In 2014, the pharmacist’s role in the United States expanded to include prescribing hormonal contraception, and this practice is currently addressed by policy in 14 states and the District of Columbia. Training and education requirements for this expanded scope of practice vary between states and are changing rapidly. The objective of this review is to examine how student pharmacists are taught to provide contraceptive care, specifically for prescribing ongoing hormonal contraception and emergency contraception, and to identify potential gaps in the United States pharmacy curricula related to contraception. Despite steady adoption into community pharmacy practice, there is sparse literature assessing educational methods used to teach contraceptive care. This review offers recommendations to promote consistent and comprehensive student pharmacist education in providing contraceptive care across institutions, regardless of state policy status.

**Keywords:** pharmacist prescribed, hormonal contraception, emergency contraception, student pharmacist, teaching method, assessment method

## INTRODUCTION

In the United States, the pharmacist’s role in reproductive care continues to expand as states broaden the scope of practice to include prescribing hormonal contraception. As of 2021, 14 states and the District of Columbia have specifically authorized pharmacists to prescribe hormonal contraceptives, either using statewide protocols, standing orders, or specific collaborative practice agreements, with several other states allowing this practice under broader policies. These efforts build on prior state efforts to increase direct access to emergency contraception in pharmacies, as well as other pharmacy-based public health interventions, such as immunizations, tobacco cessation, and naloxone access.2

In a 2009 survey assessing women’s perception of pharmacist-prescribed hormonal contraception, 67% of women perceived not having to visit a physician and incur a copay as a benefit, while 85% agreed that the convenience of multiple locations and extended hours offered by community pharmacies make them a preferred avenue for obtaining hormonal contraception.3 Additionally, surveys of US pharmacists and student pharmacists have identified strong interest in prescribing hormonal contraception in community pharmacies.4-6 Given the strong support for pharmacist-prescribed hormonal contraception from both patients and pharmacists, it is expected to become standard practice in community pharmacy settings in most, if not all, states in the future. Therefore, providing competent contraception care should be an
essential core competency within pharmacy education and training.

A study by Rim and colleagues in 2020 assessed delivery of contraceptive topics and noted that the majority (~70%) of doctor of pharmacy (PharmD) programs indicated their curriculum adequately covered contraceptive topics; however, programs also expressed interest in developing a standardized contraceptive curriculum. Other studies between 2018 and 2020 have highlighted institution-specific training opportunities in which students’ demonstrate their knowledge of contraceptives in simulated scenarios (discussed below), but studies assessing a broader cohort of learners from multiple institutions have not been conducted. Although pharmacists and student pharmacists have indicated in surveys that they are comfortable with prescribing hormonal contraception, a desire for additional training in specific areas has also been consistently identified. For example, in 2014, Rafie and colleagues found that student pharmacists in California expressed a desire for additional training in product selection, switching a patient from one product to another, and prescribing for minors. Another study by Stone and colleagues in 2020 that assessed pharmacist readiness demonstrated similar results, with a majority of participants indicating they desired additional training in product selection and switching a patient from one product to another. These surveys highlight potential curricular gaps and opportunities to expand the resources allotted for contraceptive pharmacy education consistently across schools and colleges of pharmacy.

This review evaluates the available literature describing how pharmacists are taught to provide contraceptive care, specifically emergency contraception and hormonal contraception, and identify potential gaps in the current PharmD curricula in the United States based on this information. In addition, this review offers recommendations to promote consistent and comprehensive student pharmacist education in providing contraceptive care across institutions. Accordingly, a scoping literature search was conducted in PubMed to identify articles assessing the delivery of contraceptive education for student pharmacists, physicians, and nurses from 2000 to the present.

FINDINGS

In a 2020 survey by Rim and colleagues that assessed the contraception curricula taught in US pharmacy schools, 100% of schools that responded indicated they provided education on emergency contraception and hormonal contraception. The majority of respondents also offered non-hormonal nonprescription (over-the-counter [OTC]) contraception content (96%) and long-acting reversible contraception content (91%). On average, schools spent 6.8 ± 3.7 (mean ± SD) hours on contraception topics (range: 1.4-22 hours) with emergency contraception and hormonal contraception taking 0.9 ± 0.5 hours (range: 6 minutes-2 hours) and 2.9 ± 2.0 hours (range: 45 minutes-12 hours) of the curricula, respectively. Patient cases were the most frequent type of supplemental material used. Despite inclusion of content on routine and emergency contraception in the vast majority of PharmD programs, the curricula may not prepare all graduates to confidently prescribe hormonal contraception.

In 2007 Evans and colleagues was one of the first studies to evaluate learning outcomes associated with contraception content in pharmacy education (n = 752 from 18 colleges of pharmacy). This study evaluated general student knowledge of emergency contraception at different timepoints during the PharmD curriculum but did not assess a specific learning experience. The results found that students’ knowledge of emergency contraception increased with each year in pharmacy school, after taking a course covering contraception, or when emergency contraception was a specific topic in a course. Out of nine questions, students’ mean knowledge score was 5.9 (n = 65.5%). Scores improved with each academic year: first- and second-year students scored an average of 5.4, third-year students scored an average of 5.8, and fourth-year students scored an average of 6.4. Evans and colleagues did not address instructional time or quality of instruction as a determinant of student knowledge.

