		16 (35)	30 (65)			
Practice Location	139			1.394 ^a	1	0.238 ^a
Urban		38 (46)	45 (54)			
Rural		20 (36)	36 (64)			
Years of Experience	139			7.240 ^b	1	0.007
≤ 5 years		24 (55)	20 (45)			
6-10 years		19 (46)	22 (54)			
11-15 years		7 (29)	17 (71)			
≥ 16 years		8 (27)	22 (73)			
Weekly Volume of Gynecologic Care	134			0.053 ^b	1	0.817
Low (< 10 visits)		13 (39)	20 (61)			
Medium (10-25 visits)		29 (48)	32 (52)			
High (> 25 visits)		15 (38)	25 (62)			
Accuracy of ECP Knowledge	136			20.597 ^a	1	<0.001
Low		47 (59)	33 (41)			
High		11 (20)	45 (80)			
ECPs encourage irresponsible behavior	136			7.760 ^a	1	0.005
Agree		12 (75)	4 (25)			
Disagree		46 (38)	74 (62)			
Women will rely on ECPs as a regular form of contraception	136			n/a ^c	n/a	0.700
Agree		3 (50)	3 (50)			
Disagree		55 (42)	75 (58)			
ECPs should be available	133			32.030 ^a	1	<0.001
Over-the-counter		12 (17)	57 (83)			
By prescription only		42 (66)	22 (34)			

Bold type indicates statistical significance at alpha=0.05

^aPearson's χ^2

^bLinear χ^2

^cFisher's exact test for small cell sizes

Table 15. Results of Logistic Regression Model of Discussion of ECPs as a Function of Practice Characteristics, Midwifery Experience, Weekly Number of Gynecologic Visits, Accuracy of ECP Knowledge, and Attitudes toward ECPs (N=126)

	OR	(95% CI)	p-value
Practice Type			
Public or other	Referent		
Private	0.82	(0.30-2.21)	0.692
Practice Location			
Rural	Referent		
Urban	0.42	(0.16-1.12)	0.083
Years of Experience			
≤ 5 years	Referent		
6-10 years	0.97	(0.32-2.94)	0.955
11-15 years	2.21	(0.56-8.83)	0.260
≥ 16 years	1.71	(0.43-6.79)	0.448
Weekly Number of Gynecologic Visits	1.01	(0.98-1.03)	0.570
Accuracy of ECP Knowledge			
Somewhat knowledgeable	Referent		
Very knowledgeable	3.33	(1.24-8.93)	0.017
ECPs encourage irresponsible behavior			
Disagree	Referent		
Agree	0.16	(0.01-1.78)	0.136
Women will rely on ECPs as a regular form of contraception			
Disagree	Referent		
Agree	8.66	(0.46-164.95)	0.151
Over-the-counter availability of ECPs			
Disagree	Referent		
Agree	5.72	(2.19-14.95)	<0.001

Bold type indicates statistical significance at alpha=0.05

Table 16. Bivariate Analysis of Prescription of ECPs and Practice Characteristics, Midwifery Experience, Weekly Volume of Gynecologic Care, Accuracy of ECP Knowledge, and Attitudes toward ECPs

