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Contraception: *Original Research*

Association of Pharmacist Prescription of Hormonal Contraception With Unintended Pregnancies and Medicaid Costs

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OBJECTIVE: To estimate unintended pregnancies averted and the cost effectiveness of pharmacist prescription of hormonal contraception.

METHODS: A decision-analytic model was developed to determine the cost effectiveness of expanding the scope of pharmacists to prescribe hormonal contraception compared with the standard of care and contraceptive access in clinics. Our perspective was that of the payor, Oregon Medicaid. Our primary outcome was unintended pregnancies averted. Secondary outcomes included: costs and quality-adjusted life years (QALYs). Model inputs were obtained from an analysis of Medicaid claims for the first 24 months after policy implementation in Oregon, and the literature. Univariate and bivariate sensitivity analyses, as well as a Monte Carlo simulation, were performed.

RESULTS: Among Oregon's Medicaid population at risk for unintended pregnancy, the policy expanding the scope of pharmacists to prescribe hormonal contraception averted an estimated 51 unintended pregnancies and saved $1.6 million dollars. Quality of life was also improved, with 158 QALYs gained per 198,000 women. Sensitivity analysis demonstrated that the model was most sensitive to the effect on contraceptive continuation rates. If contraceptive continuation rates among women receiving care from a pharmacist are 10% less than among clinicians, than pharmacist prescription of hormonal contraception will not avert unintended pregnancies.

CONCLUSION: Pharmacist prescription of hormonal contraception averts unintended pregnancies and is cost effective. Full implementation of the policy is needed for maximum benefits. Prospective data on the effect of the policy on contraceptive continuation rates are needed.

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Unintended pregnancy is endemic in the United States, with significant consequences for the woman, her family, and the community.[1–3] Latest estimates indicate that 45% of all pregnancies in the United States are unintended.[1] Reducing the proportion of pregnancies that are unintended and decreasing pregnancies resulting from contraceptive failure have been identified as two national health priorities by the Office of Disease Prevention and Health Promotion's Healthy People 2020 initiative.[4] Contraception is highly effective at preventing unintended pregnancy, but barriers exist to effective and consistent use.[5,6] Innovations in service delivery, including task sharing, are needed to improve access to and continuation of contraception, especially among vulnerable populations.[1,7,8]

Identifying cost-effective strategies to reduce unintended pregnancy is important to achieve

national public health goals. Pharmacists in the community are increasingly relied on to expand their scope of practice to deliver clinical services such as providing vaccinations and prescribing naloxone. Pharmacist prescription of hormonal contraception has the potential to strengthen access to and enable easier continuation of contraception for women.

In 2016, Oregon became the first state to implement legislation allowing pharmacists to independently prescribe hormonal contraception, including the pill, patch, or ring, directly to the patient without a traditional clinic visit.[9] Pharmacists complete a 5-hour training course to become certified to prescribe contraception, and follow evidence-based, clinical algorithms for prescribing and referring women.[10] One year after passage of this legislation, 63% of ZIP codes across the state of Oregon now have a pharmacist certified to prescribe hormonal contraception.[11] Among women in Oregon using combined hormonal contraception, 10% receive their prescription from a pharmacist.[12] Oregon's Medicaid program reimburses for the cost of the contraception, and the pharmacists' time to prescribe. Efforts are underway to establish billing mechanisms with private payors.

Since the implementation of this policy in Oregon, five other states (California, Colorado, Hawaii, New Mexico, and Utah) have passed legislation to allow pharmacist prescription of hormonal contraception and implemented services.[13] A sixth state, Washington, has previously had the possibility for pharmacists to prescribe under collaborative practice agreements, but it is not known to what extent, if any, the practice is currently occurring. Additional states are anticipated to follow (Maryland, Tennessee, and Washington, D.C.). The effect of these programs on unintended pregnancy and Medicaid cost are not known. We therefore sought to determine the cost effectiveness of pharmacist prescription of hormonal contraception by modeling unintended pregnancies averted by the policy.

METHODS

We created a decision-analytic model using TreeAge Pro 2018. This model was designed to assess the cost-effectiveness of a Medicaid program of a policy expanding the scope of pharmacists to directly prescribe hormonal contraception (Fig. 1). Model inputs were obtained from Oregon Medicaid data and the literature.

Our primary outcome was unintended pregnancies averted. We calculated the number of unintended pregnancies averted by modeling unintended pregnancies under two different policy scenarios: with and without pharmacist prescribing of hormonal contraception. Secondary outcomes included costs and quality-adjusted life years (QALYs). Our study used a 1-year time horizon. Our study was reviewed and approved by the institutional review board at Oregon Health & Science University.

As shown in Figure 1, the initial decision node was the existence of a policy allowing pharmacist prescription of hormonal contraception (yes or no). Methods of contraceptives were collapsed into standard tiers based on contraceptive efficacy (tier 1: intrauterine device [IUD], implant; tier 2: pill, patch, ring, injection; tier 3: barrier methods; and no method). In our model, women used tier 1, tier 2, tier 3, or no method of contraception in rates based on the literature. Model inputs are summarized in Table 1. We accounted for method discontinuation and switching, assuming that women who switched or discontinued would do so at an average of 6 months. Women who experienced an unintended pregnancy could have an induced abortion, experience a spontaneous abortion, or continue the pregnancy to term.[2,14] Women using a tier 2 method with access to pharmacist-prescribing had the option to return to their original provider for a prescription or visit a pharmacy to obtain the method. We assumed that all women who were continuing their contraceptive method and chose to visit a pharmacy would be able to receive her method during that single visit. Women not using a method of contraception with access to pharmacist-prescribing had the option of initiating contraception at the pharmacy or continuing with no method. If she was ineligible for hormonal methods available at the pharmacy, she was referred to her provider for a prescription. Alternatively, women without access to pharmacist-prescribing just visited their provider for contraception.

We modeled outcomes for the proportion of the Medicaid population at risk of unintended pregnancy in each state where pharmacists are eligible to prescribe hormonal contraception. The Guttmacher Institute provides estimates of the number of women in each state at risk for unintended pregnancy, and in need of publicly funded contraception.[15] In Oregon, 198,110 women are in need of publicly funded family planning and at risk of unintended pregnancy.[15] In the six other states (California, Colorado, Hawaii, New Mexico, Utah, and Washington) that have expanded the scope of pharmacists to directly prescribe hormonal contraception, an additional 3.3 million women are at risk of unintended pregnancy. We used estimates specific to each state to make these calculations.