In 2018, Hohmann and colleagues conducted a cross-sectional survey of first-year student pharmacists (n = 110) regarding their contraceptive knowledge, perceptions, and counseling intentions among students. The results of the survey suggested that student pharmacists early in training preferred to learn by watching examples of pharmacists counseling patients on contraception (56%) or through “role-playing” (30%). In 2014, Rafie and colleagues conducted a survey of student pharmacists (n = 502) in California prior to the state’s policy change. The survey was administered to student pharmacists who had completed pharmacotherapeutic coursework but not yet started advance pharmacy practice experiences (APPEs). Despite 94% of students feeling confident about counseling patients on the proper use of hormonal contraception, only 65% felt adequately educated to prescribe hormonal contraception in their pharmacy practice. In 2020, Stone and colleagues reported that 58% of pharmacists surveyed felt they had received adequate training to prescribe hormonal contraception. However, 42% did not feel that they were adequately trained and competent to prescribe hormonal contraception, and of these 21% reported that hormonal contraception was not covered in their pharmacy school.
curriculum. Finally, a majority of respondents indicated they desired additional training, specifically on switching patients from one contraceptive to another and selection of contraceptive products for a specific patient.\footnote{11}

Pharmacists are not the only health care providers to report deficits in contraceptive training. Some surveys of primary care providers also reveal a reported lack of knowledge and comfort with contraception counseling.\footnote{14} and surveys of graduating medical residents found that their knowledge of contraception varied widely.\footnote{15} Provider knowledge about emergency contraception also varies widely. A 2016 survey of general practitioners who provided care for women of reproductive age did not know about more effective methods of emergency contraception (oral ulipristal acetate and copper intrauterine device) and rarely (4%) prescribed them.\footnote{16} Establishing a standardized curricula for contraceptive training to address these knowledge gaps has been suggested for medical students.\footnote{14}

The amount of time dedicated to contraceptive training also varies in medical education. A 2003 survey of US and Canadian medical schools found that most taught three to 10 hours of sexual health education content and the majority was lecture-based.\footnote{17} One review suggested that training in sexual health and assessment of students’ knowledge are lagging behind the clinical and scientific advancements in the field.\footnote{18} A report issued in 2010 by the International Consultation of Sexual Medicine, an international, multidisciplinary expert panel, indicates that sexual health training of physicians is inadequate and standardized assessments of clinical skills are needed.\footnote{18}

There are limited studies that assess the quality of instructional methods and associated clinical competencies for emergency contraception and hormonal contraception curricula in pharmacy education. The available literature is described, and a summary of the study objectives, teaching modalities, type of course, study design, and assessment methods can be found in Appendix 1.

Young and colleagues (n = 189) found that approximately 25% of pharmacy students stated they were confident in counseling patients regarding emergency contraception prior to an active-learning exercise compared to 59% after (\(p < .01\)).\footnote{20} Students were asked to rate the degree to which certain barriers hindered their ability to counsel a patient regarding emergency contraception using a scale of 0 to 100, with 0 representing “not a barrier” and 100 representing “it’s a definite barrier.” The most common barrier to counseling identified by students on the pre- and post-workshop survey was lack of knowledge (presurvey mean score = 41.0 and postsurvey mean score = 19.8, \(p < .001\)). Student pharmacists’ knowledge of counseling patients regarding emergency contraception increased from 86% to 93% after the exercise (\(p < .001\)). The study concluded that active-learning exercises may be an effective way to increase student pharmacists’ knowledge and confidence regarding emergency contraception.

A few studies have evaluated teaching methods for contraception training in student pharmacists. Two studies in elective courses have been conducted. A 2018 study by Lynch and colleagues assessed student pharmacists enrolled in a women’s health elective (n = 11).\footnote{21} The students underwent training on state hormonal contraception prescribing legislation and completed three simulated standardized-patient scenarios in which they used a prescribing algorithm to make clinical decisions and interacted with the simulated patients. Students received an average score of 27.6 out of 30 points, and all completed the activity within the allocated 20 minutes. Students reported overall satisfaction with the activity, generally agreed that the activity was realistic, and reported feeling prepared to prescribe contraceptives. A second study evaluating a women’s health elective was conducted by Elbibary and colleagues in 2018 and included contraception discussion activities and active learning in the form of reading journal article reviews and using drug information resources.\footnote{22} Of the students enrolled (n = 33), 80% preferred workshops with OTC products as the mode of learning. Hormonal contraception workshops were the second most preferred (61%) mode of learning. Students’ confidence in counseling women about reproductive health significantly increased after the course (mean scores 2.62 pre-course vs 3.75 post-course; \(p < .01\)). Students’ perceptions of their overall knowledge in women’s health also increased (mean scores 2.63 pre-course vs 3.92 post-course; \(p < .01\)). Prior to the course, students were least confident in counseling patients about progestin-only implants and most confident in counseling patients about emergency contraception. After the course, students’ confidence increased for both products, respectively (mean score of 1.82 to 3.81; 3.70 to 4.29; \(p < .01\) for both items).

