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Journal

Journal of Midwifery & Women's Health, 67(5)

ISSN

1526-9523

Authors

Avery, Melissa D
Mathiason, Michelle
Andrighetti, Tia
et al.

Publication Date

2022-09-01

DOI

10.1111/jmwh.13394

Journal of Midwifery & Women's Health www.jmwh.org
Research Article

Improved Self-Assessed Collaboration Through Interprofessional Education: Midwifery Students and Obstetrics and Gynecology Residents Learning Together

Melissa D. Avery[1], CNM, PhD, Michelle Mathiason[1], MS, Tia Andrighetti[2], CNM, DNP, Amy M. Autry[3], MD, Dominic Cammarano[4], DO, Kim Q. Dau[5], CNM, MS, Samantha Hoffman[6], MD, Susan Agard Krause[7], CNM, MSN, Owen Montgomery[8], MD, Audrey Perry[2], CNM, DNP, Heather Z. Sankey[7], MD, MS, Mark B. Woodland[4,9], MD, MS, John C. Jennings[10], MD

Introduction: Research suggests that interprofessional education, bringing learners together to learn about, with, and from each other, improves health professions education and can improve health outcomes. Little research has measured outcomes of interprofessional education between midwifery students and obstetrics and gynecology residents. The purpose of this study was to examine self-assessed interprofessional and collaborative competencies among midwifery students and obstetrics and gynecology residents.

Methods: Baseline self-assessed interprofessional and collaborative competencies were compared with follow-up measurements to evaluate learners' experiences over an 11-month study period. Participants were midwifery students and obstetrics and gynecology residents who experienced interprofessional learning activities. The Interprofessional Education Collaborative Competency Self-Assessment Survey (IPEC Survey) and Interprofessional Collaborative Competency Attainment Survey (ICCAS) were used.

Results: Of 256 learners at 4 demonstration sites, 223 (87%) completed the baseline, and 121 of 237 eligible learners (51%) completed the follow-up surveys. The IPEC Survey total score ($t = 2.31$, $P = .02$) and interaction subscale ($t = 2.85$, $P = .005$) and ICCAS score ($t = 4.04$, $P = .001$) increased for midwifery students but not obstetrics and gynecology residents on the IPEC Survey ($t = 0.32$, $P = .75$) and ICCAS ($t = -0.05$, $P = .96$) measures. Midwifery students (87%) and residents (57%) reported improved overall ability to collaborate. Learners responding to 3 open-ended questions valued team-based experiences, including learning how to communicate with each other; appreciated learning each other's education and scope of practice; and recommended skills development including uncommon clinical events, case discussions, and direct clinical care.

Discussion: This study advanced knowledge about interprofessional education between midwifery students and obstetrics and gynecology residents. Midwifery students improved in self-assessed interprofessional and collaborative competencies. Most learners reported better interprofessional collaboration skills and were positive about future interprofessional learning. This evaluation approach is available for other programs implementing or extending interprofessional education.

J Midwifery Womens Health 2022;67:598–607 © 2022 The Authors. *Journal of Midwifery & Women's Health* published by Wiley Periodicals LLC on behalf of American College of Nurse Midwives (ACNM).

Keywords: collaboration competencies, health professions education, interprofessional education, midwifery students, obstetrics and gynecology residents

INTRODUCTION

Interprofessional education (IPE) is recommended for health professions learners to learn about, from, and with each other[1,2] and to provide interprofessional team-based care and improve care outcomes in the United States and globally. Recommendations are based on research demonstrating that IPE improves learners' attitudes about other health professionals and their knowledge and skills in collaboration competencies.[3] IPE has been implemented using distance

[1]University of Minnesota School of Nursing, Minneapolis, Minnesota
[2]Department of Midwifery and Women's Health, Frontier Nursing University, Hyden, Kentucky
[3]Department of Obstetrics, Gynecology and Reproductive Sciences, University of California San Francisco School of Medicine, San Francisco, California
[4]Reading Department of Obstetrics and Gynecology, Reading Hospital/Tower Health, Reading, Pennsylvania
[5]Department of Family Health Care Nursing, University of California San Francisco School of Nursing, San Francisco, California
[6]Department of Obstetrics, Gynecology and Women's Health, University of Minnesota School of Medicine, Minneapolis, Minnesota
[7]Department of Obstetrics and Gynecology, University of Massachusetts-Baystate, Springfield, Massachusetts
[8]Department of Obstetrics and GynecologySidney Kimmel College of Medicine, Thomas Jefferson University, Philadelphia, Pennsylvania
[9]Department of Obstetrics and Gynecology, Drexel University College of Medicine, Philadelphia, Pennsylvania
[10]Texas Tech University Health Sciences, Odessa, Texas