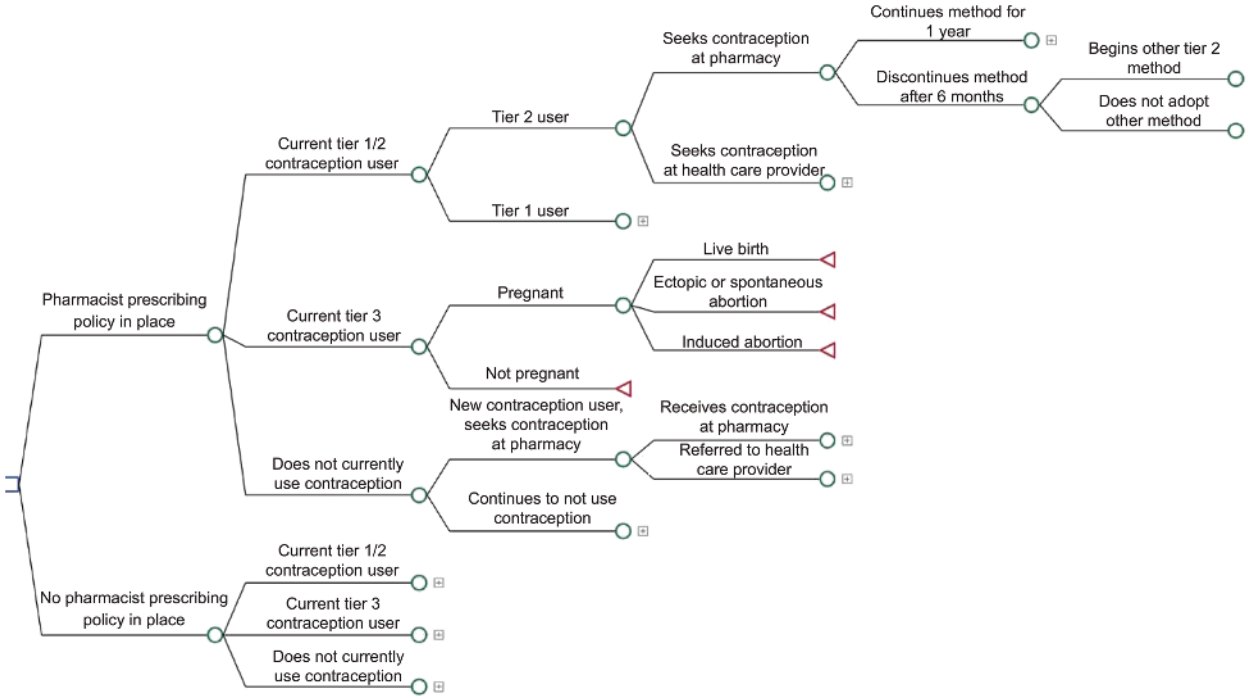

Fig. 1. Cost-effectiveness model. *Plus sign* indicates that subsequent branches of the tree are hidden; they lead to the same subsequent branches and outcomes as those that are displayed. Time horizon is 1 year. Tier 1 method includes intrauterine device. Tier 2 methods include combined hormonal contraceptives and progestin-only pills. Tier 3 methods include condoms and withdrawal.

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All model inputs were derived from the literature (Table 1) or Oregon Medicaid data. A database was created of Medicaid claims from January 1, 2016, through December 31, 2017, representing the first 24 months of the policy change in Oregon. Contraceptives prescribed by pharmacists were identified by national provider identifier. This database was used to estimate the rate of women seeking contraception under the policy change. This database was also used to determine the probability that women seeking contraceptives from pharmacists were new contraceptive users or continuing users. A new contraceptive user was defined as a woman who had no contraceptive use in the 30 days before initiating hormonal contraception. All other probabilities were obtained from the literature (Table 1). The probability of current contraceptive use with a tier 1 or 2 method was obtained from reports from the Oregon Health Authority.[16] We used typical-use contraceptive efficacy rates to account for pregnancies related to contraceptive failure.[17–19] We identified the probability that a current contraceptive user would switch methods in the literature.[20,21] We assumed women switching methods would select a method of the same or higher efficacy.

Cost data specific to Oregon's Medicaid program was obtained from the literature and from Oregon's Fee for Service Reimbursement schedule (Table 1). To provide a conservative estimate of costs, only the costs of direct medical care were included. As Medicaid reimburses for the cost of the provider's time to provide counseling, as well as the contraceptive supplies, the cost for a counseling visit was included regardless of where a woman received her contraception. As clinicians are typically providing a range of services, the base estimate for contraceptive care is higher in a clinic than a pharmacy (Table 1; $81 vs $27). For clinic visits, we used the average of reimbursement for new and established level 3 and 4 visits. Pharmacists bill using Medication Therapy Service codes or a level 2 visit. We used the average of the reimbursement for these services. All costs were adjusted for inflation to 2018 dollars using the medical component of the Consumer Price Index.[22] Cost data from Oregon was used to estimate costs for other states with pharmacist prescription of contraception.

Quality-adjusted life years are a standard measure used in decision and cost-effectiveness analyses to assess the effect of a wide range of health outcomes on quality of life. Quality-adjusted life years are the

Table 1. Model Inputs

Parameter	Value	Range Considered in Sensitivity Analysis	Distribution	Reference
Probabilities				
Probability of being a current tier 1 or tier 2 contraception user	0.46	0.22–0.94	Beta	Oregon Medicaid claims*
Current tier 2 contraception user, probability of seeking contraception at pharmacy	0.11	0.05–0.22	Beta	Oregon Medicaid claims*
1-year continuation rate, tier 2 methods	0.59	0.27–1.0	Beta	21
1-year failure rate, tier 2 methods	0.07	0.03–0.14	Beta	17
Probability of choosing another contraceptive method after discontinuation of method	0.68	0.32–1.0	Beta	20
Probability of being a tier 1† user	0.08	0.04–0.16	Beta	Oregon Medicaid claims*
1-year continuation rate, tier 1	0.87	0.42–1.0	Beta	21
1-year failure rate, tier 1	0.003	0.0015–0.006	Beta	17
1-year failure rate, tier 1 for 6 months, tier 2 for 6 months	0.06	0.03–0.12	Beta	18
1-year failure rate, condoms or withdrawal	0.175	0.08–0.34	Beta	18
Probability of pregnancy with no contraception	0.85	0.42–1.0	Beta	19
Probability of ectopic pregnancy or spontaneous abortion after unintended pregnancy	0.14	0.07–0.28	Beta	14
Probability of induced abortion after unintended pregnancy	0.48	0.24–0.94	Beta	2
Utilities				
Health	1.00	—		Assumed
Unintended pregnancy	0.99	0.48–1.00	Beta	23
Life expectancy				
Average woman of reproductive age	53.80	25–100	Beta	24
Costs (2018 U.S. dollars)				
Cost of contraceptive counseling, pharmacy	27.83	13–54	Gamma	11
Cost of contraceptive counseling visit, provider	81.30	40–160	Gamma	12
Cost of condom use or withdrawal	0	—	Gamma	Assumed
Cost of tier 2 use, 1 year	126	100–150	Gamma	23
Cost of tier 2 use, 6 months	63	50–100	Gamma	23
Cost of tier 1 use, 1 year	550	400–700	Gamma	23
Cost of tier 1 use, 6 months	550	400–700	Gamma	23
Cost of live birth (direct maternal medical care)	7,027	3,563–14,056	Gamma	23
Costs of newborn care‡	6,745	3,350–13,490	Gamma	23
Cost of ectopic pregnancy or spontaneous abortion after unintended pregnancy	2,146	1,500–3,000	Gamma	23
Cost of induced abortion	757	378-1,514	Gamma	23

Tier 1: intrauterine device (IUD), implant. Tier 2: combined hormonal contraceptive pill, patch or ring; progestin only pills, progestin only injectable. We used typical-use failure rates in our analysis. For the typical-use failure rate of LARC methods, we used the average typical-use failure rate of levonorgestrel IUDs, the copper IUD, and the progestin implant.