Two larger studies evaluating teaching methods for contraception training in student pharmacists have been conducted. The first was by Harris and colleagues in 2020 and evaluated student knowledge of and confidence with prescribing hormonal contraception following participation in a simulated patient case activity.\footnote{8} Student performance on an individual readiness assurance test was consistent, with a mean of 84% for two academic years sampled (2017-2018; n = 131 and 2018-2019; n = 112). Students scored an average of 84% (2017-2018) and 92% (2018-2019) on the documented assessment and plan (\(p < .001\)) and 96% (2017-2018) and 91% (2018-2019) on the post-activity quiz (\(p = .001\)). The tasks that students felt the most confident about completing included
navigating and interpreting the patient’s prescription drug formulary, providing the patient with written documentation about the product, and notifying the patient’s primary care provider of any product prescribed to the patient. Students reported less confidence in their ability to select an appropriate hormonal contraception product based on patient-specific factors and provide education on managing missed doses. The second study by Lynch and colleagues assessed the impact of a stimulated activity on second-year student pharmacist readiness and confidence in prescribing contraception (n = 216).23 The mean activity score was 86% (median 90%), with a significant change in students’ confidence in their ability to complete the process after the activity (p < .01). There was a significant increase from pre-activity to post-activity in the number of students who agreed that the curriculum prepared them to prescribe hormonal contraception (increase from 15% to 29%; p < .01). However, at both baseline (52%) and follow up (53%) a majority of students still reported they would need more practice during advanced pharmacy practice experiences (APPE) before they would feel prepared to prescribe contraception.

Evaluation of teaching activities and learning assessments for contraception training in other health care professions is also limited, but available data indicate that active-learning activities may be effective in improving knowledge and comfort with contraceptive care. For example, one 2019 study provided internal medicine residents with a pocket card and one-hour didactic lecture and assessed their confidence in counseling on and prescribing contraception before and after the activity.24 Forty-two students (56%) completed the pre-intervention survey and 40 students (53%) completed the post-intervention survey. Although there was a significant improvement in resident attitudes toward the applicability of contraception training (p = .03), there was no difference in confidence in prescribing or counseling patients regarding oral contraceptives (p = .05, p = .45). Another 2019 study evaluated internal medicine residents (n = 38) who completed a contraception case-based assessment using interactive online resources (CDC MEC and Reproductive Health Access Project websites) and smartphone applications (CDC Contraception and Contraception Point-of-Care applications).25 The students’ mean knowledge score improved significantly after this learning activity, nearly doubling from 49% correct answers on the pre-survey to 85% correct on the post-survey. Students were asked to rate their confidence and comfort level with counseling patients and assessing their eligibility to use contraception using the following scale: 1 = very comfortable/confident, 5 = not at all comfortable/confident. Post-surveys demonstrated significant improvements in all categories (ie, comfort with counseling patients, confidence in evaluating their medical eligibility, and confidence in initiating contraception). Improvements in confidence were maintained on follow-up surveys administered four to six months later (evaluating patients’ medical eligibility, presurvey mean score = 3.2 and delayed postsurvey mean score = 2.7, p = .004; and initiating patient use of the pill, patch, ring, or injection, presurvey mean score = 3.6 and delayed postsurvey mean score = 3.0, p = .002).

One major limitation in evaluating teaching activities for student pharmacists regarding contraception prescribing and patient education is the understanding that there is a discordance between methodologies used in the classroom and those described in the literature. Robust literature related to active learning techniques, applied skills laboratory time within the curriculum, and simulation scenarios is lacking. Educators are likely using these techniques to deliver the contraception curriculum; however, they are not publishing papers about their experience or research in this area. This can be because of a variety of reasons, including lack of time or concerns of lack of rigor or high enough degree of innovation for peer consumption.

Faculty may face barriers that impact successful implementation and expansion of advanced contraception education into pharmacy curricula.7,26,27 Some of the overarching concerns that commonly impact curricular development include faculty resources or resources for activity development and curricular design. School curricula often are already strained for space and time, and inserting a new activity can be challenging. Additionally, having the faculty resources for development of new activities may be difficult depending on the institution and faculty expertise. Also, an institution may place limitations on faculty in terms of how in-depth contraception content can be delivered, discussed, and applied. When extrapolating data from other health professions, similar barriers have been documented.24-28 Reported barriers in delivering sexuality content, including contraception, within nursing curricula include: time constraints in the curriculum, less priority compared to other topics, comfort and capability to teach the topics, and importance not seen by faculty.26,27 Aaberg found 40% of responding nursing programs identified time constraints as the primary barrier in 2016, which aligns with a study conducted nearly 50 years prior in which 45% identified lack of time as a barrier.26,28 Pharmacy schools also identified time as a barrier to contraception education curricula incorporation in the 2020 study by Rim and colleagues, although 68% felt the curriculum was adequate. Only 29% of pharmacy schools agreed that incorporating six to eight hours of hormonal contraception education into the required didactic curriculum would be easy. Interestingly, 61% agreed that
providing six to eight hours of contraception education within the elective curriculum would be easy.\textsuperscript{7} Although expanding women’s health education within any part of a curriculum should be lauded, expansion in elective areas of the curriculum alone would not contribute to the practice-readiness of all students in a pharmacy program.

