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Confidentiality, insurance, and provider-based barriers to sexual and reproductive health services

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CONFIDENTIALITY, INSURANCE, AND PROVIDER-BASED BARRIERS TO SEXUAL AND REPRODUCTIVE HEALTH SERVICES

by

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DEDICATION

For Jim Burgess

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ABSTRACT

This dissertation consists of three studies that examine barriers to sexual and reproductive healthcare among commercially-insured young adults and women. Study 1, *Parental Coverage and Insurance Use for Sexual and Reproductive Health Services by Young Adult*s, investigates differences in insurance use behavior for confidential SRH care by young adults with parental versus policyholder coverage. Findings demonstrate that individuals with parental insurance coverage are less likely than their counterparts with policyholder coverage to use their insurance to pay for pap testing, contraception, sexually transmitted infection (STI) testing, and pre-exposure prophylaxis (PrEP). Study 2, *The National Dependent Coverage Expansion and Insurance Use for Sexual and Reproductive Health Services*, builds on study 1 to evaluate the role of the national dependent coverage expansion on insurance use for sexual and reproductive health services. Findings demonstrate an aggregate reduction in insurance use for pap testing, contraception, and STI testing among young adult

women newly eligible for parental coverage under the expansion. Study 3, *Trends and Variations in Pelvic Examination During Contraceptive Encounters*, examines the extent to which the prevalence of non-indicated pelvic examinations performed during contraceptive visits has changed over time, along with variations by provider specialty and patient age. Results show a substantial increase in the number of pelvic examinations performed during contraceptive encounters from 2007 – 2017, and higher rates of non-indicated exams performed by obstetrician-gynecologists. Together, this research provides evidence of barriers to sexual and reproductive healthcare among commercially-insured young adults and women, highlighting ongoing issues of patient privacy and autonomy in healthcare financing and service delivery.

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LIST OF ABBREVIATIONS

AAFP..... American Academy of Family Physicians

ACA..... Affordable Care Act

ACOG ..... American College of Obstetricians and Gynecologists

ACP..... American College of Physicians

APC..... Advanced practice clinician

AYA.....Adolescents and young adults

CDC ..... Centers for Disease Control

CDHP.....Consumer-driven health plan

CPT..... Current procedural terminology

DCE .....Dependent Coverage Expansion

DiD .....Difference-in-differences

EOB ..... Explanation of benefits

EPO .....Exclusive provider organization

ESI .....Employer-sponsored insurance

FPP .....Family practice physicians

HCPCS .....Healthcare common procedure coding system

HDHP..... High deductible health plan

HEDIS ..... Healthcare effectiveness data and information set

HMO..... Health maintenance organization

HPV..... Human papilloma virus

ICD ..... International classification of disease

IUD ..... Intrauterine device

LARC ..... Long-acting reversible contraceptive

MSA ..... Metropolitan statistical area

MSM ..... Men who have sex with men

NCQA ..... National Center for Quality Assurance

NDC ..... National drug codes

NSFG ..... National survey of family growth

OBGYN ..... Obstetrician-gynecologist

OCP ..... Oral contraceptive pill

OPA ..... Office of Population Affairs

OTC ..... Over-the-counter

PID ..... Provider-induced demand

POS ..... Point of service

PPO ..... Preferred provider organization

PrEP ..... Pre-exposure prophylaxis

SRH ..... Sexual and reproductive health

TDF-FTC ..... Tenofovir disoproxil fumarate and emtricitabine

USPSTF ..... U.S. Preventative Services Task Force

CHAPTER 1: INTRODUCTION

Sexual and reproductive health (SRH) services are a primary reason for care seeking by young adults[1] and women[2]. Despite more service use, young adults have higher rates of unintended pregnancies and sexually transmitted infections than their older counterparts. Women are largely responsible for controlling fertility, have a heightened biological vulnerability to STIs, and are more likely to experience adverse health, social, and economic consequences of unintended pregnancies and STIs. Barriers to SRH services therefore have disproportionate, negative impacts on young adults and people who can get pregnant. Attention to the SRH care needs of both these populations is therefore necessary to improve access to essential SRH care.

This chapter provides an overview of the SRH services examined in the subsequent research, followed by reviews of the literature including research gaps on: 1) confidentiality in SRH service use among adolescents and young adults, 2) the role of insurance and cost-sharing on access to care, and 3)

[1] I define young adults as individuals aged 19–25, who are no longer legally dependent, but who typically have not transitioned into adulthood. While this age group also falls under the category of 'adolescents', I distinguish between 19–25 year-olds and their younger counterparts because this age group has different needs and experiences which are the focus of this research.

[2] Throughout this dissertation, I use gender-neutral language when possible to cover the range of patients affected by the policies and practice studied. I refer to women specifically when sources use that terminology for accuracy. Additionally, because the primary data source for this research is claims data, which do not capture gender outside of a male-female binary, I sometimes use 'women' to refer to female-sexed individuals as defined by administrative records. Transgender and non-binary individuals experience considerable obstacles to sexual and reproductive healthcare. Accurately capturing gender identity in administrative and other data will be necessary to understand and address these disparities.

provider-based barriers to contraception. The conceptual approaches used to address the three studies in this dissertation are then discussed in detail. To provide context for the following literature review, this dissertation research addresses three primary questions: 1) what is the relationship between parental insurance coverage and SRH service use among commercially insured young adults? 2) did the National Dependent Coverage expansion improve insurance use for SRH care among young adult females newly eligible for parental coverage? and 3) what is the prevalence of non-indicated pelvic examinations performed during contraceptive encounters among commercially insured, reproductive age females, and how does the practice vary temporally, by provider specialty, and by patient age?

SRH service need and use

Pap testing: Human papilloma virus (HPV) is the most common sexually transmitted infection in the US, and is a necessary cause of cervical cancer. Most women become infected with at least one type of HPV during their sexual lives, and infection rates are highest among those ages 20–24.[1] Papanicolaou testing (hereafter referred to as pap testing) predicts the risk of cervical cancer and, when combined with screening and appropriate follow up, can reduce deaths due to cervical cancer by up to 80%.[2] Early-stage diagnosis of cervical dysplasia and cancer through pap testing allows for use of fertility-sparing treatments.[3] According to the U.S. Preventative Services Task Force (USPSTF), women

should be screened for cervical cancer with cytology (pap test) once every three years starting at age 21, and up to five years among women aged 30–65.[4] Pap testing is not recommended for those younger than 21. From 2008–2013, 82.6% of women aged 21–25 received a pap test in accordance with national recommendations, compared to 96% of those ages 26–30.[5] Prevalence of pap testing was higher among people who had initiated HPV vaccination and among those with a college degree. Hispanic women and women living in rural areas have a higher incidence of cervical cancer and are less likely to receive pap testing due to structural and logistic barriers, including cost (which ranges from $50–$200), not having time off work, and lack of transportation.[6,7] Lower levels of HPV awareness, health literacy, and personal beliefs have also been identified as barriers to pap testing.[8,9,10]

STI testing: Half of all sexually active young adults will contract an STI by age 25, and the rate of infection is over twice as high for women aged 20–24 than for those aged 25–29 (4,290 vs 1,932 per 100,000 women, respectively).[11] Men aged 20–24 have the highest rate of gonorrhea diagnoses among all sexes and age groups, the highest chlamydia rates of all age groups among men, and young adult men who have sex with men (MSM) account for over 70% of new HIV diagnosis.[12,13] These rates do not capture infections that are never diagnosed, and because STIs are often asymptomatic, young people who go without getting tested and are more susceptible to the health consequences of

undiagnosed infection.[14] Untreated chlamydia and gonorrhea put women at risk of pelvic inflammatory disease, infertility, ectopic pregnancy, and increased risk of HIV transmission.[15] Additionally, an estimated 10.2% of new HIV infections among MSM can be attributed to chlamydia and gonorrhea infection.[16]

According to USPSTF guidelines, sexually active women aged 24 and younger as well as older women deemed 'at risk' should be screened for chlamydia and gonorrhea, and people ages 15–61, those at risk, and all pregnant women should receive HIV testing.[17] Additionally, the USPSTF recommends that men at increased risk be screened for syphilis and that clinicians offer pre-exposure prophylaxis (PrEP) to persons who are at high risk of HIV acquisition.[18] A national survey of adolescents and young adults found that only one in ten men and one in four women aged 20–25 reported STI testing in the past year.[19] The study also found that young adults with public insurance were significantly more likely than those with commercial insurance to receive testing (aOR = 1.36), and that those living in the Northeast, West, and Midwest were more likely than those living in the South to receive testing (aOR= 1.44, 1.38, and 1.12, respectively). Among 20–25 year-olds, 54.7% reported never getting tested because of confidentiality concerns, 63.6% because their provider did not suggest it, 61.9% due to embarrassment or difficulty asking for testing, and 81.7% because of cost or lack of insurance. Adolescent and young adult men aged 15–25 were more likely than their female counterparts to forgo testing due

to confidentiality concerns (60.1% versus 39.9%).

Contraception: The unintended pregnancy rate is higher in the US than in any other developed country. In 2011, approximately half of all pregnancies, 59% of pregnancies among women aged 20–24, and 42% of pregnancies among those ages 25–29 were unintended.[20] Women living in the South or in densely populated states are also more likely to have an unplanned pregnancy.[21] Recent declines in unintended pregnancy rates are largely attributed to increased use of highly effective contraceptive methods, though one in four sexually active women aged 18–24 do not use contraceptives.[22,23] This age group is, however, more likely to use emergency contraception than older women.[23]

Births from unintended pregnancies are associated with adverse maternal and child health outcomes as well as social and economic consequences. Pregnancy intention has been linked with later initiation of prenatal care, reduced likelihood of breastfeeding, lower birth weight, and increased prevalence of maternal depression, anxiety, and preterm birth.[24,25] Access to contraception is associated with lower poverty rates, higher rates of labor force participation, entry into professional school, and higher wages for women.[26,27,28] Contraception helps people time and space their pregnancies, which is particularly essential for those in their early 20's, though this age group is more likely to experience cost-related barriers to contraception.[29]

Without insurance, out-of-pocket costs for oral contraceptives range from

$240–$600 annually, the patch and the ring from $180–$1,000, and the shot up to $240 annually. Emergency contraception costs anywhere from $35–$60 for a single use, implants cost over $800 for three years, and the intrauterine device (IUD) costs anywhere from $500–$1,000 for 5–12 years.[30] Though it is not medically necessary for modalities other than the diaphragm and IUD, many providers also require that women undergo a pelvic exam and/or pap test before prescribing hormonal birth control, which can cost anywhere from $35–$250.[31] These costs can be financially burdensome and even prohibitive for women in their early 20's who are unemployed, in college, or are joining the labor force with lower incomes and fewer health insurance benefits. In 2011, approximately three-quarters of young adults had incomes under 250% of the federal poverty level.[32] Provision of contraceptives without cost-sharing eliminates or reduces financial barriers, improving both access to care and the subsequent health, social, and economic benefits associated with contraceptive use.[33]

A key provision of the Patient Protection and Affordable Care Act (ACA) requires commercial insurers to cover women's preventative services, including the aforementioned SRH services outlined by the USPSTF, without cost-sharing. The office visit or follow-up treatments associated with these services, however, are not included under the coverage requirement. In addition, based on Institute of Medicine recommendations, the ACA requires that all FDA-approved contraceptives be provided without cost-sharing (hereafter referred to as the

contraceptive mandate), though religious and religiously-affiliated employers are exempt from providing insurance that covers contraception.[34]

Pelvic Examinations: Also covered service under the ACA preventative service mandate, pelvic examinations are the most common female health screening, with over 37 million performed in 2016.[35] Pelvic examination typically consists of three components: visual inspection of the external genitalia, speculum examination including taking a swab from the cervix, and the bimanual component, where a provider inserts two fingers into the vagina while pressing on the lower abdomen. The speculum component is also performed as part of the pap test, and the procedures are often provided concurrently.

The pelvic exam has traditionally been performed for several reasons, including screenings for gynecological cancer, pelvic inflammatory disease, sexually transmitted infections, determining eligibility for hormonal contraception, and as part of an annual well-woman exam. While it is still routinely performed for these indications, research shows that the pelvic exam is not effective for detecting ovarian cancer, unnecessary for STI screening, and is not requisite for determining hormonal contraceptive eligibility.[36]

The clinical value of pelvic examination for *any* reason in asymptomatic, non-pregnant women has been challenged in recent years, with conflicting recommendations across professional organizations. The American College of Physicians and the American Academy of Family Physicians recommend against

ever performing pelvic examinations on non-pregnant, asymptomatic women,[37,38] while the American College of Obstetricians and Gynecologists (ACOG), recommends that pelvic examination be informed by shared decision-making and when indicated by medical history or symptoms.[39] The USPSTF recommendation is similarly ambiguous, and states that "the current evidence is insufficient to assess the balance of benefits and harms of performing screening pelvic examinations in asymptomatic women for the early detection and treatment of a range of gynecologic conditions".[40] Despite conflicting guidance on routine screening exams, there is broad consensus that, with the exception of the intrauterine device and diaphragm, pelvic examination should not be performed as a requirement for contraceptive prescription in asymptomatic women.[41,42]

Confidentiality barriers to SRH care

Research on confidentiality in SRH service use consistently demonstrates a negative relationship between parental knowledge or involvement and SRH service use, though the extent of this effect varies across geographic locations, subgroups, and services. A study on adolescent responses to a proposed policy requiring parental notification for contraceptive prescriptions in Wisconsin found that approximately 60% of adolescent girls would stop using all SRH services, delay testing and treatment for STIs including HIV, or discontinue use of specific SRH services if parents were informed of contraceptive service seeking.[43] These findings suggest a spillover effect of parental notification for contraceptives on

other SRH services due to adolescent perceptions of privacy for all SRH services. A national study on the effect of a similar policy found that 20% would forgo contraceptive use, though 70% of those whose parents were not already aware of their contraceptive use would stop using prescription contraception if parental involvement were mandated, indicating differential effects of the law based on prior parental knowledge of SRH care use.[44]

A qualitative study of young adult's experiences with the Massachusetts health reform found that access to contraception and STI testing for young adults is mediated by the loss of privacy of having parental insurance coverage, and many participants reported seeking services at Title X family planning clinics when they were unable to use their insurance for contraception.[45] According to one woman in the study: "*I think the reason that I haven't had, you know, oral contraception or that before was kind of because I didn't want my mom to find out that I had to like purchase this.… I didn't want it to show up on my mom's bill for insurance or whatnot"*. Another study that examined changes confidential SRH service provision after implementation of Title X funding cuts in Texas found that organizations affected by cuts saw a decrease in the number of teenage patients, and attributed this reduction to their inability to provide subsidized, confidential care.[46]

Most research on confidentiality relies on survey or qualitative interview data and are consequently subject to the inaccuracies of self-reported behaviors

including recall and social desirability bias. Research on the effects of parental notification on objective service use is limited. In addition, while the tendency to alter care-seeking behavior to protect confidentiality likely continues into young adulthood, less attention in the literature has been paid to privacy concerns or the specific role of parental insurance on service use among young adults.

More recent analyses of data from the National Survey of Family Growth (NSFG) suggest that confidentiality concerns as a barrier to SRH care among adolescents and young adults have declined in recent years.[47] Another study examined associations between dependent coverage status and utilization of SRH and other preventative services.[48] Findings demonstrated no difference in doctor visits, flu shots, or SRH service use between young adults with dependent versus policyholder coverage. Findings did show that those with Medicaid coverage were significantly more likely than privately-insured dependents to have a pap test. Compared to their policyholder counterparts, women with dependent coverage were significantly younger, had higher family income, were more likely to be non-Hispanic white, less likely to be employed, have lower levels of education, more likely to live with parents, less likely to live with a partner, and less likely to be a parent. While valuable for understanding subgroup differences in dependent coverage status and SRH utilization, these findings provide only evidence of associations between dependent coverage status and SRH service use. In addition, this data does not capture whether or not insurance was used to

pay for care.

It is important to emphasize the distinction between *service use* and *insurance use for services*. Confidentiality concerns lead some women to seek SRH services outside of mainstream health care settings, most commonly, publicly-funded family planning clinics. These facilities are known for providing confidential and free or low-cost care if patients are uninsured or choose not to use their insurance.[49] In 2010, 27% of all US women, 16% of privately-insured, 43% of publicly-insured, and 64% of uninsured women received contraceptive care from a publicly-funded clinic.[50] The Title X Family Planning Program, enacted as part of the 1970 Public Health Service Act to provide SRH care to low-income and uninsured populations, allocates state and federal funds to qualifying clinics for provision of preventative SRH services (including breast and pelvic exams, pap tests, HIV/STI screening, pregnancy testing and counseling, and contraceptives).[51] Because the program has historically included extensive confidentiality protections, individuals with privacy concerns often obtain care from Title X-funded providers and forgo using their insurance to pay a reduced out-of-pocket fee for services.[52] While these facilities fill an important gap for young people seeking confidential care, use of Title X resources by young adults with parental coverage diverts public funding from other medically underserved populations, to the benefit of private insurers who don't have to pay for services that aren't billed.

Insurance billing and claims processing procedures used by private insurers often violate the privacy of those insured as a dependent on someone else's plan, in particular, the practice of sending explanation of benefits (EOB) forms to a policyholder whenever care is provided under his or her policy. The purpose of EOBs are to provide policyholders with detailed information on the amounts charged for care and covered by the insurer, and to prevent insurance fraud and abuse.[53] Because these forms also typically provide information on health services provided, to whom, and where they were provided, they indirectly disclose the protected health information of persons insured as a dependent under that plan. Other standard insurer practices, including communicating primarily with the policyholder about claim submissions, reimbursement, and denial, subject dependents to privacy breaches. While some insurance providers may offer to send EOBs to the patient rather than the policyholder for confidential services, state statutes and regulations ultimately determine who insurers communicate with about services provided and what is communicated. While state, insurer, and provider policies vary in the extent to which they protect dependent privacy, decisions of young adults with parental coverage are likely an effect of perceptions of privacy as opposed to actual policies or privacy breaches.

Insurance and cost-sharing

While little attention has been paid to SRH services specifically, the effect of prices on health service use has been studied extensively in the economic

literature. Evidence from the RAND health insurance experiment (HIE) suggests that higher levels of cost-sharing reduce health service use, including both unneeded and needed medical care.[54] Findings from the Oregon HIE demonstrated higher rates of health service utilization, lower rates of medical debt, and higher self-reported mental and physical health among those who gained Medicaid coverage.[55] Consistent with other studies, the Oregon HIE found evidence that younger adults were more likely to use emergency department services.[56,57] While limited in geographic scope and specific to public health insurance, findings from this study provide causal evidence supporting differential impact of insurance coverage on utilization between young adults and their older counterparts. In addition, several quasi-experimental studies support the finding that cost-sharing reduces health service demand, and that some types of medical services may be more sensitive to cost-sharing; in particular, preventative services, emergency department visits, mental health and substance use disorder services, and prescription drugs.[58,59,60,61,62,63]

The link between health insurance coverage and SRH service use is well-established; women who go without health insurance for any period of time over a year are less likely than those with continuous public or private insurance coverage to use any health care, including SRH care.[64] In 2010, women with Medicaid coverage were more likely than those with private insurance coverage to use any SRH service (including contraception, pap and STI testing).[50] Much

research on the relationship between insurance coverage and use of SRH care is descriptive. A few pre-post analyses have examined the impact of the ACA contraceptive mandate on contraceptive use and out-of-pocket costs, demonstrating reductions in out-of-pocket spending, oral contraceptive discontinuation, and increased contraceptive choice among the commercially-insured.[65,66,67] Using a large, employer-sponsored claims database, Snyder et al. found a significant increase in use of long-acting reversible contraceptives (LARCS) after the mandate, and increased LARC uptake by women in the South, Midwest, and rural areas.[68] Another study leveraged quasi-experimental methods and demonstrated that pre-ACA state contraceptive mandates were associated with a reduction in unintended and mistimed births.[69]

The Affordable Care Act Dependent Coverage Expansion

Young adults are healthier, have less expected need for health care, and have lower incomes, making this group more likely to forgo health insurance, especially when premiums are high relative to income.[70] Consequently, this population has a higher uninsurance rate than any other age group, which has been linked with lower ambulatory care use, preventative service use, and forgone or delayed care.[71,72,73] To address uninsurance and underinsurance in young adults, the dependent coverage expansion provision of the Affordable Care Act (ACA-DCE) requires employers to allow the children of policyholders to stay on their parents' health plan through age 26. Though 34 states enacted

some form of legislation requiring insurers to expand dependent coverage prior to ACA-DCE implementation, state-level eligibility requirements varied by age, marital status, college enrollment, residence with parents (among other factors), and pre-ACA state-level expansions demonstrated only very minor increases in young adult insurance coverage, which were largely offset by reductions in employer-sponsored insurance (ESI) policyholder coverage.[74]

Since implementation in 2010, the effects of the ACA-DCE on insurance coverage, access, utilization, costs, health outcomes, and disparities in outcomes between subgroups has been studied extensively. This research typically leverages a difference-in-differences (DiD) analytic approach, taking advantage of the naturally-occurring contrast between young adults before and after the expansion compared with their slightly older (and sometimes younger) counterparts who were not impacted by the intervention. These DiD studies of the DCE typically use cross-sectional data from a variety of national surveys, with different treatment and control group specifications and time frames. Findings from this research have demonstrated a rapid increase in insurance coverage among young adults, and differential uptake by sociodemographic characteristics, with whites, men, nonstudents, unmarried individuals, and those from higher-income families benefitting most from the expansion.[75,76,77] Several studies found that the ACA-DCE improved young adult's perception of their physical and mental health.[78,79,80] The provision also resulted in increased

utilization of preventive health screenings, mental health visits, hospital visits, and the probability of having a primary care doctor.[81,82,78] One study found that uptake of parental coverage after the DCE may have crowded out self-coverage, and that young adults tend to use dependent coverage temporarily (from 1–2 years).[83] This research also found that healthier individuals were more likely to take up parental coverage.

Though SRH services are a primary reason for care seeking by young adults, the effects of the ACA-DCE on SRH service use have received less attention. A study of prenatal and birth outcomes found that ACA-DCE implementation was associated with a reduced probability of preterm birth, but no changes in caesarian delivery, low-birthweight, or admission to neonatal intensive care unit.[84] Another study found an increase in HPV vaccination and completion among women aged 19–25 relative to 18 and 26 year-olds after DCE implementation.[85] Findings on the impact of the DCE on pap testing demonstrate no change in utilization following policy implementation.[86,78] A recent analysis found an association between the DCE and earlier cervical cancer stage at diagnosis and use of fertility-sparing treatment by young adult women, though it was based on early data (2 years after the DCE).[87] The only study to examine the effect of the DCE on contraceptive and STI use found no effect of the expansion on SRH service utilization overall.[88] The effect of the national DCE on insurance use for SRH services has not yet been studied. Given the established

confidentiality issues associated with parental coverage, and cost-related barriers to care among young adults, it is important to understand if, and to what extent stagnant post-expansion SRH service use is a consequence of increased parental coverage uptake.

Provider Barriers

Due to their lower cost, effectiveness, and benefits outside of pregnancy prevention, hormonal contraceptives are the most commonly used contraceptive methods.[89] According to Centers for Disease Control (CDC) selected practice recommendations for contraceptive use, the contraceptive implant, injectable, and progestin-only pill can all be safely initiated without any tests or procedures, and blood pressure measurement is the only screening requirement for combined hormonal contraception.[90] Hormonal contraception is safer than many over-the-counter (OTC) medications including nonsteroidal pain pills and decongestants.[91]

With the exception of the intrauterine device and diaphragm, pelvic exams are not required before initiating hormonal contraception, and are an established provider-based barrier to contraceptive care.[42,92] Though there is no contraceptive-related medical need for pelvic exam, anywhere from 33% to 71% of providers regularly require or perform one prior to prescribing contraception or renewing a prescription, a practice commonly referred to as “holding birth control hostage”.[93,94] Most hormonal modalities require annual prescription renewals, clinicians therefore have the power to withhold contraceptive care until women

present for office visit where they perform a pelvic exam and/or pap test. In a 2010 survey, almost three-quarters of obstetrician-gynecologists (OBGYNs) endorsed the belief that increasing the interval between gynecological exams would negatively affect patient health and access to contraception.[95] Even if clinicians believe that linking pelvic examination with contraception is the best interest of the patient, the practice imposes an unnecessary burden on access to essential care.

Studies show that pelvic examination makes many women feel anxious, uncomfortable, or embarrassed, especially younger women and those with a diagnosis of depression, anxiety, post-traumatic stress disorder or a history of sexual assault.[96,97,98] The experience of pain and distress during pelvic examination can lead to healthcare avoidance, potentially deterring women from seeking out contraception or other essential services.[99] Consequently, pelvic exam requirements present an unnecessary barrier to care. Among women reporting difficulty getting a prescription for hormonal contraception, 13% endorsed clinician requirement for a clinic visit, pelvic exam, or pap test as a barrier to care.[100] Other barriers, including cost and logistic difficulties associated with the required office visit were also reported.

Studies of concurrent pelvic examination and hormonal contraceptive provision in the U.S. rely on survey data of providers and patients. Much of this literature focuses on the self-reported behaviors of OBGYNs, though a few national studies also examine practices and beliefs of other specialties and

clinicians. A study of OBGYNs, family medicine physicians, and advanced practice nurses conducted from 2008–2009 assessed provider and practice characteristics associated with concurrent pelvic examination. Primary care nurses were most likely to require an examination (45%), followed by family medicine physicians (33%), OBGYNs (29%), and reproductive health nurses (17%).[93] The authors also found that 44% of clinicians *usually* require the exam before contraceptive provision, and that providers working in private practice were more likely to require it. A separate survey conducted around the same time found that OBGYNs were more likely than other specialties/clinicians to conduct pelvic examinations as a requirement for hormonal contraception (71%), followed by family/general practitioners (68%), and internists (40%). OBGYNs were also most likely to report routine provision of pelvic exams for a range of reasons, including as part of a "well-woman exam" (98%), ovarian cancer screening (95%), gynecologic cancer screening (96%), and STI screening (92%).[101]

In 2010, approximately 80% of OBGYNs considered at least one component of the pelvic exam to be of some importance for assessing hormonal contraception eligibility.[95] The bimanual component of the exam was considered most important, followed by speculum examination and visual inspection, and those who considered no component of the exam to be important were younger and more likely to be female and working in a setting other than private practice.

Research with patients offers important insight into preferences and experiences with pelvic examination. A 2016 survey conducted at an academic

medical center outpatient clinic found that women most commonly described their experiences with pelvic examinations as respectful (48.4%) and reassuring (41.4%).[102] After reading the 2014 ACP guideline recommendation against annual pelvic exams, the percentage of respondents reporting that they would continue yearly examinations dropped 19 percentage points (from 53.8% to 34.9%), though 35% indicated that they would continue having an annual pelvic exam.[102] Additionally, most participants endorsed inaccurate beliefs that pelvic examinations are useful for ovarian cancer screening, necessary for STI screening, and required before hormonal contraception provision. Study participants were primarily white, married, and college educated. A similar study randomized patients presenting for care at a women's health clinic to read either the ACP guideline or the ACOG guideline, which at the time (2016), recommended annual pelvic examinations in asymptomatic women beginning at age 21. Women randomized to read the ACP guideline were significantly less likely to indicate that they would want a routine examination (39%), as compared to respondents randomized to read the ACOG guideline (82%), and no guideline (79%).[103] Almost all participants (94%) believed that the benefits and harms of the exam should be discussed beforehand. While these studies provide needed insights into patient beliefs and experiences, the fact that both surveys were conducted in the clinic setting raises the potential issue of selection bias. The preferences of those experiencing barriers that interfered with an in-person office are likely different from those who made it to their visit. Additionally, the focus of

these studies was on routine pelvic examination in asymptomatic women, as opposed to pelvic examination for contraceptive initiation. That said, this research demonstrates that many patients, when provided with information on the clinical effectiveness of the exam, would prefer not to have a routine examination.

A recent analysis of NSFG data estimated the prevalence of potentially unnecessary pelvic exams among women ages 15–20 (for whom pap tests and associated pelvic exams are not recommended). After excluding women who reported a pregnancy or STI treatment in the past year, as well as those who indicated the bimanual pelvic exam was provided for medical reasons, an estimated 1.4 million young women received a potentially unnecessary pelvic exam from 2011 to 2017. This was the first study to estimate the national prevalence of potentially unnecessary exams.[104]

Most clinical guidelines against requiring pelvic examinations to determine contraceptive eligibility were released in the early 2000's, and those against any routine examination in asymptomatic women were released in the 2010's. Discussed earlier, the most recent survey of provider beliefs and behaviors was conducted from 2010–2011 and found that 80% of OBGYNs believed the pelvic exam to be of some importance for assessing hormonal contraception eligibility. The most recent estimate of potentially unnecessary exam provision used pooled data from 2011–2017 and therefore does not provide insight on trends. Given the more recent guidelines against screening pelvic exams, is important to

understand if and to what extent rates are changing over time.