Correspondence
Melissa D. Avery
Email: avery003@unm.edu

ORCID
Melissa D. Avery https://orcid.org/0000-0001-8726-2086
Michelle Mathiason https://orcid.org/0000-0002-9520-9565
Heather Z. Sankey https://orcid.org/0000-0002-0674-8867

 1526-9523/09/$36.00 doi:10.1111/jmwh.13394

Quick Points

- Interprofessional education is recommended for health professions students to improve interprofessional collaborative practice and health care outcomes.
- Midwifery students and obstetrics and gynecology residents reported better overall interprofessional collaboration abilities following an interprofessional education program and were positive about the experiences.
- Midwifery students, but not obstetrics and gynecology residents, demonstrated significant improvement in self-assessed interprofessional and collaboration competencies following multiple interprofessional education activities.
- Measuring self-assessed learner interprofessional and collaboration competencies regularly over an entire health professions program and extending this work to include examining effects on health systems are important for future research.

methodologies, including simulations, and has been shown to improve learner competencies.[4]

Little is known specifically about IPE programs where midwifery students and obstetrics and gynecology residents learn together during their education programs. Faculty developed normal birth and perinatal emergency simulations for midwifery students, medical students, and obstetrics, pediatric, and family medicine residents and found that learners appreciated opportunities for interprofessional practice in communication skills and learning about each other through debriefing.[5] Midwifery and medical students participated in interprofessional courses, identified scheduling difficulties and disparities in clinical knowledge, and requested additional time for interacting and learning about each profession.[6] Research specifically measuring the ability of midwifery students and obstetrics and gynecology residents to work collaboratively has not been reported in the literature.

Measurement tools have been designed and validated to allow learners to self-assess interprofessional and collaboration competencies. Examples include the Interprofessional Education Collaborative (IPEC) Competency Self-Assessment Survey (IPEC Survey)[7] and the Interprofessional Collaborative Competency Attainment Survey (ICCAS).[8] The IPEC Survey was designed for learners to assess their interprofessional skills and is based on the landmark IPEC report.[1] The ICCAS was developed for learners to assess their ability to collaborate in teams. It was initially tested with learners from 15 different health professions programs and later revalidated.[9] Measuring interprofessional and collaboration abilities among midwifery students and obstetrics and gynecology residents is important in assessing IPE as part of developing interprofessional programs and is a first step in studying the effect of IPE on interprofessional practice and health care outcomes.

The aim of this study was to examine self-assessed interprofessional and collaboration competencies among midwifery students and obstetrics and gynecology residents participating in interprofessional learning during an 11-month period. A secondary aim was to evaluate achievement of education objectives for learning activities that were implemented as part of this project.

METHODS

Settings

Four demonstration sites that offered IPE activities to midwifery students and obstetrics and gynecology residents were the settings for this IPE evaluation study. Three sites had both a midwifery and an obstetrics and gynecology program in the same institution. One site was a partnership between a distance midwifery program and a hospital-based residency program. The sites were participants in a project to develop interprofessional learning activities initiated by the American College of Nurse-Midwives and the American College of Obstetricians and Gynecologists.[10]

Participants

Midwifery students and obstetrics and gynecology residents at the 4 demonstration sites who experienced any education modules and other learning activities from June 2019 to May 2020 were the participants. Inclusion criteria were being a learner at one of the demonstration sites and planning participation in IPE activities during the evaluation period. All learners participated in an informed consent process at their education program in June or July 2019 and were informed that their participation was voluntary and that identifying information would not be collected. Across all 4 demonstration sites, 256 learners were invited to participate: 172 midwifery students and 84 residents.

Study Design

A descriptive comparative design was used to evaluate an interprofessional project including learning activities and modules that had been developed between 2017 and 2019.[10] Baseline and postimplementation evaluations of midwifery and obstetrics and gynecology learners' IPE experiences were conducted during an 11-month IPE implementation and evaluation period.