	N	Prescribe ECPs		Test statistic	df	p-value
		Never or only when client requests	Sometimes or most of the time			
		n (%)	n (%)			
Practice Type	139			5.537 ^a	1	0.019
Private		69 (74)	24 (26)			
Public or other		25 (54)	21 (46)			
Practice Location	139			0.002 ^a	1	0.962
Urban		56 (68)	27 (32)			
Rural		38 (68)	18 (32)			
Years of Experience	139			4.376 ^b	1	0.036
≤ 5 years		32 (73)	12 (27)			
6-10 years		33 (81)	8 (19)			
11-15 years		12 (50)	12 (50)			
≥ 16 years		17 (57)	13 (43)			
Weekly Volume of Gynecologic Care	134			1.740 ^b	1	0.187
Low (< 10 visits)		19 (58)	14 (42)			
Medium (10-25 visits)		42 (69)	19 (31)			
High (> 25 visits)		29 (73)	11 (27)			
Accuracy of ECP Knowledge	136			3.935 ^a	1	0.047
Low		60 (75)	20 (25)			
High		33 (59)	23 (41)			
ECPs encourage irresponsible behavior	136			3.065 ^a	1	0.080
Agree		14 (88)	2 (12)			
Disagree		79 (66)	41 (34)			
Women will rely on ECPs as a regular form of contraception	136			n/a ^c	n/a	0.665
Agree		5 (83)	1 (17)			
Disagree		88 (68)	42 (32)			
ECPs should be available	133			10.076 ^a	1	0.002
Over-the-counter		37 (54)	32 (46)			
By prescription only		51 (80)	13 (20)			

Bold type indicates statistical significance at alpha=0.05

^aPearson's χ^2

^bLinear χ^2

^cFisher's exact test for small cell sizes

Table 17. Results of Logistic Regression Model of Prescription of ECPs as a Function of Practice Characteristics, Midwifery Experience, Weekly Number of Gynecologic Visits, Accuracy of ECP Knowledge, and Attitudes toward ECPs (N=126)

	OR	(95% CI)	p-value
Practice Type			
Public or other	Referent		
Private	0.48	(0.20-1.16)	0.104
Practice Location			
Rural	Referent		
Urban	0.81	(0.34-1.93)	0.630
Years of Experience			
≤ 5 years	Referent		
6-10 years	0.44	(0.14-1.39)	0.162
11-15 years	2.01	(0.61-6.59)	0.251
≥ 16 years	1.34	(0.41-4.40)	0.629
Weekly Number of Gynecologic Visits	0.99	(0.97-1.01)	0.350
Accuracy of ECP Knowledge			
Somewhat knowledgeable	Referent		
Very knowledgeable	1.21	(0.47-3.13)	0.690
ECPs encourage irresponsible behavior			
Disagree	Referent		
Agree	0.65	(0.09-4.72)	0.671
Women will rely on ECPs as a regular form of contraception			
Disagree	Referent		
Agree	0.66	(0.04-10.3)	0.767
Over-the-counter availability of ECPs			
Disagree	Referent		
Agree	2.35	(0.90-6.16)	0.082

Bold type indicates statistical significance at alpha=0.05

CHAPTER 5

DISCUSSION

This chapter discusses the study findings and compares them to previous research on the topic. Implications of the study findings, recommendations for further research, and the limitations of the study are presented.

Weekly Volume of Gynecologic Care

Among the 134 CNMs who reported the number of women seen weekly for gynecologic care in this study, 95% saw one or more women. This is consistent with previous findings in national studies that 92%⁴⁹ to 96%⁴⁸ of CNMs provide gynecologic care. The median number of women seen weekly for gynecologic care was 15. This is approximately three times higher than a national survey⁴⁹ in which CNMs reported seeing an average of 19 clients for gynecologic care per month. A previous study in North Carolina⁵² reported CNMs saw an average of 21 clients who were not pregnant each week, although it did not state the number of these clients who were seen for gynecologic care and it is possible that some of these visits were for postpartum or primary health care.

Discussion and Provision of Contraceptive Methods

The results of this study demonstrate that CNMs in North Carolina are offering their clients a wide variety of contraceptive method options. The majority of CNMs ($\geq 78\%$)

discussed all contraceptive methods with patients except the female condom, cervical cap, and vaginal sponge. The omission of these methods is not surprising considering less than 2% of women nationally use these three methods according to the recent National Survey of Family Growth.⁸⁹ In addition, the sponge was not available in the United States at the time of the study. Interestingly, the CNMs reported less frequent discussion (91%) and prescription (85%) of the vaginal ring than the other hormonal contraceptive methods (97-100%) although no explanation for this inconsistency can be provided from the current data.