Conceptual Approach

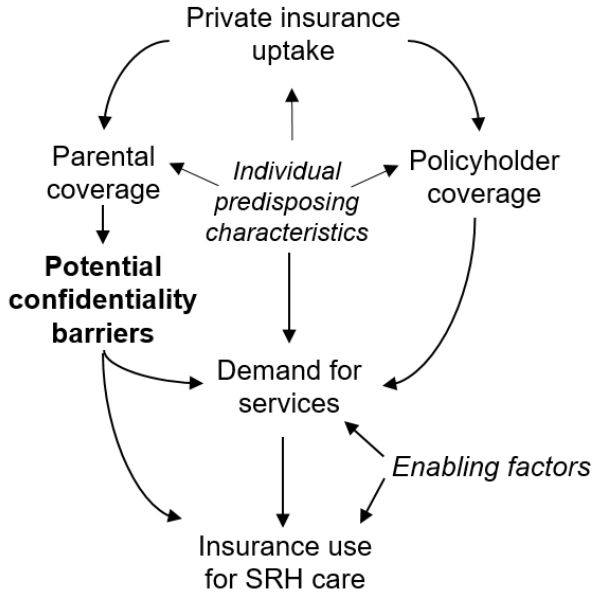
Chapters 2 and 3 leverage stigma theory coupled with the demand theory to understand the SRH care-seeking and service use behavior of women and young adults. Elements of the Andersen model of health care utilization will also provide insight into how individual enabling and predisposing factors influence both demand for care and insurance use for services.[105]

Following the Grossman model of demand for health care, uptake of parental coverage by young adults will reduce point-of-service costs, resulting in increased demand and subsequent use of SRH care.[106] Research on the price elasticity of demand for health care also suggests that direct barriers to care, such as provider scarcity, will decrease utilization due to the opportunity costs of seeking and receiving care.[107] The determinants of insurance use for confidential SRH services, however, are different than for other types of health care. The standard economic model is grounded in the assumption that insurance coverage necessarily facilitates service use, ignoring the possibility that privacy concerns may obstruct demand and/or insurance use for care. The effects of intangible barriers to care, including stigma, have also received less attention in the economic literature. Unlike most other medical services, stigma will influence insurance use for sexual and reproductive health care, especially for those covered as dependents who have limited (perceived or actual) privacy in their

use of health services.

Stigma operates at multiple levels- the individual (self-stigma), interpersonal (person-to-person discrimination), and structural (social conditions, cultural norms, and institutional practices that constrain opportunities, resources, and wellbeing).[108] These levels interact and are manifested differently across health conditions and social contexts.[109] Individual and interpersonal stigma around STI testing and abortion have received the most empirical attention, and research consistently demonstrates stigma as a barrier to service use. For example, perceptions of STI-related stigma are negatively associated with decisions to seek STI testing and treatment.[110,111] Research on abortion stigma highlights fear of social judgement, self-judgment, and a desire for secrecy, which was associated with psychological distress and social isolation among women who had abortions.[112]

Figure 1. *Conceptual framework: Insurance use for SRH care by young adults*



When human sexuality is viewed through a lens of morality, the provision and use of sexual and reproductive health services are sources of stigma with social, psychological, and health-related consequences[113]. Because the nature and magnitude of stigma varies across SRH services, these consequences disproportionately impact those who are most likely to need and use stigmatized services.

Chapter 4 focuses on the enabling (or disabling) role of clinicians in SRH care-seeking and service use. In order to understand practice variations in compulsory pelvic examinations for contraceptive prescription, I'll consider three potential motives: provider-induced demand, the uncertainty hypothesis, and the enthusiasm hypothesis. The most commonly studied economic model for understanding physician behavior emphasizes relationship between clinician incentives and patient use of health services. While the model means different things to different people, there is a general consensus that provider-induced demand (PID) is a consequence of information asymmetry; physicians have clinical knowledge and expertise that patients often rely on for clinical decisionmaking.[114] Physicians are consequently expected to act as an agent for the patient (the principal), guiding them to make the best possible treatment decisions. The practice of shifting patient demand to suit clinician interest is especially salient in situations where clinicians can benefit financially from providing certain services or treatments, though demand inducement does not

depend on physicans misleading their patients for financial gain, and the phenomenon is not limited to financial incentives.

The Labelle et al. conceptual framework for provider-induced demand moves beyond traditional models which focus almost exclusively on cost-containment and service use to include both the extent of clinician agency and the effect of service provision on patient health outcomes.[115] The Labelle framework conceptualizes the principal-agent and health outcome relationships

Figure 2. *Conceptual framework: Provider-induced demand*

Effectiveness of Agency: *Would the patient have demanded the service if they had the same information as the clinician?*	Effectiveness of service: *Did the service contribute positively to the patient's health status?*		
	Yes	**No**	
	Beneficial	Neutral	Detrimental
Yes	I	III	V
No	II	IV	VI

with two questions: 1) would the patient have demanded the service if they had the same information as the clinician, and 2) did the service contribute positively to the patient's health status? By asking about the 'effectiveness' of the principal-agent relationship, question one determines whether or not the provider (the agent) acts in the best interest of the patient (the principal). If the answers to these questions are yes and yes, the situation is not a case of provider-induced demand. The physician is providing a service that the patient would have chosen

themselves had they the same information as the physician, and the service is beneficial. Cells II, IV and VI represent those undesirable situations where a clinician provides a service that the patient would *not* have requested if they had the same information as the physician. At best, in cell II, the clinician overlooks patient desires to perform a service that the patient ultimately benefits from (though one could argue that ignoring patient desires is never beneficial). At worst, in cell VI, the patient is disregarded and harmed.

Because pelvic examination is never necessary for contraceptive provision, provision of the exam for this reason will almost always fall into cells III – VI. The primary question, then, is one of agency. Findings from two separate studies demonstrate that most patients would prefer not to have a routine pelvic exam once they are informed of clinical guidelines against routine screenings, though some would prefer to continue annual pelvic examination.[103,102] Additionally, most participants endorsed inaccurate beliefs that pelvic examinations are useful for ovarian cancer screening, necessary for STI screening, and required before hormonal contraception provision. These findings provide a very clear example of information asymmetry and highlight how the effectiveness of provider agency will differ across individuals and populations. The fact that many patients believe the exam has clinical value when it does not is probably a consequence of corresponding provider behaviors and beliefs, and demonstrates how perfect agency can exist without perfect information.

Ultimately, provider motives are less important than the effect of their behaviors on patient health and access to care. According to Labelle, the physician is not acting as a perfect agent if they recommend or provide a service without regard to the psychosocial or emotional effects of that service on the patient. In situations where a patient requests a screening pelvic exam during contraceptive encounter for a sense of reassurance, the service could be considered effective. Even in this seemingly desirable situation, issues around allocative efficiency and equitable distribution of health resources arise. In most situations, requiring a pelvic exam for contraception will fall into cells III, IV, V, and VI. Cell III if no harm comes from it, and cell VI if the pelvic exam causes discomfort or anxiety, results unnecessary costs or procedures, or if it otherwise obstructs access to care.

Two distinct, yet related theories provide additional insights into clinician motives. The "uncertainty hypothesis" explains practice variation as a consequence of professional disagreement around the appropriateness of certain services in specific clinical circumstances.[116] According to this theory, physicians may agree on procedures that are always or never appropriate for a certain indication, and differences in service use can be attributed to the grey area over which there is professional disagreement. Alternatively, the "enthusiasm hypothesis" attributes variation to physicians who are "enthusiastic" about the utility of certain health services in specific clinical circumstances. These providers

are confident in the appropriateness of a procedure because they "extrapolate the indications for their procedures by logical extension rather than by adherence to scientific data".[117] These explanations of physician behavior are highly service-specific, and may be more common among procedures for which no referral is needed.

Leveraging these conceptual approaches, the subsequent research addresses three primary barriers to SRH care among commercially insured young adults and people with the capacity for pregnancy: confidentiality, cost, and provider-induced. Chapter 2 investigates differences in insurance use behavior for confidential SRH care by young adult males and females aged 19 – 25 with parental versus policyholder coverage, and chapter 3 evaluates the impact of the national dependent coverage expansion on insurance use for SRH care among 23–25 year-old females. Chapter 4 examines the prevalence of non-indicated pelvic examinations performed during contraceptive visits, along with temporal, patient age, and provider specialty variations. Together, these studies will provide insights into the nature and extent of SRH barriers within U.S. health care financing and service delivery institutions.

CHAPTER 2: PARENTAL COVERAGE AND INSURANCE USE FOR SEXUAL AND REPRODUCTIVE HEALTH SERVICES

Abstract

Given the documented negative relationship between parental involvement and SRH service use by younger adolescents, there is a need to understand the insurance use behavior for SRH care by young adults, who, after implementation of the Affordable Care Act dependent coverage expansion (ACA-DCE) are increasingly covered under parental insurance. Using a retrospective, cross-sectional design and commercial insurance claims from 2012 – 2016, this study examines the relationship between parental coverage status and insurance use for STI testing, contraception, and pap testing among females, and for STI testing and PrEP among males. Differences in insurance use for SRH services by 19–25 year-olds with parental coverage versus those with policyholder coverage are assessed with multivariate logistic regression. Using data from the 2015 – 2017 National Survey of Family Growth, a secondary aim is to assess differences in sociodemographic characteristics and sexual behaviors between 19–25 year-olds with parental versus policyholder coverage. Findings show that young adult females with parental coverage are significantly less likely to use insurance to pay for STI testing, pap testing, and LARCs. Males with parental coverage are less likely to use parental coverage for STI testing and PrEP, though differences in PrEP use are likely due to systematic differences in sexual

behaviors between young adult males with and without policyholder coverage.

Background

Sexual and reproductive health (SRH) services are a primary reason for care seeking by young adults, and those in their early 20's use these services more than any other age group.[118] Despite using more preventative SRH services, this population is more likely to experience adverse SRH outcomes than their older counterparts. Women aged 20–24 have the highest rate of chlamydia, gonorrhea and syphilis cases among women of any age, and in 2011, over half of pregnancies in this age group were unintended.[12,119] Men aged 20–24 have the highest rate of gonorrhea diagnoses among all sexes and age groups, the highest chlamydia rates among men, and young adult men who have sex with men (MSM) account for over 70% of new HIV diagnosis.[12,13] Young adults are more likely to experience cost-related barriers to care, potentially exacerbating existing disparities and indicating a need to address access to essential SRH services for this population.

This is particularly important given the implications of insurer practices on dependent confidentiality, which may obstruct access to SRH care. Specifically, the practice of sending explanation of benefits forms (EOBs) to a policyholder whenever care is provided under his or her plan indirectly violates dependent confidentiality, as these forms detail services provided, to whom, and where they were provided.[53] Research on confidentiality in SRH service use consistently demonstrates a negative relationship between parental knowledge or

involvement and adolescent SRH service use, though the extent of this effect varies across geographic locations, subgroups, and services.[19,44,120,121] Approximately 40% of sexually active women aged 20–25 indicated confidentiality concerns as the reason for not seeking STI testing, and 70% of adolescents with parents who are not already aware of their contraceptive use would stop using prescription contraception if parental notification of use were mandated.[19,44] While young adults likely alter their service use behavior to protect confidentiality, less attention has been paid to the role of privacy concerns in SRH care decision-making in this age group.

Confidentiality concerns as a barrier to SRH care became especially salient after implementation of the Affordable Care Act national dependent coverage provision (ACA-DCE) in 2010. Since the expansion, approximately 5.5 million young adults have gained insurance coverage through a parent's health plan.[122] Given this increase, it is important to identify if, and to what extent, young adults with parental coverage are using their insurance to pay for confidential services, as barriers to service use could exacerbate the poor SRH outcomes among young people. Thus, the purpose of this study is to examine associations between parental coverage and insurance use behaviors for confidential SRH services, and to identify how these associations vary with age. A secondary aim is to describe sociodemographic characteristics and sexual behaviors of young adults with private parental versus policyholder coverage using nationally

representative survey data.

Methods

Data Sources

The primary data source was the 2012–2016 Truven Health Analytics MarketScan® Commercial Claims and Encounters database. This individual-level national database consists of employer-sponsored insurance claims and captures over 60 million unique patients in the U.S. It includes inpatient, outpatient, and pharmacy claims for over 100 insurers and self-insured companies located in all 10 U.S. census regions. These data are fully de-identified, and include information on age, gender, health plan type, relationship to the primary beneficiary (self, parental, or spousal), state of residence, and 3-digit zip code.

Because claims data do not include information on important patient sociodemographic characteristics or sexual behaviors that may confound the treatment effect, descriptive analyses are also conducted to identify potential differences between young adults with private parental and self-coverage using data from the 2015–2017 National Survey of Family Growth (NSFG).[123] The NSFG collects information on health outcomes, sociodemographic characteristics, and sexual behaviors of a national probability sample of non-institutionalized men and women aged 15–49 years. The household survey is conducted in-person and through Audio Computer Assisted Self-Interviewing,

which is used for more sensitive questions to ensure respondent privacy. NSFG over-samples Black and Hispanic/Latino women to produce reliable estimates for these groups, and sampling weights were used to obtain nationally representative estimates. While these data are not used in the primary analyses, they provide insight into characteristics of young adults with parental versus policyholder coverage that could potentially influence need and subsequent insurance use for SRH services.

Study Sample

For the primary analysis, young adults aged 19–25 were separated into four study populations: (1) women insured as dependent on a parent's plan, (2) women insured as the policyholder, (3) men insured as dependent on a parent's plan, and (4) men insured as the policyholder. The study period, 2012 – 2016, was selected because the focus of this analysis is insurance use for SRH services post-DCE and contraceptive mandate which were implemented in 2010 and 2012, respectively. Enrollees with spousal or other coverage were excluded. Though the DCE expanded coverage to young adults up to age 26, 26-year-olds were excluded because their eligibility for parental coverage is contingent on enrollee birthday and the start date of their parent's insurance, and consequently ambiguous. Because pregnant women are more likely to be connected with obstetric and gynecologic care, receive routine HIV testing, and do not use contraception, services used in the nine months before delivery were excluded

from the analysis. Delivery was defined by ICD-9 or ICD-10 codes as identified by the National Center for Quality Assurance's (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS) prenatal quality measures.[124]

As with the primary analysis, the analysis of sociodemographic characteristics and sexual behaviors included young adults aged 19–25 who indicated they were covered by a private health insurance plan. Among those with private coverage, parental insurance status was assessed with the question: "Are you covered on your parents' private health insurance plan?". Because the NSFG does not distinguish between private policyholder or spousal coverage, it was not possible to exclude young adults with the latter.

Outcome Variables

Pap testing was identified with International Classification of Disease ninth and tenth revision codes (ICD-9, ICD-10), and Current Procedural Terminology (CPT) codes, as defined by Healthcare Effectiveness Data and Information Set (HEDIS) quality measures of cervical cancer screening.[125] As per national guidelines, only women aged 21–25 were included in the analysis of pap test use.

Consistent with the Centers for Disease Control and Prevention (CDC) 2017 surveillance report, STI testing and was defined based on the most commonly diagnosed STI's among young adults.[126] I used ICD, CPT, and Healthcare Common Procedure Coding System (HCPS) codes to identify testing for chlamydia, gonorrhea, syphilis, herpes, trichomoniasis, and/or HIV among

women and men. STI diagnoses and HPV screenings were not included. Codes used to define STI testing are based on previously published literature.[127,128] For the analyses of STI testing, service use by men and women are examined separately, to provide insight into the differential relationships between coverage status and insurance use for services experienced by men and women.

Contraceptive use was defined as any clinical encounter contraceptive initiation or management. Modalities included the oral contraceptive, vaginal ring, transdermal patch, injectable, counseling on natural family planning, emergency contraception, subdermal implant and intrauterine device. Because sterilization is extremely rare among young women, this method of contraception was not included in any of the analyses. Additionally, CPT, HCPS, and National Drug Codes (NDC) were used to capture contraceptive provision that was billed without an associated diagnostic code.

As no official billing codes exist for Pre-exposure prophylaxis (PrEP), use was defined based on the combination of drugs prescribed for PrEP, tenofovir disoproxil fumarate and emtricitabine (TDF-FTC), and identified via NDC codes. Because TDF-FTC is also prescribed to treat HIV and Hepatitis B, men with either of these diagnoses identified by corresponding ICD codes in inpatient or outpatient claims, were excluded from the analyses of PrEP outcomes (n=1,431). PrEP is most commonly used by gay and other men who have sex with men to prevent HIV infection, and therefore only men were included in the analysis of PrEP outcomes. Similar methods have been used to identify PrEP in other

research.[129]

Emergency department visits were included as a placebo outcome for men and women, as they should not be sensitive to confidentiality concerns. Consistent with other research, identification of ED visits is based on CPT codes indicating a claim for services provided in a hospital emergency department.[130] Codes used to identify the outcomes of interest are listed in Appendix A, tables 1–6.

Other Variables

Individual-level covariates included enrollee age, plan type (preferred provider organization (preferred provider organization [PPO], health maintenance organization [HMO], point-of-service [POS], exclusive provider organization [EPO], consumer-driven health plan [CDHP] or high deductible health plan [HDHP]), and whether or not enrollees were covered by a high-deductible plan (categorized as high if ≥ $1,000, low if < $1,000). Geographic covariates included state and residence in a micro- or metropolitan statistical area, and year of service use was included to account for secular trends. To measure health status, which may influence type of coverage, likelihood of having a regular provider, or demand for SRH care, the Elixhauser comorbidity software was used to identify comorbid conditions based on diagnoses listed on claims filed for men and women in the sample.[131]

Primary statistical analyses

Sample characteristics are presented for enrollees with parental and

policyholder coverage from the claims data. These individual-level characteristics include age, residence in a micro- or metropolitan statistical area, census division as defined by the U.S. Census Bureau, plan type, whether or not the enrollee had a deductible greater than $1,000, number of comorbidities, and the three most common comorbidities in the study cohort.[132] For the purpose of description, time-variant characteristics, including age and region, were defined at initial enrollment in the study period.

Use of each service was dichotomized (yes/no) to indicate any use during the calendar year. Service use was treated as a binary outcome rather than a count for two reasons. First, each of these services are provided over different time intervals. For example, pap testing is recommended once every three years, while PrEP and the oral contraceptive are daily medications that will be filled several times in a year, and the IUD can last anywhere from 3–12 years. By dichotomizing the outcomes of interest, probability of service use is more standardized across services. Also, the phenomenon of interest is the sensitivity of insurance use for confidential services by young adults with parental coverage, which can be captured and presented most clearly by use or non-use.

Multivariate logistic regression was used to estimate the probability of SRH service use for the outcomes of interest by young adult women and men. Adjusted models accounted for age, plan type, high vs. low annual deductible, state, residence in a micro vs. metropolitan statistical area, comorbidity category,

and year. Standard errors were clustered at the state-level and statistical significance was set at $\alpha = 0.05$.

Supplementary analysis

To provide additional context on potential differences between the treatment and comparison groups that are not included in claims data, I also present information on sociodemographic characteristics and sexual behaviors between young adult women and men with parental versus policyholder coverage from the National Survey of Family Growth. Bivariate analyses were used to identify differences in sociodemographic characteristics, service use, and sexual behaviors by parental coverage status. Chi-square or Fisher's exact tests were used to identify differences between categorical variables, and two-tailed t-tests were used for continuous variables.

Results

Supplementary analysis of sociodemographic characteristics & sexual behaviors

Sociodemographic characteristics and sexual behaviors of young adult women and men with private insurance coverage from the NSFG are presented in tables 1 and 2. Among women ages 19–25, those with private policyholder coverage were older, more likely to be Hispanic/Latino, and work full-time. Those with policyholder coverage were also more likely to be married and have a higher annual income. A higher proportion of women with parental coverage were students, reported more education, and used the pill as their primary

contraceptive method. There were no significant differences in sexual behaviors between women with parental and policyholder coverage.

Table 1. Sociodemographic characteristics and sexual behaviors of privately insured females by parental coverage status, 2015–2017

	Total (n=556)	Parental (n = 392)	Policyholder (n=164)	P-value
Age, *mean ± SD*	21.9 ± 2.0	21.9 ± 1.9	23.2 ± 1.7	< 0.001
Race/ethnicity, %				
Non-Hispanic white	68.9%	68.9%	64.9%	
Hispanic	11.8%	11.8%	22.6%	
Non-Hispanic Black	14.1%	14.1%	8.3%	0.0345
Non-Hispanic Asian or other	5.2%	5.2%	4.2%	
Sexual orientation, %				
Heterosexual or straight	88.4%	88.4%	76.3%	
Homosexual, gay, or lesbian	3.7%	3.7%	3.1%	0.1276
Bisexual	7.8%	7.8%	20.6%	
Employment status, %				
Full time	24.9%	24.9%	70.9%	
Part time	41.6%	41.6%	11.8%	
Other	33.4%	33.4%	17.3%	< 0.001
Income, %				
< $10,000	35.2%	35.2%	15.5%	
$10,000 – $19,000	26.2%	26.2%	24.5%	0.0173
$20,000 – $59,000	35.5%	35.5%	53.4%	
>= $60,000	3.1%	3.1%	6.5%	
Current Student, %				
Yes	56.3%	56.3%	25.8%	
No	43.7%	43.7%	74.2%	< 0.001
Education, %				
Less than high school	1.6%	1.6%	6.8%	
High school	8.0%	8.0%	17.3%	0.0167
Some college	48.0%	48.0%	42.9%	
College	42.4%	42.4%	33.0%	
Relationship status, %				
Married	7.4%	7.4%	26.3%	
Cohabiting	15.3%	15.3%	20.0%	< 0.001
Formerly married	0.1%	0.1%	1.4%	
Never married	77.2%	77.2%	52.2%	

(continued)

Table 1. (Continued)

	Total (n=556)	Parental (n = 392)	Policyholder (n=164)	P-value
Ever had sex with a man, %				
Yes	69.6	69.6	75.0	0.5771
No	30.4	30.4	25.0	
Ever had sex with a woman, %				
Yes	7.0	7.0	4.5	0.3214
No	93.0	93.0	95.2	
Age at sexual debut, mean ± SD	17.3 ± 2.9	17.3 ± 2.3	17.3 ± 2.7	0.921
Number of male sex partners in the past 12 months, %				
0	5.8	5.8	6.9	
1	48.7	48.7	60.1	0.1968
2	16.7	16.7	16.1	
3	5.0	5.0	3.5	
4+	23.8	23.8	13.5	
Current contraceptive method, %				
None	22.2	22.2	30.8	
Birth control pills	42.3	42.3	22.8	
Condom	13.5	13.5	19.9	
Withdrawal	10.5	10.5	8.6	0.0101
Injectable	1.7	1.7	2.4	
Implant	3.1	3.1	1.9	
IUD	5.3	5.3	7.5	
Vaginal Ring	0.6	0.6	3.3	
Other	0.9	0.9	2.8	
Used contraception at last sex, %				
Yes	85.1	85.1	78.9	0.2996
No	14.9	14.9	20.6	
Chlamydia test, past 12 months, %				
Yes	30.6	30.6	41.2	0.0896
No	69.4	69.4	58.8	

Abbreviations: SD, standard deviation; STI, sexually transmitted infection
Source: National Survey of Family Growth

As with women, men who had policyholder coverage were older, more likely to be employed full time, have a higher income, and be married or cohabitating. A higher proportion of men with policyholder coverage were gay and non-Hispanic Black. Men with parental coverage were more likely to be white, in school, and have at least some college education. Aside from more policyholders reporting sex with men, there were no notable differences in condom use, STI testing, or number of sexual partners between men with parental versus policyholder coverage.

Table 2. Sociodemographic characteristics and sexual behaviors of privately insured males by parental coverage status, 2015–2017

	Total	Parental (n=387)	Policyholder (n=160)	P-value
Age, mean ± SD	22.1 ± 1.9	21.6 ± 1.9	23.3 ± 1.7	< 0.001
Race/ethnicity, %				
Non-Hispanic white	67.9	73.7	53.0	
Hispanic	12.1	12.1	12.3	
Non-Hispanic Black	14.6	11.2	23.4	0.001
Non-Hispanic Asian or other	5.3	3.0	11.3	
Sexual orientation, %				
Heterosexual or straight	92.0	95.5	84.4	
Homosexual or gay	4.6	1.6	11.1	0.0247
Bisexual	3.4	2.9	4.5	
Employment status, %				
Full time	55.4	44.2	82.7	
Part time	23.6	30.5	7.0	< 0.001
Other	20.9	25.3	10.3	
Income, %				
< $10,000	26.8	35.3	4.4	
$10,000 – $19,000	22.0	25.9	11.6	< 0.001
$20,000 – $59,000	40.9	33.4	60.5	
>= $60,000	10.4	5.3	23.5	
Current Student, %				
Yes	48.7	60.1	18.9	< 0.001
No	51.1	39.6	81.1	
Educational attainment, %				
Less than high school	4.2	1.3	11.7	
High school	16.0	13.7	22.2	< 0.001
Some college	48.1	53.4	34.1	
College	31.7	31.7	32.1	
Relationship status, %				
Married	8.9	4.9	19.2	
Cohabiting	6.1	3.8	12.1	< 0.001
Formerly married	0.3	0.1	0.9	
Never married	84.7	91.2	67.8	

(continued)

Table 2. (Continued)

	Total	Parental (n=387)	Policyholder (n=160)	P-value
Ever had sex with a woman, %				
Yes	74.4	73.9	78.3	0.67
No	25.6	26.1	21.7	
Ever had sex with a man, %				
Yes	5.0	2.6	11.5	0.01
No	95.0	97.4	88.5	
Age at sexual debut, *mean ± SD*	18.8 ± 12.9	17.5 ± 8.3	21.5 ± 18.8	0.352
Number of female sex partners in the past 12 months, %				
0	7.0	5.8	9.6	0.905
1	52.1	51.7	53.0	
2	19.3	19.5	19.0	
3	12.9	14.1	10.5	
4+	8.6	9.0	7.9	
Condom use at last sex, %				
Yes	56.2	58.3	51.4	0.206
No	42.6	41.7	44.5	
STI test, past 12 months, %				
Yes	17.3	16.2	20.2	0.47
No	82.7	83.8	79.8	

Abbreviations: SD, standard deviation; STI, sexually transmitted infection
Source: National Survey of Family Growth

Study population

For the primary analysis, the final sample included a total of 8,045,721 young adults; 4,257,506 women and 3,788,215 men (Table 3), corresponding to 7,980,150 person-years and 6,229,739 person-years, respectively. At baseline, 70% of the entire sample had insurance coverage through a parent and 30% had policyholder coverage. Approximately 53% of enrollees with parental coverage were women. Both men and women with parental coverage were more likely to live in the Mid-Atlantic than their counterparts with policyholder coverage, and a

higher proportion of women with policyholder coverage lived in the South Atlantic and West South Central regions. Men with parental coverage were more likely than men with policyholder coverage to have at least one comorbidity and a higher proportion of men and women with parental coverage had a diagnosis of depression (4.9% vs. 2.8% among men with policyholder coverage, and 8.2% vs. 6.9% among women). Women and men with policyholders were less likely to be enrolled in an HMO and more likely to have a PPO than their counterparts with parental coverage. Finally, while the majority of enrollees had an annual deductible lower than $1,000, men with policyholder coverage were slightly more likely to have a high deductible (40.6% versus 36.7% with parental coverage).