Procedures

Midwifery students and obstetrics and gynecology residents participated in didactic modules and other learning activities

Table 1. Summary of Activities and Modules by Demonstration Site

Demonstration Site	Modules	Activities[a]
Academic medical center–based midwifery and obstetrics and gynecology programs	Guiding Principles, Role Clarification, Collaborative Practice, History and Culture	NRP, TeamSTEPPS, poverty simulation, communication simulation, bootcamp skills session
Partnership site: distance midwifery program and hospital-based residency program	Guiding Principles, Role Clarification, Collaborative Practice	Online synchronous distance learning simulation with case discussions and consultations, debriefing with faculty
University-based midwifery and obstetrics and gynecology programs 1	Guiding Principles, Collaborative Practice, Difficult Conversations	NRP; Centering Pregnancy facilitation preparation; seminars on human rights for birth, Black midwifery, trauma informed pelvic care; some learners together on labor unit
University-based midwifery and obstetrics and gynecology programs 2	Guiding Principles, Role Clarification, and Care Transitions	Multistation skills laboratory, 3-case OSCE, high-risk simulation with consulting or being consultant and team-based care, pilot adding midwife student to resident team on labor unit

Abbreviations: NRP, neonatal resuscitation program; OSCE, objective structured clinical evaluation; TeamSTEPPS, Team Strategies & Tools to Enhance Performance & Patient Safety.
[a] Demonstration site activities commonly combined modules with other learning activities.

including case discussions, grand rounds, simulations, and short courses as part of their respective education programs during the evaluation period. The modules had been developed by faculty at the 4 sites as part of a previously described nationally funded IPE project.[10] Faculty at each demonstration site selected the IPE modules and other activities that fit best in their respective programs; a unique schedule was developed by each site as shown in Table 1.

Baseline learner self-assessment of interprofessional and collaboration competencies was conducted in June or July 2019 based on each program's schedule. Learners received a link to an electronic survey that they were asked to complete. A reminder email was sent 2 to 3 weeks following the initial request. An exception was that midwifery students at the distance program completed the baseline assessment as part of their third clinical course and were included in the study if they completed the baseline survey by October 31, 2019.

Following each IPE activity at each site, learners were asked to determine if the learning objectives for that specific activity were met. Examples of the objectives for interprofessional activities at the 4 sites included "Understand the background for and importance of interprofessional collaboration and team-based care," "Describe patterns of collaborative practice including appropriate use of language in partnering together and with patients in respectful team-based care," "Demonstrate beginning skills in facilitative leadership," and "Demonstrate interprofessional communication skills in debriefing post complex care simulations."

Follow-up of learner self-assessment of interprofessional and collaboration competencies was conducted in April and May 2020. An electronic survey link was again sent by email to all participants. Reminders were sent via email by each program's faculty twice at 2-to-3-week intervals. The follow-up survey included fewer participants because graduates of the midwifery distance program who completed their program after May 31, 2020, were excluded, resulting in 237 eligible participants.

Individual Learner Information

Learners were asked to identify if they were a midwifery student or resident and at which program. They were not asked to provide their name or any specific program or university identification number. Learners were also asked if they had experienced IPE instruction in their previous nursing or medical school program and whether the IPE instruction was (1) no IPE instruction, (2) a limited program (1- or 2-session experience), or (3) comprehensive (a series of organized sessions or events over a defined period). They were also asked to select the appropriate category that included the number of formal IPE activities they participated in during their current program, including coursework, modules, simulation, and working together in clinical settings (choices: none, 1 to 3, or 4 or more).

Instruments

Two recognized and validated instruments were used. The IPEC Survey[7] and ICCAS[8,9] are self-report measures of specific interprofessional and collaboration competencies. The IPEC Survey (Table 2) was selected because project faculty developed modules based on IPEC competencies including mutual respect and shared values, knowledge of one's own role and that of other professionals, communication with patients and other health professionals, and teamwork to deliver safe and effective care.[1] The ICCAS tool (Table 3) was selected because it focused on interprofessional collaboration behaviors, a goal of this project.[8]

The IPEC Survey[7] is a 16-item survey where learners assess their interprofessional competencies using a 5-point Likert-type scale (from "strongly disagree" to "strongly agree"). The IPEC Survey has been tested and revised from a larger initial survey. Items include the learner's perception of aspects of team communication, care focused on patients, awareness of one's own and other health care professional's