For clinic visits, we used the average of reimbursement for new and established level 3 and 4 visits. Pharmacists bill using Medication Therapy Service codes or a level 2 visit. We used the average of the reimbursement for these services.

* A database of Medicaid claims was created and analyzed for these variables.

† Tier 1 methods include only reversible methods (IUD or implant) in our analysis.

‡ Estimate of Medicaid cost of public programs a child is eligible for until age 5 (including newborn medical care). The cost used in the model ($6,745) is the cost of a newborn to age 5 discounted by 46.7% owing to the rate of deliveries that are mistimed vs unintended.

product of both life expectancy and utility. Utility is a measure of satisfaction or value for a particular health state. By convention, utility values range from 0 to 1, with 0 representing death and 1 indicating perfect health. The utility for an unintended pregnancy was obtained from the literature.[23] The length of a woman's life after a pregnancy was calculated by subtracting the average age at first child birth from the current estimated life expectancy of an American women.[24]

We calculated total costs and QALYs to determine the incremental cost effectiveness of the existence of a pharmacist-prescribing policy. The cost-effectiveness threshold was set at a standard $100,000 per QALY.[25] We calculated incremental cost-effectiveness ratios that compared a policy expanding

the scope of pharmacists to prescribe hormonal contraception with no policy. Incremental cost-effectiveness ratio is a measure of value that compares the differences between the costs and health outcomes of two competing interventions.[26]

Univariate and multivariate sensitivity analyses were performed to test how varying one or more model parameters may affect the results. Univariate sensitivity analysis was performed on all inputs. We varied each input from 50% to 200% of base estimates to identify whether any threshold values existed. A threshold value marks the point at which a change in a variable would alter the model's conclusion.[27] A tornado diagram was made to determine which variables had the greatest effect on the model when varied individually between their extreme values (Appendix 1, available online at http://links.lww.com/AOG/B388). We also performed bivariate sensitivity analysis on variables with threshold values and other key inputs, including the probability of accessing contraception in pharmacies and contraceptive continuation rates.

Finally, we performed a Monte Carlo simulation using 10,000 trials to evaluate how simultaneous multivariable changes would affect outcomes. Beta distributions were used for probabilities and gamma distributions for costs. The Monte Carlo simulation enabled variation of all probability estimates simultaneously by sampling distributions around the baseline estimate. We used scatter plots to represent uncertainty in results, and a 95% CI was generated.

RESULTS

Over the first 2 years of the program (January 2016–December 2017), 248 pharmacists wrote 1,313 prescriptions for 367 women in the Oregon Medicaid program. Within this time period, a total of 3,614 women received hormonal contraceptive prescriptions from all providers.[12] Among Oregon's Medicaid population at risk for unintended pregnancy, the policy to expand the scope of pharmacists to prescribe hormonal contraception averted an estimated 51 unintended pregnancies and saved $1.6 million dollars in the first 2 years. Women's quality of life was also improved, with 158 QALYs gained per 198,110 women. Pharmacist prescription of hormonal contraception is a dominant strategy: it improved health outcomes and reduced costs (Table 2).

We identified the model inputs that varied the most and subjected those to univariate and bivariate sensitivity analyses. The model inputs that had the most influence on outcomes when varied were: contraceptive continuation rates, the costs of pharmacist time for contraceptive counseling and costs of a provider visit. We examined how differences in contraceptive continuation rates between pharmacists and clinicians affected our findings. If fewer than 46% of women continue the contraception at 1 year (64% discontinue), it is no longer cost effective at a willingness-to-pay threshold of $100,000 per QALY. Similarly, if contraceptive continuation rates among women receiving care from a pharmacist is 10% less than women receiving care from a clinician, pharmacist prescription of hormonal contraception will not avert unintended pregnancies. For the baseline strategy of no access to pharmacist prescription of hormonal contraception to be the preferred strategy, the cost of a pharmacy visit would need to exceed $100 and the cost of a clinic visit could only be $60 (Fig. 2). The average range for a pharmacy visit is $10–52, and clinic visits range considerably.[28]

One-way sensitivity analysis indicated that across all other probabilities, pharmacist prescription of hormonal contraception prevents unintended pregnancies and reduces costs. We examined how the percentage of women relying on IUDs and implants might affect study findings. Pharmacist prescription of hormonal contraception is cost effective regardless of the probability that current tier 1 or 2 users select an IUD or implant. A 132% increase in tier 1 contraceptive method use among current nonusers of contraception would be needed for pharmacist prescription of hormonal contraception to not be cost effective.

During multivariate sensitivity analysis, we found that our findings were robust: regardless of how change was introduced across the distributions of variables, pharmacist prescription of hormonal contraception was the preferred (dominant) strategy 100% of the time using a willingness-to-pay threshold of $100,000 per QALY (Fig. 3).

We then considered the effect on the six additional states where the policy is currently in place: California, Colorado, Hawaii, New Mexico, Utah, and Washington. We estimated the female population enrolled in Medicaid in each state, and at risk for unintended pregnancy. Data from the Guttmacher Institute was used to estimate the population of women in each state in need of publicly funded family planning services.[29] Assuming these states achieve the same level of implementation as Oregon (4% of nonusers initiate care), 862 unintended pregnancies would be averted, with a gain of 66,366 QALYs, and $26.9 million saved (Table 3).

DISCUSSION

Our study provides an estimate of the cost-effectiveness of pharmacist prescription of hormonal

Table 2. Results in a Theoretical Cohort of 198,010 Women in Oregon Seeking Contraception

Result	Pharmacist Prescribing Policy in Place	No Pharmacist Prescribing Policy in Place	Difference
Unintended pregnancies	28,317	28,368	−51
Cost	191,718,520	193,320,497	−1,601,978
QALYs (effectiveness)	5,252,419	5,248,470	+3,949
Strategy*	Dominant	Dominated	

QALYs, quality-adjusted life years.
* In cost-effectiveness analysis, a strategy is dominant if it results in lower costs and better outcomes.

contraception. Our findings suggest a meaningful effect of pharmacist prescription of hormonal contraception on unintended pregnancy rates and associated costs. However, we believe our findings to be conservative given that our model was based on use 24 months after implementation. We expect over time that knowledge of and use of contraceptive access from pharmacists will increase. If the policy continues to decrease the rate of contraceptive nonusers, an even greater policy effect will be realized. It is anticipated that as pharmacies contract with additional insurers for coverage, the practice will increase.