Emergency Contraceptive Pill Knowledge

The majority of the CNMs (51%) perceived they were very knowledgeable about the use of ECPs, yet less than half (41%) had high accuracy of ECP knowledge. Despite this discrepancy, the CNMs were generally correct in their self-assessment of knowledge as demonstrated by the bivariate and multivariable association between levels of self-perceived and accurate knowledge. The lowest areas of knowledge were ECP effectiveness, contraindications, and side effects. Higher weekly volume of gynecologic care was associated with low accuracy of ECP knowledge, which is concerning because these CNMs have more opportunities to provide ECPs and need accurate information to do so. It appears that ECP information is now incorporated into midwifery curricula with nearly three-quarters (73%) of the CNMs with five or fewer years of experience and all of the CNMs with two or fewer years of experience having learned about ECPs in midwifery school. Aside from midwifery school, self-study of articles or books and formal continuing education programs were the most frequently identified sources of ECP education.

Emergency Contraceptive Pill Attitudes

Only 12% of the CNMs in this study thought ECPs encourage irresponsible behavior. Three previous studies have asked if participants thought providing ECPs would encourage risk-taking behavior specifically among adolescents. The percentage who agreed ranged from 7% among a national sample of CNMs,⁶² to 12% among a national sample of adolescent health experts,⁷⁶ to 22% among a sample of New York pediatricians.⁷⁷ In a study of family medicine providers,⁸² 7% agreed ECPs would promote promiscuity. Only 4% of the CNMs in this study thought women will rely on ECPs as a regular form of contraception. Six previous studies have asked participants if they thought providing ECPs will discourage consistent use of other contraceptive methods. The percentage who agreed ranged from 14% among a national sample of CNMs⁶² and a sample of Midwestern family medicine providers,⁸² to 23% among providers in a California health maintenance organization,⁵⁸ to 25% among a national sample of adolescent health experts,⁷⁶ to 27% among a sample of Massachusetts providers,⁷² to 45% among a sample of New York pediatricians.⁷⁷

Half (50%) of the CNMs in this study thought ECPs should be available over-the-counter. The percentage of participants in other studies who agreed ECPs should be available over-the-counter has ranged from 14% among Minnesota health care providers,⁶¹ to 15% among a national sample of adolescent health experts,⁷⁶ to 20% among a sample of New York pediatricians,⁷⁷ to 33% among providers in a California health maintenance organization,⁵⁸ to 34% among a sample of Massachusetts providers,⁷² to 42% among a national sample of CNMs.⁶² It is interesting that the highest percentages of agreement with over-the-counter availability of ECPs have been found in the current study and the other previous study exclusively of CNMs. Increasing support for over-the-counter availability of

ECPs may relate to increased attention to and awareness of this delivery option in the past few years.

All three of the measured attitudes toward ECPs (whether they encourage irresponsible behavior, whether women will rely on ECPs as a regular form of contraception, and whether ECPs should be available over-the-counter, by prescription only, or not at all) were associated with accuracy of ECP knowledge. This association supports the potential for ECP education that improves knowledge to also alter attitudes toward ECPs. However, two previous studies of ECP educational interventions have shown conflicting results in this regard with one finding that education altered attitudes⁷² and the other that attitudes remained unchanged after education.⁵⁹

Emergency Contraceptive Pill Practice Patterns

The majority of the CNMs discussed and prescribed ECPs (92%). However, many of the CNMs relied on requests from patients to initiate discussion and prescription of ECPs. One-third (33%) of the CNMs discussed ECPs only when the client requests, and 59% prescribed ECPs only when the client requests. The CNMs were not specifically asked about advance provision of ECPs, but 33% reported prescribing ECPs sometimes or most of the time when providing gynecologic care so presumably advance provision is occurring on occasion.