The optimal duration of instructional time needed to deliver contraceptive content is unknown, and instructional time may not directly correlate with an increase in practice-readiness. Typical assumptions often include the idea that additional instruction time results in increases in performance outcomes. A 2017 study by Cattaneo and colleagues in secondary education illustrated that an additional hour of instruction only delivered 30\%-40\% of the expected learning impact that is typically associated with the first hour of instruction.\textsuperscript{29} Lavy, and Rivkin and Schiman found that increasing instructional time modestly increased students’ performance on examinations in secondary education.\textsuperscript{30,31}

Depending on state regulations and current contraception prescribing practices, pharmacy faculty, preceptors, and students may have different expectations of the importance of advanced student learning activities within the curriculum with regard to contraception. Theoretically, students and educators located in states that allow pharmacists to prescribe may place a greater emphasis on active learning and simulated activities and devote more time to the topic. Additionally, lack of support for these types of activities from other health care providers may exist as well, which could impact interprofessional education experiences. The most commonly used learning technique for contraception in the 2020 study by Rim and colleagues was the use of case studies, but the lowest used method was patient interviews.\textsuperscript{7} The use of active learning techniques allows students to apply the information they have learned and grow in their comfort level with prescribing contraception. Rim and colleagues suggested that patient interview utilization could be increased to aid with student confidence. As practicing pharmacists often cite training as a barrier to providing this service, robust activities using a variety of teaching techniques can best help equip students for practice.\textsuperscript{32}

Student attitudes towards contraception prescribing also play a role in the intent to perform this action. In 2018, Hohmann and colleagues discovered that, among first-year student pharmacists who had not yet learned about contraception, those with more positive attitude scores regarding contraception counseling had a higher intent to counsel. Perceived importance of contraceptive education may vary among students, schools of pharmacy (ie, religious vs secular institutions), and states (ie, pharmacist prescribing vs non-prescribing). These factors may ultimately affect an individual pharmacist’s decision to prescribe contraception.

States that allow pharmacist-prescribed contraception mandate that the provider complete a training course, the content of which varies among states. However, some states waive this requirement for pharmacists who graduated from a school in the state after the bill went into effect (Appendix 2). It is unclear whether receiving this prescriptive authority as part of earning a PharmD degree instead of by completing postgraduate training increases the number of pharmacists who choose to provide this service.

**DISCUSSION**

Data indicate that all student pharmacists currently receive contraceptive care education; however, studies have identified that a subset of students report they do not feel adequately prepared to prescribe contraception or desire additional training in specific areas.\textsuperscript{7} There is limited literature assessing the specific teaching modalities that are currently employed in pharmacy schools to deliver this content, particularly in the context of the pharmacy professions expanding scope of practice. The majority of available literature assesses student self-perception or confidence, which likely does not fully assess whether a teaching methodology is effective without accompanying outcomes data. Additionally, the authors did not identify any data specifically assessing contraceptive care education within introductory pharmacy practice experience (IPPE) or advanced pharmacy practice experience (APPE) training.

The Accreditation Council for Pharmacy Education (ACPE) sets standards for PharmD programs in the United States and addresses three key standards within the required Educational Outcomes: Foundational Knowledge, Essentials for Practice and Care, and Approach to Practice and Care.\textsuperscript{33} The pharmacist’s role in providing contraceptive care has changed rapidly since 2013. In this quickly changing landscape, PharmD curricula will require review and potential revision to prepare graduates to confidently prescribe contraception, a skill that is becoming essential in community pharmacy practice.

The American College of Clinical Pharmacy’s (ACCP) Pharmacotherapy Didactic Curriculum Toolkits have strongly recommended contraception education as a tier 1 core curriculum component within the Women’s Health section since the first of three iterations in 2009.\textsuperscript{34-36} The tier 1 recommendation is defined as topics in which education and training should prepare learners to provide patient-centered, collaborative care by demonstrating competence during or at the end of the program.
(AACP) Learning and Performance Outcomes also address contraception education, stating that students should be able to “develop appropriate pharmaceutical care plans for pregnancy prevention.” In 2020 Rim and colleagues found that all responding PharmD programs reported inclusion of hormonal contraception and emergency contraception in their curricula, as recommended by these organizations. However, only 68% of responding institutions believe the contraception education regarding long-acting reversible contraception is adequate. As noted earlier, a majority of surveyed student pharmacists and pharmacists indicated they would like additional product-specific education in preparation for prescribing contraception. This data suggest that the essential content needed to provide patient-centered contraceptive care may not be uniformly met by all PharmD programs.

Although schools and colleges of pharmacy include contraceptive content in the didactic portion of their curricula, few use more complex teaching modalities, such as simulated patient cases. Data are limited regarding learner outcomes associated with instructional time, content delivery, and assessment of practice-readiness in pharmacy contraception education. To the authors’ knowledge, research has not been conducted to assess whether there is a relationship between the type of teaching activity (ie, SOAP note, case studies, role play, simulated patient) and the outcome of interest, graduating a practice ready pharmacist, prepared to prescribe contraceptive products. Other health care professions face similar challenges in delivering sexual education and reproductive health content. Medical schools often use lecture-based methods to teach these topics, with data indicating this may not effectively prepare students to confidently practice in this area. However, evaluations of more active learning styles indicate they increase student interest and confidence and have a sustained effect. Both pharmacy and medical educators have identified that standardization of learning activities may improve training in their field through either standardization of curricula or assessments of clinical skills.