Although reaching nonusers is one important means by which pharmacist prescription of hormonal contraception may reduce unintended pregnancies and associated public costs, we also need the effect of the policy on contraceptive continuation rates. We identified a key threshold value in our model; if contraceptive continuation rates among women receiving care from pharmacists are lower by 10% than continuation rates among women accessing contraception from a clinician, the policy is not cost-effective. Multiple factors may affect contraceptive continuation rates including: concern about side effects, supply dispensed, cost, and access issues.[30,31]

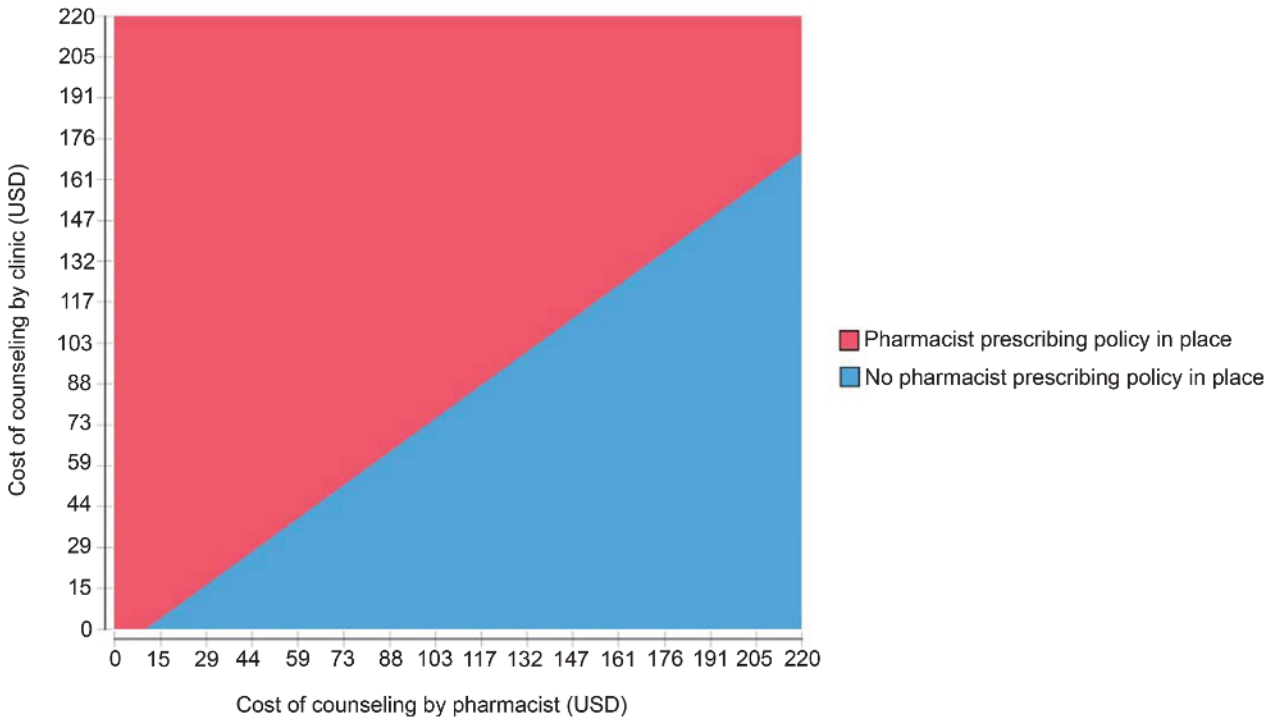

Fig. 2. Bivariate sensitivity analysis (net monetary benefit), cost of pharmacist counseling vs cost of health care provider visit. Baseline estimate of pharmacist counseling is $28, and baseline estimate of health care provider visit is $81. This figure demonstrates that pharmacist prescribing of contraception results in net monetary benefit when the cost of a health care provider visit is larger than the cost of pharmacist counseling.

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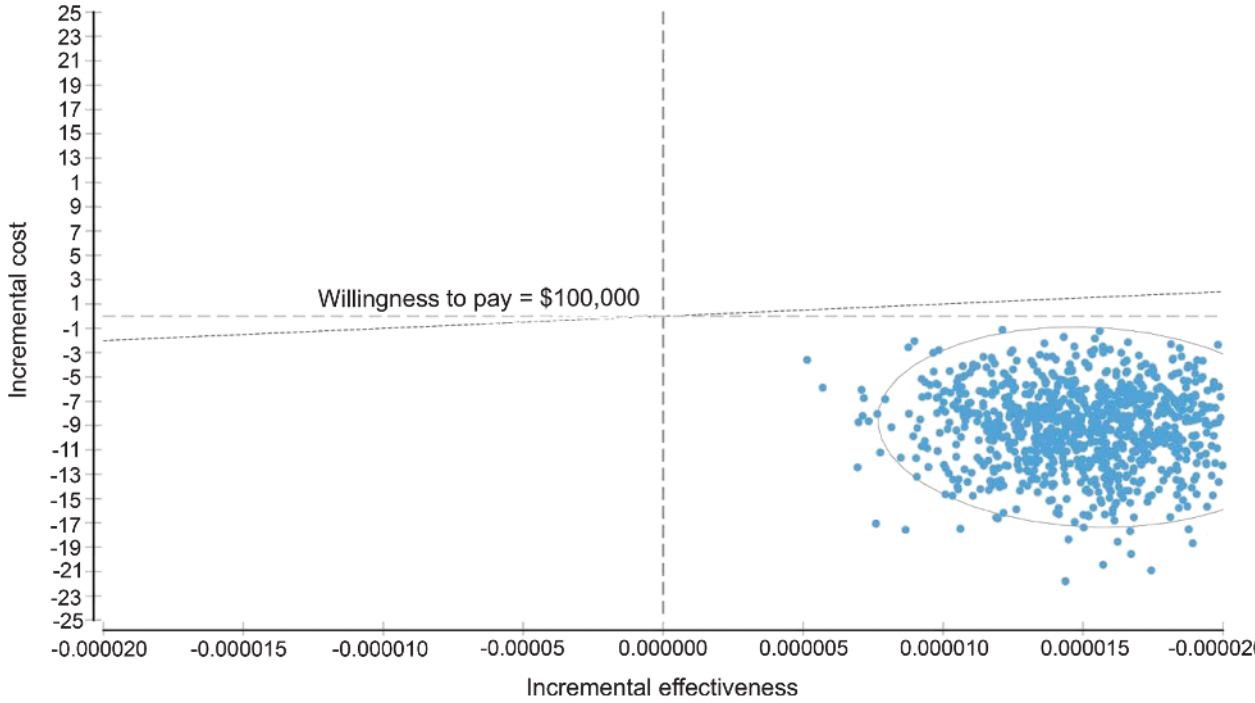

Fig. 3. Multivariate sensitivity analysis. This Monte Carlo simulation displays the outcomes of the 10,000 trials of the simulation. The *dashed line* indicates a willingness-to-pay threshold set at $100,000. Each *blue dot* represents the result of a single trial. The *ellipse* represents the 95% CI.