Table 2. Interprofessional Education Collaborative Self-Assessment Survey

Question[a,b]	Midwifery Students		Obstetrics and Gynecology Residents	
	Baseline Mean (SD)	Follow-Up Mean (SD)	Baseline Mean (SD)	Follow-Up Mean (SD)
1. I am able to choose communication tools and techniques that facilitate effective team interactions.	4.1 (0.9)	4.4 (0.9)	4.1 (0.5)	4.1 (0.5)
2. I am able to place the interests of patients at the center of interprofessional health care delivery.	4.4 (0.9)	4.5 (0.9)	4.3 (0.5)	4.3 (0.6)
3. I am able to engage other health professionals in shared problem-solving appropriate to the specific care situation.	4.2 (0.9)	4.4 (0.9)	4.2 (0.5)	4.2 (0.5)
4. I am able to respect the privacy of patients while maintaining confidentiality in the delivery of team-based care.	4.4 (0.8)	4.5 (0.9)	4.4 (0.5)	4.5 (0.6)
5. I am able to inform care decisions by integrating the knowledge and experience of other professions appropriate to the clinical situation.	4.2 (0.9)	4.5 (0.9)	4.0 (0.7)	4.1 (0.4)
6. I am able to embrace the diversity that characterizes the health care team.	4.2 (0.8)	4.5 (0.8)	4.3 (0.5)	4.3 (0.5)
7. I am able to apply leadership practices that support effective collaborative practice.	4.0 (0.9)	4.4 (1.0)	4.0 (0.6)	4.0 (0.6)
8. I am able to respect the cultures and values of other health professions.	4.4 (0.8)	4.6 (0.8)	4.3 (0.5)	4.1 (0.6)
9. I am able to engage other health professionals to constructively manage disagreements about patient care.	4.0 (1.0)	4.3 (0.9)	3.8 (0.6)	4.0 (0.6)
10. I am able to develop a trusting relationship with other team members.	4.3 (0.9)	4.5 (0.9)	4.2 (0.5)	4.2 (0.5)
11. I am able to use strategies that improve the effectiveness of interprofessional teamwork and team-based care.	4.1 (0.9)	4.5 (0.9)	4.0 (0.5)	4.2 (0.6)
12. I am able to demonstrate high standards of ethical conduct in my contributions to team-based care.	4.4 (0.8)	4.5 (0.8)	4.2 (0.5)	4.2 (0.5)
13. I am able to use available evidence to inform effective teamwork and team-based practices.	4.2 (0.9)	4.5 (0.9)	4.0 (0.6)	4.1 (0.4)
14. I am able to act with honesty and integrity in relationships with other team members.	4.5 (0.9)	4.6 (0.8)	4.4 (0.5)	4.4 (0.6)
15. I am able to understand the responsibilities and expertise of other health professions.	4.3 (0.9)	4.5 (0.8)	4.1 (0.6)	4.2 (0.6)
16. I am able to maintain competence in my own profession appropriate to my level of training.	4.3 (0.8)	4.5 (0.9)	4.2 (0.5)	4.2 (0.5)

[a] Five-point Likert-type scale with anchors "strongly disagree" to "strongly agree" and 1 to 5.
[b] Interaction factor includes items 1, 3, 5, 7, 9, 11, and 13.

responsibilities, and ability to interact as part of a team (Table 2). The survey consists of 2 factors, interprofessional interaction and interprofessional values, and was developed from the IPEC competencies.[1] Internal consistency of the 2 factors was high in previous work (.92 and .96, respectively), demonstrating internal consistency and perhaps some redundancy among the items.[7] The score for the survey is determined by summing the scores for each item and calculating a total mean score; the same process is used for calculating the score for each factor using the items in each factor. A higher score reflects a higher level of self-assessed competency.

The ICCAS is a 20-item survey where learners assess their ability to collaborate interprofessionally using a 5-point Likert-type scale (poor, fair, good, very good, excellent).[9] The tool was originally developed at the University of Ottawa with learners from Canada and New Zealand[8] and then revised and revalidated at the University of Minnesota (Table 3).[9] Cronbach's alpha was .96 for the revised scale.[9] The score for the survey is determined by summing the scores for the 20 items and calculating a total mean score. A higher score reflects a higher level of self-assessed competency. One additional final item, scored separately, asks learners to assess