As the role of the pharmacist in contraceptive care continues to expand, the authors put forth the following recommendations for educators to consider. Doctor of Pharmacy programs should proactively address curriculum and experiential training gaps that may develop with the rapidly expanding pharmacist scope of practice, such as hormonal contraception prescribing. Graduating pharmacists should have a working knowledge of the pharmacology of all of the contraceptive products available, the ability to efficiently access and apply more detailed product-specific information, and the clinical skills to provide direct contraception care. Pharmacy school curricula should incorporate key guidelines in providing contraceptive care, such as the United States Medical Eligibility Criteria for Contraceptive Use and the United States Selected Practice Recommendations for Contraceptive Use. Graduating pharmacists should possess communication skills that allow them to gather pertinent and often sensitive patient information and apply their knowledge to provide contraceptive education and care for a specific patient. Doctor of Pharmacy programs may consider working directly with state regulatory agencies to ensure pharmacists are prepared and authorized upon graduation to prescribe contraceptives, which may aid implementation of this service for state residents to access. Doctor of Pharmacy programs may consider including discussion regarding potential barriers and facilitators to implementation of pharmacist prescribing of contraception within the curricula (eg, payment structure, overcoming resistance from other providers). Pharmacy educators are encouraged to evaluate and publish data regarding novel training techniques used to teach contraceptive care.

CONCLUSION

An increasing number of states permit pharmacists to prescribe select medications, including hormonal contraception and emergency contraception. The training that student pharmacists receive must also adapt to produce “practice ready” graduates in this changing landscape. Additional research is needed to identify which types of teaching methods are most effective in preparing graduating pharmacists to confidently prescribe contraceptives, and then to implement these best teaching practices into pharmacy education.

REFERENCES

1. Birth Control Pharmacist. Policies - State policies and protocols for pharmacist prescribing of contraception. https://birthcontrolpharmacist.com/policies/.
2. National Alliance of State Pharmacy Associations (NASPA). Scope of Practice. https://naspa.us/restopic/scope/. Accessed April 22, 2022.
3. Landau SC, Tapias MP, Mcgee BT. Birth control within reach: a national survey on women’s attitudes toward and interest in pharmacy access to hormonal contraception. Contraception. 2006;74(6):463-470.
4. Landau S, Besinque K, Chung F, et al. Pharmacist interest in and attitudes toward direct pharmacy access to hormonal contraception in the United States. J Am Pharm Assoc (2003). 2009;49(1):43-50.
5. Rafie S, Cieri-Hutcherson NE, Frame TR, et al. Pharmacists’ perspectives on prescribing and expanding access to hormonal contraception in pharmacies in the United States. J Pharm Pract. 2021;34(2):230-238.
6. Rafie S, El-Ibiary SY. Student pharmacist perspectives on providing pharmacy-access hormonal contraception services. J Am Pharm Assoc (2003). 2011;51(6):762-765.
7. Rim C, El-Ibiary SY, Rafie S, Borgelt LM. Assessment of contraceptive curricula in US pharmacy programs. Curr Pharm Teach Learn. 2020;12(4):395-399.
8. Harris E, Melody K, Charneski L. Student knowledge and confidence with prescribing hormonal contraception. Curr Pharm Teach Learn. 2020;12(6):751-762.
9. Lynch SE, Griffin BL, Vest KM. Assessment of a simulated contraceptive prescribing activity for pharmacy students. Curr Pharm Teach Learn. 2018;10(2):178-184.
10. Rafie S, El-Ibiary, SY. California pharmacy student perceptions of confidence and curricular education to provide direct pharmacy access to hormonal contraception. Pharmacy Education. 2014;14(1):31-36.
11. Stone RH, Rafie S, Griffin B, Shealy K, Stein AB. Pharmacist self-perception of readiness to prescribe hormonal contraception and additional training needs. Curr Pharm Teach Learn. 2020;12(1):27-34.
12. Hohmann N, Kavookjian J. Using the theory of planned behavior to determine pharmacy students’ intention to participate in hormonal contraception counseling services. Curr Pharm Teach Learn. 2018;10(11):1488-1495.
13. Evans E, Patel M, Stranton D. Student pharmacist knowledge and attitudes regarding oral emergency contraception. J Am Pharm Assoc (2003). 2007;47(6):711-716.
14. Akers AY, Gold MA, Borrero S, Santucci A, Schwarz EB. Providers’ perspectives on challenges to contraceptive counseling in primary care settings. J Womens Health (Larchmt). 2010;19(6):1163-1170.
15. Schreiber CA, Harwood BJ, Switzer GE, Creinin MD, Reeves MF, Ness RB. Training and attitudes about contraceptive management across primary care specialties: a survey of graduating residents. Contraception. 2006;73(6):618-622.
16. Batur P, Cleland K, McNamara M, Wu J, Pickle S, Group ECS. Emergency contraception: A multispecialty survey of clinician knowledge and practices. Contraception. 2016;93(2):145-152.
17. Solursh DS, Ernst JL, Lewis RW, et al. The human sexuality education of physicians in North American medical schools. Int J Impot Res. 2003;15 Suppl 5:S41-45.
18. Eardley I, Reisman Y, Goldstein S, Kramer A, Dean J, Coleman MF, Ness RB. Training and attitudes about contraceptive management across primary care specialties: a survey of graduating residents. Contraception. 2006;73(6):618-622.
19. Parish SJ, Rubio-Aurioles E. Education in sexual medicine: providers’ perspectives on challenges to contraceptive counseling in primary care settings. J Womens Health (Larchmt). 2010;19(6):1163-1170.
20. Lavy V. Do differences in schools’ instruction time explain international achievement gaps? Evidence from developed and developing countries. The Economic Journal. 2015;125(588):F397-F424.
21. Rivkin SG, Schiman JC. Instruction time, classroom quality, and academic achievement. The Economic Journal. 2015;125(588):F425-F448.
22. Lin CW, Chang EH, Clinciu DL, et al. Using modified information delivery to enhance the traditional pharmacy OSCE program at TMU - a pilot study. Comput Methods Programs Biomed. 2018;158:147-152.
23. Accreditation Council for Pharmacy Education (ACPE). Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree, 2016. 2015; https://www.acpe-accredit.org/pdf/Standards2016FINAL.pdf. Accessed April 22, 2022.
24. American College of Clinical Pharmacy (ACCP). Pharmacotherapy didactic curriculum toolkit 2009. http://www.accp.com/docs/positions/misc/pharmacotherapytoolkit.pdf. Accessed April 22, 2022.
25. Schwinghamer TL, Crannage AJ, Boyce EG, et al. The 2016 ACCP pharmacotherapy didactic curriculum toolkit. Pharmacotherapy. 2016;36(11):e189-e194.
26. Flannery AH, Soric MM, Benavides S, et al. 2019 Update to the American College of Clinical Pharmacy pharmacotherapy didactic curriculum toolkit. JACCP. 2020;3(2):455-464.
27. American Association of Colleges of Pharmacy (AACP) Learning and Performance Outcomes: Women’s Health Learning Outcomes. https://www.aacp.org/resource/learning-and-performance-outcomes. Accessed April 22, 2022.
28. Rosen R, Kountz D, Post-Zwicker T, Leiblum S, Wiegel M. Sexual communication skills in residency training: the Robert Wood Johnson model. J Sex Med. 2006;3(1):37-46.
29. Curtis KM, Tepper NK, Jatlaoui TC, et al. U.S. medical eligibility criteria for contraceptive use, 2016. MMWR Recomm Rep. 2016;65(3):1-103.
30. Curtis KM, Tepper NK, Jatlaoui TC, et al. U.S. selected practice recommendations for contraceptive use, 2016. MMWR Recomm Rep. 2016;65(4):1-66.
## Appendix 1. Literature Assessing Contraception Teaching Modalities and Outcomes