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Oregon has passed legislation requiring insurers to cover a 12-month supply of contraceptives be dispensed in an effort to try to improve contraceptive continuation rates. No one knows whether this policy has been successfully implemented. The Oregon Board of Pharmacy's algorithm for pharmacist prescribing of contraception helps to support this policy, because it educates and advises pharmacists to prescribe up to 12 months' supply.[32] Oregon law requires insurers to cover a 12-month supply. It is possible that pharmacists may improve contraceptive continuation rates by decreasing barriers to contraceptive access (eg, no appointment required, extended hours) or by dispensing larger supplies of contraceptives. It is not known whether there is a difference in supply dispensed by prescriber type. Data on the effect of policy changes expanding the scope of pharmacists to provide and bill for influenza vaccinations has demonstrated improved receipt of recommended vaccines in a range of settings.[33] Research to study the effect of pharmacist prescription of hormonal contraception on contraceptive continuation rates, via

Table 3. Projected Annual Outcomes for States Newly Adopting Pharmacist Prescription of Hormonal Contraception

State	Women at Risk of Unintended Pregnancy*	Unintended Pregnancies Averted	Cost	QALYs (Effectiveness)
California	1,976,297	512	−$15,988,243	39,407.36
Colorado	277,620	72	−$2,245,946	5,535.74
Hawaii	64,773	17	−$524,014	1,291.57
New Mexico	295,130	76	−$2,387,598	5,884.88
Utah	159,341	41	−$1,289,065	3,177.25
Washington	357,138	92	−$2,889,246	7,121.33

Assumes implementation rates equivalent to Oregon.
* Estimates from Guttmacher Institute of women of reproductive age in need of publicly funded family planning and at risk of pregnancy.

prospective data collection or health systems research, is needed.

Our study has limitations. As with all decision models, outcomes are dependent on the accuracy and availability of model inputs. We performed sensitivity analysis widely around all variables to address this limitation. For example, we tested our model assumptions, such as the referral rate from pharmacies or new users reached by the policy, and how they would affect our outcomes. Across all reasonable ranges for variables, our findings remained robust. We did not systematically examine how differences in counseling by provider type may inform results. No data exists to guide this estimate. We did, however, conduct sensitivity analyses to determine how different health outcomes would need to be by provider type to affect population health. We noted that, if long-acting reversible contraceptive (LARC) use increases by 132% among current nonusers of contraception, pharmacist prescription of hormonal contraception would not be cost effective. Nationally, LARC rates have increased markedly over the past decade, from 6% to 14% of all contraceptive users.[34] The increase in LARC usage parallels a decrease in sterilization: the increase in LARC use is thought to be the result of current users of contraception switching methods. In Oregon, LARC rates have increased. We do not have available data on what proportion of nonusers of contraception are initiating LARC, but it is believed that a 132% increase in LARC in this population is unlikely.

Oregon-specific findings may not be generalizable to other states. Oregon is unique in that Medicaid has reimbursed for pharmacist time and contraceptives since policy inception. Pharmacists have rapidly become certified to prescribe contraception in Oregon.[11] Ensuring equitable reimbursement for services provided by pharmacists has been key to the uptake of the practice. Data from California, where Medicaid has not reimbursed for pharmacists' counseling and time, demonstrates low availability of services when reimbursement is not assured.[35] Our perspective is that of Medicaid costs–we did not include in the model the costs for pharmacies to implement this service. Medicaid reimbursements vary by state; if states reimburse less for clinic visits than in Oregon, it is possible pharmacist provision of contraception would not be cost effective.

Unintended pregnancy remains an entrenched public health problem in the United States, with multigenerational consequences.[7] Pharmacist prescription of hormonal contraception has the potential to improve contraceptive use and continuation rates nationwide. States appear interested in this approach with a rapid increase in legislation. As services are expanded, research is needed to both monitor the implementation and quality of care, as well as to identify the public health effect.

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Contraception: *Original Research*

Pharmacist Provision of Hormonal Contraception in the Oregon Medicaid Population

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OBJECTIVE: To describe early utilization of pharmacist prescription of contraception in Oregon's Medicaid program.

METHODS: Using Oregon Medicaid claims data, we conducted a retrospective analysis and quantified overall and monthly trends in pharmacist-prescribed contraceptives from January 1, 2016, to December 31, 2017. Our population was restricted to patients obtaining a new prescription for oral and transdermal methods and who had continuous Medicaid coverage during the study period. We summarized demographic and utilization characteristics, including whether patients were continuing or switching methods or initiating contraception. New prescriptions were those written to patients who did not have one for hormonal contraception in the prior 30 days. To assess program safety, we examined rates of prescriptions to patients with medical contraindications to contraceptive use.

RESULTS: Among the 3,614 patients receiving a new prescription for oral or transdermal contraceptives in the Oregon Medicaid program from all health care providers, 367 (10%) received their prescription from a pharmacist. Five months after implementation, pharmacists filled an average of 61 prescriptions per month as the prescriber. Most claims originated from retail chain pharmacies (94%) in urban locations (71%). The majority of patients who were prescribed contraception by pharmacists (73.8%) had no history of contraceptive prescriptions in the preceding 30 days (n=252). Ages ranged from 13 to 49 years, fewer patients lived in a rural location (35.7%), most received a combined hormonal pill (90.5%), and the average day's supply dispensed was 65 (range of 21–364 days). Fewer than 5% (12) of patients had a diagnostic code indicating a possible contraindicating comorbidity.

CONCLUSION: Among Medicaid enrollees, we found that 10% of all new oral and transdermal contraceptive prescriptions were written by pharmacists.

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Unintended pregnancy is an entrenched public health problem in the United States, with 45% of all pregnancies being unplanned.[1] Unintended pregnancy is associated with health disparities and economic costs for the woman, her family, and society.[2]

Oral contraceptives (OC) are a popular birth control method in the United States, with nearly a third of all females relying on them for contraception.[3] Ensuring convenient and timely access to OCs is important for contraceptive efficacy and continuation rates. Pharmacist prescription of OC is one strategy to improve access to contraception.