Table 3. Characteristics of study sample by sex and coverage type, 2012–2016

	Total (n=8,045,721)		Parental (n=5,569,318)		Policyholder (n=2,476,403)	
Cohort *(no.)*[a]	Men (n=3,788,215)	Women (n=4,257,506)	Men (n=2,591,733)	Women (n=2,977,585)	Men (n=1,196,482)	Women (n=1,279,921)
Age, *mean ± SD*	21.4 ± 2.0	21.3 ± 2.0	20.7 ± 1.7	20.7 ± 1.7	23.2 ± 1.7	23.3 ± 1.6
Residence in MSA , %						
Non-MSA	14.2	13.3	13.7	13.7	15.6	12.1
MSA	85.8	86.7	86.4	86.3	84.5	87.9
Census division, %						
New England	2.9	2.9	3.0	3.0	2.4	2.3
Middle Atlantic	15.5	15.5	16.1	16.1	13.6	13.5
East North Central	18.1	17.6	18.4	18.3	17.2	15.4
West North Central	4.9	4.8	4.6	4.6	5.4	5.2
South Atlantic	18.6	19.3	18.4	18.6	19.0	21.6
East South Central	6.1	6.2	6.0	6.0	6.4	6.8
West South Central	13.1	12.9	12.1	12.2	15.7	15.3
Mountain	6.4	6.3	6.3	6.1	6.7	6.7
Pacific	14.6	14.6	15.0	15.0	13.6	13.2
Total comorbidities [b], %						
0	84.6	78.0	83.8	78.2	86.7	78.0
1	11.6	16.3	12.0	16.3	10.4	16.3
2	2.8	4.1	3.0	4.0	2.2	4.1
≥3	1.1	1.6	1.2	1.4	0.7	1.7
Conditions, %						
Depression	4.3	7.7	4.9	8.1	2.8	6.7
Obesity	1.2	2.7	1.1	2.4	1.5	3.6
Substance use disorder [c]	2.4	1.4	2.8	1.6	1.3	0.7

continued

Table 3. (Continued)

	Total		Parental		Policyholder	
	Men	Women	Men	Women	Men	Women
Annual deductible, %						
High (≥ $1,000)	37.7	21.4	36.7	21.1	40.6	22.4
Low (< $1,000)	62.3	78.6	63.3	78.9	59.4	77.6
Plan Type, %						
PPO	63.5	62.9	62.3	62.4	67.0	64.3
Comprehensive	1.8	1.6	1.7	1.8	1.8	1.8
EPO	1.7	1.7	1.8	1.7	1.5	1.7
HMO	11.9	11.8	12.4	12.3	7.6	12.3
POS	7.1	7.3	7.2	7.2	6.6	7.2
CDHP/HDHP	14.8	14.7	14.6	14.6	15.5	14.6

Abbreviations: MSA, metropolitan statistical area; PPO, preferred provider organization; EPO, exclusive provider organization; HMO, health maintenance organization; POS, point of service; CDHP, consumer-directed health plan; HDHP, high-deductible health plan

Notes:

[a] *All sample characteristics are based on an individual's first year of enrollment*

[b] *The Elixhauser Comorbidity classification system measures 30 comorbidity groups. Enrollees were classified into four categories based on the total number of comorbidities experienced.*

[c] *Substance use disorder was defined as either drug or alcohol use disorder*

Service use by young adults with parental coverage

Crude and adjusted odds of service use for each outcome along with rates per 100 person-years are presented in Table 4. For all women, contraceptive use was most common (44 per 100 person-years), followed closely by pap testing among those aged 21–25 (43%), and STI testing (32%). In adjusted models, women with parental coverage were significantly less likely to use their insurance for STI testing (aOR 0.87; 95% CI: 0.86 to 0.91) and pap testing (aOR 0.77; 95% CI: 0.74 to 0.8), as compared to those with policyholder coverage. The association between parental coverage and contraceptive use was also significant, though the magnitude of the relationship was small (aOR 0.96; 95% CI: 0.92 to 0.99). There was no significant difference in OCP use between women with parental and policyholder coverage (aOR 1.01; 95% CI: 0.97 to 1.05), but women with parental coverage were notably less likely to use a LARC (aOR 0.80; 95% CI: 0.79 to 0.83) than policyholders. Finally, women with parental coverage had a slightly lower odds of having an Emergency Department visit than women with policyholder coverage (aOR 0.94; 95% CI: 0.92 to 0.97)

Table 4. Rate per 100 person years, crude and adjusted odds of insurance use for SRH services by women and men aged 19 – 25 with parental versus policyholder coverage[a] (2012 – 2016)

	Rate	*OR*	*95% CI*	*p*	*aOR*	*95% CI*	*p*
STI test	31.99	0.82	(0.78 to 0.86)	< 0.001	0.87	(0.86 to 0.91)	< 0.001
Contraception	44.26	0.90	(0.87 to 0.93)	< 0.001	0.96	(0.92 to 0.99)	0.050
Pill	33.68	0.96	(0.93 to 0.99)	0.033	1.01	(0.97 to 1.05)	0.749
LARCs	6.02	0.75	(0.73 to 0.78)	< 0.001	0.82	(0.79 to 0.84)	< 0.001
Pap test [b]	43.32	0.67	(0.64 to 0.71)	< 0.001	0.77	(0.74 to 0.8)	< 0.001
ED visit	18.56	0.99	(0.95 to 1.03)	0.545	0.94	(0.92 to 0.97)	< 0.001
	Men (n=5,102,036 person-years)						
		OR	*95% CI*	*p*	*aOR*	*95% CI*	*p*
STI test	23.93	0.88	(0.84 to 0.93)	< 0.001	0.81	(0.76 to 0.86)	< 0.001
PrEP	0.01	0.61	(0.51 to 0.72)	< 0.001	0.63	(0.52 to 0.76)	< 0.001
ED visit	16.61	1.05	(1.0 to 1.08)	0.033	0.93	(0.9 to 0.96)	< 0.001

[a] *Analyses were limited to enrollees with at least 12 months of continuous enrollment. This analysis included 7,829,178 enrollees. All outcomes were measured annually. Explanatory variables included age, plan type, comorbidity category, high vs. low deductible, state, and residence in a micro- or metropolitan statistical area.*

[b] *The analysis of pap test use was limited to women aged 21 – 25*

Men with parental coverage were less likely than those with policyholder coverage to have an STI test (aOR 0.81; 95% CI: 0.76 to 0.86) and substantially less likely to use PrEP (aOR 0.63; 95% CI: 0.52 to 0.76). As with women, odds of ED use was also slightly lower for men with parental coverage (aOR: 0.93; 95% CI: 0.9 to 0.96).

Discussion and Conclusions

Young adults aged 19 to 25 with parental coverage were less likely than their counterparts with policyholder coverage to use insurance to pay for SRH services, with the exception of oral contraceptive use among women. As compared to policyholders, women with parental coverage had the lowest odds

of pap testing, followed by LARC use and STI testing. Men with parental coverage had lower odds STI testing, and men and women with parental coverage had similar odds. Additionally, both men and women with parental coverage were less likely to have an ED visit, though the magnitude of this effect was much smaller.

Interestingly, pap test use was more sensitive to parental coverage status than STI testing or contraceptive use. Because pap testing is a cancer screening recommended for all women aged 21 – 25 regardless of sexual initiation, it is not typically considered confidential. Use of this service may have less to do with women seeking out the exam and more to do with provider-initiated provision. Pap testing is also a quality measure on which health care organizations are evaluated, and is often provided alongside contraceptive provision and STI testing (though it is not medically necessary to couple cervical cancer screening with other SRH services). This issue of provider-induced demand for gynecological screening will be explored in chapter 3. If women with parental coverage are less likely to seek out contraception or STI testing, they may be less likely to receive a pap test as well. They may also be paying out-of-pocket for the services that happen during their SHR visit, including the pap test. Finally, if women with parental coverage have lower levels of HPV awareness or certain personal beliefs, both of which have been identified as barriers to pap testing, this may contribute to the observed disparities.[8, 10] However there is no evidence

to suggest differential awareness or personal beliefs between individuals with parental and policyholder coverage.

The descriptive analysis of NSFG data demonstrates no notable differences in sexual behaviors between young adult women with parental vs. policyholder coverage. Men with policyholder coverage, however, were over four times as likely to report being gay, bisexual, or ever having sex with a man than those with parental coverage. A study on patterns of disclosure among sexual minority adolescents aged 14–21 found that one-third of youth experience parental acceptance, one-third parental rejection, and one-third do not disclose their sexuality to their parents by their early 20's.[133] Whatever the reason for systematic differences in sexual behaviors between men with parental versus policyholder coverage, it is not appropriate to draw any conclusions about the relationship between parental coverage status and insurance use for PrEP, as these groups are not comparable in regards to their sexual health service needs. Instead, the observed differences in PrEP use among men with parental versus policyholder coverage is likely due to differences in perceived HIV risk. Ultimately, this supplementary analysis provides important information on potential confounders that should be considered when analyzing the relationship between parental coverage and insurance use for SRH services.

The finding from the primary analysis that there was no difference in the odds of insurance use for oral contraceptives between women with and without

parental coverage is inconsistent with the NSFG analysis, which demonstrates that women with parental coverage are almost twice as likely to use the OCP as their primary method. Higher use of this modality among women with parental coverage suggests that confidentiality concerns may not be a barrier to oral contraceptive use. Alternatively, this finding may be a consequence of the fact that, unlike other methods, the OCP is sometimes used for reasons other than pregnancy prevention. Approximately 14% of OCP users rely on the method for noncontraceptive reasons, most commonly to treat menstrual-related and other medical conditions, including dysmenorrhea, premenstrual syndrome, premenstrual dysphoric disorder, menorrhagia, menstrual regulation, acne, and endometriosis.[134] Additionally, among OCP users who have never had sex, 95% use the method for noncontraceptive reasons only.[135] Finally, the fact that young women with parental coverage were notably less likely to use a LARC (which, given their cost and invasiveness, are rarely used for noncontraceptive reasons), supports the possibility that higher OCP use by women with parental coverage is at least in part related to noncontraceptive use.

This study has several limitations. Results provide evidence only of associations between parental coverage and insurance use for SRH care. In addition, selection into plan type by certain subgroups means that those with parental and policyholder coverage may be systematically different; for example, students are more likely to be insured on a parent's plan and less likely to be

employed full time. Claims data do not capture many important sociodemographic and behavioral characteristics, and heterogeneity between young adults with and without private parental coverage could lead to biased estimates if differences between the groups are associated with sexual behavior and subsequent need and use of SRH care. Findings from the descriptive analysis of NSFG data, however, indicate no major differences in sexual behavior between young adult women with and without parental coverage. The fact that men with parental coverage were much less likely to have reported sex with a man suggests that differences in PrEP use may be due to a differential need between the two groups. Additionally, while analyses of the NSFG provides important and nationally-representative context for understanding potential differences between the groups of interest, findings from this analysis do not necessarily represent characteristics of the study sample. These data are also subject to the inaccuracies of self-reported behaviors.

In conclusion, this analysis provides evidence of a negative relationship between parental coverage and insurance use for confidential SRH services, and demonstrates that young adult women and men are less likely to use parental insurance to pay for these essential services. Future research should examine whether or not sociodemographic characteristics or sexual behaviors influence privacy concerns and subsequent insurance use for confidential services. Additionally, the extent to which individuals with spousal coverage are sensitive

to confidentiality concerns has not yet been studied. These findings have implications for insurance reform. The ACA-DCE successfully improved coverage for a traditionally underinsured demographic. Along with the rapid increase in parental coverage among young adults, research has demonstrated increased utilization of preventative health screenings, mental health visits, and likelihood of having a primary care doctor.[81,82,78] With the substantial uptake in parental coverage, however, the implications of this type of coverage on young adult access to confidential services requires additional attention. The following chapter will expand on this research using quasi-experimental methods to identify the role of the ACA-DCE on insurance use for confidential SRH care.

CHAPTER 3: THE NATIONAL DEPENDENT COVERAGE EXPANSION AND INSURANCE USE FOR SEXUAL AND REPRODUCTIVE HEALTH SERVICES

Abstract

Sexual and reproductive health (SRH) services are a primary reason for care seeking by young adult women, but the impact of the Affordable Care Act dependent coverage expansion on insurance use for these services has not yet been studied. This is important given the implications of insurer billing practices on dependent confidentiality, which may prevent dependents from using parental insurance to pay for care. A difference-in-differences analysis of a national sample of commercial claims from 2007 to 2009 and 2011 to 2016 captured insurance use before and after policy implementation by women aged 23 to 25 relative to changes among women aged 27–29. Linear probability models adjusted for age, plan type, annual deductible, comorbidities, state and year fixed effects, with standard errors clustered at the state level. Implementation of the expansion was associated with a 1.8 (95% CI: -2.3 to -1.2) percentage point reduction in use of STI testing by women aged 23–25, a 2.8 percentage point (95% CI: -3.3 to -2.2) relative reduction in contraceptive use, and a 3.4 percentage point reduction in pap testing (95% CI: -3.3 to -2.2). We also found a 0.4 percentage point (95% CI: -1.9 to -0.9) increase in emergency department visits, which should not be sensitive to treatment status. The national dependent coverage expansion appears to have reduced insurance use for services among

women newly eligible for parental coverage.

Background

Implemented in September 2010, the Affordable Care Act dependent coverage expansion (ACA-DCE) requires employers to allow the children of policyholders to stay on their parents' health plan until age 26. Approximately 5.5 million young adults have gained parental insurance coverage under the provision.[122] Since implementation, the impact of the ACA-DCE on access, utilization, and outcomes have been studied extensively. Though sexual and reproductive health services are the primary reason for care seeking by young adult women, the extent to which this population is using their newly-gained insurance to pay for SRH services is unknown.[118]

Understanding the impact of the ACA-DCE on insurance use for SRH care is particularly important given the implications of insurer billing practices on dependent confidentiality. Explanation of benefits forms (EOBs) sent to policyholders whenever care is provided under his or her plan indirectly violate dependent confidentiality, as these forms detail services provided, to whom, and where they were provided.[53] National studies have demonstrated that 40% of sexually active young adult women indicated confidentiality concerns as the reason for not seeking STI testing, and 70% of adolescents with parents who are not already aware of their contraceptive use would stop using prescription contraception if parental notification of use were mandated.[19,44] Less attention has been paid to the role of privacy concerns in SRH care decision-making

beyond age 18, and the specific role of the ACA-DCE on insurance use behavior of young adults.

Young adult women have higher rates of unintended pregnancy and sexually transmitted infection than their older counterparts, and are more likely to experience cost-related barriers to care.[136,119] Privacy concerns may lead women with parental coverage to delay, forgo, or pay out-of-pocket for services, perpetuating existing disparities.[137] Thus, the objective of this study was to evaluate the impact of the national dependent coverage expansion with commercial insurance use for contraception and STI testing by young adult women newly eligible for parental coverage under the provision.

Methods

Study Sample

The study sample consisted of young adult women enrolled in commercial insurance from 2007 to 2016. The treatment group included women ages 23–25, and the comparison group included women ages 27–29 who were ineligible for parental coverage under the expansion. Because treatment status is contingent on enrollee birthday and start date of a parent's insurance (and consequently ambiguous), 26-year-olds were excluded (n=2,153,425). Use of narrow age ranges for the treatment and control groups addresses some of the methodological issues with prior literature on the DCE, which fails to take into account dynamics in the age-structure of the health insurance and labor

markets.[138]

The nature of the data source did not allow for the identification of insurance coverage transitions, and treatment status was therefore defined by age and subsequent eligibility for coverage under the provision as opposed to coverage type. Women with spousal coverage (n=3,033,773), as well as the few in the comparison group with parental coverage (n=3,718) were excluded, which allowed for more accurate identification the target population of the ACA-DCE and precise estimation of its association with aggregate SRH service use.

Consistent with prior literature, women living in Massachusetts (n=402,573) and Hawaii (n=2,106) were excluded from the analysis; both states implemented dependent coverage expansions and insurance mandates prior to the national DCE, which were associated with uptake of parental coverage independent of national reform.[139] Because pregnant women are more likely to be connected with care, receive routine HIV testing, and do not use contraception, all services provided to enrollees with any evidence of delivery based on Healthcare Effectiveness Data and Information Set (HEDIS) prenatal quality measures.[124]

Data Source

As in Chapter 2, data on insurance-reimbursed service use came from the Truven Health Analytics MarketScan® Commercial Claims and Encounters database for years 2007–2016. This individual-level national database consists

of employer-sponsored insurance claims and captures over 50 million unique patients in the U.S. It includes professional, inpatient, outpatient, and pharmacy claims for over 100 insurers and self-insured companies located in all 50 states. Data are fully de-identified, and include information on patient age, gender, health plan type, state of residence, relationship to the primary beneficiary (self, spouse, parent), and Metropolitan statistical area (MSA). The Institutional Review Board at Boston University Medical Center determined that this research does not meet the definition of human subject research.

Outcome variables

As with Chapter 2, the outcomes of interest included STI testing, contraception, and pap testing. Office of Population Affairs (OPA) performance measures were used for contraceptive care and the associated International Classification of Disease ninth and tenth revision codes (ICD-9, ICD-10), Current Procedural Terminology (CPT) codes, Healthcare Common Procedure Coding System (HCPS), and National Drug Codes (NDC) to identify use (codes used to define all services are listed in Appendix table 5). Modalities included "most and moderately-effective" methods: subdermal implant, intrauterine device (IUD), injectable, pill, patch, ring, and diaphragm.[124]

Consistent with the Centers for Disease Control and Prevention (CDC) 2017 surveillance report, STI testing was defined as screening for the most commonly diagnosed STI's among young adults: chlamydia, gonorrhea, syphilis,

herpes, and HIV.[126] ICD, CPT, and HCPCS codes used to define STI testing are based on HEIDIS quality measures and previously published literature.[10]

Emergency department visits were included as a placebo outcome, as confidentiality concerns should not influence insurance use for these services. Consistent with published literature, identification of ED visits was based on HCPCS and revenue codes indicating a claim for services provided in a hospital emergency department.[130]

Other Variables

Individual-level covariates included enrollee age, plan type (preferred provider organization (preferred provider organization [PPO], health maintenance organization [HMO], point-of-service [POS], exclusive provider organization [EPO], consumer-driven health plan [CDHP] or high deductible health plan [HDHP]), and whether or not enrollees were covered by a high-deductible plan (categorized as high if ≥ $1,000, low if < $1,000). Geographic covariates included state and residence in a micro- or metropolitan statistical area, and year of service use was included to account for secular trends. To measure health status, which may influence type of coverage, likelihood of having a regular provider, or demand for SRH care, the Elixhauser comorbidity software was used to identify comorbid conditions based on diagnoses listed on claims filed for men and women in the sample.[131]

Statistical Analyses

Characteristics of the study sample are assessed before and after DCE implementation, by treatment status. Because treatment status is based on eligibility for parental coverage and not parental coverage status, the compositional change in the proportion of enrollees with parental insurance among 23–25 year-olds is presented graphically over the study period.

A difference-in-differences (DiD) analysis evaluated aggregate changes in service use by the target group of the ACA-DCE provision from the pre- to post-implementation period relative to the change in a comparison group. The focus of this study is on the relationship between the ACA-DCE and SRH service use due to compositional changes in this group (i.e. inclusion of those with parental coverage in the post-period). The study period was from 2007–2016, including three years of pre-implementation data (2007–2009), and five years post-implementation (2011–2016). While the ACA-DCE was enforced in late September 2010, some insurers implemented coverage expansion earlier. Thus, services provided in 2010 were excluded as a washout period.

To assess the relationship between the DCE and insurance use for SRH services, linear probability models were used for each outcome, which can easily be interpreted as absolute percentage point changes in the probability of insurance use for services. This approach has been widely used in the literature on the impacts of the DCE as it provides reliable estimates of average treatment

effects and avoids complications associated with estimating and interpreting interaction terms and their standard errors in logit models.[140] The following generalized linear model specification was used to calculate effect estimates, adjusting for observable covariates that may influence coverage or service use:

$$Y_{igst} = \beta_0 + \beta_1 T_g + \beta_2 P_t + \beta_3 (T_g * P_t) + X_i + \varphi_t + \sigma_s + \varepsilon_{igst}$$

where Y_{igst} indicates service use for individual *i*, of age *g*, living in state *s*, in year *t*. T_g is a dummy variable indicating whether age g falls in the treatment or comparison group and P_t is a dummy variable for whether period t is before or after DCE implementation (2011–2016). β_3 is the difference-in-difference coefficient, representing the average adjusted change in insurance use for each outcome in the post-implementation period attributable to parental coverage eligibility and controlling for secular trends in the comparison group. X_i is a vector of time-variant variables including age, plan type, residence in a micro- or metropolitan statistical area, and a categorical variable indicating the number of comorbidities (0, 1, 2, and ≥3) based on the Elixhauser comorbidity index.[141] I also included fixed effects for state (σ_s) and year(φ_t), to account for unobserved heterogeneity, as well as an error term (ε_{igst}), and clustered standard errors at the state level.

The validity of the DiD study design is based on the assumption that there would have been no differing change in outcomes between the treatment and comparison groups had the intervention not occurred. I tested this assumption by

examining pre-policy biannual trends (Appendix B table 1). While levels of use are different, there were no significant pre-implementation utilization trend differences between the treatment and control groups for any of the services. Differences in time-invariant characteristics between the treatment and control groups will not bias outcome estimates.

I conducted additional sensitivity tests to evaluate the robustness of results to DiD assumptions. All analyses were replicated with the placebo outcome (ED visits), which should not be sensitive to treatment status. Because I was able to identify coverage status, I repeated the analysis with women aged 23–25 who had only parental or only policyholder coverage in the post period, in order to identify the extent to which aggregate changes were due to coverage status. I also replicated the analyses excluding years 2014–2016, which may be subject to secondary effects of ACA coverage expansions (i.e. Medicaid and insurance exchanges) that could differentially impact the treatment and comparison groups. Finally, I estimated the change in each year post-DCE, relative to the pre-DCE baseline. This analysis helps to identify the extent to which insurance use for SRH care may be a function of other policy changes occurring during the post period (such as the contraceptive mandate, which went into effect in 2012).

Results

Study Population

The final study sample included 4,690,699 unique beneficiaries, with 7,268,372 person-years of enrollment from 2007–2009 and 2011–2016 (**Table 5**). Sample characteristics are based on enrollee's initial record within each calendar year. Of these, approximately 62% were aged 23–25 and eligible for parental coverage under the ACA-DCE. As expected, there was a notable increase in the proportion of women in the treatment group with parental insurance coverage after DCE implementation, from 18% to 42%, confirming a compositional change in this group from pre- to post-period. Most of the compositional change can be attributed to the increase in parental coverage among 21 and 22 year-olds (**Figure 3**). Changes in census region from the pre- to post-period are likely a result of changes in the companies included in the MarketScan data over time.

Table 5. Characteristics of study sample by treatment status (2007–2009 and 2011–2016)[a]

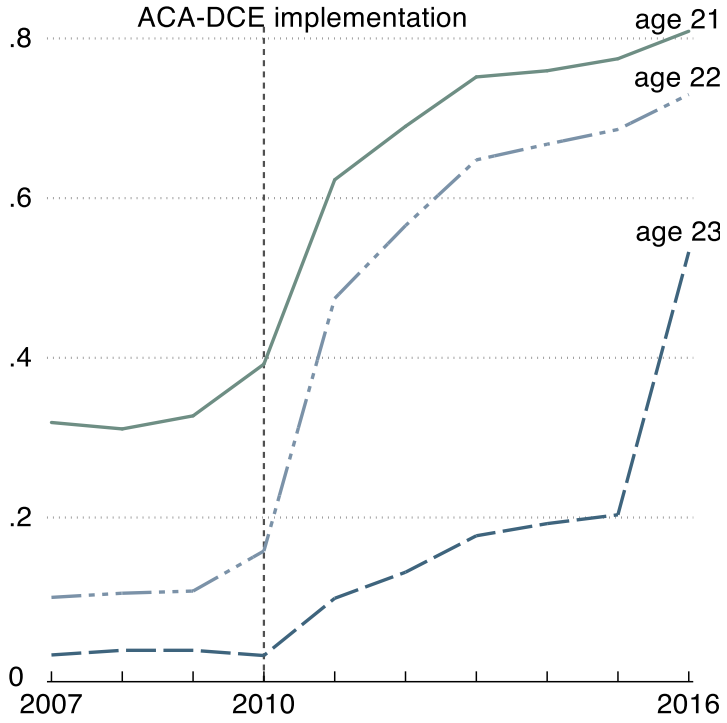
	Treatment group: aged 23–25 (n= 2,898,275)		Control group: aged 26–29 (n= 1,792,424)	
	Pre-DCE (n=729,662)	Post-DCE (n= 2,168,613)	Pre-DCE (n=681,165)	Post-DCE (n=1,111,259)
Age, mean ± SD	23.8 ± 0.8	23.6 ± 0.8	27.9 ± 0.8	27.9 ± 0.8
Residence in MSA, %				
Non-MSA	13.0	12.0	12.4	10.5
MSA	87.0	88.0	87.6	89.5
Census division, %				
New England	1.5	2.9	1.3	2.6
Middle Atlantic	10.5	15.4	10.7	14.6
East North Central	17.7	17.4	17.0	16.3
West North Central	8.1	4.7	7.7	4.7
South Atlantic	24.6	19.9	25.4	21.2
East South Central	4.7	6.1	5.3	6.1
West South Central	19.4	12.9	18.8	14.6
Mountain	5.5	6.1	5.2	6.2
Pacific	8.1	14.5	8.6	13.8
Coverage type, %				
Parental	17.7	42.5	0.0	0.0
Policyholder	82.3	57.5	100.0	100.0
Total Comorbidities, %				
0	78.5	76.9	73.4	72.6
1	19.5	20.5	23.9	24.1
≥2	2.0	2.7	2.7	3.3
Depression, %	6.9	8.0	8.7	9.0
Annual deductible				
High (≥$1,000)	12.7	15.2	8.5	10.4
Low (<$1,000)	87.3	84.8	91.5	89.6
Plan Type, %				
PPO	68.4	65.6	66.7	64.4
Comprehensive	1.8	1.4	1.1	0.7
EPO	0.6	2.1	0.6	2.7
HMO	18.0	11.9	20.2	12.2
POS	8.6	6.7	8.9	6.7
CDHP/HDHP	2.5	12.7	2.5	11.4

Abbreviations: MSA, metropolitan statistical area; PPO, preferred provider organization; EPO, exclusive provider organization; HMO, health maintenance organization; POS, point of service; CDHP, consumer-directed health plan; HDHP, high-deductible health plan

[a] Patient characteristics are based on first year of enrollment. The sample included 4,690,699 individuals with a total of 7,268,372 person-years of enrollment

[b] The Elixhauser Comorbidity classification system measures 30 comorbidity groups. Enrollees were classified into four categories based on the total number of comorbidities experienced.

Figure 3. *Compositional change in the treatment group after ACA-DCE implementation: proportion of enrollees with parental coverage*



Individuals in the comparison group were slightly more likely to have at least one comorbidity than those in the treatment group. There were no other major differences between the treatment and comparison groups on observed covariates.

National estimates

Women in the exposure group had higher levels of STI testing, and trends for both groups increased over time and converged in the post-period (**Figures 4–7**). Among the treatment group, the average percentage of women who used

Figures 4-7. *Unadjusted trends in service use among enrollees in the treatment and comparison groups (2007 – 2016)*

Figure 4. STI testing

Figure 5. Contraception

Figure 6. Pap testing

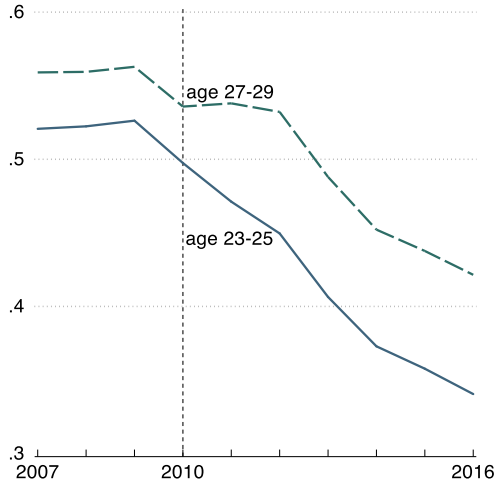
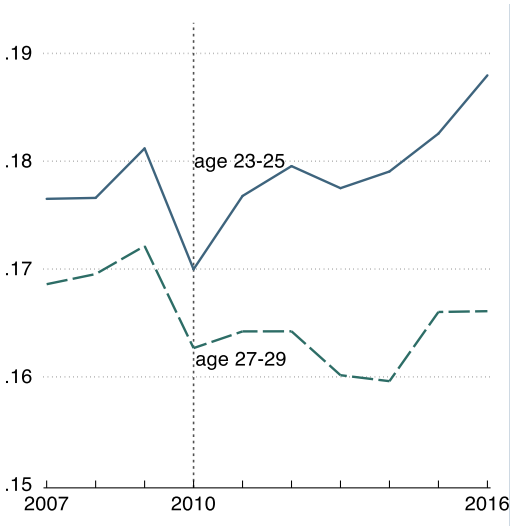


Figure 7. ED visits



STI testing increased from 28% in 2007–2009 to 31.1% in 2011–2016, while use increased from 26.2% to 31.1% in the comparison group. This change corresponds to an 11% absolute increase versus an 18.6% increase in the comparison group. In the adjusted DiD analysis, policy implementation was associated with a 1.8 percentage point reduction (95% CI: -2.3 to -1.2) in the proportion of women aged 23–25 using STI screening (**Table 6**).

The proportion of women in the treatment group using contraception decreased from 40.5% to 38.9%, and increased from 37.3% to 38.6% in the comparison group, corresponding to a 4% absolute reduction versus a 3.5% increase in the comparison group. In the DiD regression, policy implementation was associated with a 2.8 (95% CI: -3.3 to -2.4) percentage point reduction in pre-intervention contraceptive use by the treatment group.

Pap testing in the treatment group dropped from 52% to 40% and in the comparison group from 55.7% to 48.6%, corresponding to a 23% and a 12.8% absolute decrease, respectively. There was a 3.4 (95% CI: -3.9 to -2.8) percentage point reduction in pap testing associated with DCE implementation in the adjusted DiD analysis.

In the placebo outcome analysis, the proportion of enrollees in the treatment group with an ED visit declined from 17.9% to 18%, and from 17.1% to 16% in the comparison group, corresponding to a 0.5% increase versus a 5% absolute reduction. In the adjusted DiD analysis, there was a 0.4% (95% CI: 0.2

Table 6. Use of SRH and ED visits before (2007-2009) and after (2011-2016) DCE implementation [a]

	Treatment group: aged 23-25 (n=4,443,751)		Comparison group: aged 27-29 (n=3,607,532)		Difference-in-Differences	
	Pre-DCE	Post-DCE	Pre-DCE	Post-DCE	Unadjusted	Adjusted
STI test	28.0%	31.1%	26.2%	31.1%	-1.8%	-1.8%
(95% CI)	(27.9 to 28.0)	(30.2 to 30.1)	(26.1 to 26.3)	(30.2 to 30.1)	(-2.4 to -1.2)	(-2.3 to -1.2)
Contraception	40.5%	38.9%	37.3%	38.6%	-2.9%	-2.8%
(95% CI)	(40.4 to 40.6)	(38.8 to 38.9)	(37.2 to 37.3)	(38.5 to 38.6)	(-3.4 to -2.3)	(-3.3 to -2.2)
Pap test	52.0%	40.0%	55.7%	48.6%	-4.6%	-3.4%
(95% CI)	(5.1 to 5.2)	(39.9 to 40)	(55.6 to 55.8)	(48.5 to 48.7)	(-5.1 to -4)	(-3.9 to -2.8)
ED visit	17.9%	18.0%	17.1%	16.3%	0.6%	0.4%
(95% CI)	(17.8 to 18)	(1.9 to 18)	(17 to 17.2)	(16.2 to 16.4)	(0.3 to 0.8)	(0.2 to 0.6)

[a] *Analyses were limited to individuals with at least 12 months of continuous enrollment. This analysis included 4,654,339 enrollees. All outcomes were measured annually. Explanatory variables included age, plan type, comorbidity category, high or low deductible, and residence in a micro- or metropolitan statistical area.*

to 0.6) percentage point increase in ED visits by women in the treatment group associated with policy implementation.

Sensitivity Analyses

As in the primary analysis, there was a reduction in insurance use for all SRH services after excluding years 2014–2016, and a slight increase in ED visits. The magnitude of these reductions were similar to the primary analysis, suggesting that observed effects are largely a consequence of the DCE, as opposed to other changes in coverage options including ACA marketplace and Medicaid expansions, which have potential to influence the composition of the study population or subsequent insurance use behaviors (Appendix table 2).