| Citation and Number of Participants | Study Objective | Teaching Modality | Required or Elective Course | Design/Statistics / Assessment Method(s) | Outcome |
|-------------------------------------|-----------------|-------------------|-----------------------------|------------------------------------------|---------|
| Young 2012 n=189                    | To increase pharmacy students’ knowledge of and confidence in counseling patients regarding EC and to identify any barriers to counseling patients about EC | Workshop | Required | - Cross-sectional pre and post workshop survey  
- Students observed a 5-minute skit of a counseling session on EC and then were asked to pair up with a classmate and practice counseling each other regarding the use of EC following a checklist of key points | 94.5% students responded  
Students’ knowledge scores increased from 86% to 93% (p < .01)  
Approximately 25% of the students stated they were confident in counseling patients on EC prior to active-learning exercise compared to 58.5% after (p < .01)  
The most common barrier to counseling that students identified on the pre- and post-workshop survey was lack of knowledge. |
| Lynch 2018 n=11                     | Determine the utility of a contraceptive prescribing simulation activity for pharmacy students | Simulation | Elective | - Cross-sectional post activity survey  
- Faculty graded clinical decision-making based on the student’s electronically submitted A/P.  
- The SP graded interpersonal skills using the CSC’s standardized communication skills rubric. | 100% students completed the activity in the allocated 20 min  
Overall students received an average score of 27.6 out of 30 points  
Students reported overall satisfaction with the activity, with general agreement that the activity was realistic and made them feel like they were prepared to prescribe contraceptives |
| El-Ibiary 2018 n=33                 | Describe the content and evaluation of an elective course in women’s reproductive health | Didactic and Simulation | Elective | - Descriptive study  
- Paired sample t-tests to compare pre and post course survey  
- Self-perceived confidence was measured on a Likert scale  
- Quizzes given at the end of each lecture, participation in | 80% (n=24) of students preferred OTC workshops with products more than any other methods  
Students’ confidence in counseling on women’s reproductive health |
## Appendix 1. (Continued)

| Citation and Number of Participants | Study Objective | Teaching Modality | Required or Elective Course | Design/Statistics / Assessment Method(s) | Outcome |
|-------------------------------------|----------------|------------------|----------------------------|----------------------------------------|---------|
| Harris 2020 n=131 (2017-2018) & n=112 (2018-2019) | Assess student knowledge and confidence with prescribing HC following a simulated patient case activity in 2017 to 2018 and 2018 to 2019 academic years | Simulation | Required | 3 workshops, 2 take-home case assignments, 1 group project and peer evaluation, and an open notes final exam | significantly increased after the course (mean scores 2.62 pre-course and 3.75 post-course, p < .01). Students’ perceptions of their overall knowledge in women’s health (mean scores 2.63 pre-course and 3.92 post-course, p < .01). Prior to the course, students were least confident in counseling on the progestin-only implant (mean score 1.82) and most confident in counseling on EC (mean score 3.70). After the course, students’ confidence ↑ for both products (mean scores 3.81 and 4.29 respectively with p < .01 for both items). |