Graduating pharmacists are highly trained health professionals that practice in a variety of settings including hospital, ambulatory care, and community or retail pharmacies. Community pharmacies offer an alternative point of access for patients and are highly

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accessible with 90% of Americans living within 5 miles of a pharmacy.[4] Most have more extended hours than a traditional ambulatory clinic and do not require an appointment. Previous research has shown that pharmacists can safely prescribe hormonal contraception in a community pharmacy setting, and that patients were satisfied with this type of service.[5]

On January 1, 2016, Oregon implemented a statewide expansion of the scope of pharmacists to directly prescribe short-acting methods of hormonal contraception without a visit to a clinician. Pharmacists in Oregon are required to undergo training, use a self-screening risk-assessment questionnaire and to follow a Standard Procedures Algorithm.[6–8] The self-screening questionnaire and the Standard Procedures Algorithm for Oregon can be found in Appendices 1 and 2, available online at http://links.lww.com/AOG/B376.

We sought to understand who is being served by this policy change. We describe the demographics and utilization patterns of patients in Oregon's Medicaid program receiving a contraceptive prescription from a pharmacist in the first 2 years of program implementation.

METHODS

We conducted a retrospective analysis of pharmacist-prescribed contraception in Oregon Medicaid patients within the first 2 years after implementation of the law. Our study objectives were to 1) characterize trends in pharmacist contraception prescribing over time from all claims within the study time period and 2) describe the population of patients receiving contraception from a pharmacist. We sought to examine whether patients accessing care from pharmacists were more likely to be new or continuing contraceptive users. We also summarized initial days' supply dispensed, whether patients with medical contraindications to estrogen were receiving appropriate therapy, and characteristics of participating pharmacies. The Institutional Review Board at Oregon Health & Science University approved this project and data use agreements were executed with the Oregon Health Authority.

Our analytic dataset was derived from Oregon Medicaid pharmacy claims, eligibility, medical diagnostic, and demographic data from January 1, 2016, to December 31, 2017. During the study time period, Oregon pharmacists were restricted to prescribing only oral and transdermal methods of hormonal contraception. Therefore, we included only contraceptive claims for products that pharmacists were eligible to prescribe, the combined hormonal pill and patch, and progestin-only pills. We determined claims for oral and transdermal contraceptive methods using prescription drug names and national drug codes. Although the focus of our analysis was on pharmacist prescribing, we also examined the number of new contraceptive prescriptions issued by nonpharmacists (eg, physicians, nurse practitioners) during the same period for context. We used descriptive statistics to report population characteristics within the claims. Results are presented as averages or percentages of qualifying characteristics of the overall claims or population.

We identified pharmacist-prescribed contraception as pharmacy claims where the prescribing provider had a National Provider Identifier from the list of pharmacists certified to prescribe contraception in the state. This list is maintained by the Oregon State University College of Pharmacy that has developed the training and certification program.[9]

We first analyzed monthly counts of contraception prescriptions prescribed by pharmacists during the study period. We further analyzed these trends by pharmacy type and location. We categorized pharmacies as retail chain, independent, or outpatient health care system-affiliated. We used the pharmacy's ZIP code to determine rural status according to the Oregon Office of Rural Health.[10]

For our second objective, to describe the population of patients accessing care from a pharmacist, we restricted our sample to patients who had 180 days of Medicaid enrollment before their initial (index) contraception prescription to ensure complete capture of antecedent utilization data. For these patients, we summarized demographic data including age, race–ethnicity, and urban or rural location. Medicaid and race–ethnicity are reported in approximately 60 categories, and members have the option to opt out of answering this question. We categorized race–ethnicity into three groups: white, non-white, and unknown. We categorized the contraceptive product for the index claim as combined hormonal transdermal, combined hormonal OC, or progestin-only OC. For each index fill, we summarized the intended duration of the first fill using the prescription days' supply.

New hormonal contraceptive users included any patient without a prescription for one in the prior 30 days. This could include patients who have never used this form of contraception, or those who used hormonal contraception only before our 30-day window. We used pharmacy claims data in the 30 days before the index claim to assess whether the woman was continuing contraception or whether the index claim was a new start. We defined contraceptive

continuation to mean the woman had a prior contraceptive prescription that would have ended in the 30-day period before the index claim. We calculated end dates of prior contraceptive prescriptions by adding the days' supply to the fill date of contraceptive claims dispensed in the prior 180 days, which would include refills on any existing prescriptions. When accounting for contraceptive coverage, we included all hormonal oral, transdermal, vaginal, and injectable contraceptive methods. As a sensitivity analysis, we also analyzed contraceptive prescriptions in the 180 days before their index claim, which is the time period of continuous Medicaid coverage for this population. We did not assess methods of contraception or conditions affecting pregnancy risk that are not found in pharmacy claims (barrier methods, long-acting reversible contraceptives, lactation amenorrhea, recent pregnancy, abortion, or miscarriage).

The Oregon pharmacist Standard Procedures Algorithm explicitly prohibits prescribing to individuals at risk for contraceptive-related adverse events (eg, coagulation disorder) or contraceptive failure (eg, seizure medications). We assessed compliance with the algorithm by analyzing International Classification of Diseases, 10th Revision (ICD-10) diagnostic codes present on medical claims in the 180 days before the index claim. Specifically, we characterized comorbidities provided by the US Medical Eligibility Criteria as a relative (category 3) or absolute (category 4) contraindication with combined OC.[11] ICD-10 codes were used to identify medical claims for the following diagnoses, which are associated with increased risk of adverse events or failure of that method: bariatric surgery, breast cancer, cardiovascular disease (includes hypertension), coagulation disorder, diabetes (types 1 and 2), inflammatory conditions, liver disease, migraines with aura, sickle cell disease, stroke or transient ischemic attack, tobacco use, and 35 years or older, and pregnancy history or breastfeeding in the previous 6 weeks (from the index date). We also examined recent (within 30 days before the index date) prescriptions of drugs known to interact with contraceptives such as some antiseizure drugs and antiinfectives. Appendix 3 (available online at http://links.lww.com/AOG/B376) contains the full list of ICD-10 codes and interacting medications used.

RESULTS

Over the first 2 years of the program (January 2016–December 2017), a total of 3,614 patients in the Oregon Medicaid program received a new prescription for oral and transdermal methods from all providers. Within this time period, 162 pharmacists prescribed contraception for 367 patients, resulting in 1,313 fill claims. Among all patients using oral and transdermal hormonal contraception, 10% received their prescription from a pharmacist.

Trends and characteristics of pharmacist-prescribed contraception are shown in Figures 1 and 2. Within 4 months of implementation, pharmacist-prescribed contraception claims consistently totaled more than 40 claims per month among Medicaid enrollees. In the next 7 months, pharmacists filled an average of 61 contraceptive prescriptions per month as the prescriber. The highest number of claims in a month occurred in July and August of 2017, with 80 and 79 claims per month, respectively. The majority of claims originated from retail chain pharmacies (94%) in urban locations (71%).