A variety of limitations to discussing ECPs were identified by the CNMs. The most common limitations among those listed on the survey were lack of ready availability at community pharmacies and insufficient time for adequate patient counseling and education. Nearly half of the CNMs (43%) did not know about how many pharmacies in their community kept ECPs in stock, and 25% of the CNMs reported none or only a few

pharmacies did so. Patient misconceptions and CNM concerns were other frequently cited limitations to the discussion of ECPs.

Knowledge about, and attitudes toward ECPs were associated with the frequency of both discussion and prescription of ECPs. This supports education as a potential intervention for increasing ECP discussion and prescription. Beckman et al.⁵⁹ reported a significant increase in the frequency of ECP prescriptions after an educational intervention. Chuang and Freund⁷² did not find a significant increase in the number of ECP prescriptions after an educational intervention but did report a significant increase in the number of providers who had ever provided an advance ECP prescription.

Study Implications and Recommendations for Future Research

The findings of the current study support that the vast majority of CNMs are providing gynecologic care with 30% of the CNMs in North Carolina seeing an average of five or more gynecologic clients daily. The prevalence of gynecologic care in nurse-midwifery practice is important from a policy standpoint because some CNMs have reported difficulty receiving reimbursement for gynecologic services. Clearly the scope of nurse-midwifery practice extends beyond maternity care, and reimbursement for nurse-midwifery services should as well. Despite the frequency with which CNMs provide gynecologic care, little is known about the specific services being provided. Further study of the types of clients being seen and the conditions being treated is warranted for developing gynecologic content in midwifery curricula and assessing the quality of gynecologic care provided by CNMs.

An ECP educational intervention for CNMs in North Carolina is warranted by the findings that less than half of the CNMs had high accuracy of ECP knowledge, and that

accurate knowledge was associated with more favorable attitudes toward ECPs and more frequent discussion and prescription of ECPs. The study results should be considered in the developing the content of the intervention. Information about ECP effectiveness, contraindications, and side effects should be included, as these were the lowest areas of knowledge. Concerns identified as limitations to discussing ECPs, such as the use of ECPs as primary contraception and the timing of ECP use, should be addressed in the intervention. Targeting CNMs who are providing a high volume of gynecologic care, which was associated with low accuracy of ECP knowledge, for the intervention would be appropriate. Although the most frequent sources of ECP education were identified in the study, the CNMs' preferred method of education was not. This information would be useful in designing the educational intervention. Reassessing ECP attitudes and practice patterns after the intervention would be beneficial not only as a follow up to this study, but also for comparison to the previous studies of ECP educational interventions which have had some conflicting results.

Overall, the minority of providers in the current and previous studies have concerns about the effect of ECPs on women's sexual and contraceptive behavior. These results are important because these concerns are frequently cited as reasons to restrict access to ECPs by prescription only, yet they are not the attitudes of the majority of health care providers. The finding that half of the participants support over-the-counter availability of ECPs is important for continued policy discussions regarding ECP availability.

Two additional strategies could address the limitations to discussing ECPs that the CNMs specified. First, it would be helpful to assess pharmacy availability of ECPs in North Carolina and to make that information readily available to CNMs and other providers.

Second, the lack of time for adequate education and counseling as well as some of the patient misconceptions about ECPs identified as limitations might be helped by having more patient education materials available.

Limitations of the Study

The high response rate (73%) in this study reduces but does not eliminate the potential for response bias. Those who participated may have been willing to complete the survey because of more favorable attitudes toward ECPs. A meaningful comparison of the participants with non-responders is not possible because the only information known about the non-responders is their addresses. As with any self-reported data, there is the potential for respondent bias. Participants may have given responses they perceived to be desirable rather than ones consistent with their actual attitudes or practices. The instrument used in this research was specifically designed for the study and not previously validated. It is possible that important information in understanding ECP knowledge, attitudes, and practices was unmeasured. For example, the participants were not asked specifically about advance provision. Finally, the study was conducted among a single provider group in one state. It is unknown whether or not the findings can be generalized to other provider types CNMs in other geographic areas.