- Descriptive study utilizing educational assessments and survey data from 2nd professional year students during the 2017 - 2018 & 2018 - 2019 academic years.
- Student performance was assessed using a five-question readiness assurance test (IRAT) at the beginning of class, documented patient A/P, and five-question post-activity quiz
- Student performance on the IRAT was consistent from 2017 to 2018 to 2018 to 2019 with a mean score of 83.9% ± 16.3 and 83.9% ± 17.8 respectively, p = 0.979.
- Students scored an average of 84.2% and 91.6% (p < .001) on the documented A/P and 96.4% and 91.2% (p = .001) on the post-activity quiz for each year, respectively.
- Tasks associated with highest confidence included navigating and interpreting the patient’s prescription drug...
| Citation and Number of Participants | Study Objective | Teaching Modality | Required or Elective Course | Design/Statistics / Assessment Method(s) | Outcome |
|-----------------------------------|-----------------|-------------------|-----------------------------|----------------------------------------|---------|
| Lynch 2020 n=216                  | Assess the impact of a simulated activity on student pharmacists’ readiness for, ability to use, and confidence in applying the PPCP along with the US MEC to a patient seeking contraception. | Simulation          | Required                     | Quasi-experimental study                 |         |
|                                   |                 |                   |                             | Chi-square and Mann–Whitney U tests were used to analyze categorical variables and Likert-scale data, respectively. |         |
|                                   |                 |                   |                             | Students completed a contraceptive-prescribing simulation with SPs. |         |
|                                   |                 |                   |                             | Scores were analyzed for safe and appropriate prescribing practices. |         |
|                                   |                 |                   |                             | Pre- and post-workshop surveys measured confidence and perceived preparedness. |         |

- Students reported less confidence with the ability to select an appropriate HC product based on patient-specific factors and providing education on managing missed doses.
- 91.2% (n=197) students completed the pre survey.
- 42.6% (n= 92) students completed the post survey.
- Mean activity score was 86% (median 90%), with significant change in student confidence of ability to complete the process (p < .01).
- Majority of students at baseline (52.2%) and follow up (53.2%) reported needing more practice during APPEs to feel prepared.
- There was a significant change pre/post in students who agreed that their curriculum prepared them (15% to 28.7%, p < .01).
- Statistically significant changes in confidence for all aspects of the pharmacist...
| Citation and Number of Participants | Study Objective | Teaching Modality | Required or Elective Course | Design/Statistics / Assessment Method(s) | Outcome |
|-------------------------------------|----------------|-------------------|-----------------------------|------------------------------------------|---------|
| Medical Students Maciuba 2019 n=40 | Elucidate the perceptions of contraception in an IM primary care setting in a military residency and improve confidence in contraceptive counseling and prescribing | Didactic | Residents at a military IM residency program | • Description<br>• 1-hour long presentation on contraception that was followed 5 weeks later by the implementation of a pocket card for point of care use with key information from the presentation.<br>• Residents became certified in the placement and removal of the etonogestrel implant.<br>• Pre- and post-intervention surveys were administered to assess for changes in attitudes and confidence in prescribing and counseling. | patient care process as related to contraception provided by pharmacist (ex. assessing the patient, making a recommendation, monitoring the patient, referring the patient when needed)<br>• 53% (40 of 75) of participants responded. <br>• There was a significant improvement in resident attitudes towards applicability of contraception training (p = .03) as well as acquiring the skill of etonogestrel implant placement (p < .01).<br>• There was a trend towards significance in confidence in prescribing OC (p = .05).<br>• There was no change in residents’ confidence in counseling on OC (p = 0.45). |
| Bachorik 2019 n=38 pre-survey & n=20 post-survey | Evaluate whether a new contraception curriculum improved IM resident knowledge of and comfort with contraceptive care | Case-base workshop Required | | • Descriptive<br>• Pre and post activity survey assessing knowledge of and comfort with contraceptive care<br>• 2-hour session<br>• Interns were provided with select online resources and two smartphone applications at the beginning of the session, which they then used in case-based small group work | • 38 paired pre- and immediate post-surveys (95% of possible survey participants) and 20 (50% of possible survey participants) completed the delayed post-survey 4–6 months after the curriculum.<br>• Pre-session, the mean knowledge score (eg, % of 10 questions answered correctly) was <50% among all participants <br>• 38 paired pre- and immediate post-surveys (95% of possible survey participants) and 20 (50% of possible survey participants) completed the delayed post-survey 4–6 months after the curriculum. |
| Citation and Number of Participants | Study Objective | Teaching Modality | Required or Elective Course | Design/Statistics / Assessment Method(s) | Outcome |
|------------------------------------|-----------------|-------------------|-----------------------------|------------------------------------------|---------|
|                                    |                 |                   |                             | Mean ratings of comfort and confidence around contraceptive care ranged from 3.0 for comfort with counseling about the IUD or implant to 3.6 for confidence in initiating birth control pills, patch, ring or injection (1 = very comfortable or confident & 5 = very uncomfortable) |         |
|                                    |                 |                   |                             | Post-session, the mean knowledge score improved significantly, nearly doubling from 49.2% correct answers on the pre-survey to 84.5% correct on the post-survey |         |
|                                    |                 |                   |                             | Post-curriculum surveys demonstrated significant improvements in knowledge about comfort with counseling about assessing medical eligibility for and initiating multiple forms of contraception. |         |
|                                    |                 |                   |                             | Improvements in knowledge and comfort were maintained on follow-up surveys 4-6 months later |         |