Table 1 summarizes demographic and utilization data for the population of patients with 180 days of continuous enrollment preceding their index contraceptive prescription. This included 252 of the total 367 women who received their contraception from a pharmacist. The majority (82%) of patients were between 18 to 35 years, while only 7% were younger than 18 years. Because there is an option to opt out, race–ethnicity is unknown for approximately 38.5% of the population. Of the 155 (of 252) patients who reported race–ethnicity, 133 (86%) were white and 22 (14%) made up all other minority groups.

The most common method of contraception prescribed by pharmacists was the combined OC (90.5%), with only 5.6% being prescribed the progestin-only pill, and 3.2% prescribed the transdermal patch. Patients received an average of 65 days' supply of contraception on their index fill, with a range from 21 to 364 days. Most (59%) index claims were between 31 and 90 days' supply.

The majority of patients receiving a prescription from a pharmacist were new hormonal contraceptive users: 73.8% had no evidence of contraceptive coverage in the previous 30 days. When we increased the timeframe to look for contraceptive coverage before the index claim, 61.5% had not filled a contraception prescription that would end in the preceding 180 days.

Fewer than 5% (12) of patients had a diagnostic code indicating a possible contraindicating comorbidity. The most frequently identified conditions were cardiovascular disease (8), liver or gallbladder disease (5), and tobacco use in patients aged 35 or older (3), with some of the patients identified as having more than one of these conditions. There were no patients identified with a history of bariatric surgery, breast

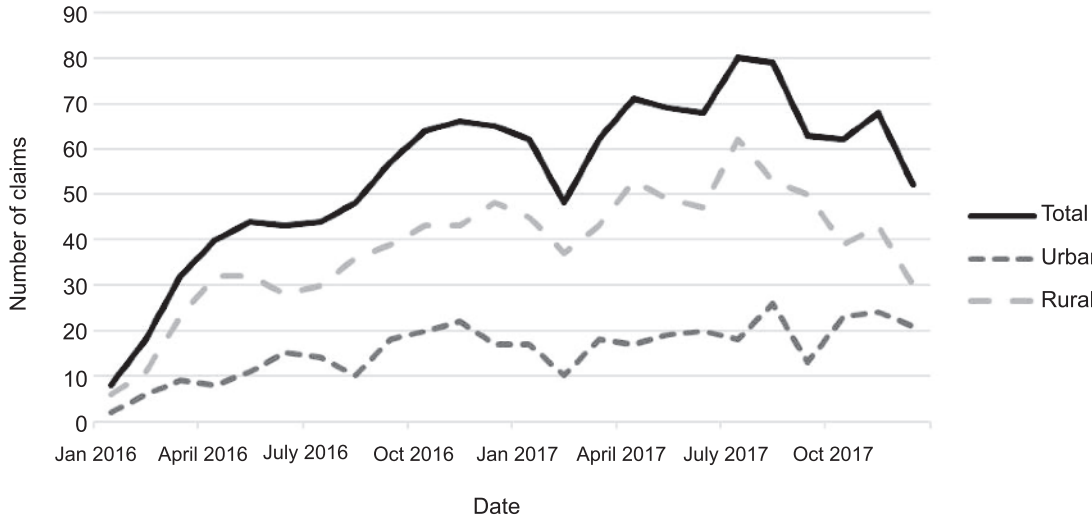

Fig. 1. Trend in prescription claims* per month where pharmacists are the prescriber vs location of the pharmacy. *The total number of overall claims in the 2-year study period was 1,313. The overall number of claims from rural pharmacies was 385 (29%) and from urban pharmacies was 928 (71%).

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cancer, coagulation disorders, diabetes, inflammatory conditions, sickle cell disease, stroke or transient ischemic attack, or a pregnancy history or breastfeeding in the previous 6 weeks. Contraindicated drugs identified included two patients on lamotrigine (an antiseizure medication commonly used as a mood stabilizer). No patients were found to have interacting antiinfectives or cystic fibrosis drugs.

DISCUSSION

Identifying effective strategies to help reach new contraceptive users or improve method adherence is essential to meet national goals to reduce unintended pregnancy. Expanding the role for pharmacists to prescribe hormonal contraception is one strategy that has been implemented in Oregon. In the first 2 years of program implementation, we

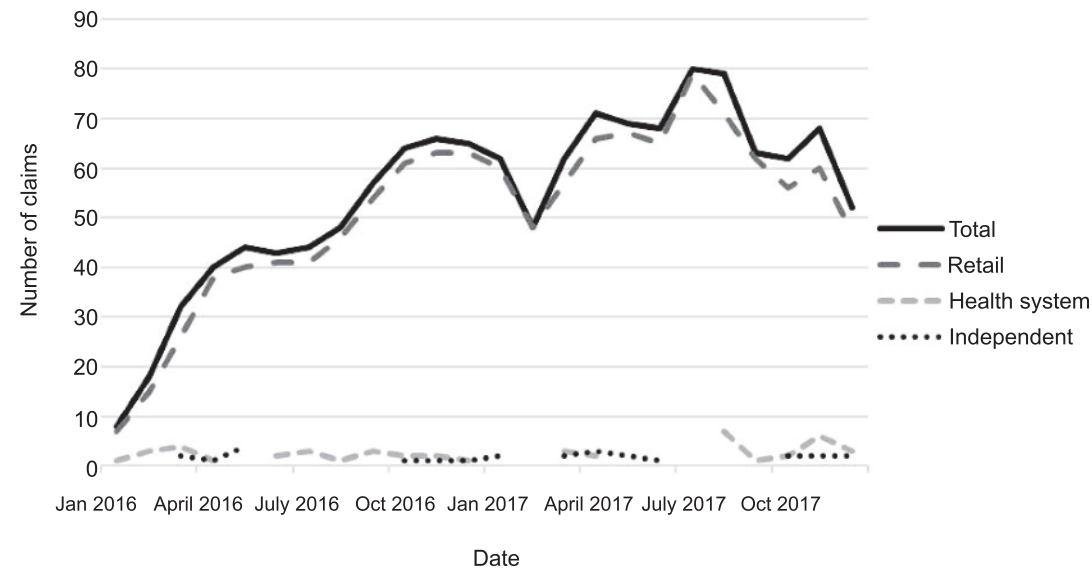

Fig. 2. Trend in prescription claims* per month where pharmacists are the prescriber vs pharmacy type. *The total number of overall claims in the 2-year study period was 1,313. The overall number of claims from retail chain pharmacies was 1,233 (94%), from health-system pharmacies was 51 (4%), and from independent pharmacies was 29 (2%).