Table 3. Interprofessional Collaborative Competency Attainment Survey

Question[a]	Midwifery Students		Obstetrics and Gynecology Residents	
	Baseline Mean (SD)	Follow-Up Mean (SD)	Baseline Mean (SD)	Follow-Up Mean (SD)
1. Promote effective communication among members of an IP team	3.9 (0.9)	4.3 (0.8)	3.7 (0.8)	3.8 (0.8)
2. Actively listen to IP team members' ideas and concerns	4.2 (0.8)	4.5 (0.6)	3.9 (0.8)	4.0 (0.7)
3. Express my ideas and concerns without being judgmental	4.0 (0.9)	4.3 (0.8)	3.7 (0.9)	3.8 (0.7)
4. Provide constructive feedback to IP team members	3.7 (1.0)	4.1 (1.0)	3.2 (0.9)	3.3 (0.8)
5. Express my ideas and concerns in a clear, concise manner	3.8 (0.9)	4.2 (0.9)	3.5 (1.0)	3.6 (0.88)
6. Seek out IP team members to address issues	3.9 (0.9)	4.4 (0.7)	3.6 (0.9)	3.6 (0.9)
7. Work effectively with IP team members to enhance care	4.1 (0.8)	4.5 (0.7)	3.9 (0.7)	3.9 (0.8)
8. Learn with, from and about IP team members to enhance care	4.2 (0.8)	4.5 (0.68)	3.9 (0.8)	3.9 (0.7)
9. Identify and describe my abilities and contributions to the IP team	3.9 (0.9)	4.3 (0.9)	3.7 (0.9)	3.8 (0.7)
10. Be accountable for my contributions to the IP team	4.1 (0.8)	4.5 (0.7)	3.9 (0.8)	3.9 (0.6)
11. Understand the abilities and contributions of IP team members	4.1 (0.8)	4.4 (0.7)	3.8 (0.8)	3.9 (0.7)
12. Recognize how others skills and knowledge complement and overlap with my own	4.2 (0.8)	4.4 (0.7)	3.8 (0.7)	3.9 (0.7)
13. Use an IP team approach with the patient to assess the health situation	4.1 (0.8)	4.4 (0.7)	3.8 (0.8)	3.8 (0.7)
14. Use an IP team approach with the patient to provide whole person care	4.1 (0.8)	4.4 (0.7)	3.9 (0.7)	3.8 (0.7)
15. Include the patient/family in decision-making	4.3 (0.7)	4.6 (0.6)	4.1 (0.7)	4.0 (0.7)
16. Actively listen to the perspectives of IP team members	4.3 (0.7)	4.5 (0.6)	4.1 (0.7)	3.9 (0.7)
17. Take into account the ideas of IP team members	4.2 (0.8)	4.5 (0.6)	4.0 (0.7)	3.8 (0.7)
18. Address team conflict in a respectful manner	4.0 (0.9)	4.3 (0.8)	3.6 (0.9)	3.6 (0.9)
19. Develop an effective care plan with IP team members	4.1 (0.9)	4.4 (0.7)	3.8 (0.8)	3.9 (0.7)
20. Negotiate responsibilities within overlapping scopes of practice	4.0 (0.9)	4.2 (0.9)	3.7 (0.8)	3.6 (0.8)

Abbreviation: IP, interprofessional.
[a] Five-point Likert-type scale with anchors "poor" to "excellent" and 1 to 5.

their ability to collaborate interprofessionally at follow-up compared with before an interprofessional course or program (much worse, worse, about the same, somewhat better, much better). Although the ICCAS was originally developed as a single postactivity survey to self-assess competencies before and after an IPE activity, the authors used the survey questions at baseline and then again at the 11-month postimplementation evaluation for this study because of the longer time between assessments.

Three open-ended questions developed by the project faculty team were included at the end of the postimplementation survey: (1) How did these interprofessional education experiences impact your interprofessional interactions with midwifery students (for residents) or obstetrics and gynecology residents (for midwifery students) or other health professionals you work with? (2) What other topics or clinical situations would you like to learn in an interprofessional setting? and (3) What can we do to improve the interprofessional education experience between midwifery students and obstetrics and gynecology residents?

Learning Activities Evaluation

Learning activities were evaluated using objectives developed for each specific IPE activity that occurred at each site during implementation. Faculty at each site created 3 to 7 objectives for each of their learning activities. Following the activity, learners were asked if each objective was met (yes or no) via an electronic survey link that was provided either immediately or within a few days of activity completion. Ten activities, including some that combined modules with interactive learning activities, were implemented at the sites, and more than 50 objectives were evaluated.