To further examine changes over time, I conducted six additional analyses, limiting the post-period to each individual year after 2010. With a few exceptions, the magnitude of the DiD increased slightly for STI testing and contraceptive use with each post-period year. A similar pattern occurred with ED visits. These increased differences over time correspond to an increase in parental coverage among the treatment group (figure 1). The difference in pap testing doubled from 2011 (DiD: 2.2%; 95% CI: -2.7 to -1.8) to 2016 (DiD: 4.4%; 95% CI: -5.1 to -3.7). It is possible that other ACA provisions (such as preventative care without cost-sharing) had a differential effect on individuals in the treatment and comparison group, this difference may also have to do with the 2012 changes to cervical cancer screening guidelines.

Finally, to identify the role of parental coverage status on aggregate insurance use for services, two additional DiD analyses were conducted excluding women in the treatment group with parental coverage and those with policyholder coverage in the post-period. In the post-period policyholder only adjusted models, there were no statistically significant differences in SRH service use between the treatment and comparison groups from the pre- to post-period. The difference in ED visits was significant, though the effect was small (DiD: 0.8%; 95% CI: 0.5 to 1.0). In the post-period parental coverage only adjusted models, there was a notable increase in the magnitude of differences for SRH services; a 3.4 (95% CI: -4.1 to 2.7) percentage point reduction in STI testing, a 4.8 (95% CI: -5.6 to -4) percentage point reduction in contraceptive use, and a 6.3 (95% CI: -7.3 to -5.3) percentage point reduction in pap testing. There was a small, non-significant increase in ED use. These findings confirm that the aggregate change in insurance use for services among enrollees newly eligible for parental coverage can be attributed to the inclusion of women with parental coverage.

Discussion

In this national study, the ACA-DCE was associated with an aggregate reduction in commercial insurance use for pap testing, contraception, and sexually transmitted infection testing among females aged 23–25. The provision was also associated with a smaller, yet significant increase in emergency

department visits.

These results suggest that young adult women newly eligible for parental coverage were less likely to use insurance to pay for SRH services after DCE implementation, and that the magnitude of this phenomenon differed across services. As with paper 1, the greatest effect was observed for pap testing, followed by contraception and STI testing. It is possible that the sensitivity of pap testing to DCE eligibility is due to a spillover effect from other confidential SRH services. Because clinicians routinely perform pap tests and/or pelvic examinations during SRH visits, higher use in the comparison group may be a consequence of their higher likelihood of going in for an office visit as opposed to care-seeking behavior.

These findings deviate from prior research on the DCE which generally demonstrate desirable outcomes, including increased use of preventive health screenings, HPV vaccination, likelihood of having a primary care doctor, and improved self-reported health.[142,85,143] These findings are, however, consistent with the literature on confidentiality and SRH service use among adolescents and young adults.[43,44]

Findings are also consistent with a recent study that found no change in STI testing or contraceptive use after DCE implementation.[88] It is important to emphasize that the observed reduction in insurance use for SRH care does not necessarily correspond to a reduction in service use. Confidentiality concerns

lead some women to seek SRH services outside of traditional health care settings, most commonly, publically funded family planning clinics, which are known for providing confidential and free or low-cost care if patients are uninsured or choose not to use their insurance.[49] A 2016 survey of individuals seeking contraceptive care at Title X-funded facilities found that 25% of respondents with private coverage did not plan to use their insurance to pay for care, and over 25% of *all* respondents who did not plan to use their insurance indicated confidentiality concerns as the reason.[144] This research was conducted after implementation of ACA coverage expansions, and corroborates findings from the present study while highlighting how some individuals with commercial coverage rely on publicly subsided contraceptive care.

These findings indicate potential unintended consequences of the ACA-DCE. Insurance billing and claims processing procedures used by private insurers routinely violate confidentiality for those insured as a dependent. Some states, insurers, and providers have enacted policies to protect dependent confidentiality, though they vary in the extent to which they protect dependent privacy.[53] For example, the 2018 Massachusetts PATCH ACT allows patients insured as dependents on a parent or spouses' plan to submit a request to the insurer to keep information about any health service use confidential in communications with the policyholder.[145] Moving forward, it will be important to understand whether or not young adults are aware of these policies, if they take

advantage of them, and their impact on service use and outcomes. Ultimately, the insurance use behavior of young adults is likely a consequence of privacy perceptions as opposed to actual policies or privacy breaches.

This study has several limitations. Given the large sample size, it is possible that small differences are statistically significant but not meaningful. Results should therefore be interpreted with caution, especially for smaller effect sizes. Additionally, because this study included analyses of multiple outcomes it is possible that observed significant effects are a consequence of random Type 1 error. Multiple hypothesis testing was not used, as observed p-values were small, and findings were qualitatively consistent with those from different analyses conducted in Chapter 2. Young adults with dependent coverage are more likely to be non-Hispanic white, a student, and have a higher family income.[146,77] Sociodemographic differences between women with parental and policyholder coverage that cannot be captured with insurance claims data could bias results if these differences are associated with sexual behavior and subsequent need for SRH care, though there is no published literature to support this theory.

Differences between the treatment and comparison groups would also lead to selection bias if policyholder coverage “crowds-out” parental coverage for women in the treatment group with privacy concerns. Prior research has demonstrated the opposite- parental coverage after the DCE crowded out policyholder coverage for those eligible.[22] In addition, because the out-of-pocket

costs associated with the SRH services of interest are generally much lower than the cost of insurance premiums, crowd-out due to confidentiality concerns is likely not an issue.

Because these data did not allow identification of insurance coverage transitions, outcome estimates were based on a *compositional* change in the treatment group after policy implementation and include enrollees with both parental and policyholder coverage. As suggested by sensitivity analyses, these findings likely underestimate the relationship between DCE implementation and insurance use among those who gained parental coverage under the provision.

While the use of narrow age ranges strengthens the internal validity of this study, this inclusion criterion did not allow estimation of the association between the ACA-DCE and insurance use for women ages 19–22. The provision may have had a different impact on insurance use by younger women who are at higher risk for STIs and unintended pregnancies that could not be captured.[11,119]

An estimated 41% of women aged 19–25 in the United States are covered under private insurance as dependents and are consequently vulnerable to inadvertent privacy breaches.[147] Women are primarily responsible for controlling fertility, have a higher biological vulnerability to STIs, and are more likely to experience adverse health, social and economic consequences of unintended pregnancies and STIs. The national dependent coverage expansion, and subsequent privacy barriers on insurance use for SRH services therefore have

disproportionate, negative impacts on these individuals, especially those in their early 20's who have lower incomes and worse SRH outcomes.

The value of dependent coverage is predicated on insurance use for services. While the ACA-DCE has increased use of some care by young adults, this research demonstrates a decline in insurance use for SRH services and ED visits, potentially a consequence of confidentiality concerns.

CHAPTER 4: TRENDS AND VARIATIONS IN PELVIC EXAMINATION DURING CONTRACEPTIVE ENCOUNTERS

Abstract

Despite evidence that mandatory pelvic examinations deter people from receiving needed contraception and are not clinically recommended, survey research suggests that clinicians regularly perform this screening prior to prescribing hormonal contraceptives. This research identifies the prevalence of non-indicated pelvic exams performed during contraceptive encounters, as well as trends and variations in prevalence by provider specialty and patient age. Contraceptive encounters with no documented indication for pelvic examination were identified among a national sample of commercially-insured females aged 15–49 from 2007 to 2017. Linear probability models were used to examine the association between provider specialty and probability of non-indicated pelvic examination, adjusting for patient age, plan type, comorbidities, and state fixed effects. Differential trends were assessed by including interaction terms for specialty/year and age/year. There were 3.5 million contraceptive encounters, 59% of which had no documented indication for pelvic exam. Exams were performed at 6.6% of these visits, on 12.3% of patients. The rate increased across specialties- from 3.2% of encounters in 2007 to 10.3% in 2017. OBGYNs saw the greatest increase, followed by APCs, all other physicians, and FPPs. In 2017, OBGYNs were 11.6 percentage points (95% CI: 10 to 13), APCs were 8.2

percentage points (95% CI: 5 to 10), and other physicians were 3.9 percentage points (95% CI: 3 to 5) more likely to perform a concurrent exam than family practice physicians. Our findings demonstrate rates of non-indicated exams increased almost threefold from 2007 to 2017. This increase occurred across provider specialties and was largely driven by OBGYNs who oversaw over half of all contraceptive encounters and performed non-indicated pelvic exams at the highest rate.

Background

With over 37 million performed in 2016, pelvic examinations are the most common women's health screening.[35] The procedure typically consists of three components: visual inspection of the external genitalia, speculum examination with swabbing of the cervix, and a bimanual component where the provider inserts two fingers into the vagina while pressing on the lower abdomen. This examination has traditionally been performed as part of the well-woman visit to screen for gynecological cancers, sexually transmitted infections, and prior to prescribing hormonal contraception, among other reasons.

The clinical value of pelvic examination for any reason in asymptomatic, non-pregnant women has been challenged in recent years, by the American College of Physicians (ACP) in 2014, and by the American Academy of Family Physicians (AAFP) in 2017.[148,149] The American College of Obstetricians and Gynecologists (ACOG) recommends that pelvic exam be performed when indicated by medical history or symptoms, and based on shared decision-making.[150] The U.S. Preventative Services Task Force (USPSTF) position on screening pelvic examinations on asymptomatic women asserts that the evidence is insufficient to determine whether or not benefits of the exam outweigh the harms.[40] However, consistent with recommendations from the American Society for Colposcopy and Cervical Pathology, the 2012 USPSTF cervical cancer screening guideline increased the screening interval from 1 to 3

years for women aged 21–65, and precluded reimbursement for screening on individuals younger than 21.[40,151] Because pelvic examinations are almost always provided alongside pap tests, cervical cancer screening guidelines will also impact pelvic examinations. [152] Despite guideline inconsistencies across professional organizations, there is broad consensus that, with the exception of the diaphragm and intrauterine device, pelvic examination is not required prior to contraceptive provision in asymptomatic women.[41,153,39]

While the evidence on the harms of pelvic examination is limited, a 2014 systematic review found that 11–60% of women experience pain or discomfort during the exam (median, 35%; 8 studies), and 10–80% experience fear, embarrassment, or anxiety (median, 34%; 7 studies).[148] Certain subgroups are more likely to report adverse experiences, including women with a history of sexual violence or mental health conditions including post-traumatic stress disorder, depression, and anxiety.[96,97,98] Younger women are also more likely to experience pain and distress which can lead to healthcare avoidance, including avoidance of contraceptive visits and STI screening.[154,155,156,157] Time, costs and logistical difficulties associated with an in-person office visit to also present avoidable barriers to care.[100] Finally, unnecessary pelvic exams are an inefficient use of resources, and may lead to false-positive findings, overdiagnosis, and avoidable surgical procedures.[38]

Despite clinical guidance and evidence on potential harms, survey

research suggests that anywhere from 33% to 71% of providers require or routinely perform pelvic examination prior to prescribing hormonal contraception.[93,101] Studies of obstetrician-gynecologist (OBGYN) beliefs show that the overwhelming majority consider at least one component of the pelvic examination important for assessing hormonal contraceptive eligibility, and that increasing the interval between gynecological examinations will negatively affect patient health, satisfaction, and access to contraception.[158,95] The few studies of provider specialty variation in pelvic examination have inconsistent findings and are outdated.[159,101] Patients also report undergoing unnecessary pelvic examinations: in a recent study using pooled data from the 2011–2017 National Survey of Family Growth, approximately 12.5% of 15–20 year-olds reported receiving a potentially unnecessary pelvic exam, and exam receipt was associated with non-IUD hormonal contraceptive use, suggesting a link between pelvic examination and contraceptive provision.[104]

The literature on pelvic examinations for contraceptive prescription primarily relies on survey research, much of which was conducted over a decade ago. Consequently, little is known about actual clinical practice or changes in clinical practice in recent years. Given more recent guidelines recommending against performing pelvic examinations on asymptomatic patients, guideline inconsistencies across professional organizations, and differing recommendations based on patient age, it is important to understand recent

trends in potentially unnecessary exams, along with practice patterns across clinical specialties. Thus, the objective of this study was to evaluate prevalence, trends, and variations in the administration of pelvic examination at contraceptive encounters by patient age and provider specialty.

Methods

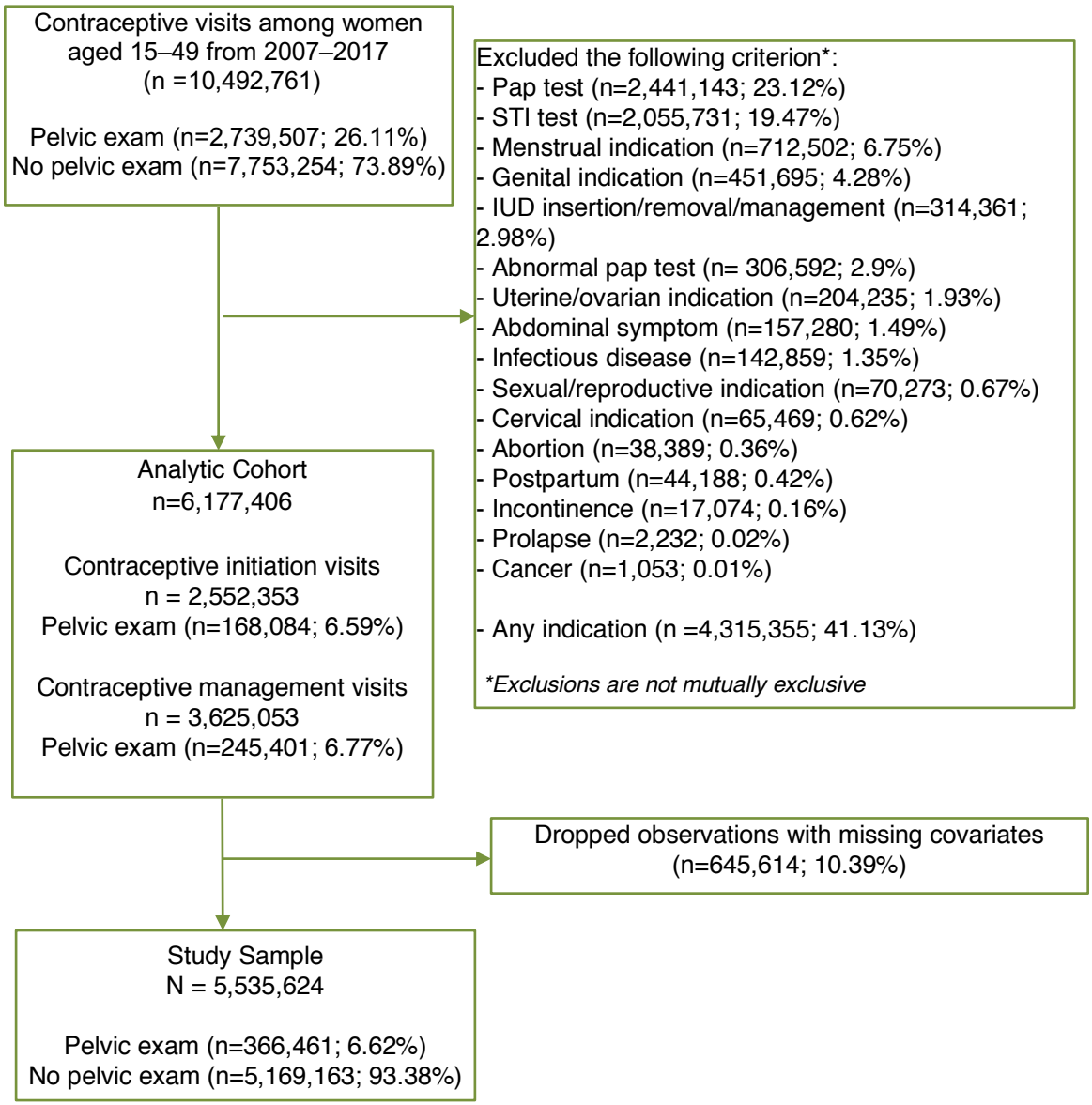
Study Sample

The study sample (figure 8) included 3.5 million commercially-insured reproductive aged women (15–49), with 5.6 million clinical encounters for contraceptive initiation, surveillance, or management from 2007 to 2017. Contraceptive encounters were identified with claims that had a qualifying International Classification of Disease ninth or tenth revision code (ICD-9, ICD-10). Because pelvic exam is indicated in these situations, encounters for IUD insertion, removal, or surveillance (N=314,361) were excluded from the analyses, as were contraceptive encounters that occurred during or six weeks after a delivery (N=44,188).

Consistent with ACOG guidelines, indications for pelvic examination included evidence of cervical, genital, ovarian, or uterine abnormalities, infectious diseases including STIs and pelvic inflammatory disease, urinary incontinence, prolapse, abdominal pain or menstrual, sexual, or reproductive symptoms or conditions and were consequently excluded.[150] I also excluded contraceptive encounters that occurred alongside abortion (N=38,389) or cervical cancer

screening (N=2,441,143), and among individuals with any history of gynecologic cancer (N=1,053). Though pelvic examination is not always necessary for STI testing, it is commonly performed for or along with these screenings, therefore I

Figure 8. *Identification of Study Sample*



excluded contraceptive encounters with concurrent STI test from the primary analysis (N=2,055,731), though I included these visits in a sensitivity analyses. Ultimately, I aimed to err the side of over-excluding those with any potential indication for pelvic examination. These indication categories, along with the ICD-9, ICD-10, and Current Procedural Terminology (CPT), and Healthcare Common Procedural Coding System (HCPCS) codes used to identify them were derived from ACOG guidelines and validated by a board-certified OBGYN. All contraceptive encounter and indication codes are listed in Appendix C. The sample was restricted to encounters with complete information on provider specialty and other covariates, leaving a final sample size of 5,535,624.

Data Source

As with Chapters 2 and 3, the 2007–2016 Truven Health Analytics MarketScan® Commercial Claims and Encounters database was used for this analysis. This individual-level national database consists of employer-sponsored insurance claims and captured anywhere from 10.1% – 20.5% of reproductive-aged women in the United States over the study period. It includes the medical claims for over 100 insurers and self-insured companies located in all 10 U.S. census regions. These data are fully de-identified, and include information on age, gender, health plan type, relationship to the primary beneficiary (self, parental, or spousal), state of residence, and 3-digit zip code. Data on service use were pulled from the outpatient claims file and patient characteristics from

the enrollee file.

Outcome and Covariates

The primary outcome was pelvic examination during an encounter for contraceptive initiation, management, or surveillance (corresponding codes listed in Appendix C). Because codes for contraceptive counseling are less likely to indicate visits that occurred for the purpose of initiating or filling a contraceptive prescription, these were not included in the definition of contraceptive encounter. Pelvic examinations were identified with the ICD-9 code for 'Routine gynecological examination' (V72.31), the corresponding ICD-10 code (Z01.419), or the associated CPT code (G0101). Pelvic examinations billed without an ICD or CPT code associated with the aforementioned indications on the same day, at the same facility, by the same provider who oversaw the contraceptive encounter were considered to be potentially unnecessary examinations.

Individual-level covariates included age category, plan type (preferred provider organization (preferred provider organization [PPO], health maintenance organization [HMO], point-of-service [POS], exclusive provider organization [EPO], and consumer-driven health plan [CDHP] or high deductible health plan [HDHP]). Geographic region, enrollee's relationship to the primary beneficiary (self, child, or spouse) residence in a micro- or metropolitan statistical area, and year were also included in analyses.

Provider type/specialties were consolidated into the four most common

categories: obstetricians/gynecologists (OBGYNs), family practice physicians (FPPs), all other physicians (e.g. internal medicine, pediatric, and not otherwise classified MDs), and advanced practice clinicians (APCs), which included advanced practice registered nurses, nurse practitioners, certified nurse midwives, and physician assistants. This variable is defined by Truven-standardized values and are mapped from carrier-specific coding.

Statistical Analyses

A retrospective cross-sectional analytic approach was used to identify the prevalence of and patterns in contraceptive encounters where a non-indicated pelvic examination was performed. Cohort characteristics are presented over the study period, and in the first and last years of the study period, stratified by whether or not enrollees ever received a non-indicated pelvic exam. Results are expressed at the individual-level (defined as having a concurrent pelvic exam at any point over the study period). The proportion of asymptomatic enrollees and encounters with an examination were then summarized by provider specialty. Because pelvic exam is never recommended for asymptomatic individuals under age 21, this is also stratified by age at or above the 20-year-old threshold. Results are expressed at both the individual and encounter-levels.

To evaluate contemporary practice patterns, linear probability models were used to evaluate the association between provider specialty and pelvic examination at contraceptive encounter in the most recent year of the study

period (2017), with contraceptive encounter as the unit of analysis. Ordinary least-squares is preferable to logistic regression for ease of interpretation, and can be justified because of the large sample size and the high proportion of encounters with the outcome of interest.[160] Adjusted models included age category in years (40–49, 30–39, 21–29, 15–20), plan type, region, relationship to the primary beneficiary, residence in an MSA, a categorical variable indicating the number of comorbidities (0, 1, 2, and ≥3) based on the Elixhauser comorbidity index,[141] and standard errors were clustered at the state level. To quantify change over time stratified by provider specialty and age categories, an interaction for year/specialty, and year/age category were included in adjusted models with data from 2007 – 2017. State fixed accounted for potential unobserved time-invariant heterogeneity and were used because the only smaller geographic unit of analysis was three-digit zip code, which was missing for about 20% of the sample, including all individuals living outside an MSA. The marginal effects of these interactions are displayed graphically. Finally, age trends in potentially unnecessary exams are assessed for each provider specialty.

As a sensitivity analysis, the analysis was replicated including only those contraceptive encounters for the IUD, which always involve a pelvic exam. Because exams at these encounters represent appropriate care, findings will provide insights into specialty variations in coding practices that could bias

estimates. Analyses were also replicated including contraceptive encounters where STI testing was performed. These findings represent less conservative estimates of potentially unnecessary examinations. Finally, because 10% of encounters had missing information for provider specialty, I included these encounters in a calculation of non-indicated exam rates by year to ensure there was nothing systematically different about these claims.

Results

Sample characteristics

The final sample included 2.9 million enrollees with 5.5 million contraceptive encounters, averaging 2.8 (standard deviation: 3.5) visits per enrollee from 2007 to 2017 (**Table 7**). Most enrollees in the sample lived in a metropolitan area (85.7%) and in the South Atlantic, East North Central, West South Central, or Pacific regions. Over the study period, 12.3% of patients underwent a potentially unnecessary pelvic examination during a contraceptive visit. This proportion increased almost threefold — from 4.4% of patients in 2007 to 13.6% 2017. Across the study period, enrollees who received a concurrent pelvic exam were slightly older and more likely to live in a metropolitan area or in the mid-Atlantic. As compared to 2007, enrollees in 2017 who received a potentially unnecessary pelvic exam were more likely to be covered by a high-deductible or consumer-directed health plan, though the proportion of all enrollees with a high-cost sharing plan increased substantially over the study

period (from 0.7% in 2007 to 13.9% in 2017). While two-thirds of the sample had no comorbidities, 12.8% had a diagnosis of depression, and those who underwent a pelvic examination were generally healthier. Over half of the study sample received their contraceptive care from an OBGYN, followed by a family practice physician (22%), another physician (18%), and an advanced-practice clinician (7%).

Provider Specialty Variation

Pelvic examination at contraceptive encounter varied considerably by provider specialty. OBGYNs performed the highest overall number of exams at approximately 9.2% of all contraceptive encounters (**Table 8**). Patients receiving contraceptive care from advanced-practice clinicians were as likely to receive a potentially unnecessary pelvic exam as those who saw an OBGYN (16.6%).

Table 7. Characteristics of enrollees with a contraceptive encounter by receipt of pelvic exam in 2007 and 2017

	2007–2017 (n=2,969,713)		2007 (n=201,904)		2017 (n=233,750)	
	No Pelvic exam (n=2,727,541)	Pelvic exam (n=242,172)	No Pelvic exam (n=193,115)	Pelvic exam (n=8,789)	No pelvic exam (n=201,600)	Pelvic exam (n=32,150)
Total %	91.9	8.1	95.7	4.3	86.8	13.3
Age, *mean ± SD*	26.5 ± 8.1	29.7 ± 8.9	27.6 ± 8.6	28.2 ± 8.4	26.1 ± 8.0	29.8 ± 8.9
# of contraceptive visits, *mean ± SD*	2.8 ± 3.5	1.6 ± 1.9	2.7 ± 3.4	1.6 ± 1.6	2.4 ± 2.9	1.5 ± 1.5
	Column %			*Row %*		
Residence in MSA , %						
Non-MSA	14.3	11.6	96.1	3.9	89.0	11.0
MSA	85.7	88.4	95.6	4.4	86.4	13.6
Census division, %						
New England	4.6	3.1	99.0	0.1	87.3	12.7
Middle Atlantic	11.3	15.3	97.2	2.8	82.3	17.7
East North Central	16.7	17.1	97.1	2.9	85.6	14.4
West North Central	6.3	6.2	96.0	4.0	86.4	13.6
South Atlantic	19.8	21.4	93.0	7.0	86.0	14.0
East South Central	5.5	4.5	98.5	1.5	87.7	12.3
West South Central	14.1	13.6	95.0	5.0	87.3	12.7
Mountain	7.9	7.0	95.9	4.1	89.5	10.5
Pacific	13.8	11.8	97.2	2.8	92.6	7.4
Total comorbidities, %						
0	66.5	71.5	95.3	4.7	85.6	14.4
1	23.3	20.6	96.4	3.6	88.3	11.7
2	7.0	5.7	96.7	3.3	89.1	10.9
≥3	3.2	2.3	97.0	3.0	90.6	9.4
Depression, %	12.8	9.0	96.5	3.5	90.6	9.4

continued

Table 7. (Continued)

	2007–2017		2007		2017	
	No pelvic exam	Pelvic exam	No pelvic exam	Pelvic exam	No pelvic exam	Pelvic exam
Provider specialty, %						
Obstetrics/gynecology	50.8	72.3	94.6	5.4	80.6	19.4
Family Practice	23.2	6.9	97.8	2.2	97.2	2.8
Advanced Practice Clinician	7.7	9.5	93.4	6.6	87.1	12.9
Other MD	18.3	11.3	96.7	3.3	92.0	8.0
Plan Type*, %						
PPO	62.8	60.9	95.5	4.5	86.7	13.3
Comprehensive	1.3	1.0	95.6	4.4	89.2	10.8
EPO	1.7	1.7	98.9	1.1	87.5	12.5
HMO	14.6	14.4	95.2	4.8	88.4	11.6
POS	7.5	6.9	97.0	3.0	86.3	13.7
CDHP/HDHP	12.0	15.1	99.3	0.7	86.1	13.9

Abbreviations: MSA, metropolitan statistical area; PPO, preferred provider organization; EPO, exclusive provider organization; HMO, health maintenance organization; POS, point of service; CDHP, consumer-directed health plan; HDHP, high-deductible health plan

The Elixhauser Comorbidity classification system measures 30 comorbidity groups. Enrollees were classified into four categories based on the total number of comorbidities experienced.

In 2007, 246,573 enrollees had a total of 370,884 contraceptive encounters, 9,209 (2.5%) of which involved a pelvic exam. In 2017, enrollees had a total of 546,950 contraceptive encounters, 55,907 (10.2%) of which involved concurrent pelvic exam.

For the purposes of description, women with more than one contraceptive encounter were grouped in to the 'pelvic exam' category if they received an examination at any of their contraceptive visits.

Other physicians performed examinations at 4.5% of contraceptive visits (on 8.1% of patients), and FPPs were least likely to perform potentially unnecessary exams (at 2.1% of encounters, for 4.2% of patients).