Abbreviations: EC = emergency contraception, A/P = assessment and plan, SP = standardized patient, OTC = over-the-counter, HC = hormonal contraception, IRAT = individual readiness assurance test, PPCP = Pharmacists Patient Care Process, US MEC = United States Medical Eligibility Criteria, CSC = clinical skills center, APPEs = advance pharmacy practice experiences, IM = internal medicine, OC = oral contraception, IUD = intrauterine device.
| States with HC pre-scribing<sup>a</sup> | Prescriptive authority status | Training Program Requirements | Required Hours | Recent graduates prescribe HC without additional training? | State Regulations |
|---------------------------------|-------------------------------|-------------------------------|----------------|----------------------------------------------------------|------------------|
| Arkansas                        | In development; Statewide protocol | -Approved by BOP              | -Hours not noted | Unknown                                                   | https://www.arkleg.state.ar.us/Bills/FTPDocument?path=\%2FBills\%2F2021R\%2FPublic\%2FHB1069.pdf |
| California                      | Implemented; Statewide protocol | -Approved by BOP              | -1 hour        | Yes; starting in 2014                                     | https://www.pharmacy.ca.gov/publications/hormonal_contraception_protocol_rphs.pdf |
| Colorado                        | Implemented; Statewide protocol | -ACPE-accredited              | -Hours not noted | No                                                       | https://dpo.colorado.gov/Pharmacy/Protocols |
| Washington, District of Columbia| In development                 | -Approved by BOP              | -Hours not noted | Unknown                                                   | https://code.dccouncil.us/dc/council/code/sections/3-1202.08.html |
| Hawaii                          | Implemented; Statewide protocol | -ACPE-accredited              | -Hours not noted | No                                                       | https://www.capitol.hawaii.gov/hrscurrent/Vol10_Ch0436-0474/HRS0461/HRS_0461-.htm |
| Maryland                        | Implemented; Statewide protocol | -Approved by BOA              | -Hours not noted | Yes                                                      | https://health.maryland.gov/regs/Pages/10-34-40-.aspx |
| Minnesota                       | In development                 | -ACPE-accredited              | -Hours not noted | Yes                                                      | https://www.revisor.mn.gov/bills/text.php?number=HF1140&version=0&session=ls90&session_year=2017&session_number=0 |
| New Hampshire                   | In development                 | -ACPE-accredited              | -Hours not noted | Unknown                                                   | https://www.oplc.nh.gov/sites/g/files/ehbemt441/files/inline-documents/sonh/nh-phcy-law-rule-book-10-29-19.pdf |
| New Mexico                      | Implemented; Statewide protocol | -ACPE accredited              | -Hours not noted | Yes                                                      | http://www.rld.state.nm.us/uploads/files/OCConfirmedFinalJune2016.pdf |
| Oregon                          | Implemented; Statewide protocol | -ACPE accredited              | -5 hours        | No                                                       | https://www.oregon.gov/pharmacy/Pages/Contraceptive-Prescribing.aspx |
| Tennessee                       | Implemented; HC specific CPA   | -ACPE-accredited              | -Hours not noted | Yes; starting in 2017                                     | https://publications.tnosfiles.com/rules/1140/1140-15.20180718.pdf |

(Continued)
**Appendix 2. (Continued)**

| States with HC pre-scribing<sup>a</sup> | Prescriptive authority status | Training Program Requirements | Required Hours | Recent graduates prescribe HC without additional training? | State Regulations |
|----------------------------------------|-------------------------------|------------------------------|----------------|--------------------------------------------------------|------------------|
| Utah                                   | Implemented; Standing order   | -ACPE-accredited             | -Hours not noted | No                                                      | https://dopl.utah.gov/pharm/ |
| Vermont                                | In development; Statewide protocol | -Unknown                   | -Unknown                   | Unknown                                                 | https://legislature.vermont.gov/Documents/2020/Docs/ACTS/ACT178/ACT178%20As%20Enacted.pdf |
| Virginia                               | In development; Statewide protocol | -ACPE-accredited           | -Hours not noted       | No                                                      | https://www.dhp.virginia.gov/pharmacy/docs/protocols/Pharmacist%20routine%20contraceptive%20statewide%20protocol-9-9-2020.docx |
| West Virginia                          | In development; Standing order | -Approved by BOP            | -Hours not noted       | No                                                      | https://code.wvlegislature.gov/16-58-5/ |

<sup>a</sup>Idaho, Michigan, Montana, Washington, allow pharmacists to prescribe contraception under general collaborative practice agreements without specific training requirements.

Abbreviations: BOP = Board of Pharmacy, ACPE = Accreditation Council for Pharmacy Education, HC = hormonal contraception, CE = continuing education, DOH = Department of Health.

Birth Control Pharmacist: Policies. https://birthcontrolpharmacist.com/policies/, updated August 18, 2020. Accessed 1/29/2021.

National Alliance of State Pharmacy Associations. Pharmacist prescribing: hormonal contraceptives. Available at: https://naspa.us/resource/contraceptives/. Accessed February 1, 2020.