Data Collection

Research Electronic Data Capture (REDCap)[11] was used to collect data for the IPEC Survey and ICCAS, at baseline and after implementation, and for assessing objectives for learning activities. The REDCap database uses a secure web interface and is housed on secure servers operated by the University of Minnesota Academic Health Center's Information Systems group. Learners entered survey and other data directly into the system for later analysis. Entries were reviewed for completeness and internal consistency of site and activity timing over the course of the evaluation period.

Ethics

Institutional review board or independent ethics review committee approval was obtained or an educational exemption

Table 4. Learner Interprofessional Education Experiences

	All Locations		Location			
IPE Experiences	Midwifery Students (n = 171) n (%)	Residents (n = 52) n (%)	Academic Medical Center–Based Programn (%)	Partnership Site[a] n (%)	University-Based Program 1 n (%)	University-Based Program 2 n (%)
IPE experiences at baseline (n = 223)						
None	26 (15)	8 (15)	0 (0)	21 (14)	3 (14)	10 (36)
1-3	79 (46)	28 (54)	13 (68)	70 (45)	8 (36)	16 (57)
4+	66 (39)	16 (31)	6 (32)	63 (41)	11 (50)	2 (7)
IPE experiences after implementation (n = 121)						
None	3 (3)[b]	0 (0)	0 (0)	3 (4)[b]	0 (0)	0 (0)
1-3	38 (38)	14 (67)	2 (20)	38 (45)	6 (40)	6 (55)
4+	59 (59)	7 (33)	8 (80)	44 (52)	9 (60)	5 (45)

Abbreviation: IPE, interprofessional education.
[a] Distance midwifery program and hospital-based residency program.
[b] All students at the distance midwifery program were required to complete 3 IPE modules as part of a course; however, 3 learners responded as having completed no IPE activities.

was granted by each institution for each of the 4 demonstration sites.

Plan for Analysis

Descriptive statistics were calculated for the number of participating midwifery and obstetrics and gynecology learners, the classification of IPE curriculum exposure in their previous nursing or medical school program, and classification of the number of IPE activities in their current midwifery or residency program, by learner type and education program. Individual education activities were evaluated by learner perspectives of objectives having been met (yes or no) following each activity. The proportions of individual learning objectives met from each activity at each site were combined for all 4 sites.

Open-ended questions asked on the postimplementation survey were analyzed by one author (M.D.A.), experienced in qualitative methods, using a basic content analysis methodology.[12] Comments were first reviewed in their entirety to obtain an overall sense of the responses. Responses were then grouped into simple categories of responses within each of the 3 questions to identify the most common responses and those mentioned less frequently.

Pre- and postimplementation results of the IPEC Survey and ICCAS were analyzed by learner type. Identifiers were not collected to maintain learner anonymity; therefore, comparisons were 2-sample, 2-tailed *t* tests. A *P* value less than .05 was considered statistically significant, and SAS statistical software was used for all comparisons (SAS Institute, Cary, NC).

RESULTS

Across all 4 demonstration sites, 223 of 256 learners completed the baseline survey for an 87% response rate. Of the 223 respondents, 171 (77%) were midwifery students and 52 (23%) were obstetrics and gynecology residents. Nineteen respondents attended the academic medical center (3 midwifery students, 16 residents), 154 attended the partnership site (141 midwifery students, 13 residents), 22 attended university-based program 1 (15 midwifery students, 7 residents), and 28 attended university-based program 2 (12 midwifery students, 16 residents). Just under half of learners (n = 99, 45%) reported no IPE curriculum in their previous program (basic nursing or medical school); 65 (33%) reported limited IPE, and 54 (25%) reported comprehensive IPE in their prior program (5 respondents did not answer this question). The number of IPE activities participated in during the current program by category is reported in Table 4.

The number of IPE activities completed at each demonstration site ranged from 2 to 4. Midwifery students reported experiencing more activities (59% reported 4+ activities) during the evaluation period than obstetrics and gynecology residents (67% reported 1 to 3 activities). See Table 4. A total of 210 midwifery student and 47 resident evaluations of IPE learning objectives were received. Among the 1223 ratings of objectives for all learners and all activities, 98% (n = 1199) were assessed as met.