Females aged 20 and younger accounted for 30% of all contraceptive visits. Among all their patients, APCs provided contraceptive care to a higher proportion of adolescents and young adults (AYAs), followed by FPPs, other MDs, and OBGYNs. Overall differences in potentially unnecessary exams between AYAs and those 21 and older were small. AYAs who received

Table 8. Encounter and patient-level prevalence of potentially unnecessary pelvic exams by provider specialty and AYA status, 2007 – 2017

Provider specialty	Enrollees, in hundreds (%)	Contraceptive visits, in hundreds (%)	Pelvic exams, in hundreds (%)	Visits with pelvic exam	Patients with pelvic exam
All providers	2,970	5,536	366	6.6%	12.3%
Women ≤ 20 years	889 (30)	1,650 (30)	83 (23)	5.0%	9.3%
Women > 20 years	2,079 (70)	3,885 (70)	283 (77)	7.3%	13.6%
OBGYNs	1,557	2,814	259	9.2%	16.6%
Women ≤ 20 years	415 (27)	752 (27)	59 (22)	7.8%	14.2%
Women > 20 years	1,141 (73)	2,062 (73)	200 (77)	9.7%	17.5%
Family Practice	650	1,306	27	2.1%	4.2%
Women ≤ 20 years	217 (33)	427 (33)	6 (23)	1.4%	2.8%
Women > 20 years	433 (67)	878 (67)	21 (77)	2.4%	4.8%
Other MD	531	966	43	4.5%	8.1%
Women ≤ 20 years	175 (33)	316 (33)	9 (21)	2.8%	5.1%
Women > 20 years	355 (67)	648 (67)	34 (80)	5.2%	9.6%
APCs	229	449	38	8.5%	16.6%
Women ≤ 20 years	80 (35)	153 (34)	10 (26)	6.5%	12.5%
Women > 20 years	149 (65)	296 (66)	28 (74)	9.5%	18.8%

Abbreviations: AYA stands for 'adolescent and young adult' and refers to patients aged 20 and younger; OBGYNs: obstetrician/gynecologists; APCs: advanced practice clinicians

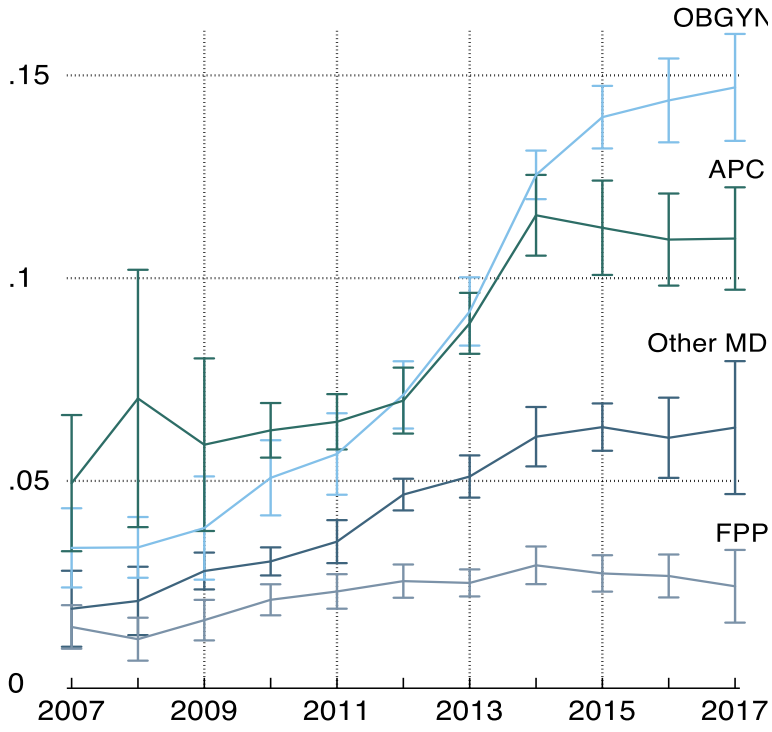
Because several individuals in the study cohort had more than one contraceptive encounter over the study period, prevalence is reported at both the encounter and individual-levels.

contraceptive care from an OBGYN were more likely to receive an exam than those who received care from other providers. When including encounters with missing information on provider specialty, there were no major differences in the prevalence of pelvic exam (appendix table C15).

Age and Specialty Trends

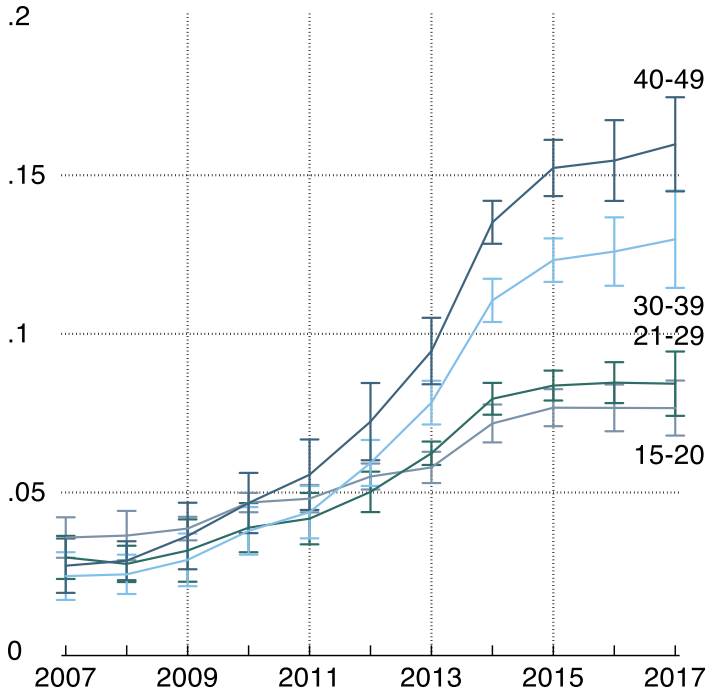
Figure 9 illustrates trends in pelvic examination, stratified by provider specialty. Pelvic examination at contraceptive encounter increased among all specialties from 2007 to 2017. Concurrent provision by FPPs increased from 1.6% to 2.1% of contraceptive encounters, and from 2.4% to 6.2% by other physicians, (corresponding to a 3.6% and 15.6% annual change, respectively). APCs performed pelvic exams at 4.5% of clinical encounters in 2007 and 10.5%

Figure 9. *Trends in pelvic examination at contraceptive visits by provider specialty*



in 2017, corresponding to a 24.4% annual increase. Provision by OBGYNs increased 27.1% each year — from 4.1% to 15.4% over the study period. Non-indicated pelvic examination by advanced practice clinicians, family practice physicians, and other physicians started to plateau in 2014.

Figure 10. *Trends in pelvic examination at contraceptive visits by patient age*



As with provider specialties, concurrent pelvic examinations increased across patient age groups over the study period. From 2007 – 2010, there were no major differences in concurrent encounters between age groups. By 2017, 40–49 year-olds were receiving exams at 22.3% of their clinical encounters, followed by 30–39 year-olds at 17.8%, 15–20 year-olds at 12.3% and 21–29 year-olds at 12.2%. These changes correspond to a 586.5%, 441.3%, 255%, and

215.8% absolute increase, respectively. Figures C1–C4 in the appendix illustrate trends in concurrent examination by patient age for each specialty.

Table 9. Probability of Pelvic Examination at Contraceptive Encounter Excluding all Indications (n= 446,566)				
Provider Specialty	β	α	95% CI	
FPP (reference)				
Other MD	0.039	<0.001	(0.030	to 0.048)
OBGYN	0.116	<0.001	(0.103	to 0.130)
APC	0.082	<0.001	(0.068	to 0.095)
Sensitivity Analysis: Probability of Pelvic Examination at Contraceptive Encounter Including Encounters with STI test (n= 533,126)				
Provider Specialty	β	α	95% CI	
FPP (reference)				
Other MD	0.070	<0.001	(0.058	to 0.082)
OBGYN	0.145	<0.001	(0.129	to 0.161)
APC	0.097	<0.001	(0.082	to 0.113)
Sensitivity Analysis: Probability of Pelvic Examination at IUD Encounter (n= 22,249)				
Provider Specialty	β	α	95% CI	
FPP (reference)				
Other MD	0.120	<0.001	(0.100	to 0.141)
OBGYN	0.023	0.002	(0.009	to 0.038)
APC	0.035	<0.001	(0.018	to 0.052)
Abbreviations: MD, medical doctor; FPP, family practice physician; OBGYN, obstetrician/gynecologist; IUD, intrauterine device				
All models adjust for age category, plan type, region, relationship to the primary beneficiary, MSA residence MSA, and comorbidity category				

Multivariate Models

Table 9 presents the probability of pelvic examination by provider specialty, adjusting for patient-level covariates. In 2017, OBGYNs were 12 percentage points (95% CI: 10% to 13%), advanced practice clinicians were 8 percentage points (95% CI: 7% to 10%), and other physicians were 4 percentage points (95% CI: 3% to 5%) more likely to perform a non-indicated pelvic examination than family practice physicians.

After including encounters where STI screening was performed, the magnitude of these differences increased across provider specialties. When the analytic sample was limited to only IUD encounters, the probability of performing an indicated pelvic exam among OBGYNs dropped 10 percentage points from the primary model, and 4 percentage points among APCs. At 12 percentage points (95% CI: 10 to 14), other physicians were substantially more likely to code for an indicated exam than family practice physicians. Full models are included in the appendix.

Discussion

Findings from this research demonstrate that provision of non-indicated pelvic exams at contraceptive encounters increased almost threefold during the study period — from 3.6% of visits (among 5.5% of patients) in 2007 to 9.9% of visits (among 19.7% of patients) in 2017. This increase occurred across provider specialties, but was largely driven by OBGYNs, who oversaw over half of all contraceptive encounters and administered exams at the highest rate. After adjusting for patient-level covariates, OBGYNs were still more likely to perform non-indicated exams, and the magnitude of provider variation between OBGYNs, FPPs, and APCs dropped notably when looking only at IUD encounters, where exams are always indicated.

These findings are consistent with prior research demonstrating that OBGYNs believe in the importance of pelvic examination, and often perform the

procedure prior to prescribing contraception.[158,95] They also corroborate a 2008 survey that examined specialty variation and found OBGYNs were most likely to perform a pelvic exam as a requirement for hormonal contraception (71.6%), followed by FPPs (67.7%), and internists (40.2%).[101] In contrast, a 2009 survey of clinicians found that advanced practice nurses in primary care were most likely to require a pelvic exam prior to contraceptive provision (45%), followed by family medicine physicians (33%), OBGYNs (29%), and reproductive health nurses (17%).[93] Any discrepancies between these surveys and the present study may be due to the fact that the surveys were conducted over a decade ago, at which time this analysis found between-specialty variation low. In addition, this is the first study to examine rates, trends, and specialty variations using administrative claims. These data likely provide a more accurate picture of clinical practice, as the aforementioned survey studies focused on provider-reported beliefs and practices which may be subject to biases against reporting behaviors that diverge from professional guidelines or norms.

It is not clear why the non-indicated pelvic exam rates increased so substantially among OBGYNs as compared to other specialties over the study period. This variation may have to do with the arguably more pliable ACOG recommendations for non-indicated examinations based on shared decision-making. This recommendation may reflect a view that gynecological examination is a fundamental part of OBGYN practice. Alternatively, the inclusion of shared

decision making incorporates a patient's values and preferences to guide clinical decisions and care. While many women may prefer avoiding a non-indicated pelvic examination, research suggests that some find the exam reassuring, and that OBGYNs believe the exam is an important component of patient satisfaction.[102, 158] Younger physicians and female physicians were less likely to endorse this belief.

As with other specialties, OBGYNs may also have a financial incentive to provide more services than what is medically necessary. One study found that three-quarters of OBGYNs believe performing pelvic exams less frequently will reduce financial reimbursement.[158] Pelvic examination documentation requirements for billing purposes may also lead to the observed specialty variations. For example, in order to be reimbursed for performing a breast exam, the Centers for Medicare & Medicaid Services require that at least 7 of the following elements are included and documented: inspection and palpation of the breasts, digital rectal exam, examination of the external genitalia, urethral meatus, bladder, urethra, vagina, cervix, uterus, adnexa/parametria, and anus. If clinicians are paid in a lump sum for a visit that involves the provision of multiple preventative services and pelvic examination is included in this bundle of services, providers will be incentivized to perform the procedure even in non-indicated situations.

Findings also show a steady increase in concurrent pelvic exams across

age groups. Not surprisingly, 40–45 year-olds were most likely to receive an exam, followed by 30–39 year-olds, 21–29 year-olds, and 15–20 year-olds. The finding that 9.3% of 15–20 year-olds received a non-indicated pelvic exam is slightly lower than findings from a recent NSFG analysis, which estimated that 12.5% of AYAs in a nationally-representative sample received a potentially unnecessary exam in the past year.[104] The nature of NSFG data did not allow authors to identify exams that occurred during a contraceptive encounter, or the full range of potential indications. Additionally, this analysis focused exclusively on commercially insured women, who are less likely than women with Medicaid coverage to receive a compulsory exam prior to contraceptive provision.[93] Prior research suggests that AYAs are more likely to have a negative experience with pelvic examinations, and the finding that AYAs received non-indicated exams only slightly less frequently than their older counterparts is an area for improvement.[157] It is, however, promising that this difference has widened in recent years, which may be due to changes in cervical cancer screening guidelines for younger women.

While these data have many advantages, administrative claims also have limitations, including their inability to provide insights into services or diagnoses that were not coded. This could bias results if OBGYNs are more likely to see patients with an indication for pelvic exam or less likely to code indications for pelvic exams. The analysis of differential time trends by specialty addresses this

issue to a certain extent, as it is unlikely that differences in the patient population seen by each specialty changed dramatically over the study period. The sensitivity analysis of appropriate pelvic exam administration at IUD encounters also suggests patient heterogeneity is not entirely responsible for the variation. This analysis did demonstrate, however, that family practice physicians were significantly less likely to bill for a pelvic exam at an IUD encounter, and other physicians were substantially more likely to bill for the exam, meaning these physicians may be under-coding and over-coding the procedure, respectively. Because FPPs oversaw the second-highest proportion of contraceptive encounters and had the lowest rate and increase in non-indicated exams over the study period, I do not expect that under-coding is the primary driver of variation for this group.

It is possible that observed increases in non-indicated pelvic exams over the study period were driven by an increased reliance on electronic health systems designed to maximize billable services, where either (1) not all billed exams were actually performed, or (2) providers were increasingly likely to document and bill for performed services over time. Additionally, guidelines against pelvic examination at contraceptive encounters apply to average or low-risk patients, and the greater increase among older women may be due to undercoding of indications among those with an increased risk of gynecologic health issues. Alternatively, older patients may have more prior exposure to

pelvic examinations resulting in different levels of comfort and/or expectations around receiving the exam in non-indicated situations.

Finally, the study sample consisted of commercially-insured women, and therefore does not capture potentially unnecessary exams administered to publicly-insured women. Clinicians who provide care to individuals with Medicaid coverage are more likely to require pelvic examinations for contraceptive prescription, and consequently this study likely underestimates the national prevalence of concurrent examination.[158] Because women with Medicaid coverage already disproportionately experience structural and provider-based barriers to care, it is important that future research examine variation in non-indicated pelvic exams among women with public versus commercial coverage, and the extent to which unnecessary exams influence disparities SRH care seeking and outcomes. Medicaid and all-payer claims data have potential to provide insights into these questions.

This study evaluated the prevalence of potentially unnecessary pelvic examinations during contraceptive encounters among a sample of commercially insured women. There is no contraceptive-related medical need for pelvic examination with the exception of the IUD, and because the procedure causes anxiety, fear, and discomfort, unnecessary administration may cause women, especially adolescents and young adults, to forgo needed sexual and reproductive healthcare. Unnecessary administration of the exam without

discussion of potential benefits and harms is also inconsistent with patient-centered care and shared decision making. Continuing education for clinicians is important to support evidence-based practice, especially when new protocols conflict with prior training. Reimbursement policy reform is also needed to ensure that there are no financial incentives for performing unnecessary pelvic exams. Future research should examine the extent and consequences of unnecessary examinations in vulnerable populations, including women with mental health conditions or history of sexual violence. Additionally, understanding the effects of more recent clinical guidelines on pelvic examination during non-contraceptive encounters will provide insights into the utility of clinical guidelines for changing clinician behavior. Finally, more reliable evidence on clinical and other intangible consequences of non-indicated pelvic examination is needed to inform evidence-based practice.

CHAPTER 5: CONCLUSION

More so than most other health services, the use and provision of sexual and reproductive healthcare is highly politicized. Understandably, much research and popular media focus on state and federal regulations explicitly designed to restrict access to care. My goal with this dissertation was to examine the extent to which elements of healthcare financing and service delivery implicitly obstruct access to SRH care.

Chapter 2 addresses an established issue in the SRH literature-confidentiality concerns as a barrier to care. The unique contributions of this work include a focus on young adults, who are largely overlooked in this literature, the analysis of insurance use behavior as opposed to service use, and the range of SRH outcomes examined, including contraception, STI testing, pap testing, and PrEP. Chapter 2 demonstrates that young adults with parental coverage are less likely to use their insurance to pay for SRH care than their counterparts with parental coverage. Descriptive analysis of NSFG data also confirms prior research on sociodemographic differences between young adults with parental and policyholder coverage while identifying no major differences in sexual behavior between females in these groups. This finding supports the hypothesis that differences in insurance use for services between females with parental and policyholder coverage are a consequence of privacy concerns as opposed to SRH service needs. The finding that young adult men with policyholder coverage

are more likely than those with parental coverage to report sex with men likely accounts for differences in PrEP use. Future research in this area should connect these questions to identify the extent to which insurance use for confidential services is a consequence of systematic differences in SRH service need or care-seeking behaviors between individuals with parental versus policyholder coverage.

I expand on this work to evaluate the impact of the national dependent coverage expansion on insurance use for STI testing, contraception, and pap testing (Chapter 3). Given the negative relationship between parental coverage and insurance use identified in chapter 1, my goal was to understand if and how the expansion influenced insurance use for these confidential services. Findings from this study demonstrate that ACA-DCE implementation was associated with an aggregate reduction in insurance use for STI testing, contraception, and pap testing among 23–25 year-old females newly eligible for parental coverage. This is the first study to examine the relationship between the national dependent coverage expansion and insurance use for care. Future research should examine if and to what extent use of Title X funded services among young adults changed over this time period.

These findings raise questions about the capacity of parental coverage expansions to improve access to confidential SRH care that young adults are most likely to need and use. Additionally, if this population is not using their

insurance to pay for care do to confidentiality concerns, they are not able to take advantage of other ACA provisions including the contraceptive and preventative service mandates. It is important to note that the population studied in this research, and those who benefitted most from the DCE, are more likely to be white, have higher levels of education, and come from middle and upper-middle class households. These individuals are not typically considered a marginalized or disadvantaged group. Findings from this research highlight the disproportionate consequences of tying health insurance to employment on women and young adults (who are most likely to be covered as a dependent and to need confidential services), even for those we expect to have fewer cost-related barriers to care.

Chapter 4 examines prevalence and trends in non-indicated pelvic exams performed during contraceptive encounters, along with variations by provider specialty and patient age. Findings from this study demonstrate a substantial increase in pelvic exams performed at contraceptive visits from 2007 to 2017, and higher rates of provision by obstetrician-gynecologists. This is the first study to leverage administrative data to examine potentially unnecessary pelvic exams, providing insight into provider-based barriers to contraception that do not rely on self-reported behaviors. While the nature of these data did not allow examination of the extent to which providers are “holding contraception hostage”, findings suggest that non-indicated pelvic examinations performed during contraceptive

encounters is a common practice that is on the rise. Additional research is needed to better understand the nature and extent of specialty variations and financial incentives for performing unnecessary pelvic exams. This research could leverage changes in payment methods, regional variations in OBGYN density, or changes in state policies allowing pharmacists to prescribe hormonal contraception.

Allowing over-the-counter access to hormonal contraception is one tangible policy solution to compulsory pelvic examinations for contraceptive prescription. Research shows that pharmacists are interested in providing, and women are interested in obtaining OTC contraception.[161,162] Eleven states and the District of Columbia currently allow “behind the counter” access to certain contraceptives, where pharmacists conduct a brief health assessment for contraindications before prescribing. In 2019, ACOG updated their 2012 recommendation to support of over-the-counter sale of all non-IUD hormonal methods- the organization had previously endorsed OTC provision of the oral contraceptive only.[91] While moving contraception OTC would improve access for some, if it is not covered by insurance, doing so will likely increase cost-related barriers to care for many.

Withholding contraception until patients undergo a pelvic exam, or otherwise performing an unnecessary pelvic exam also has ethical implications. The practice has been characterized as paternalistic, a violation of autonomy, and contrary to consent.[163] Policies around obtaining informed consent before

performing a pelvic exam vary by medical institution and state. State-level policies primarily focus on the practice of training medical students to perform pelvic exams on anesthetized women. Underlying these policies are the assumptions that patients have equal power and information to decline an exam, and that providers are explicitly seeking consent in situations where the patient is *not* unconscious. The fact that many clinicians learn to perform pelvic exams on anesthetized women may also contribute to their attitudes around consent.

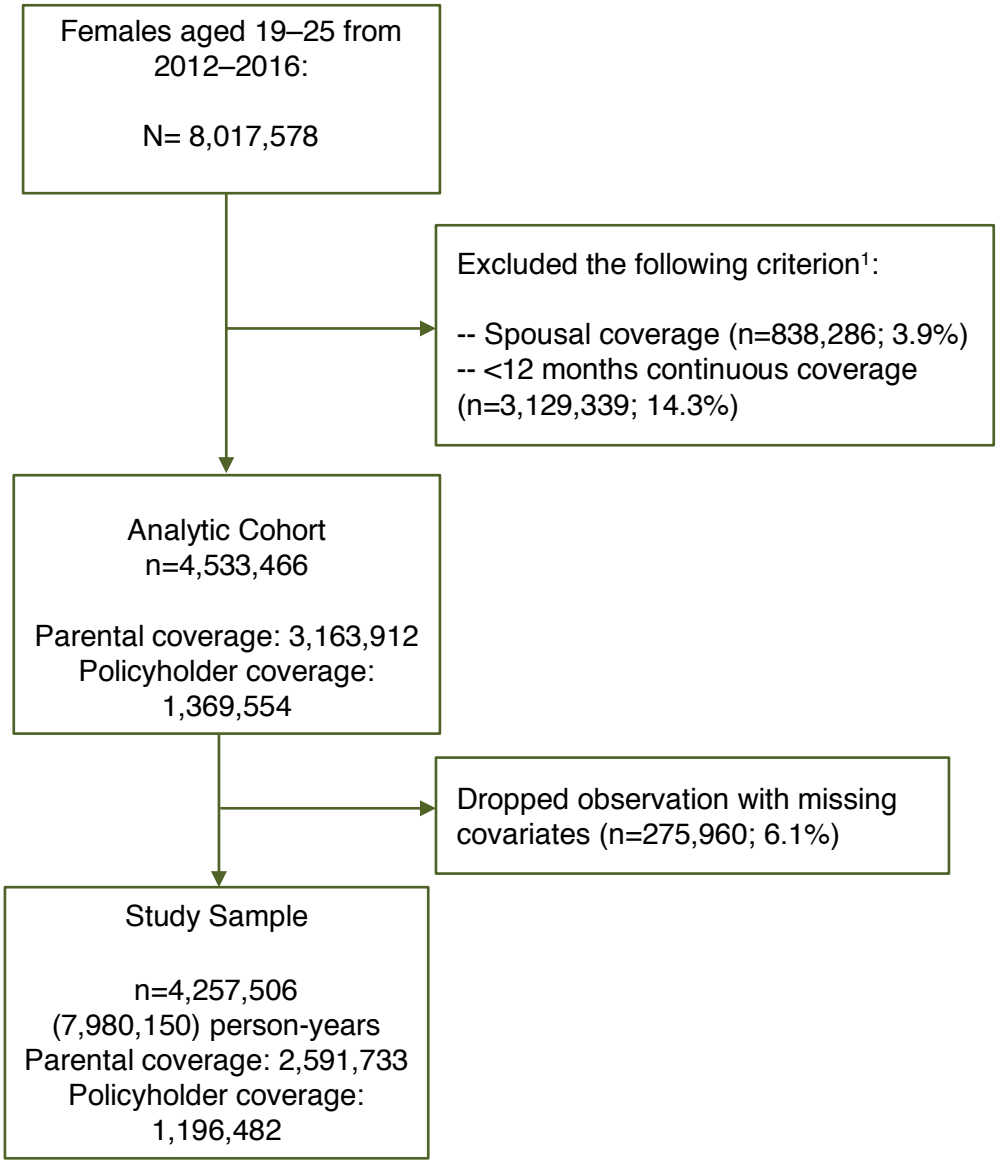
Finally, if providers are financially incentivized to perform pelvic exams, these practices are unlikely to change under current billing requirements. The provision of contraception-related services, while essential, is undervalued. Recently developed contraceptive quality measures have potential to shift provider reimbursement to reflect the importance of these services, though they may also incentivize providers to promote the most effective methods, without regard for patient values and preferences. Ultimately, the issue highlights a salient conflict between professional ethics and the profit-oriented demands of clinicians and medical institutions.

Together, these studies highlight issues of patient privacy and autonomy endemic to American institutions of health financing and service delivery. As mentioned earlier, research and public discourse on SRH care often centers politically-motivated restrictions or otherwise hostile policies on access to SRH care. Moving forward, it will be necessary to situate SRH services research within larger health equity principles and efforts. Doing so will be essential to ensure

that eventual financing and systems reform explicitly protects comprehensive, person-centered SRH care for those most likely to need and use these services.

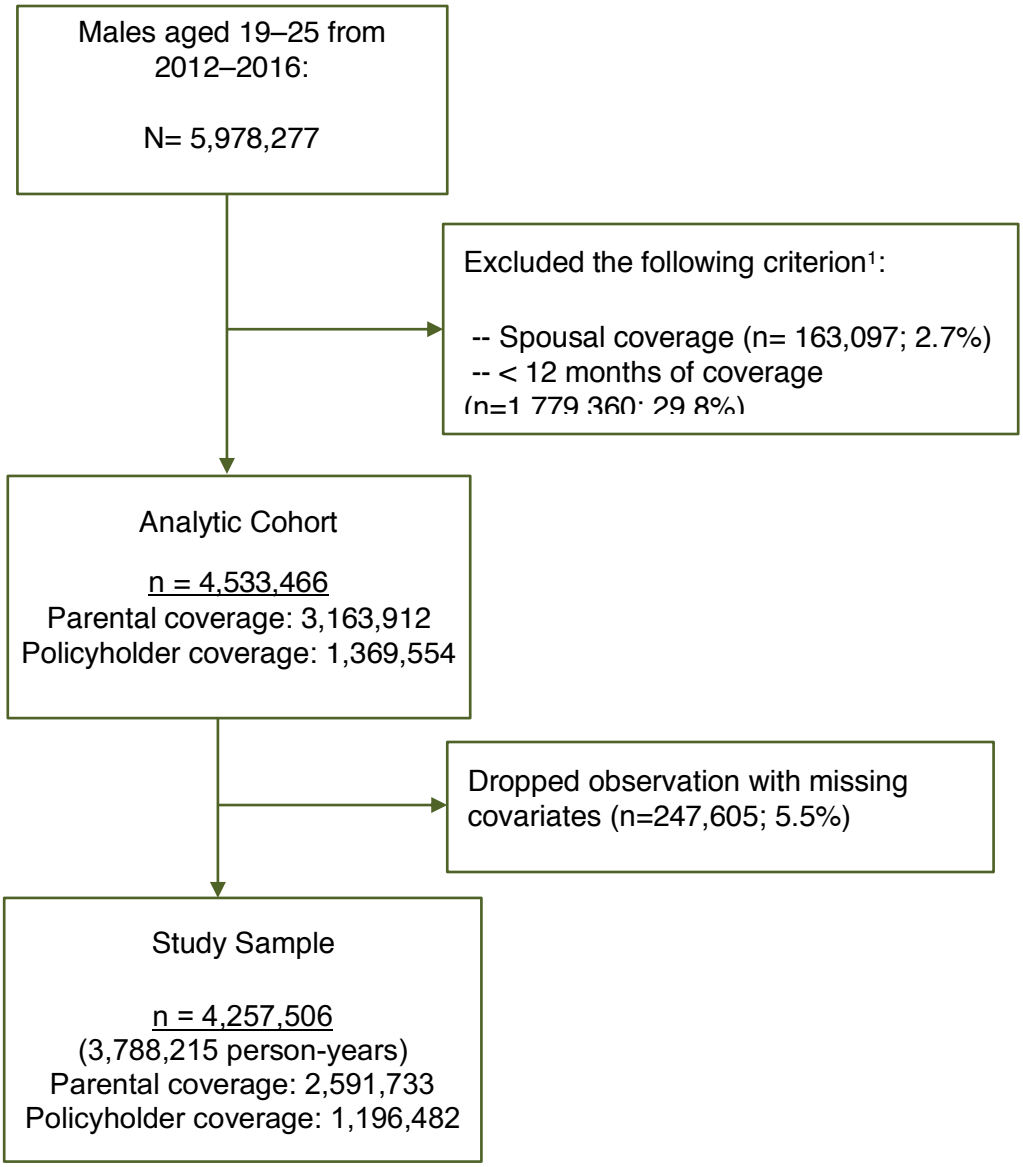
APPENDIX A: SUPPLEMENTAL MATERIALS FOR CHAPTER 2

Figure A1: Sample selection: Females



[1]*Exclusions are not mutually-exclusive*

Figure A2: Sample selection: Males



[1]*Exclusions are not mutually-exclusive*

Table A1. Pap test

Code	Definition	Code system
88141	Cytopathology, cervical or vaginal (any reporting system), requiring interpretation by physician	CPT
88142	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; manual screening under physician supervision	CPT
88143	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; with manual screening and rescreening under physician supervision	CPT
88147	Cytopathology smears, cervical or vaginal; screening by automated system under physician supervision	CPT
88148	Cytopathology smears, cervical or vaginal; screening by automated system with manual rescreening under physician supervision	CPT
88150	Cytopathology, slides, cervical or vaginal; manual screening under physician supervision	CPT
88152	Cytopathology, slides, cervical or vaginal; with manual screening and rescreening under physician supervision	CPT
88153	Cytopathology, slides, cervical or vaginal; with manual screening and rescreening under physician supervision	CPT
88154	Cytopathology, slides, cervical or vaginal; with manual screening and computer-assisted re screening using cell selection and review under physician supervision	CPT
88164	Cytopathology, slides, cervical or vaginal (the Bethesda System); manual screening under physician supervision	CPT
88165	Cytopathology, slides, cervical or vaginal (the Bethesda System); with manual screening and rescreening under physician supervision	CPT
88166	Cytopathology, slides, cervical or vaginal (the Bethesda System); with manual screening and computer-assisted rescreening under physician supervision	CPT
88167	Cytopathology, slides, cervical or vaginal (the Bethesda System); with manual screening and computer-assisted rescreening using cell selection and review under physician supervision	CPT
88174	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; screening by automated system, under physician supervision	CPT
88175	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; with screening by automated system and manual rescreening or review, under physician supervision	CPT
G0123	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, screening by cytotechnologist under physician supervision (G0123)	HCPCS
G0124	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, requiring interpretation by physician (G0124)	HCPCS