Conclusion

This study achieved its purposes of learning about ECP knowledge, attitudes, and practice patterns among CNMs in North Carolina, describing characteristics of CNMs practicing in North Carolina, and identifying the contraceptive methods other than ECPs that these CNMs discuss with and prescribe for their patients. A major contribution of this

research was to study CNMs. Gynecologic care by CNMs has been little represented in the peer-reviewed literature despite the frequency with which it is provided.

This study found that CNMs frequently provide gynecologic care and offer their patients a variety of contraceptive options. More than half of the CNMs had knowledge deficits about ECPs, but attitudes toward ECPs were generally favorable. The majority of CNMs discuss and prescribe ECPs, but they often rely upon requests from patients to do so. Attitudes toward ECPs and the frequency of ECP discussion and prescription were associated with accuracy of ECP knowledge. The findings warrant conducting an educational intervention about ECPs among CNMs in North Carolina then reassessing knowledge, attitudes, and practice patterns. If the intervention was demonstrated to be effective, it could be used for CNMs and other providers nationally.

APPENDICES

Appendix A: Study Questionnaire

²Please circle the answer(s) that apply to you. By completing the survey, you are giving your consent to participate in this study. When you have completed the survey, please return it in the envelope provided.

1. Are you a certified nurse-midwife in clinical practice in North Carolina?
 - a. Yes
 - b. No *Please stop now and return the survey as directed.*

2. Which best describes your primary practice setting (i.e., the one where you spend the majority of your time in clinical practice)? *Please circle one*
 - a. Federally Funded Community Health Center
 - b. Freestanding Birth Center
 - c. Health Department
 - d. Health Maintenance Organization
 - e. Home Birth Practice
 - f. Other Publicly Funded Clinic
 - g. Private Practice
 - h. University Practice
 - i. Other (*please specify*) _____

**Circle
one**

²The questionnaire has been reformatted for this appendix. The questionnaire the participants received was four pages in length, and the text boxes with instructions about circling one or more than one answer were to the left, rather than the right, of the response choices.

3. Which best describes the location of your primary practice setting?
 - a. Rural (area with a population of <50,000)
 - b. Urban (area with a population of 50,000 or more)

4. What types of providers practice in your primary practice setting? *Please circle all that apply*

<ol style="list-style-type: none"> a. Other Certified Nurse-Midwives b. Nurse Practitioners c. Physician Assistants d. Family Physicians e. Obstetricians/Gynecologists f. Physicians in other specialties 	<p>You may circle more than one</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------

5. Who is your primary supervising/collaborating physician?
 - a. Family Physician
 - b. Obstetrician/Gynecologist
 - c. Other (*please specify*) _____

6. What year did you complete your initial midwifery training? _____

7. How long have you been practicing midwifery?
 - a. <2 years
 - b. 2-5 years
 - c. 6-10 years
 - d. 11-15 years
 - e. 16-20 years
 - f. >20 years

8. How many women do you see for gynecologic care each week? _____

9. How many vaginal births did you personally attend in 2004? _____

Please do not include cesarean, vacuum-assisted, or forceps-assisted births where another provider performed these procedures. If you do not attend births, please write "none."

10. Which of the following contraceptive methods do you discuss at your primary practice site? *Please circle all that apply*

- a. Abstinence
- b. Fertility Awareness-Based Methods/Natural Family Planning
- c. Female Condom
- d. Male Condom
- e. Vaginal Spermicides
- f. Vaginal Sponge
- g. Cervical Cap
- h. Diaphragm
- i. Sterilization (tubal sterilization or vasectomy)
- j. Oral Contraceptive Pills
- k. Contraceptive Patch
- l. Contraceptive Ring
- m. Contraceptive Injection
- n. Intrauterine Device (IUD)
- o. None of the above
- p. All of the above

**You
may
circle
more
than
one**

11. Which of the following contraceptive methods do you prescribe or provide at your primary practice site? *Please circle all that apply*