Approximately half (51%) of the 237 eligible learners completed the follow-up survey. Of the 121 respondents, 100 (83%) were midwifery students and 21 (17%) were obstetrics and gynecology residents. Ten respondents attended the academic medical center (4 midwifery students, 6 residents), 85 attended the partnership sites (80 midwifery students, 5 residents), 15 attended university-based program 1 (9 midwifery students, 6 residents), and 11 attended university-based program 2 (7 midwifery students, 4 residents). Individual item mean scores for midwifery students and obstetrics and gynecology residents for the IPEC Survey are reported in Table 2 and for the ICCAS in Table 3. A statistically significant increase in both the IPEC Survey (overall score and interaction factor) and the ICCAS scores was observed for the midwifery students but not for the obstetrics and gynecology residents (Table 5). Both learner groups reported a difference on the final ICCAS follow-up survey question asking learners to assess their ability to collaborate interprofessionally

Table 5. Self-Assessed Interprofessional and Collaboration Competency Outcomes[a]

	Midwifery Students				Obstetrics and Gynecology Residents			
Survey	Baseline Mean (SD)	Follow-Up Mean (SD)	*t* Value	*P* Value	Baseline Mean (SD)	Follow-Up Mean (SD)	*t* Value	*P* Value
IPEC Survey overall	4.26 (0.78)	4.50 (0.85)	2.31	.02	4.16 (0.41)	4.20 (0.45)	0.32	.75
IPEC Survey values factor	4.38 (0.79)	4.55 (0.84)	1.69	.09	4.29 (0.39)	4.29 (0.48)	0.07	.94
IPEC Survey interaction factor	4.14 (0.80)	4.44 (0.86)	2.85	.005	4.04 (0.48)	4.11 (0.45)	0.63	.53
ICCAS	4.05 (0.74)	4.41 (0.63)	4.04	.001	3.77 (0.68)	3.78 (0.65)	0.05	.96

Abbreviations: ICCAS, Interprofessional Collaborative Competency Attainment Survey; IPEC Survey, Interprofessional Education Collaborative Competency Self-Assessment Survey.
[a] n = 256 participants at baseline, 223 (87%) responded; n = 237 participants at postimplementation follow-up, 121 (51%) responded.

compared with before the learning activities. Of midwifery students, 87% said much or somewhat better; 57% of residents said much or somewhat better. No learners responded that their ability to collaborate was worse than before the IPE activities. Because the partnership distance midwifery program had a larger number of participants than the other midwifery programs combined, a secondary analysis of the nature and direction of the IPEC Survey and ICCAS results of the distance program midwifery students was completed and found to be similar to the other 3 midwifery programs combined (interaction between time and site *P* values ranged from .37 to .93).

A total of 77 learners (64% of respondents) replied to the open-ended questions on the follow-up survey; 84% (n = 65) of the 77 responses were from midwifery students and 16% (n = 12) were from residents. For the question about the impact of the IPE program, learners who responded commented most often about the value of team-based experiences including learning how to communicate and consult with each other. Many learners commented on the helpfulness of learning about each other's education and scope of practice. Several learners appreciated developing relationships across the 2 professions. A midwifery student stated, "I was able to collaborate with the physicians in patient care that fell outside midwifery scope of practice. I was also able to consult for advice on patient care." For future IPE activities, learners recommended skill development including perinatal emergencies and other less common situations, as well as case discussions and direct clinical care opportunities. In addition, learners recommended opportunities for communication to build relationships including consultation and patient transfers. Finally, reflecting on how faculty can improve IPE, the most common learner recommendations included more IPE learning in general and, more specifically, simulation and direct clinical care opportunities. Some learners suggested adding social activities to get to know each other. One resident recommended the "continued ability to work side by side on labor and delivery floor with midwives and midwifery students." The majority of comments made by all learners were positive. A couple of comments from midwifery and obstetrics and gynecology learners reflected their perception of negative sentiment toward one profession by the other in one or more activities they experienced.

DISCUSSION

This study provides new information about IPE among advanced level learners in programs focused on perinatal and women's health. An evaluation study of US midwifery students and obstetrics and gynecology residents who participated in IPE over an 11-month period at multiple sites had not previously been reported. Midwifery students' scores on the 2 collaboration scales increased from baseline to the postimplementation evaluation consistently in all midwifery programs. The same change was not seen among the residents' scores. However, a majority of midwifery students and obstetrics and gynecology residents responded that their collaboration skills were better on the ICCAS postimplementation evaluation final question.