G0141	Screening cytopathology smears, cervical or vaginal, performed by automated system, with manual rescreening, requiring interpretation by physician (G0141)	HCPCS
G0143	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, with manual screening and rescreening by cytotechnologist under physician supervision (G0143)	HCPCS
G0144	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, with screening by automated system, under physician supervision (G0144)	HCPCS
G0145	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, with screening by automated system and manual rescreening under physician supervision (G0145)	HCPCS
G0147	Screening cytopathology smears, cervical or vaginal, performed by automated system under physician supervision (G0147)	HCPCS
G0148	Screening cytopathology smears, cervical or vaginal, performed by automated system with manual rescreening (G0148)	HCPCS
P3000	Screening papanicolaou smear, cervical or vaginal, up to three smears, by technician under physician supervision (P3000)	HCPCS
P3001	Screening papanicolaou smear, cervical or vaginal, up to three smears, requiring interpretation by physician (P3001)	HCPCS
Q0091	Screening papanicolaou smear; obtaining, preparing and conveyance of cervical or vaginal smear to laboratory (Q0091)	HCPCS
79500	Abnormal glandular Papanicolaou smear of cervix	ICD-9
79501	Papanicolaou smear of cervix with atypical squamous cells of undetermined significance (ASC-US)	ICD-9
79502	Papanicolaou smear of cervix with atypical squamous cells cannot exclude high grade squamous intraepithelial lesion (ASC-H)	ICD-9
79503	Papanicolaou smear of cervix with low grade squamous intraepithelial lesion (LGSIL)	ICD-9
79504	Papanicolaou smear of cervix with high grade squamous intraepithelial lesion (HGSIL)	ICD-9
79505	Cervical high risk human papillomavirus (HPV) DNA test positive	ICD-9
79506	Papanicolaou smear of cervix with cytologic evidence of malignancy	ICD-9
79507	Satisfactory cervical smear but lacking transformation zone	ICD-9
79508	Unsatisfactory cervical cytology smear	ICD-9
79509	Other abnormal Papanicolaou smear of cervix and cervical HPV	ICD-9
79510	Abnormal glandular Papanicolaou smear of vagina	ICD-9
79511	Papanicolaou smear of vagina with atypical squamous cells of undetermined significance (ASC-US)	ICD-9
79512	Papanicolaou smear of vagina with atypical squamous cells cannot exclude high grade squamous intraepithelial lesion (ASC-H)	ICD-9
79513	Papanicolaou smear of vagina with low grade squamous intraepithelial lesion (LGSIL)	ICD-9
79514	Papanicolaou smear of vagina with high grade squamous intraepithelial lesion (HGSIL)	ICD-9

79515	Vaginal high risk human papillomavirus (HPV) DNA test positive	ICD-9
79516	Papanicolaou smear of vagina with cytologic evidence of malignancy	ICD-9
79518	Unsatisfactory vaginal cytology smear	ICD-9
79519	Other abnormal Papanicolaou smear of vagina and vaginal HPV	ICD-9
79670	Abnormal glandular Papanicolaou smear of anus	ICD-9
79671	Papanicolaou smear of anus with atypical squamous cells of undetermined significance (ASC-US)	ICD-9
79672	Papanicolaou smear of anus with atypical squamous cells cannot exclude high grade squamous intraepithelial lesion (ASC-H)	ICD-9
79673	Papanicolaou smear of anus with low grade squamous intraepithelial lesion (LGSIL)	ICD-9
79674	Papanicolaou smear of anus with high grade squamous intraepithelial lesion (HGSIL)	ICD-9
79675	Anal high risk human papillomavirus (HPV) DNA test positive	ICD-9
79676	Papanicolaou smear of anus with cytologic evidence of malignancy	ICD-9
79677	Satisfactory anal smear but lacking transformation zone	ICD-9
79678	Unsatisfactory anal cytology smear	ICD-9
79679	Other abnormal Papanicolaou smear of anus and anal HPV	ICD-9
V7232	Encounter for Papanicolaou cervical smear to confirm findings of recent normal smear following initial abnormal smear	ICD-9
88155	Cytopathology on vaginal smear with definitive hormonal evaluation	
R85610	Atypical squamous cells of undetermined significance on cytologic smear of anus (ASC-US)	ICD-10
R85611	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of anus (ASC-H)	ICD-10
R85612	Low grade squamous intraepithelial lesion on cytologic smear of anus (LGSIL)	ICD-10
R85613	High grade squamous intraepithelial lesion on cytologic smear of anus (HGSIL)	ICD-10
R85619	Unspecified abnormal cytological findings in specimens from anus	ICD-10
R87610	Atypical squamous cells of undetermined significance on cytologic smear of cervix (ASC-US)	ICD-10
R87611	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of cervix (ASC-H)	ICD-10
R87612	Low grade squamous intraepithelial lesion on cytologic smear of cervix (LGSIL)	ICD-10
R87613	High grade squamous intraepithelial lesion on cytologic smear of cervix (HGSIL)	ICD-10
R87614	Cytologic evidence of malignancy on smear of cervix	ICD-10
R87615	Unsatisfactory cytologic smear of cervix	ICD-10
R87616	Satisfactory cervical smear but lacking transformation zone	ICD-10
R87619	Unspecified abnormal cytological findings in specimens from cervix uteri	ICD-10
R87620	Atypical squamous cells of undetermined significance on cytologic smear of vagina (ASC-US)	ICD-10

R87621	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of vagina (ASC-H)	ICD-10
R87622	Low grade squamous intraepithelial lesion on cytologic smear of vagina (LGSIL)	ICD-10
R87623	High grade squamous intraepithelial lesion on cytologic smear of vagina (HGSIL)	ICD-10
R87624	Cytologic evidence of malignancy on smear of vagina	ICD-10
R87625	Unsatisfactory cytologic smear of vagina	ICD-10
R87628	Other abnormal cytological findings on specimens from vagina	ICD-10
R87628	Other abnormal cytological findings on specimens from vagina	ICD-10
R87810	Cervical high risk human papillomavirus (HPV) DNA test positive	ICD-10
R87811	Vaginal high risk human papillomavirus (HPV) DNA test positive	ICD-10
R87820	Cervical low risk human papillomavirus (HPV) DNA test positive	ICD-10
Z124	Encounter for screening for malignant neoplasm of cervix	ICD-10

Table A2. Sexually Transmitted Infection Screen

Code	Definition	Code system
86631	Antibody; Chlamydia	CPT
86632	Antibody; Chlamydia, IgM	CPT
87110	Culture, chlamydia, any source	CPT
87164	Dark field examination, any source (eg, penile, vaginal, oral, skin); includes specimen collection	CPT
87166	Dark field examination, any source (eg, penile, vaginal, oral, skin); without collection	CPT
87270	Infectious agent antigen detection by immunofluorescent technique; Chlamydia trachomatis	CPT
87320	Detection test for chlamydia	CPT
87490	Infectious agent detection by nucleic acid (DNA or RNA); Chlamydia trachomatis, direct probe technique	CPT
87491	Chlamydia trachomatis detection by nucleic acid using amplified probe technique	CPT
87492	Detection test for chlamydia	CPT
87590	Neisseria gonorrhoeae detection by nucleic acid using direct probe technique	CPT
87591	Infectious agent detection by nucleic acid (DNA or RNA); Neisseria gonorrhoeae, amplified probe technique	CPT
87592	Neisseria gonorrhoeae quantification by nucleic acid	CPT
86592	Syphilis test, non-treponemal antibody; qualitative (eg, VDRL, RPR, ART)	CPT
86593	Syphilis test, non-treponemal antibody; quantitative	CPT
87660	Infectious agent detection by nucleic acid (DNA or RNA); Trichomonas vaginalis, direct probe technique	CPT
87661	Infectious agent detection by nucleic acid (DNA or RNA); Trichomonas vaginalis, amplified probe technique	CPT
87808	Infectious agent antigen detection by immunoassay with direct optical observation; Trichomonas vaginalis	CPT
87810	Infectious agent antigen detection by immunoassay with direct optical observation; Chlamydia trachomatis	CPT
87850	Infectious agent antigen detection by immunoassay with direct optical observation; Neisseria gonorrhoeae	CPT
G0475	HIV antigen/antibody, combination assay, screening (G0475)	HCPCS
V016	Contact with or exposure to venereal diseases	ICD-9
V7381	Special screening examination for Human papillomavirus (HPV)	ICD-9
V7388	Special screening examination for other specified chlamydial diseases	ICD-9
V7398	Special screening examination for unspecified chlamydial disease	ICD-9
V745	Screening examination for venereal disease	ICD-9
V769	Special screening for unspecified malignant neoplasms	ICD-9
Z113	Encounter for screening for infections with a predominantly sexual mode of transmission	ICD-10
Z114	Encounter for screening for human immunodeficiency virus [HIV]	ICD-10

Z1151	Encounter for screening for human papillomavirus (HPV)	ICD-10
Z202	Contact with and (suspected) exposure to infections with a predominantly sexual mode of transmission	ICD-10

Table A3. Contraception

Code	Definition	Code system
11976	Removal, implantable contraceptive capsules	CPT
57170	Diaphragm or cervical cap fitting with instructions	CPT
58300	Insertion of intrauterine device (IUD)	CPT
58301	Removal of intrauterine device (IUD)	CPT
11981	Insertion, non-biodegradable drug delivery implant	HCPCS
11982	Removal, non-biodegradable drug delivery implant	HCPCS
11983	Removal with reinsertion, non-biodegradable drug delivery implant	HCPCS
J7300	Intrauterine copper contraceptive	HCPCS
J7301	Levonorgestrel-releasing intrauterine contraceptive system, 13.5 mg	HCPCS
J7302	Levonorgestrel-releasing intrauterine contraceptive system, 52 mg	HCPCS
S4989	Contraceptive intrauterine device (e.g., progestacert iud), including implants and supplies	HCPCS
Q0090	Levonorgestrel-releasing intrauterine contraceptive system, 13.5 mg	HCPCS
S4981	Insertion of levonorgestrel-releasing intrauterine system	HCPCS
J7297	Levonorgestrel-releasing intrauterine contraceptive system, 52 mg, 3 year duration	HCPCS
J7298	Levonorgestrel-releasing intrauterine contraceptive system, 52 mg	HCPCS
J7306	Levonorgestrel (contraceptive) implant system, including implants and supplies	HCPCS
J7307	Etonogestrel (contraceptive) implant system, including implant and supplies	HCPCS
J1050	Injection, medroxyprogesterone acetate, 1 mg	HCPCS
J7304	Contraceptive supply, hormone containing patch, each	HCPCS
J7303	Contraceptive supply, hormone containing vaginal ring, each	HCPCS
A4266	Diaphragm for contraceptive use	HCPCS
A4261	Cervical cap for contraceptive use	HCPCS
S4993	Contraceptive pills for birth control	HCPCS
J7298	Levonorgestrel-releasing intrauterine contraceptive system, 52 mg, 5 year duration	HCPCS
Z30011	Encounter for initial prescription *of* contraceptive pills	ICD-10
Z30012	Encounter for prescription of emergency contraception	ICD-10
Z30013	Encounter for initial prescription *of* injectable contraceptive	ICD-10
Z30014	Encounter for initial prescription of intrauterine contraceptive device	ICD-10
Z30018	Encounter for initial prescription of other contraceptives	ICD-10
Z30019	Encounter for initial prescription of contraceptives, unspecified	ICD-10
Z3009	Encounter for other general counseling and advice on contraception	ICD-10
Z3040	Encounter for surveillance of contraceptives, unspecified	ICD-10

Z3041	Encounter for surveillance of contraceptive pills	ICD-10
Z3042	Encounter for surveillance of injectable contraceptive	ICD-10
Z30430	Encounter for insertion of intrauterine contraceptive device	ICD-10
Z30431	Encounter for routine checking of intrauterine contraceptive device	ICD-10
Z30432	Encounter for removal of intrauterine contraceptive device	ICD-10
Z30433	Encounter for removal and reinsertion of intrauterine contraceptive device	ICD-10
Z3049	Encounter for surveillance of other contraceptives	ICD-10
Z308	Encounter for other contraceptive management	ICD-10
Z309	Encounter for contraceptive management, unspecified	ICD-10
99632	Intrauterine device malfunction	ICD-9
V2511	Encounter for insertion of intrauterine contraceptive device	ICD-9
V2501	General counseling on prescription of oral contraceptives	ICD-9
V2502	General counseling on initiation of other contraceptive measures	ICD-9
V2503	Encounter for emergency contraceptive counseling and prescription	ICD-9
V2509	Other general counseling and advice on contraceptive management	ICD-9
V2512	Encounter for removal of intrauterine device	ICD-9
V2513	Encounter for removal and reinsertion of intrauterine contraceptive device	ICD-9
V2540	Contraceptive surveillance, unspecified	ICD-9
V2541	Surveillance of contraceptive pill	ICD-9
V2543	Surveillance of implantable subdermal contraceptive	ICD-9
V2549	Surveillance of other contraceptive method	ICD-9
V2542	Surveillance of intrauterine contraceptive device	ICD-9
V2543	Surveillance of implantable subdermal contraceptive	ICD-9
V2549	Surveillance of other contraceptive method	ICD-9
V255	Insertion of implantable subdermal contraceptive	ICD-9
V258	Other specified contraceptive management	ICD-9
V259	Unspecified contraceptive management	ICD-9
V251	Encounter for insertion or removal of intrauterine contraceptive device	ICD-9
V254	Surveillance of previously prescribe contraceptive methods	ICD-9

*For ease of presentation, NDC codes are not included. There were 4 NDC codes used to identify the subdermal implant, 32 for the injectable, 14 for the intrauterine device, 9 for the patch, 8 for the ring, 63 for the diaphragm, and 547 for the oral contraceptive pill

Table A4. PrEP, HIV, Hepatitis B

Code	Definition	Code system
35356007003 35356007006 35356007030 50090087000 50090087002 50090087003 50436070101 52959096903 54569558800 54569558802 54569558803 54868514100 55045348103 61919066902 61958070101 61958070301 61958070401 61958070501 66336003203 68258198303	Emtricitabine / Tenofovir disoproxil fumarate Oral Tablet (Truvada)	NDC
042	Human immunodeficiency virus [HIV] disease	ICD-9
043	HIV infection causing other specified condition	ICD-9
044	Other HIV infection	ICD-9
B20	Human immunodeficiency virus [HIV] disease	ICD-10
B21	Human immunodeficiency virus [HIV] disease resulting in malignant neoplasms	ICD-10
B22	Human immunodeficiency virus [HIV] disease resulting in other specified diseases	ICD-10
B24	Unspecified human immunodeficiency virus [HIV] disease	ICD-10
07020	Viral hepatitis B with hepatic coma, acute or unspecified	ICD-9
07030	Viral hepatitis B without mention of hepatic coma, acute or unspecified	ICD-9
07052	Hepatitis delta without mention of active hepatitis B disease or hepatic coma	ICD-9
V0261	Hepatitis B carrier	ICD-9
B16	Acute hepatitis B	ICD-10
B161	Acute hepatitis B with delta-agent without hepatic coma	ICD-10
B162	Acute hepatitis B without delta-agent with hepatic coma	ICD-10
B169	Acute hepatitis B without delta-agent and without hepatic coma	ICD-10

Table A5. Emergency department visit

Code	Definition	Code system
99281	Emergency department visit for the evaluation and management of a patient	CPT
99282		CPT
99283		CPT
99284		CPT
99285		CPT

Table A6. Full regression output: adjusted odds of insurance use for STI test by women with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf.	Interval]
Parental	0.879	0.013	<0.001	0.855	0.905
Plan type					
EPO	1.102	0.139	0.439	0.861	1.411
HMO	1.053	0.122	0.655	0.839	1.323
POS	0.993	0.110	0.951	0.800	1.233
PPO	0.974	0.106	0.806	0.787	1.204
CDHP/HDHP	0.919	0.095	0.416	0.751	1.126
Year					
2013	1.045	0.015	0.002	1.017	1.075
2014	1.073	0.015	<0.001	1.045	1.102
2015	1.107	0.021	<0.001	1.067	1.149
2016	1.200	0.028	<0.001	1.146	1.255
Age					
20	1.170	0.009	<0.001	1.152	1.188
21	1.273	0.017	<0.001	1.241	1.306
22	1.250	0.021	<0.001	1.210	1.293
23	1.228	0.026	<0.001	1.177	1.281
24	1.172	0.029	<0.001	1.116	1.231
25	1.032	0.028	0.257	0.978	1.089
MSA	1.276	0.028	<0.001	1.223	1.331
Deductible ≥ $1,000	1.496	0.019	<0.001	1.459	1.533
Comorbidities					
1	1.149	0.008	<0.001	1.133	1.165
2	1.275	0.016	<0.001	1.244	1.307
3+	1.424	0.023	<0.001	1.380	1.468

Table A7. Full regression output: adjusted odds of contraceptive use by women with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf. Interval]	
Parental	0.962	0.016	0.050	0.916	0.987
Plan type					
EPO	0.600	0.052	<0.001	0.507	0.710
HMO	1.080	0.126	0.509	0.859	1.357
POS	1.008	0.085	0.929	0.854	1.189
PPO	0.970	0.060	0.629	0.860	1.096
CDHP/HDHP	1.135	0.083	0.082	0.984	1.310
MSA	1.054	0.030	0.063	0.997	1.113
Year					
2013	1.107	0.016	<0.001	1.076	1.139
2014	1.121	0.030	<0.001	1.064	1.182
2015	1.296	0.032	<0.001	1.234	1.360
2016	1.226	0.033	<0.001	1.163	1.291
Age					
20	1.028	0.004	<0.001	1.020	1.036
21	1.037	0.007	<0.001	1.023	1.051
22	1.054	0.013	<0.001	1.030	1.079
23	1.054	0.017	0.002	1.020	1.089
24	1.041	0.022	0.055	0.999	1.084
25	1.066	0.028	0.015	1.013	1.123
Deductible ≥ $1,000	1.057	0.017	0.001	1.025	1.091
Comorbidities					
1	0.928	0.005	<0.001	0.919	0.938
2	0.913	0.008	<0.001	0.897	0.929
3+	0.860	0.010	<0.001	0.841	0.879

Table A8. Full regression output: adjusted odds of insurance use for contraceptive pill use by women with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf. Interval]	
Parental	1.013	0.017	0.749	0.974	1.049
Plan type					
EPO	0.607	0.060	<0.001	0.500	0.738
HMO	1.072	0.130	0.565	0.845	1.360
POS	1.009	0.092	0.924	0.844	1.205
PPO	0.990	0.071	0.893	0.861	1.139
CDHP/HDHP	1.192	0.095	0.028	1.019	1.395
Year					
2013	1.020	0.015	0.19	0.990	1.050
2014	1.008	0.026	0.755	0.958	1.061
2015	1.123	0.029	<0.001	1.067	1.182
2016	1.059	0.029	0.036	1.004	1.117
MSA	1.090	0.026	<0.001	1.040	1.141
Age					
20	1.011	0.003	0.001	1.005	1.018
21	1.008	0.006	0.144	0.997	1.019
22	1.018	0.010	0.076	0.998	1.038
23	1.012	0.014	0.363	0.986	1.039
24	0.993	0.017	0.695	0.960	1.027
25	1.016	0.022	0.464	0.973	1.061
Deductible ≥ $1,000	0.992	0.019	0.676	0.956	1.030
Comorbidities					
1	0.890	0.006	<0.001	0.879	0.902
2	0.838	0.008	<0.001	0.821	0.854
3+	0.748	0.010	<0.001	0.728	0.768

Table A9. Full regression output: adjusted odds of insurance use for LARC by women with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf. Interval]	
Parental	0.816	0.013	<0.001	0.791	0.843
Plan type					
EPO	0.860	0.055	0.018	0.758	0.975
HMO	1.073	0.060	0.211	0.961	1.198
POS	1.001	0.063	0.992	0.884	1.133
PPO	0.929	0.051	0.176	0.834	1.034
CDHP/HDHP	0.857	0.052	0.011	0.762	0.965
Year					
2013	1.744	0.047	<0.001	1.653	1.839
2014	2.023	0.053	<0.001	1.922	2.129
2015	2.401	0.073	<0.001	2.263	2.548
2016	2.464	0.077	<0.001	2.318	2.619
MSA	0.869	0.032	<0.001	0.809	0.934
Age					
20	0.999	0.008	0.902	0.984	1.014
21	0.982	0.014	0.221	0.955	1.011
22	0.960	0.020	0.054	0.921	1.001
23	0.925	0.024	0.003	0.878	0.974
24	0.902	0.026	<0.001	0.852	0.954
25	0.859	0.027	<0.001	0.808	0.914
Deductible ≥ $1,000	1.306	0.019	<0.001	1.269	1.344
Comorbidities					
1	1.201	0.012	<0.001	1.177	1.225
2	1.427	0.022	<0.001	1.385	1.471
3+	1.657	0.034	<0.001	1.592	1.725

Table A10. Full regression output: adjusted odds of insurance use for pap test by women with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf. Interval]	
Parental	0.770	0.012	<0.001	0.744	0.798
Plan type					
EPO	1.051	0.030	0.081	0.994	1.111
HMO	0.954	0.028	0.107	0.901	1.010
POS	1.006	0.026	0.83	0.956	1.058
PPO	1.078	0.023	<0.001	1.034	1.123
CDHP/HDHP	1.049	0.019	0.009	1.012	1.086
Year					
2013	0.849	0.009	<0.001	0.832	0.866
2014	0.726	0.008	<0.001	0.710	0.742
2015	0.656	0.010	<0.001	0.637	0.675
2016	0.557	0.009	<0.001	0.540	0.574
Age					
20	2.935	0.105	<0.001	2.737	3.148
21	5.268	0.249	<0.001	4.802	5.780
22	5.178	0.211	<0.001	4.780	5.608
23	5.479	0.216	<0.001	5.072	5.918
24	5.767	0.222	<0.001	5.348	6.219
25	5.660	0.207	<0.001	5.268	6.082
MSA	1.072	0.012	<0.001	1.048	1.097
Deductible ≥ $1,000	1.187	0.010	<0.001	1.167	1.208
Comorbidities					
1	1.029	0.008	<0.001	1.013	1.045
2	1.048	0.015	0.001	1.018	1.078
3+	1.011	0.018	0.554	0.976	1.047

Table A11. Full regression output: adjusted odds of insurance use for ED visit by women with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf. Interval]	
Parental	0.943	0.013	<0.001	0.922	0.970
Plan type					
EPO	0.918	0.081	0.332	0.773	1.091
HMO	0.914	0.097	0.396	0.741	1.126
POS	0.900	0.094	0.316	0.733	1.105
PPO	0.787	0.072	0.009	0.658	0.942
CDHP/HDHP	0.528	0.053	<0.001	0.433	0.644
MSA	0.850	0.023	<0.001	0.807	0.895
Year					
2013	0.994	0.017	0.716	0.961	1.028
2014	0.997	0.019	0.861	0.960	1.035
2015	0.955	0.020	0.025	0.917	0.994
2016	0.981	0.021	0.372	0.940	1.023
Age					
20	0.985	0.004	<0.001	0.978	0.992
21	0.941	0.006	<0.001	0.929	0.952
22	0.855	0.008	<0.001	0.839	0.871
23	0.790	0.008	<0.001	0.774	0.805
24	0.734	0.009	<0.001	0.717	0.752
25	0.637	0.010	<0.001	0.618	0.656
Deductible ≥ $1,000	4.037	0.188	<0.001	3.684	4.424
Comorbidities					
1	2.100	0.020	<0.001	2.062	2.139
2	3.708	0.083	<0.001	3.550	3.874
3+	7.340	0.292	<0.001	6.790	7.935

Table A12. Full regression output: adjusted odds of insurance use STI test by men with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf.	Interval]
Parental	0.816	0.029	<0.001	0.762	0.875
Year					
2013	1.071	0.011	<0.001	1.051	1.092
2014	1.178	0.019	<0.001	1.141	1.216
2015	1.288	0.019	<0.001	1.252	1.325
2016	1.449	0.023	<0.001	1.405	1.495
Plan type					
EPO	0.984	0.093	0.866	0.817	1.185
HMO	1.048	0.157	0.754	0.781	1.407
POS	0.975	0.098	0.804	0.801	1.188
PPO	0.867	0.084	0.141	0.717	1.049
CDHP/HDHP	0.850	0.085	0.103	0.699	1.034
age					
20	1.143	0.018	<0.001	1.108	1.178
21	1.244	0.033	<0.001	1.180	1.311
22	1.298	0.046	<0.001	1.211	1.391
23	1.323	0.050	<0.001	1.229	1.424
24	1.317	0.053	<0.001	1.217	1.426
25	1.242	0.055	<0.001	1.139	1.355
MSA	1.575	0.063	<0.001	1.457	1.703
Deductible ≥ $1,000	1.277	0.024	<0.001	1.230	1.325
Comorbidities					
1	1.187	0.013	<0.001	1.162	1.213
2	1.468	0.022	<0.001	1.425	1.513
3+	2.066	0.059	<0.001	1.953	2.185

Table A13. Full regression output: adjusted odds of insurance use for PrEP by men with parental versus policyholder coverage

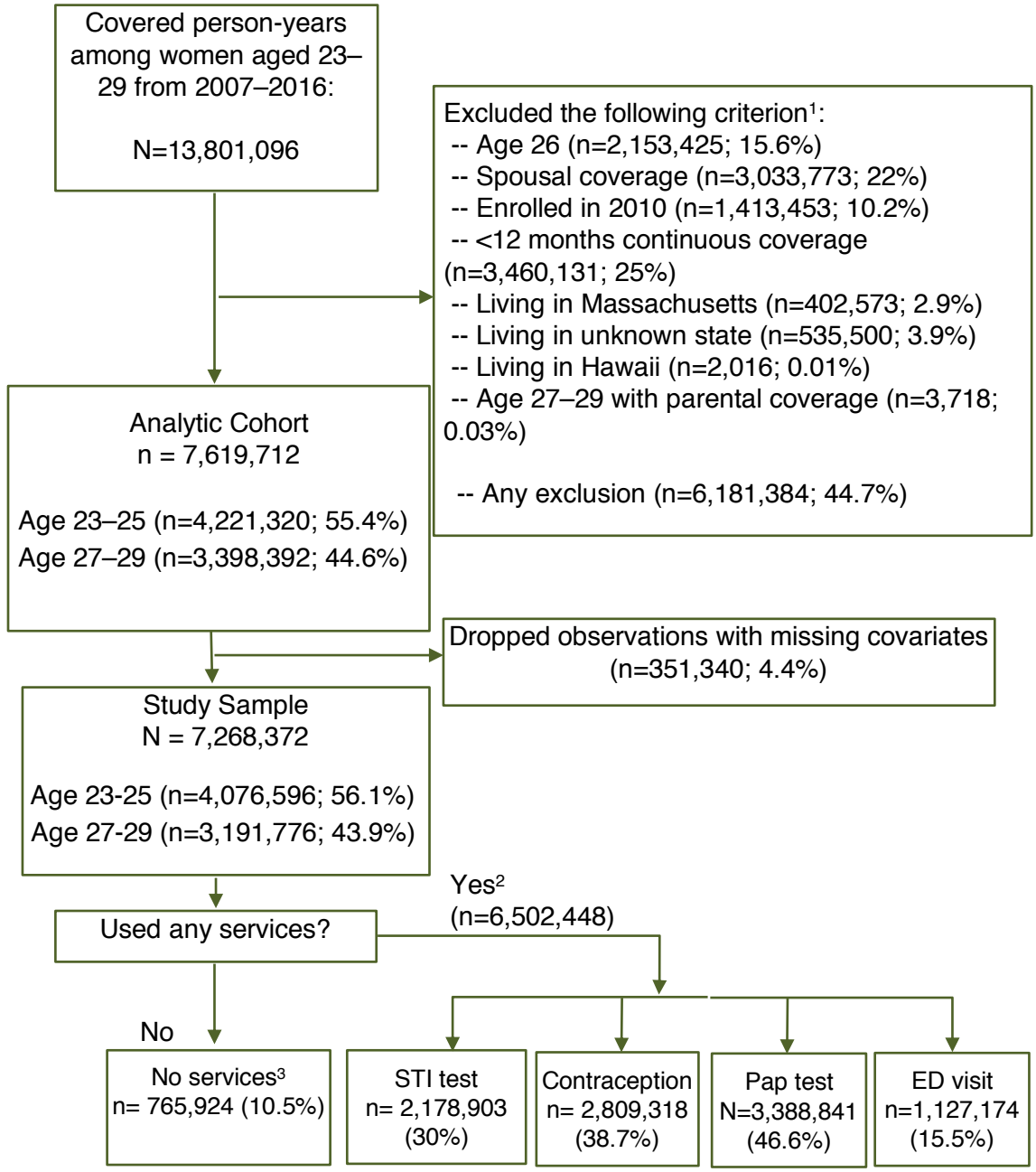
	Odds Ratio	Robust Std. Err.	P>z	[95% Conf. Interval]	
Parental	0.629	0.059	<0.001	0.523	0.756
Year					
2013	1.377	0.141	0.002	1.127	1.682
2014	3.472	0.283	<0.001	2.959	4.073
2015	9.522	0.712	<0.001	8.223	11.025
2016	15.168	1.086	<0.001	13.182	17.453
Plan type					
EPO	0.926	0.207	0.73	0.597	1.435
HMO	1.180	0.253	0.441	0.775	1.797
POS	1.019	0.203	0.924	0.690	1.505
PPO	0.833	0.144	0.289	0.594	1.168
CDHP/HDHP	0.600	0.099	0.002	0.434	0.828
Age					
20	1.482	0.124	<0.001	1.257	1.746
21	2.171	0.192	<0.001	1.826	2.581
22	3.199	0.330	<0.001	2.613	3.916
23	3.898	0.408	<0.001	3.175	4.786
24	4.451	0.565	<0.001	3.471	5.709
25	4.935	0.541	<0.001	3.981	6.117
MSA	2.108	0.193	<0.001	1.761	2.523
Deductible ≥ $1,000	2.251	0.079	<0.001	2.102	2.411
Comorbidities					
1	1.269	0.048	<0.001	1.178	1.366
2	1.157	0.090	0.059	0.994	1.347
3+	1.478	0.129	<0.001	1.246	1.753

Table A14. Full regression output: adjusted odds of insurance use for ED visit by men with parental versus policyholder coverage

	Odds Ratio	Robust Std. Err.	P>z	[95% Conf. Interval]	
Parental	0.932	0.015	<0.001	0.889	0.958
Year					
2013	0.948	0.012	<0.001	0.925	0.972
2014	0.944	0.015	<0.001	0.915	0.974
2015	0.890	0.016	<0.001	0.859	0.922
2016	0.892	0.017	<0.001	0.860	0.925
Plan type					
EPO	0.933	0.056	0.246	0.829	1.049
HMO	0.881	0.065	0.087	0.762	1.019
POS	0.887	0.067	0.113	0.764	1.029
PPO	0.806	0.050	0.001	0.714	0.911
CDHP/HDHP	0.555	0.039	<0.001	0.484	0.637
Age					
20	1.035	0.005	<0.001	1.026	1.044
21	1.039	0.006	<0.001	1.028	1.050
22	0.975	0.007	<0.001	0.962	0.988
23	0.917	0.008	<0.001	0.901	0.933
24	0.858	0.009	<0.001	0.841	0.875
25	0.744	0.010	<0.001	0.726	0.763
MSA	0.792	0.019607	<0.001	0.755	0.832
Deductible ≥ $1,000	4.076	0.200963	<0.001	3.700	4.489
Comorbidities					
1	1.837	0.019286	<0.001	1.799	1.875
2	2.999	0.07085	<0.001	2.863	3.141
3+	5.737	0.19629	<0.001	5.365	6.135

APPENDIX B: SUPPLEMENTAL MATERIALS FOR CHAPTER 3

Figure B1: Sample selection



1. Exclusions are not mutually exclusive
2. Services are not mutually exclusive.
3. No service refers to enrollees with no claims for *any* health service during the study period

Table B1. Service use trends in the pre-period (2007–2009)

	Trend	95% CI	P value
STI testing	0.0002	-.0003 to .0007	0.381
Contraception	0.0010	-.0006 to .0025	0.203
Pap testing	.00006	-0.0001 to 0.0002	0.333
ED visits	-0.0001	-.0007 to 0.0004	0.612

As a formal test of the parallel trends assumption, this analysis reports on pre-DCE implementation trends in the treatment (ages 23–25) and comparison (ages 27–29) groups. Biannual pre-implementation data from January 2007 to December 2009 were used to model each outcome as a function of the interaction between treatment status and bi-annual time period, adjusting for all covariates, state and year fixed effects, and standard errors clustered at the state-level. For all outcomes, the interaction coefficient was insignificant, indicating similar pre-policy trends in service use between the treatment and comparison groups.