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Table 1. Patient Demographics and Utilization

Variable	Value
n*	252
Total claim count (average)	884 (3.5)
Age (y)	
Younger than 18	18 (7.1)
18–25	100 (39.7)
26–35	105 (41.7)
Older than 35	29 (11.5)
Race–ethnicity	
White (Caucasian)	133 (52.8)
Non-white	22 (8.7)
Unknown	97 (38.5)
Rural location	90 (35.7)
Days' supply	65 (21–364)
Patient count by index days' supply	
0–30	90 (35.7)
31–90	149 (59.1)
91–180	11 (4.4)
181 or more	2 (0.8)
Method of contraception	
Combined oral pill only	228 (90.5)
Progestin-only pill only	14 (5.6)
Transdermal patch only	8 (3.2)
Previous contraceptive history (any prescriber)	
Any prescription in prior 30 d	66 (26.2)
Same method	60 (23.8)
Other method	6 (2.4)
Any prescription in past 180 d	97 (38.5)
Comorbidities†	12 (4.8)
Cardiovascular disease	8 (3.2)
Liver or gallbladder disease	5 (2)
Tobacco use and 35 y or older	3 (1.2)
Contraindicated drugs in prior 30 d	
Antiseizure	2 (0.8)

Data are n (%) or average (minimum–maximum) unless otherwise specified.

* Population of patients with 180 days of continuous Medicaid eligibility before pharmacist-prescribed contraceptive index claim.

† There were no patients identified with a history of bariatric surgery, breast cancer, coagulation disorders, diabetes, inflammatory conditions, sickle cell disease, stroke or transient ischemic attack, or history of pregnancy or breastfeeding the previous 6 weeks. No patients were found to have antiinfectives or cystic fibrosis drugs.

found evidence that pharmacists were safely reaching new contraceptive users.

Overall, 10% of new oral or transdermal hormonal contraceptive prescriptions were written by pharmacists. We found that, among Oregon's Medicaid enrollees, a majority (73.8%) of patients who received hormonal contraception from a pharmacist were new contraceptive users. Our finding held when we adopted a more conservative approach and examined contraceptive use over a longer time period. In the 180 days before receiving contraception from a pharmacist, 61.5% of patients had no contraceptive use, and were initiating hormonal contraceptive care in the pharmacy.

We also examined contraceptive safety by looking at whether patients with medical contraindications (Medical Eligibility Criteria Category 3 or 4) were receiving contraindicated methods. We found that overall adherence to the clinical algorithm for prescribing pharmacists was high. Only 12 (5%) patients were identified as having Medical Eligibility Criteria Category 3 or 4 medical conditions, and two (less than 1%) patients with medications contraindicating OC use received a prescription. This safety profile seen with pharmacists is on par with what is seen among clinicians prescribing contraception.[12]

Pharmacist prescription of contraception is a voluntary program for pharmacists that requires additional time and training. We found that the majority of prescriptions were written by pharmacists within retail chain pharmacies (94%) in urban locations (71%). In Oregon, 70% of community pharmacies are retail chain pharmacies and 61.8% are in urban locations (personal communication, F. Karbowicz, 2018). The higher percentage of retail chain pharmacies we found in our study may reflect encouragement from chain management to compensate pharmacists to become trained to offer these services. Oregon is unique in that Medicaid has reimbursed for both the cost of the contraceptive and the pharmacists' time in counseling the patients since the program began.

Our study has limitations. As with all observational research, our analysis is limited by variables captured in our data source: claims to Medicaid. Lack of rich clinical data (eg, blood pressure, smoking status), input errors (eg, misclassification of diagnostic data), or omissions could have affected our results. Our sample size is relatively small. We focused our data on patients with an initial fill for a prescription of oral or transdermal contraception in the first 2 years after the policy started. The initial piece of legislation passed in Oregon only included oral and transdermal hormonal contraception as methods pharmacists could prescribe. This was amended to include the vaginal ring and injection in 2017 (with implementation in 2018) making it possible for pharmacists to prescribe all forms of short-acting hormonal contraception. As the program matures, and contracts with additional insurers are implemented at pharmacies, we expect the number of pharmacist prescriptions to increase. Importantly, we did not have access to the screening questionnaire or blood pressure readings obtained by pharmacists at the time of contraceptive prescription. All individuals receiving contraception from a pharmacist are required to complete

a self-screening questionnaire with information on risk of current pregnancy, sexual activity, and other contraindicating comorbidities. We are unable to corroborate medical history self-reported by patients on the screening form with the comorbidities we captured from claims data. Future research should look at the safety of pharmacist-prescribed contraception with guidelines in the US Medical Eligibility Criteria as identified in the questionnaire, and compare this with prescribing patterns seen with other providers.

Our ability to characterize past contraceptive history may not be complete because we are not able to identify whether patients received contraception through Title X funding, those paid by other payers, or with cash. Additionally, because previous contraceptive use was identified with pharmacy claims, we do not know whether the patients in our population had a recent long-acting reversible contraceptive placed or removed, but we did gather information on recent pregnancy, along with other previous medical conditions. Our study was restricted to patients enrolled in Oregon's Medicaid, which affects the generalizability of our results.

Oregon has a relatively small population with significant demographic differences from other areas of the United States. We compared our study population with that seen in Oregon's Medicaid as a whole and noted a meaningful difference in race, ethnicity, or both. Reproductive-aged patients in Oregon who are Medicaid enrollees are 24.7% non-white.[13] In contrast, among patients who received a pharmacist-written prescription for hormonal contraception, 14% were non-white. This observation may reflect our small sample size or be emblematic of known racial or ethnic disparities in contraceptive use.[14]

It is important to interpret our findings within the context that this represents claims from the first 2 years of policy implementation. Although pharmacists were overall accepting of the program, and a majority became certified, it took months for most pharmacies to be prepared to provide care[15,16] (Figs. 1 and 2).

Ensuring equitable reimbursement for the counseling and services pharmacists provide is known to be essential to maintain contraceptive access in pharmacies.[5,16] Oregon is unique among states that have expanded the role of pharmacists to include prescription of contraception. Medicaid Fee for Service has covered the costs of both the contraceptive drug and the pharmacists' time for counseling since program inception. Oregon's Medicaid program is administered through 16 distinct coordinated care organizations with a minority of enrollees in open card, or Fee for Service (approximately 10%). Establishing the infrastructure and contracts for pharmacies to be able to bill and be reimbursed by payors is a lengthy and challenging process. Not all coordinated care organizations had established billing relationships with pharmacies during our study period. Oregon has been actively working to facilitate coordinated care organizations' and private payors' reimbursement of pharmacists' time in line with other health care providers' reimbursement for similar services. Future research should examine how increased participation by other payors affects utilization of pharmacies for contraceptive care. It is similarly important to understand who is accessing contraception from pharmacists, and why. An improved understanding of patients' reasons for seeking care in pharmacies and their experience with the service may improve contraceptive care within pharmacies and clinics. Robust implementation research, qualitative and prospective cohort studies are needed to understand how these programs are being implemented, and to identify the effect they are having.

Pharmacist prescription of hormonal contraception has the potential to improve contraceptive utilization and continuation rates nationwide. Early data from Oregon demonstrates that pharmacists are reaching new contraceptive users who are at risk for unintended pregnancy.

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