- a. Cervical Cap
- b. Diaphragm
- c. Oral Contraceptive Pills
- d. Contraceptive Patch
- e. Contraceptive Ring
- f. Contraceptive Injection
- g. Intrauterine Device (IUD)
- h. None of the above
- i. All of the above

**You
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The remainder of this survey is about emergency contraceptive pills (ECPs). ECPs can be higher doses of regular oral contraceptives or products specifically made for emergency contraception (Plan B, Preven), which are given after unprotected intercourse to prevent pregnancy. ECPs do not include mifepristone (formerly known as RU-486).

12. How would you describe your knowledge of the use of ECPs in clinical practice?

- a. Very knowledgeable
- b. Somewhat knowledgeable
- c. Not at all knowledgeable

13. How did you receive education about the use of ECPs? *Please circle all that apply*

- a. Midwifery school
- b. Formal continuing education program
- c. From my colleagues
- d. Online sources
- e. Reading articles or books on my own
- f. Other (*please describe*) _____
- g. I have never received any education about the use of ECPs

**You
may
circle
more
than
one**

14. Which of the following qualities do you think ECPs have? *Please circle all that apply*

- a. Can be managed by the woman without the man's participation
- b. Do not protect against sexually transmitted infections
- c. Easy to use
- d. Effective for preventing pregnancy
- e. Encourage irresponsible behavior
- f. Expensive
- g. Few contraindications
- h. Ineffective for preventing pregnancy
- i. Low cost
- j. No serious side effects
- k. Not necessary to use a routine contraceptive
- l. Not readily available
- m. Provides an option when no contraception was used
- n. Serious side effects

**You
may
circle
more
than
one**

- o. Unsafe for fetus if ECPs are ineffective and pregnancy occurs
- p. Women will rely on ECPs as a regular form of contraception
- q. Work primarily as an abortifacient
- r. None of the above

15. Which of the following statements do you agree with? *Please circle one*

- a. ECPs should be available over-the-counter **Circle**
- b. ECPs should be sold by prescription only **one**
- c. ECPs should not be available

16. How many pharmacy(ies) in your community keep ECPs in stock? *Please circle one*

- a. All **Circle**
- b. Most **one**
- c. Few
- d. None
- e. I do not know

17. When you discuss contraception with clients how often do you include a discussion of ECPs? *Please circle one*

- a. Always **Circle**
- b. Most of the time **one**
- c. Sometimes
- d. When the client requests information
- e. Never

18. When you provide gynecologic care to women of childbearing age how often do you prescribe ECPs? *Please circle one*

- a. Always
- b. Most of the time
- c. Sometimes
- d. When the client requests a prescription
- e. Never

**Circle
one**

19. Which of the following are limitations to discussing ECPs in your clinical practice?

Please circle all that apply

- a. ECPs are not readily available at pharmacies in my community
- b. I lack sufficient knowledge to feel comfortable discussing ECPs
- c. My clients cannot afford ECPs
- d. My institution does not allow me to discuss ECPs
- e. My personal beliefs prohibit discussing ECPs
- f. My practice does not provide contraceptive services
- g. My supervising/collaborating physicians do not allow me to discuss ECPs
- h. There is not sufficient time for adequate patient counseling/education about ECPs
- i. None
- j. Other (*please describe*) _____

**You
may
circle
more
than
one**

Thank you for taking the time to complete this survey!

Appendix B: Cover Letter

³DATE

NAME

STREET ADDRESS

CITY, STATE, ZIP CODE

Dear Ms./Mr. X:

You are invited to participate in the *Survey of North Carolina Certified Nurse-Midwives About Emergency Contraceptive Pills*. Your participation is completely voluntary and confidential. An information sheet explaining the nature of the survey is enclosed.