Table B2. Full DiD model for STI testing

	Robust Coef.	Std. Err.	P>t	[95% Conf.	Interval]
Treat	0.007	0.004	0.06	0.000	0.014
Post	0.101	0.005	<0.001	0.091	0.112
Treat#Post (DiD)	-0.018	0.003	<0.001	-0.023	-0.012
Age					
24	-0.002	0.001	0.232	-0.004	0.001
25	-0.001	0.002	0.586	-0.006	0.003
27	-0.034	0.002	<0.001	-0.038	-0.030
28	-0.041	0.002	<0.001	-0.045	-0.037
29	(omitted)				
MSA	0.051	0.005	<0.001	0.040	0.062
Year_2008	0.025	0.002	<0.001	0.021	0.028
Year_2009	0.039	0.004	<0.001	0.030	0.048
Year_2011	-0.045	0.005	<0.001	-0.055	-0.035
Year_2012	-0.032	0.005	<0.001	-0.041	-0.023
Year_2013	-0.026	0.003	<0.001	-0.033	-0.019
Year_2014	-0.024	0.003	<0.001	-0.030	-0.019
Year_2015	-0.010	0.002	<0.001	-0.015	-0.006
Year_2016	(omitted)				
Plan type					
EPO	0.019	0.016	0.24	-0.013	0.052
HMO	-0.006	0.018	0.753	-0.042	0.031
POS	0.000	0.018	0.982	-0.036	0.035
PPO	0.006	0.017	0.712	-0.027	0.040
CDHP/HDHP	-0.026	0.022	0.239	-0.070	0.018
Deductible ≥ $1,000	-0.268	0.014	<0.001	-0.297	-0.239
Comorbidities					
1	0.052	0.001	<0.001	0.050	0.055
2	0.043	0.002	<0.001	0.039	0.048
3+	0.060	0.008	<0.001	0.045	0.076

Table B3. Full DiD model for contraception

	Coef.	Robust Std. Err.	P>t	[95% Conf.	Interval]
Treat	0.068	0.003	<0.001	0.061	0.075
Post	0.074	0.019	<0.001	0.036	0.112
Treat#Post (DiD)	-0.028	0.003	<0.001	-0.033	-0.022
Age					
24	0.000	0.001	0.849	-0.003	0.002
25	0.007	0.003	0.035	0.000	0.013
27	0.042	0.001	<0.001	0.039	0.044
28	0.023	0.001	<0.001	0.021	0.024
29	(omitted)				
MSA	0.023	0.005	<0.001	0.013	0.033
Year_2008	0.034	0.022	0.132	-0.011	0.079
Year_2009	0.068	0.020	0.001	0.028	0.107
Year_2011	-0.016	0.008	0.049	-0.032	0.000
Year_2012	-0.016	0.007	0.026	-0.030	-0.002
Year_2013	-0.011	0.006	0.105	-0.024	0.002
Year_2014	-0.006	0.006	0.308	-0.019	0.006
Year_2015	0.019	0.003	<0.001	0.013	0.024
Year_2016	(omitted)				
Plan type					
EPO	-0.045	0.014	0.002	-0.073	-0.017
HMO	0.069	0.018	<0.001	0.034	0.105
POS	0.024	0.020	0.235	-0.016	0.063
PPO	0.026	0.013	0.044	0.001	0.052
CDHP/HDHP	0.012	0.036	0.741	-0.060	0.084
Deductible ≥ $1,000	-0.368	0.008	<0.001	-0.384	-0.352
Comorbidities					
1	0.009	0.002	<0.001	0.005	0.013
2	-0.026	0.003	<0.001	-0.032	-0.021
3+	-0.050	0.005	<0.001	-0.060	-0.041

Table B4. Full DiD model for pap testing

	Coef.	Robust Std. Err.	P>t	[95% Conf.	Interval]
Treat	-0.046	0.003	<0.001	-0.051	-0.040
Post	-0.140	0.009	<0.001	-0.159	-0.121
Treat#Post (DiD)	-0.034	0.003	<0.001	-0.039	-0.028
Age					
24	0.020	0.002	<0.001	0.017	0.023
25	0.051	0.003	<0.001	0.045	0.056
27	-0.003	0.001	<0.001	-0.005	-0.002
28	-0.006	0.001	<0.001	-0.008	-0.004
29	(omitted)				
MSA	0.035	0.002	<0.001	0.030	0.039
Year_2008	0.001	0.004	0.792	-0.006	0.008
Year_2009	-0.001	0.008	0.934	-0.016	0.015
Year_2011	0.121	0.006	<0.001	0.109	0.133
Year_2012	0.106	0.005	<0.001	0.096	0.117
Year_2013	0.068	0.002	<0.001	0.063	0.072
Year_2014	0.034	0.002	<0.001	0.029	0.038
Year_2015	0.017	0.002	<0.001	0.013	0.020
Year_2016	(omitted)				
Plan type					
EPO	0.033	0.011	0.004	0.011	0.055
HMO	-0.014	0.016	0.383	-0.047	0.018
POS	-0.001	0.011	0.955	-0.023	0.021
PPO	0.037	0.010	0.001	0.016	0.058
CDHP/HDHP	0.025	0.016	0.112	-0.006	0.057
Deductible ≥ $1,000	-0.422	0.008	<0.001	-0.439	-0.406
Comorbidities					
1	0.033	0.002	<0.001	0.029	0.037
2	0.001	0.003	0.72	-0.006	0.008
3+	-0.013	0.008	0.119	-0.029	0.003

Table B5. Full DiD model for ED visits

	Coef.	Robust Std. Err.	P>t	[95% Conf. Interval]	
Treat	0.024	0.001	<0.001	0.022	0.025
Post	-0.010	0.003	0.001	-0.016	-0.004
Treat#Post (DiD)	0.004	0.001	<0.001	0.002	0.006
Age					
24	-0.004	0.000	<0.001	-0.005	-0.003
25	-0.010	0.001	<0.001	-0.012	-0.009
27	0.007	0.000	<0.001	0.007	0.008
28	0.003	0.000	<0.001	0.002	0.004
29	(omitted)				
MSA	-0.027	0.002	<0.001	-0.032	-0.022
Year_2008	-0.002	0.001	0.106	-0.005	0.001
Year_2009	-0.005	0.001	0.001	-0.007	-0.002
Year_2011	0.001	0.002	0.43	-0.002	0.005
Year_2012	0.002	0.002	0.253	-0.001	0.005
Year_2013	-0.004	0.001	0.002	-0.006	-0.001
Year_2014	-0.002	0.001	0.031	-0.005	0.000
Year_2015	-0.004	0.001	<0.001	-0.005	-0.002
Year_2016	(omitted)				
Plan type					
EPO	-0.018	0.008	0.036	-0.035	-0.001
HMO	-0.021	0.009	0.027	-0.039	-0.002
POS	-0.019	0.009	0.047	-0.038	0.000
PPO	-0.020	0.008	0.018	-0.037	-0.004
CDHP/HDHP	-0.005	0.012	0.676	-0.028	0.018
Deductible ≥ $1,000	-0.121	0.004	<0.001	-0.128	-0.113
Comorbidities					
1	0.125	0.003	<0.001	0.118	0.132
2	0.242	0.009	<0.001	0.225	0.259
3+	0.388	0.025	<0.001	0.337	0.439

Table B6. *Sensitivity analyses:* Use of SRH services before (2007 – 2009) with *each year after* DCE implementation as the post-period

	STI test	Contraception	Pap test	ED visit
2011	-0.76%	-2.54%	-2.22%	0.17%
(95% CI)	(-1.2 to -0.3)	(-3.1 to -2.0)	(-2.7 to -1.8)	(-0.1 to 0.4)
2012	-1.53%	-2.75%	-3.57%	0.30%
(95% CI)	(-2.2 to -0.9)	(-3.4 to -2.1)	(-4.1 to -3.1)	(0.1 to 0.5)
2013	-2.03%	-3.12%	-3.23%	0.43%
(95% CI)	(-2.7 to -1.4)	(-4.0 to -2.3)	(-3.8 to -2.6)	(0.2 to 0.7)
2014	-2.28%	-3.14%	-3.29%	0.56%
(95% CI)	(-3.0 to -1.6)	(-3.9 to -2.4)	(-4.0 to -2.6)	(0.3 to 0.8)
2015	-2.96%	-2.62%	-3.78%	0.41%
(95% CI)	(-3.6 to -2.3)	(-3.4 to -1.8)	(-4.5 to -3.1)	(0.1 to 0.7)
2016	-1.36%	-3.29%	-4.42%	0.76%
(95% CI)	(-2.3 to -0.4)	(-4.2 to -2.4)	(-5.2 to -3.7)	(0.4 to 1.1)

Table B7. *Sensitivity analyses:* Use of SRH services before (2007 – 2009) and *three years after (2011-2013)* DCE implementation

	STI test	Contraception	Pap test	ED visit
DiD	-1.39%	-2.68%	-2.97%	0.28%
(95% CI)	(-1.9 to -1.0)	(-3.3 to -2.1)	(-3.4 to -2.5)	(0.1 to 0.5)

Table B8. *Sensitivity analyses:* Use of SRH services before (2007 – 2009) and after (2011–2016) DCE implementation: excluding women in the treatment group with *parental coverage* in the post-period

	STI test	Contraception	Pap test	ED visit
DiD	0.33%	-0.62%	-0.02%	0.75%
(95% CI)	(-0.2 to 8.2)	(-1.1 to 1.5)	(-0.5 to 0.5)	(0.5 to 1.0)

Table B9. *Sensitivity analyses:* Use of SRH services before (2007 – 2009) and after (2011–2016) DCE implementation: excluding women in the treatment group with *policyholder coverage* in the post-period

	STI test	Contraception	Pap test	ED visit
DiD	-3.40%	-4.80%	-6.30%	0.21%
(95% CI)	(4.1 to 2.7)	(-5.6 to -4.0)	(-7.3 to -5.3)	(-0.001 to 0.01)

APPENDIX C: SUPPLEMENTAL MATERIALS FOR CHAPTER 4

Table C1. Contraceptive Encounter Codes

Code	Definition	Code system
V25	Encounter for contraceptive management	ICD-9
V250	General counseling and advice on contraceptive management	ICD-9
V2501	General counseling on prescription of oral contraceptives	ICD-9
V2502	General counseling on initiation of other contraceptive measures	ICD-9
V2503	Encounter for emergency contraceptive counseling and prescription	ICD-9
V2504	Counseling and instruction in natural family planning to avoid pregnancy	ICD-9
V2509	Other general counseling and advice on contraceptive management	ICD-9
V2540	Contraceptive surveillance, unspecified	ICD-9
V2541	Surveillance of contraceptive pill	ICD-9
V2543	Surveillance of implantable subdermal contraceptive	ICD-9
V2549	Surveillance of other contraceptive method	ICD-9
V255	Insertion of implantable subdermal contraceptive	ICD-9
V258	Other specified contraceptive management	ICD-9
V259	Unspecified contraceptive management	ICD-9
Z30	Encounter for contraceptive management	ICD-10
Z300	Encounter for general counseling and advice on contraception	ICD-10
Z3001	Encounter for initial prescription of contraceptives	ICD-10
Z30011	Encounter for initial prescription of contraceptive pills	ICD-10
Z30012	Encounter for prescription of emergency contraception	ICD-10
Z30013	Encounter for initial prescription of injectable contraceptive	ICD-10
Z30015	Encounter for initial prescription of vaginal ring hormonal contraceptive	ICD-10
Z30016	Encounter for initial prescription of transdermal patch hormonal contraceptive device	ICD-10
Z30017	Encounter for initial prescription of implantable subdermal contraceptive	ICD-10
Z30018	Encounter for initial prescription of other contraceptives	ICD-10
Z30019	Encounter for initial prescription of other contraceptives unspecified	ICD-10
Z3002	Counseling and instruction in natural family planning to avoid pregnancy	ICD-10
Z3009	Encounter for other general counseling and advice on contraception	ICD-10
Z304	Encounter for surveillance of contraceptives	ICD-10
Z3040	Encounter for surveillance of contraceptives unspecified	ICD-10
Z3041	Encounter for surveillance of contraceptive pills	ICD-10
Z3042	Encounter for surveillance of injectable contraceptive	ICD-10
Z3044	Encounter for surveillance of vaginal ring hormonal contraceptive device	ICD-10
Z3045	Encounter for surveillance of transdermal patch hormonal contraceptive device	ICD-10
Z3046	Encounter for surveillance of implantable subdermal contraceptive	ICD-10
Z3049	Encounter for surveillance of other contraceptives	ICD-10

Z308	Encounter for other contraceptive management	ICD-10
Z309	Encounter for contraceptive management, unspecified	ICD-10

Table C2. Abdominal Indications

Code	Definition	Code system
7890	Abdominal pain	ICD-9
7896	Abdominal tenderness	ICD-9
7899	Other symptoms involving abdomen and pelvis	ICD-9
78094	Early satiety	ICD-9
78900	Abdominal pain, unspecified site	ICD-9
78901	Abdominal pain, right upper quadrant	ICD-9
78902	Abdominal pain, left upper quadrant	ICD-9
78903	Abdominal pain, right lower quadrant	ICD-9
78904	Abdominal pain, left lower quadrant	ICD-9
78905	Abdominal pain, periumbilic	ICD-9
78906	Abdominal pain, epigastric	ICD-9
78907	Abdominal pain, generalized	ICD-9
78909	Abdominal pain, other specified site	ICD-9
78960	Abdominal tenderness, unspecified site	ICD-9
78961	Abdominal tenderness, right upper quadrant	ICD-9
78962	Abdominal tenderness, left upper quadrant	ICD-9
78963	Abdominal tenderness, right lower quadrant	ICD-9
78964	Abdominal tenderness, left lower quadrant	ICD-9
78965	Abdominal tenderness, periumbilic	ICD-9
78966	Abdominal tenderness, epigastric	ICD-9
78967	Abdominal tenderness, generalized	ICD-9
78969	Abdominal tenderness, other specified site	ICD-9
6259	Unspecified symptom associated with female genital organs	ICD-9
7873	Flatulence, eructation, and gas pain	ICD-9
7893	Abdominal or pelvic swelling mass or lump	ICD-9
78930	Abdominal or pelvic swelling, mass, or lump, unspecified site	ICD-9
78931	Abdominal or pelvic swelling, mass, or lump, right upper quadrant	ICD-9
78932	Abdominal or pelvic swelling, mass, or lump, left upper quadrant	ICD-9
78933	Abdominal or pelvic swelling, mass, or lump, right lower quadrant	ICD-9
78934	Abdominal or pelvic swelling, mass, or lump, left lower quadrant	ICD-9
78935	Abdominal or pelvic swelling, mass, or lump, periumbilic	ICD-9
78936	Abdominal or pelvic swelling, mass, or lump, epigastric	ICD-9
78937	Abdominal or pelvic swelling, mass, or lump, generalized	ICD-9
78939	Abdominal or pelvic swelling, mass, or lump, other specified site	ICD-9
R10	Abdominal and pelvic pain	ICD-10
R100	Acute abdomen	ICD-10
R101	Pain localized to upper abdomen	ICD-10
R1010	Upper abdominal pain, unspecified	ICD-10

R1011	Right upper quadrant pain	ICD-10
R1012	Left upper quadrant pain	ICD-10
R1013	Epigastric pain	ICD-10
R102	Pelvic and perineal pain	ICD-10
R103	Pain localized to other parts of lower abdomen	ICD-10
R1030	Lower abdominal pain, unspecified	ICD-10
R1031	Right lower quadrant pain	ICD-10
R1032	Left lower quadrant pain	ICD-10
R1033	Periumbilical pain	ICD-10
R108	Other abdominal pain	ICD-10
R1081	Abdominal tenderness	ICD-10
R10811	Right upper quadrant abdominal tenderness	ICD-10
R10812	Left upper quadrant abdominal tenderness	ICD-10
R10813	Right lower quadrant abdominal tenderness	ICD-10
R10814	Left lower quadrant abdominal tenderness	ICD-10
R10815	Periumbilic abdominal tenderness	ICD-10
R10816	Epigastric abdominal tenderness	ICD-10
R10817	Generalized abdominal tenderness	ICD-10
R10819	Abdominal tenderness unspecified site	ICD-10
R1082	Rebound abdominal tenderness	ICD-10
R10821	Right upper quadrant rebound abdominal tenderness	ICD-10
R10822	Left upper quadrant rebound abdominal tenderness	ICD-10
R10823	Right lower quadrant rebound abdominal tenderness	ICD-10
R10824	Left lower quadrant rebound abdominal tenderness	ICD-10
R10825	Periumbilic rebound abdominal tenderness	ICD-10
R10826	Epigastric rebound abdominal tenderness	ICD-10
R10827	Generalized rebound abdominal tenderness	ICD-10
R10829	Abdominal pain unspecified site	ICD-10
R1084	Generalized abdominal pain	ICD-10
R109	Unspecified abdominal pain	ICD-10
R140	Abdominal distension (gaseous)	ICD-10
R6881	Early satiety	ICD-10

Table C3. Abnormal Pap Test Codes

Code	Definition	Code system
79500	Abnormal glandular Papanicolaou smear of cervix	ICD-9
79502	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of cervix (ASC-H)	ICD-9
79503	Papanicolaou smear of cervix with low grade squamous intraepithelial lesion (LGSIL)	ICD-9
79504	Papanicolaou smear of cervix with atypical squamous cells of undetermined significance (ASC-US)	ICD-9
79505	Cervical high risk human papillomavirus (HPV) DNA test positive	ICD-9
79508	Unsatisfactory cervical cytology smear	ICD-9
79510	Abnormal glandular Papanicolaou smear of vagina	ICD-9
79515	Vaginal high risk human papillomavirus (HPV) DNA test positive	ICD-9
79519	Other abnormal Papanicolaou smear of vagina and vaginal HPV	ICD-9
79501	Abnormal papanicolaou smear of vagina and vaginal hpv	ICD-9
R87610	Atypical squamous cells of undetermined significance on cytologic smear of cervix (ASC-US)	ICD-10
R87611	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of cervix (ASC-H)	ICD-10
R87612	Low grade squamous intraepithelial lesion on cytologic smear of cervix (LGSIL)	ICD-10
R87613	High grade squamous intraepithelial lesion on cytologic smear of cervix (HGSIL)	ICD-10
R87615	Unsatisfactory cytologic smear of cervix	ICD-10
R87619	Unspecified abnormal cytological findings in specimens from cervix uteri	ICD-10
R87628	Other abnormal cytological findings on specimens from vagina	ICD-10
R87810	Cervical high risk human papillomavirus (HPV) DNA test positive	ICD-10
R87811	Vaginal high risk human papillomavirus (HPV) DNA test positive	ICD-10

Table C4. Gynecological Cancer Indications

Code	Definition	Code system
179	Malignant neoplasm of uterus, part unspecified	ICD-9
1800	Malignant neoplasm of endocervix	ICD-9
1809	Malignant neoplasm of cervix uteri, unspecified site	ICD-9
1820	Malignant neoplasm of corpus uteri, except isthmus	ICD-9
1830	Malignant neoplasm of ovary	ICD-9
1840	Malignant neoplasm of vagina	ICD-9
1844	Malignant neoplasm of vulva, unspecified site	ICD-9
C519	Malignant neoplasm of vulva, unspecified	ICD-10
C52	Malignant neoplasm of vagina	ICD-10
C530	Malignant neoplasm of endocervix	ICD-10
C539	Malignant neoplasm of cervix uteri, unspecified	ICD-10
C541	Malignant neoplasm of endometrium	ICD-10
C55	Malignant neoplasm of uterus, part unspecified	ICD-10
C569	Malignant neoplasm of unspecified ovary	ICD-10

Table C5. Cervical Indications

Code	Definition	Code system
2331	Carcinoma in situ of cervix uteri	ICD-9
6160	Cervicitis and endocervicitis	ICD-9
6227	Mucous polyp of cervix	ICD-9
62210	Dysplasia of cervix, unspecified	ICD-9
62212	Moderate dysplasia of cervix	ICD-9
D069	Carcinoma in situ of cervix, unspecified	ICD-10
N72	Inflammatory disease of cervix uteri	ICD-10
N841	Polyp of cervix uteri	ICD-10
N871	Moderate cervical dysplasia	ICD-10
N872	Severe cervical dysplasia, not elsewhere classified	ICD-10
N879	Dysplasia of cervix uteri, unspecified	ICD-10

Table C6. Infectious Disease Indications

Code	Definition	Code system
6149	Unspecified inflammatory disease of female pelvic organs and tissues	ICD-9
04189	Other specified bacterial infections in conditions classified elsewhere and of unspecified site, other specified bacteria	ICD-9
05410	Genital herpes, unspecified	ICD-9
05411	Herpetic vulvovaginitis	ICD-9
05412	Herpetic ulceration of vulva	ICD-9
07811	Condyloma acuminatum	ICD-9
07888	Other specified diseases due to chlamydiae	ICD-9
07998	Unspecified chlamydial infection	ICD-9
0910	Genital syphilis (primary)	ICD-9
09189	Other forms of secondary syphilis	ICD-9
0990	Chancroid	ICD-9
0991	Chlamydial lymphogranuloma (venereum)	ICD-9
0992	Granuloma inguinale	ICD-9
0998	Other specified venereal diseases	ICD-9
1121	Candidiasis of vulva and vagina	ICD-9
13100	Urogenital trichomoniasis, unspecified	ICD-9
13101	Trichomonal vulvovaginitis	ICD-9
1322	Phthiriasis	ICD-9
6140	Acute salpingitis and oophoritis	ICD-9
6141	Chronic salpingitis and oophoritis	ICD-9
6142	Salpingitis and oophoritis not specified as acute, subacute, or chronic	ICD-9
6143	Acute parametritis and pelvic cellulitis	ICD-9
6144	Chronic or unspecified parametritis and pelvic cellulitis	ICD-9
6145	Acute or unspecified pelvic peritonitis, female	ICD-9
6146	Pelvic peritoneal adhesions, female (postoperative) (postinfection)	ICD-9
6147	Other chronic pelvic peritonitis, female	ICD-9
6148	Other specified inflammatory disease of female pelvic organs and tissues	ICD-9
6149	Unspecified inflammatory disease of female pelvic organs and tissues	ICD-9
61611	Vaginitis and vulvovaginitis in diseases classified elsewhere	ICD-9
A510	Primary genital syphilis	ICD-10
A5142	Secondary syphilitic female pelvic disease	ICD-10
A55	Chlamydial lymphogranuloma (venereum)	ICD-10
A57	Chancroid	ICD-10
A58	Granuloma inguinale	ICD-10
A5900	Urogenital trichomoniasis, unspecified	ICD-10
A5901	Trichomonal vulvovaginitis	ICD-10
A6004	Herpesviral vulvovaginitis	ICD-10

A609	Anogenital herpesviral infection, unspecified	ICD-10
A630	Anogenital (venereal) warts	ICD-10
A638	Other specified predominantly sexually transmitted diseases	ICD-10
A7489	Other chlamydial diseases	ICD-10
A749	Chlamydial infection, unspecified	ICD-10
B373	Candidiasis of vulva and vagina	ICD-10
B853	Phthiriasis	ICD-10
B9689	Other specified bacterial agents as the cause of diseases classified elsewhere	ICD-10
N730	Acute parametritis and pelvic cellulitis	ICD-10
N731	Chronic parametritis and pelvic cellulitis	ICD-10
N732	Unspecified parametritis and pelvic cellulitis	ICD-10
N733	Female acute pelvic peritonitis	ICD-10
N734	Female chronic pelvic peritonitis	ICD-10
N735	Female pelvic peritonitis, unspecified	ICD-10
N736	Female pelvic peritoneal adhesions (postinfective)	ICD-10
N738	Other specified female pelvic inflammatory diseases	ICD-10
N739	Pelvic inflammatory disease (PID), unspecified	ICD-10
N74	Female pelvic inflammatory disorders in diseases classified elsewhere	ICD-10
N771	Vaginitis, vulvitis and vulvovaginitis in diseases classified elsewhere	ICD-10

Table C7. Incontinence Indications

Code	Definition	Code system
78830	Urinary incontinence, unspecified	ICD-9
6256	Stress incontinence, female	ICD-9
78831	Urge incontinence	ICD-9
78833	Mixed incontinence (male) (female)	ICD-9
78839	Other urinary incontinence	ICD-9
78863	Urgency of urination	ICD-9
78891	Functional urinary incontinence	ICD-9
N393	Stress incontinence (female) (male)	ICD-10
N3946	Mixed incontinence	ICD-10
N39498	Other specified urinary incontinence	ICD-10
N9341	Urge incontinence	ICD-10
R32	Unspecified urinary incontinence	ICD-10
R3915	Urgency of urination	ICD-10
R3981	Functional urinary incontinence	ICD-10

Table C8. Intrauterine Device Codes

Code	Definition	Code system
58300	Insertion of IUD	CPT
58301	Removal of IUD	CPT
S4981	Insertion of levonorgestrel-releasing intrauterine system	CPT
S4989	Contraceptive intrauterine device (e.g., progestacert iud), including implants and supplies	CPT
J7296	Levonorgestrel-releasing intrauterine contraceptive system (kyleena)	HCPCS
J7297	Levonorgestrel-releasing intrauterine contraceptive system (liletta)	HCPCS
J7298	Levonorgestrel-releasing intrauterine contraceptive system (mirena)	HCPCS
J7300	Intrauterine copper contraceptive (Paragard)	HCPCS
J7301	Levonorgestrel-releasing intrauterinecontraceptive system (Skyla)	HCPCS
J7302	Levonorgestrel-releasing intrauterine contraceptive system	HCPCS
Q0090	Levonorgestrel-releasing intrauterine contraceptive system, (skyla)	HCPCS
99632	Mechanical complication due to intrauterine contraceptive device	ICD-9
V251	Encounter for insertion or removal of intrauterine contraceptive device	ICD-9
V2511	Encounter for insertion of intrauterine contraceptive device	ICD-9
V2512	Encounter for removal of intrauterine contraceptive device	ICD-9
V2542	Surveillance of intrauterine contraceptive device	ICD-9
V4551	Presence of intrauterine contraceptive device	ICD-9
T8339XA	Mechanical complication due to intrauterine contraceptive device	ICD-10
Z30014	Encounter for initial prescription of intrauterine contraceptive device	ICD-10
Z3043	Surveillance of intrauterine contraceptive device	ICD-10
Z30430	Encounter for insertion of intrauterine contraceptive device	ICD-10
Z30431	Encounter for routine checking of intrauterine contraceptive device	ICD-10
Z30432	Encounter for removal of intrauterine contraceptive device	ICD-10
Z30433	Encounter for removal and reinsertion of intrauterine contraceptive device	ICD-10
Z975	Presence of intrauterine contraceptive device	ICD-10

Table C9. Menstrual Indications

Code	Definition	Code system
6253	Dysmenorrhea	ICD-9
6254	Premenstrual tension syndromes	ICD-9
6260	Absence of menstruation	ICD-9
6261	Scanty or infrequent menstruation	ICD-9
6262	Excessive or frequent menstruation	ICD-9
6264	Irregular menstrual cycle	ICD-9
6266	Metrorrhagia	ICD-9
6269	Unspecified disorders of menstruation and other abnormal bleeding from female genital tract	ICD-9
6252	Mittelschmerz	ICD-9
6263	Puberty bleeding	ICD-9
6265	Ovulation bleeding	ICD-9
6268	Other disorders of menstruation and other abnormal bleeding from female genital tract	ICD-9
N912	Amenorrhea, unspecified	ICD-10
N915	Oligomenorrhea, unspecified	ICD-10
N920	Excessive and frequent menstruation with regular cycle	ICD-10
N921	Excessive and frequent menstruation with irregular cycle	ICD-10
N922	Excessive menstruation at puberty	ICD-10
N923	Ovulation bleeding	ICD-10
N924	Excessive bleeding in the premenopausal period	ICD-10
N926	Irregular menstruation, unspecified	ICD-10
N926	Other specified irregular menstruation	ICD-10
N938	Other specified abnormal uterine and vaginal bleeding	ICD-10
N939	Abnormal uterine and vaginal bleeding, unspecified	ICD-10
N940	Mittelschmerz	ICD-10
N943	Premenstrual tension syndrome	ICD-10
N944	Primary dysmenorrhea	ICD-10
N945	Secondary dysmenorrhea	ICD-10
N946	Dysmenorrhea, unspecified	ICD-10
N949	Pain and other conditions associated with female genital organs and menstrual cycle	ICD-10

Table C10. Pap test

Code	Definition	Code system
88141	Cytopathology, cervical or vaginal (any reporting system), requiring interpretation by physician	CPT
88142	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; manual screening under physician supervision	CPT
88143	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; with manual screening and rescreening under physician supervision	CPT
88147	Cytopathology smears, cervical or vaginal; screening by automated system under physician supervision	CPT
88148	Cytopathology smears, cervical or vaginal; screening by automated system with manual rescreening under physician supervision	CPT
88150	Cytopathology, slides, cervical or vaginal; manual screening under physician supervision	CPT
88152	Cytopathology, slides, cervical or vaginal; with manual screening and rescreening under physician supervision	CPT
88153	Cytopathology, slides, cervical or vaginal; with manual screening and rescreening under physician supervision	CPT
88154	Cytopathology, slides, cervical or vaginal; with manual screening and computer-assisted re screening using cell selection and review under physician supervision	CPT
88164	Cytopathology, slides, cervical or vaginal (the Bethesda System); manual screening under physician supervision	CPT
88165	Cytopathology, slides, cervical or vaginal (the Bethesda System); with manual screening and rescreening under physician supervision	CPT
88166	Cytopathology, slides, cervical or vaginal (the Bethesda System); with manual screening and computer-assisted rescreening under physician supervision	CPT
88167	Cytopathology, slides, cervical or vaginal (the Bethesda System); with manual screening and computer-assisted rescreening using cell selection and review under physician supervision	CPT
88174	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; screening by automated system, under physician supervision	CPT
88175	Cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation; with screening by automated system and manual rescreening or review, under physician supervision	CPT
G0123	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, screening by cytotechnologist under physician supervision (G0123)	HCPCS
G0124	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, requiring interpretation by physician (G0124)	HCPCS
G0141	Screening cytopathology smears, cervical or vaginal, performed by automated system, with manual rescreening, requiring interpretation by physician (G0141)	HCPCS

G0143	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, with manual screening and rescreening by cytotechnologist under physician supervision (G0143)	HCPCS
G0144	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, with screening by automated system, under physician supervision (G0144)	HCPCS
G0145	Screening cytopathology, cervical or vaginal (any reporting system), collected in preservative fluid, automated thin layer preparation, with screening by automated system and manual rescreening under physician supervision (G0145)	HCPCS
G0147	Screening cytopathology smears, cervical or vaginal, performed by automated system under physician supervision (G0147)	HCPCS
G0148	Screening cytopathology smears, cervical or vaginal, performed by automated system with manual rescreening (G0148)	HCPCS
P3000	Screening papanicolaou smear, cervical or vaginal, up to three smears, by technician under physician supervision (P3000)	HCPCS
P3001	Screening papanicolaou smear, cervical or vaginal, up to three smears, requiring interpretation by physician (P3001)	HCPCS
Q0091	Screening papanicolaou smear; obtaining, preparing and conveyance of cervical or vaginal smear to laboratory (Q0091)	HCPCS
79500	Abnormal glandular Papanicolaou smear of cervix	ICD-9
79501	Papanicolaou smear of cervix with atypical squamous cells of undetermined significance (ASC-US)	ICD-9
79502	Papanicolaou smear of cervix with atypical squamous cells cannot exclude high grade squamous intraepithelial lesion (ASC-H)	ICD-9
79503	Papanicolaou smear of cervix with low grade squamous intraepithelial lesion (LGSIL)	ICD-9
79504	Papanicolaou smear of cervix with high grade squamous intraepithelial lesion (HGSIL)	ICD-9
79505	Cervical high risk human papillomavirus (HPV) DNA test positive	ICD-9
79506	Papanicolaou smear of cervix with cytologic evidence of malignancy	ICD-9
79507	Satisfactory cervical smear but lacking transformation zone	ICD-9
79508	Unsatisfactory cervical cytology smear	ICD-9
79509	Other abnormal Papanicolaou smear of cervix and cervical HPV	ICD-9
79510	Abnormal glandular Papanicolaou smear of vagina	ICD-9
79511	Papanicolaou smear of vagina with atypical squamous cells of undetermined significance (ASC-US)	ICD-9
79512	Papanicolaou smear of vagina with atypical squamous cells cannot exclude high grade squamous intraepithelial lesion (ASC-H)	ICD-9
79513	Papanicolaou smear of vagina with low grade squamous intraepithelial lesion (LGSIL)	ICD-9
79514	Papanicolaou smear of vagina with high grade squamous intraepithelial lesion (HGSIL)	ICD-9
79515	Vaginal high risk human papillomavirus (HPV) DNA test positive	ICD-9
79516	Papanicolaou smear of vagina with cytologic evidence of malignancy	ICD-9
79518	Unsatisfactory vaginal cytology smear	ICD-9
79519	Other abnormal Papanicolaou smear of vagina and vaginal HPV	ICD-9

79670	Abnormal glandular Papanicolaou smear of anus	ICD-9
79671	Papanicolaou smear of anus with atypical squamous cells of undetermined significance (ASC-US)	ICD-9
79672	Papanicolaou smear of anus with atypical squamous cells cannot exclude high grade squamous intraepithelial lesion (ASC-H)	ICD-9
79673	Papanicolaou smear of anus with low grade squamous intraepithelial lesion (LGSIL)	ICD-9
79674	Papanicolaou smear of anus with high grade squamous intraepithelial lesion (HGSIL)	ICD-9
79675	Anal high risk human papillomavirus (HPV) DNA test positive	ICD-9
79676	Papanicolaou smear of anus with cytologic evidence of malignancy	ICD-9
79677	Satisfactory anal smear but lacking transformation zone	ICD-9
79678	Unsatisfactory anal cytology smear	ICD-9
79679	Other abnormal Papanicolaou smear of anus and anal HPV	ICD-9
V7232	Encounter for Papanicolaou cervical smear to confirm findings of recent normal smear following initial abnormal smear	ICD-9
88155	Cytopathology on vaginal smear with definitive hormonal evaluation	
R85610	Atypical squamous cells of undetermined significance on cytologic smear of anus (ASC-US)	ICD-10
R85611	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of anus (ASC-H)	ICD-10
R85612	Low grade squamous intraepithelial lesion on cytologic smear of anus (LGSIL)	ICD-10
R85613	High grade squamous intraepithelial lesion on cytologic smear of anus (HGSIL)	ICD-10
R85619	Unspecified abnormal cytological findings in specimens from anus	ICD-10
R87610	Atypical squamous cells of undetermined significance on cytologic smear of cervix (ASC-US)	ICD-10
R87611	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of cervix (ASC-H)	ICD-10
R87612	Low grade squamous intraepithelial lesion on cytologic smear of cervix (LGSIL)	ICD-10
R87613	High grade squamous intraepithelial lesion on cytologic smear of cervix (HGSIL)	ICD-10
R87614	Cytologic evidence of malignancy on smear of cervix	ICD-10
R87615	Unsatisfactory cytologic smear of cervix	ICD-10
R87616	Satisfactory cervical smear but lacking transformation zone	ICD-10
R87619	Unspecified abnormal cytological findings in specimens from cervix uteri	ICD-10
R87620	Atypical squamous cells of undetermined significance on cytologic smear of vagina (ASC-US)	ICD-10
R87621	Atypical squamous cells cannot exclude high grade squamous intraepithelial lesion on cytologic smear of vagina (ASC-H)	ICD-10
R87622	Low grade squamous intraepithelial lesion on cytologic smear of vagina (LGSIL)	ICD-10
R87623	High grade squamous intraepithelial lesion on cytologic smear of vagina (HGSIL)	ICD-10
R87624	Cytologic evidence of malignancy on smear of vagina	ICD-10

R87625	Unsatisfactory cytologic smear of vagina	ICD-10
R87628	Other abnormal cytological findings on specimens from vagina	ICD-10
R87628	Other abnormal cytological findings on specimens from vagina	ICD-10
R87810	Cervical high risk human papillomavirus (HPV) DNA test positive	ICD-10
R87811	Vaginal high risk human papillomavirus (HPV) DNA test positive	ICD-10
R87820	Cervical low risk human papillomavirus (HPV) DNA test positive	ICD-10
Z124	Encounter for screening for malignant neoplasm of cervix	ICD-10

Table C11. Prolapse

Code	Definition	Code system
6181	Uterine prolapse without mention of vaginal wall prolapse	ICD-9
6182	Uterovaginal prolapse, incomplete	ICD-9
6183	Uterovaginal prolapse, complete	ICD-9
6184	Uterovaginal prolapse, unspecified	ICD-9
6185	Prolapse of vaginal vault after hysterectomy	ICD-9
6186	Vaginal enterocele, congenital or acquired	ICD-9
6187	Old laceration of muscles of pelvic floor	ICD-9
6188	Other specified genital prolapse	ICD-9
6189	Unspecified genital prolapse	ICD-9
61800	Unspecified prolapse of vaginal walls	ICD-9
N810	Urethrocele	ICD-10
N8110	Cystocele, unspecified	ICD-10
N8111	Cystocele, midline	ICD-10
N8112	Cystocele, lateral	ICD-10
N812	Incomplete uterovaginal prolapse	ICD-10
N813	Complete uterovaginal prolapse	ICD-10
N814	Uterovaginal prolapse, unspecified	ICD-10
N815	Vaginal enterocele	ICD-10
N816	Rectocele	ICD-10
N8181	Perineocele	ICD-10
N8182	Incompetence or weakening of pubocervical tissue	ICD-10
N8183	Incompetence or weakening of rectovaginal tissue	ICD-10
N8184	Pelvic muscle wasting	ICD-10
N8185	Cervical stump prolapse	ICD-10
N8189	Other female genital prolapse	ICD-10
N819	Female genital prolapse, unspecified	ICD-10

Table C12. Sexual, Reproductive, Assault Indications

Code	Definition	Code system
6250	Dyspareunia	ICD-9
6251	Vaginismus	ICD-9
6267	Postcoital bleeding	ICD-9
6280	Infertility, female, associated with anovulation	ICD-9
6281	Infertility, female, of pituitary-hypothalamic origin	ICD-9
6282	Infertility, female, of tubal origin	ICD-9
6283	Infertility, female, of uterine origin	ICD-9
6284	Infertility, female, of cervical or vaginal origin	ICD-9
6288	Infertility, female, of other specified origin	ICD-9
6289	Infertility, female, of unspecified origin	ICD-9
E9601	Rape	ICD-9
N930	Postcoital and contact bleeding	ICD-10
N941	Dyspareunia	ICD-10
N942	Vaginismus	ICD-10
N970	Female infertility associated with anovulation	ICD-10
N971	Female infertility of tubal origin	ICD-10
N972	Female infertility of uterine origin	ICD-10
N978	Female infertility of other origin	ICD-10
N979	Female infertility, unspecified	ICD-10
T742	Sexual abuse, confirmed	ICD-10
T7421XA	Sexual abuse, initial encounter	ICD-10
T7421XD	Sexual abuse, subsequent encounter	ICD-10
T7421XS	Sexual abuse, sequela	ICD-10
Z390	Encounter for care and examination of mother immediately after delivery	ICD-10
Z391	Encounter for care and examination of lactating mother	ICD-10
Z392	Encounter for routine postpartum follow-up	ICD-10

Table C13. Sexually Transmitted Infection Screen

Code	Definition	Code system
86631	Antibody; Chlamydia	CPT
86632	Antibody; Chlamydia, IgM	CPT
87110	Culture, chlamydia, any source	CPT
87164	Dark field examination, any source (eg, penile, vaginal, oral, skin); includes specimen collection	CPT
87166	Dark field examination, any source (eg, penile, vaginal, oral, skin); without collection	CPT
87270	Infectious agent antigen detection by immunofluorescent technique; Chlamydia trachomatis	CPT
87320	Detection test for chlamydia	CPT
87490	Infectious agent detection by nucleic acid (DNA or RNA); Chlamydia trachomatis, direct probe technique	CPT
87491	Chlamydia trachomatis detection by nucleic acid using amplified probe technique	CPT
87492	Detection test for chlamydia	CPT
87590	Neisseria gonorrhoeae detection by nucleic acid using direct probe technique	CPT
87591	Infectious agent detection by nucleic acid (DNA or RNA); Neisseria gonorrhoeae, amplified probe technique	CPT
87592	Neisseria gonorrhoeae quantification by nucleic acid	CPT
87620	Infectious agent detection by nucleic acid (DNA or RNA); papillomavirus, human, direct probe technique	CPT
87621	Papillomavirus, human, amplified probe technique	CPT
87622	Papillomavirus, human, quantification	CPT
87624	Infectious agent detection by nucleic acid (DNA or RNA); Human Papillomavirus (HPV), high-risk types (eg, 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68)	CPT
87625	Infectious agent detection by nucleic acid (DNA or RNA); Human Papillomavirus (HPV), types 16 and 18 only, includes type 45, if performed	CPT
87660	Infectious agent detection by nucleic acid (DNA or RNA); Trichomonas vaginalis, direct probe technique	CPT
87661	Infectious agent detection by nucleic acid (DNA or RNA); Trichomonas vaginalis, amplified probe technique	CPT
87808	Infectious agent antigen detection by immunoassay with direct optical observation; Trichomonas vaginalis	CPT
87810	Infectious agent antigen detection by immunoassay with direct optical observation; Chlamydia trachomatis	CPT
87850	Infectious agent antigen detection by immunoassay with direct optical observation; Neisseria gonorrhoeae	CPT
G0476	Infectious agent detection by nucleic acid (dna or rna); human papillomavirus (hpv), high-risk types (eg, 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68) for cervical cancer screening, must be performed in addition to pap test	HCPCS
V016	Contact with or exposure to venereal diseases	ICD-9

V7381	Special screening examination for Human papillomavirus (HPV)	ICD-9
V7388	Special screening examination for other specified chlamydial diseases	ICD-9
V7398	Special screening examination for unspecified chlamydial disease	ICD-9
V745	Screening examination for venereal disease	ICD-9
V769	Special screening for unspecified malignant neoplasms	ICD-9
Z113	Encounter for screening for infections with a predominantly sexual mode of transmission	ICD-10
Z114	Encounter for screening for human immunodeficiency virus [HIV]	ICD-10
Z1151	Encounter for screening for human papillomavirus (HPV)	ICD-10
Z202	Contact with and (suspected) exposure to infections with a predominantly sexual mode of transmission	ICD-10

Table C14. Uterine, Ovarian Indications

Code	Definition	Code system
2189	Leiomyoma of uterus, unspecified	ICD-9
2564	Polycystic ovaries	ICD-9
6170	Endometriosis of uterus	ICD-9
6179	Endometriosis, site unspecified	ICD-9
6179	Endometriosis of other specified sites	ICD-9
6202	Other and unspecified ovarian cyst	ICD-9
6210	Polyp of corpus uteri	ICD-9
6212	Hypertrophy of uterus	ICD-9
6218	Other specified disorders of uterus, not elsewhere classified	ICD-9
6255	Pelvic congestion syndrome	ICD-9
6258	Other specified symptoms associated with female genital organs	ICD-9
6259	Unspecified symptom associated with female genital organs	ICD-9
6290	Hematocele, female, not elsewhere classified	ICD-9
6291	Hydrocele, canal of nuck	ICD-9
25639	Other ovarian failure	ICD-9
62989	Other specified disorders of female genital organs	ICD-9
2181	Submucous leiomyoma of uterus	ICD-9
2182	Intramural leiomyoma of uterus	ICD-9
2189	Subserous leiomyoma of uterus	ICD-9
2569	Unspecified ovarian dysfunction	ICD-9
6171	Endometriosis of ovary	ICD-9
6172	Endometriosis of fallopian tube	ICD-9
6173	Endometriosis of pelvic peritoneum	ICD-9
6174	Endometriosis of rectovaginal septum and vagina	ICD-9
6175	Endometriosis of intestine	ICD-9
6176	Endometriosis in scar of skin	ICD-9
D250	Submucous leiomyoma of uterus	ICD-10
D251	Intramural leiomyoma of uterus	ICD-10
D252	Subserosal leiomyoma of uterus	ICD-10
D259	Leiomyoma of uterus, unspecified	ICD-10
E282	Polycystic ovarian syndrome	ICD-10
E2839	Other primary ovarian failure	ICD-10
E288	Other ovarian dysfunction	ICD-10
E289	Ovarian dysfunction, unspecified	ICD-10
N800	Adenomyosis	ICD-10

N800	Endometriosis of uterus	ICD-10
N801	Endometriosis of ovary	ICD-10
N802	Endometriosis of fallopian tube	ICD-10
N803	Endometriosis of pelvic peritoneum	ICD-10
N804	Endometriosis of rectovaginal septum and vagina	ICD-10
N805	Endometriosis of intestine	ICD-10
N806	Endometriosis in cutaneous scar	ICD-10
N808	Other endometriosis	ICD-10
N809	Endometriosis, unspecified	ICD-10
N8320	Unspecified ovarian cysts	ICD-10
N840	Polyp of corpus uteri	ICD-10
N852	Hypertrophy of uterus	ICD-10
N858	Other specified noninflammatory disorders of uterus	ICD-10
N9489	Other specified conditions associated with female genital organs and menstrual cycle	ICD-10

Table C15. Encounter and patient-level prevalence of potentially unnecessary pelvic exams at contraceptive encounter, including those with missing covariates, by year (2007 – 2017)

Year	Enrollees	Contraceptive visits	Pelvic exams	% of encounters with pelvic exam	% of enrollees with pelvic exam
2007	234,015	355,255	12,757	3.6%	5.5%
2008	242,050	438,946	16,406	3.7%	6.8%
2009	236,129	451,217	17,949	4.0%	7.6%
2010	287,307	514,536	23,718	4.6%	8.3%
2011	352,440	650,642	31,297	4.8%	8.9%
2012	386,504	738,384	42,188	5.7%	10.9%
2013	352,104	672,933	46,764	6.9%	13.3%
2014	416,134	806,612	72,881	9.0%	17.5%
2015	260,934	530,284	50,963	9.6%	19.5%
2016	249,514	511,422	48,228	9.4%	19.3%
2017	255,691	507,175	50,334	9.9%	19.7%

Figure C1. Trends in Advanced Practice Clinician-Administered Exams, by Patient Age

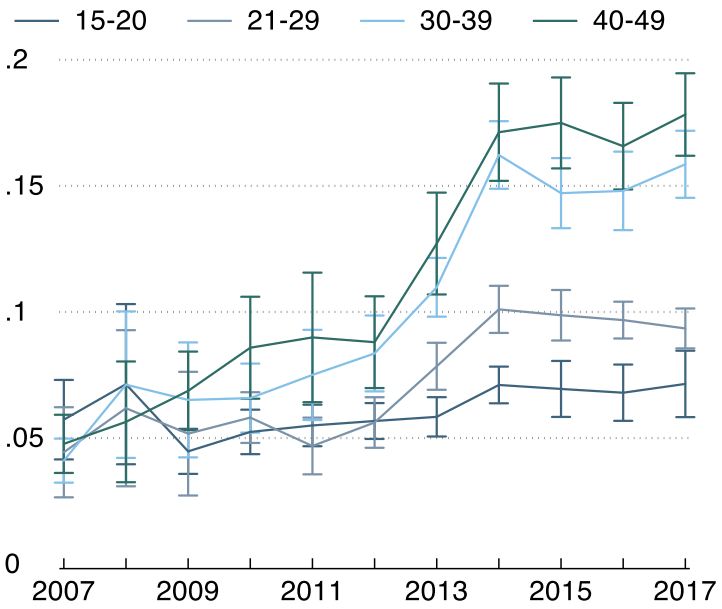


Figure C2. Trends in Family Practice Physician-Administered Exams, by Patient Age

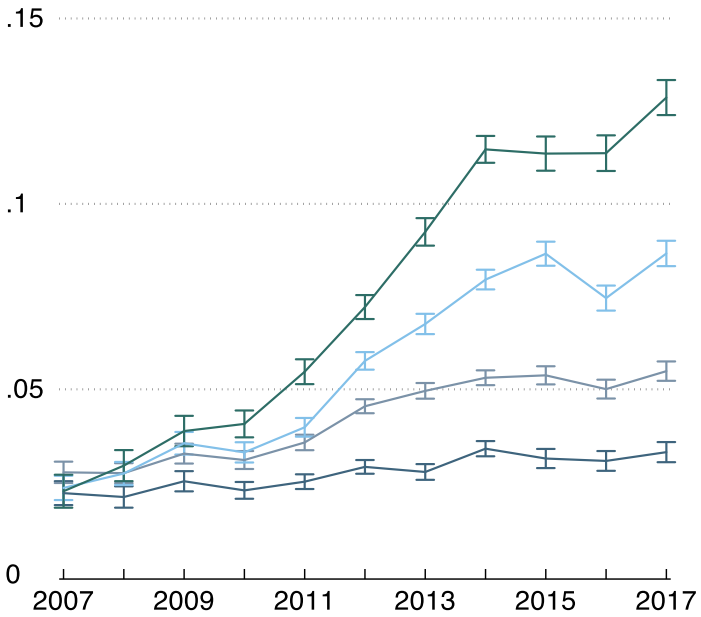


Figure C3. Trends in Obstetrician/Gynecologist-Administered Exams, by Patient Age

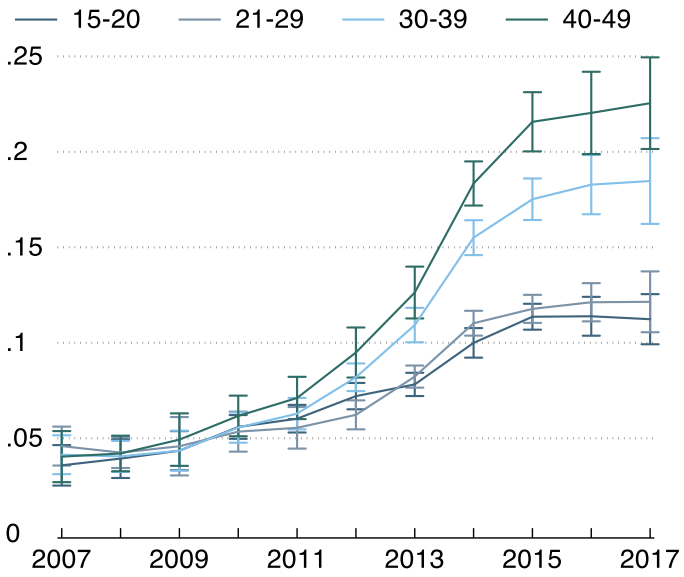


Figure C4. Trends in Other Physician-Administered Exams, by Patient Age

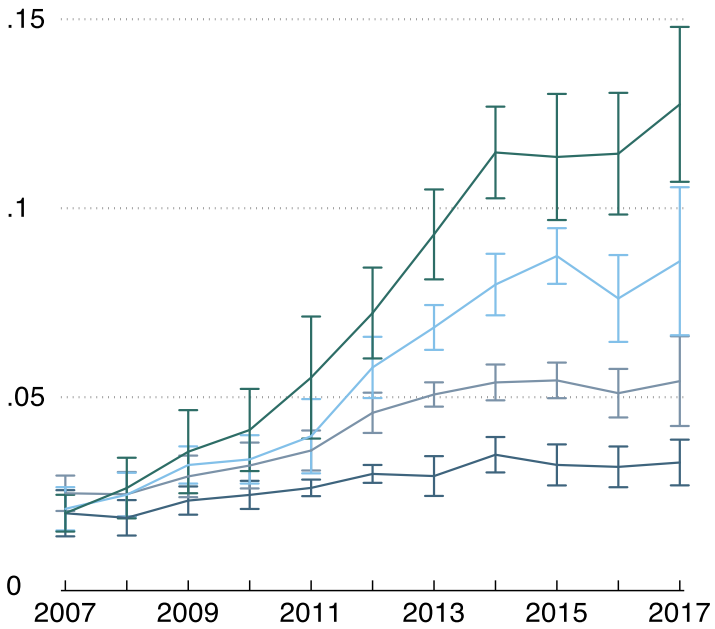


Table C15. Probability of Pelvic Examination at Contraceptive Encounter excluding all indications (n= 446,566)

	β	α	95% CI	
Provider Specialty				
FPP (reference)				
Other MD	0.039	<0.001	0.030	0.048
OBGYN	0.116	<0.001	0.103	0.130
APC	0.082	<0.001	0.068	0.095
Patient Age				
40–49 (reference)				
15–20	-0.072	<0.001	-0.082	-0.063
21–29	-0.070	<0.001	-0.078	-0.062
30–39	-0.032	<0.001	-0.039	-0.025
Plan Type				
Comprehensive (reference)				
EPO	0.016	0.242	-0.011	0.042
HMO	0.015	0.292	-0.013	0.043
POS	0.020	0.110	-0.005	0.044
PPO	0.020	0.012	0.005	0.035
CDHP/HDHP	0.025	0.008	0.007	0.043
Metropolitan Statistical Area	0.017	<0.001	0.008	0.025
Comorbidities				
0 (reference)				
1	-0.024	<0.001	-0.027	-0.021
2	-0.041	<0.001	-0.045	-0.036
3+	-0.064	<0.001	-0.072	-0.056
Relationship to policyholder				
Self (reference)				
Spouse	0.028	<0.001	0.021	0.035
Child	-0.019	<0.001	-0.027	-0.011

Table C16. Probability of Pelvic Examination at Contraceptive Encounter Including Encounters with STI test (n= 533,126)

	β	α	95% CI	
Provider Specialty				
FPP (reference)				
Other MD	0.070	<0.001	0.058	0.082
OBGYN	0.145	<0.001	0.129	0.161
APC	0.097	<0.001	0.082	0.113
Patient Age				
40–49 (reference)				
15–20	-0.038	<0.001	-0.052	-0.025
21–29	-0.058	<0.001	-0.067	-0.049
30–39	-0.028	<0.001	-0.035	-0.021
Plan Type				
Comprehensive (reference)				
EPO	0.004	0.774	-0.022	0.029
HMO	0.017	0.180	-0.008	0.042
POS	0.017	0.185	-0.008	0.043
PPO	0.021	0.006	0.006	0.035
CDHP/HDHP	0.026	0.006	0.008	0.044
MSA	0.023	<0.001	0.014	0.033
Comorbidities				
0 (reference)				
1	-0.027	<0.001	-0.030	-0.024
2	-0.047	<0.001	-0.051	-0.042
3+	-0.073	<0.001	-0.081	-0.065
Relationship to policyholder				
Self (reference)				
Spouse	0.019	<0.001	0.012	0.026
Child	-0.008	0.045	-0.016	0.000

Table C17. Probability of Pelvic Examination at IUD Encounter (n= 18,228)

	β	α	95% CI	
Provider Specialty				
FPP (reference)				
Other MD	0.120	<0.001	0.100	0.141
OBGYN	0.023	0.002	0.009	0.038
APC	0.035	<0.001	0.018	0.052
Patient Age				
40–49 (reference)				
15–20	-0.065	<0.001	-0.083	-0.046
21–29	-0.028	<0.001	-0.042	-0.014
30–39	-0.002	0.823	-0.016	0.013
Plan Type				
Comprehensive (reference)				
EPO	-0.018	0.548	-0.076	0.041
HMO	0.002	0.911	-0.030	0.034
POS	0.023	0.186	-0.012	0.058
PPO	0.017	0.234	-0.012	0.047
CDHP/HDHP	0.012	0.355	-0.014	0.039
Metropolitan Statistical Area	0.009	0.389	-0.012	0.031
Comorbidities				
0 (reference)				
1	-0.016	0.006	-0.028	-0.005
2	-0.007	0.193	-0.017	0.004
3+	-0.030	<0.001	-0.046	-0.014
Relationship to policyholder				
Self (reference)				
Spouse	-0.014	0.001	-0.023	-0.006
Child	0.001	0.928	-0.012	0.013

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