If you choose to participate, please complete the questionnaire and return it in the enclosed envelope. If you choose not to participate, please return the questionnaire in the enclosed envelope to avoid receiving additional mailings. If you have any questions, please contact Francie Likis at flikis@email.unc.edu or (919) 929-9138.

Please return your survey by DATE. Thank you in advance for your participation.

Sincerely,

Francie Likis, MSN, NP, CNM

Doctoral Student, Department of Maternal and Child Health, UNC School of Public Health

³ The cover letter has been reformatted for this appendix. The cover letter the participants received was one page in length. The name, address, and salutation were individualized for each recipient, and the cover letters were hand signed.

Ruth Petersen, MD, MPH

Director of Women's Preventive Health Research, Center for Women's Health Research

Research Assistant Professor, Department of Obstetrics and Gynecology, UNC School of
Medicine

Lecturer, Department of Maternal and Child Health, UNC School of Public Health

Trish Payne, BSN, CNM, MPH

Clinical Assistant Professor, East Carolina University Nurse Midwifery Education Program

Appendix C: Study Information Sheet

Survey of North Carolina Certified Nurse-Midwives About Emergency Contraceptive Pills Information Sheet⁴

What is this study about? You are invited to participate in a research project entitled *Survey of North Carolina Certified Nurse-Midwives About Emergency Contraceptive Pills*. The purpose of the study is to learn about the knowledge, attitudes, and practices regarding emergency contraceptive pills among certified nurse-midwives in North Carolina. You are being asked to participate because you are currently approved to practice midwifery by the Midwifery Joint Committee of the State of North Carolina. The Principal Investigator for this study is Francie Likis, MSN, NP, CNM, a doctoral student in the Department of Maternal and Child Health, UNC School of Public Health. She can be reached at (919) 929-9138 or flikis@email.unc.edu. The Faculty Advisor for this project is Ruth Petersen, MD, MPH who can be reached at (919) 966-7924 or ruth_petersen@unc.edu. You may call the Principal Investigator or Faculty Advisor collect or contact them at the Center for Women's Health Research, CB#7521, 725 Airport Road, Chapel Hill, NC 27599-7521. Trish Payne, CNM, MPH is Co-investigator.

What will I be asked to do? You will be asked to fill out a one-time survey about your clinical practice setting and emergency contraceptive pills. It will take about 10-20 minutes to complete the questionnaire. An envelope is provided for you to return the survey.

⁴The study information sheet has been reformatted for this appendix. The information sheet the participants received was one page in length and included the stamp of approval from the Institutional Review Board.

What are the risks and benefits of my participation? There is minimal risk related to breach of confidentiality associated with this study. There are no direct benefits to you for participating in this study. There is a potential benefit to the midwifery profession from your participation as very little is known about the knowledge, attitudes, and practices regarding emergency contraceptive pills among certified nurse-midwives. Your decision whether or not to participate in this study will not affect your approval to practice midwifery in the state of North Carolina.

Are there any costs? There will be no costs for participating other than the time needed to complete the questionnaire.

Will I be paid? You will not receive any compensation for your participation.

Subject's rights and confidentiality If you agree to participate in this study, please understand that your participation is voluntary (you do not have to do it). You have the right to decide not to participate or to stop your participation at any time without penalty. You have the right to refuse to answer particular questions. This survey is confidential. You have been assigned a unique study ID number used only to track the return of your survey. The questionnaires and mailing list will be stored in separate locations. No identifying information will be included on the surveys being analyzed. Completed surveys will be seen only by the investigators of the study. Results of this study will be presented in summary form only. You will not be identified in any report or publication of this study or its results. This study has been reviewed and approved by the Public Health Institutional Review Board (IRB). If you have questions about your rights as a study participant, or are dissatisfied at any

time with any aspect of this study, you may contact -- anonymously, if you wish -- the Public Health IRB, Office of Human Research Ethics, University of North Carolina at Chapel Hill, CB # 7400, Chapel Hill, NC 27599-7400, or by phone 919-966-3012. You may call collect.

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