Faculty-derived learning objectives for specific learning activities were met in nearly all cases, suggesting that these activities promoted interprofessional learning. More than half of learners documented some IPE experience from their previous nursing or medical programs. Learners' documentation of IPE activities in the current programs confirmed their participation in project activities. The majority of learner comments about their IPE participation and interest in future IPE activities were positive.

Faculty were surprised that the midwifery and obstetrics and gynecology learners differed in their self-assessed attainment of interprofessional and collaborative competencies. This may be related to the dose of IPE activities experienced during the study period. Midwifery students reported experiencing more activities during the evaluation period, perhaps related to the shorter duration of their programs (2 or 3 years) compared with the residency program duration of 4 years. In addition, residents are primarily in a clinical environment during their programs with less time devoted to didactic content. Midwifery students are in graduate degree programs that include didactic coursework as well as clinical experience courses. Demonstration sites all had existing interprofessional practice between practicing midwives and obstetrician-gynecologists. In most sites, residents work with practicing midwives during their program and therefore may have been used to participating in or observing a collaborative practice model between midwives and obstetrician-gynecologists prior to or during the study period. Fewer specific IPE activities and more exposure to practicing midwives may have

resulted in less perceived change in residents' self-assessed interprofessional and collaboration skills.

Both the IPEC Survey and ICCAS have been used, along with other assessments, in evaluating health care professions learners, including graduate level students who typically have had previous experience providing direct health care. IPEC Survey scores improved significantly following a single IPE session related to stroke care for nursing, medical, physician assistant, occupational and physical therapy, pharmacy, and social work students.[13] The same researchers examined a similar group of health professions students in a home care IPE simulation and demonstrated improvements in ICCAS scores.[14] ICCAS increases in self-assessed collaborative competencies were observed similarly among midwifery, nurse practitioner, medical, pharmacy, and dental students participating in oral health IPE activities.[15,16] Authors of a scoping review of IPE studies of medical students and at least one other health profession, but not graduate learners such as midwifery and nurse practitioner students and residents in medical specialties, were unable to recommend a specific type or duration of IPE program and recommended tools that assess IPEC competencies.[17] Graduate learners have demonstrated improved attitudes about IPE, and results are mixed related to valuing IPE in clinical care following classroom and clinical care experiences among adult nurse practitioner students and internal medicine residents.[18] Improvements in ICCAS scores were reported among nurse practitioner and pharmacy students following simulations of clients with cardiovascular disease.[19] Many studies using the ICCAS have evaluated learners as a single cohort rather than by profession. The ICCAS tool itself was recently examined for use with US graduate learners; the authors concluded that the survey was promising for nurse practitioner, pharmacy, and social work students in the United States and recommended additional testing.[20] Ongoing research partnering graduate level learners who will be working together after their health care professional program and evaluating combined and profession-specific collaboration outcomes remains important. The revised ICCAS[9] may be particularly suited to IPE studies aiming to improve collaboration competencies.

Lessons Learned

Faculty at the 4 demonstration sites identified lessons learned from this project. The academic medical center site has both an obstetrics and gynecology residency and a midwifery program within the department of obstetrics and gynecology. Learning opportunities occur at the medical center, facilitating the design and implementation of IPE experiences. The distance midwifery program partnered with a hospital-based residency program to facilitate IPE between programs not in the same institution and geographic location. Those learners used a distance learning platform and improved their understanding of each other's roles and how to communicate effectively as a team. One resident remarked that the IPE simulation experience was as important as, if not more important than, emergency drill simulations. Learners at a university-based program expressed enthusiasm for the opportunity to attend workshops side by side, especially those related to their shared social justice values. Faculty believed the most productive interprofessional learning took place in the labor and birth unit where learners developed meaningful working relationships to learn from each other. Faculty at the other university-based program believed the IPE sessions resulted in learners having greater understanding about each other, where they have overlapping scope of practice, and where they can help each other, including both consulting and being the consultant; their rapport with each other and the faculty on the labor and birth service has improved.

Limitations and Strengths

This study has several limitations. Demonstration sites selected which modules and other IPE learning activities to use based on their unique education programs; therefore, the activities varied at each site. Sites also chose when and by what methods to implement IPE activities: asynchronous or synchronous online or synchronous in a classroom. The distance midwifery program naturally had a higher (100%) response on the baseline survey because the survey was a required component of a course. Some learners may have completed only the baseline or only the follow-up survey. The coronavirus disease 2019 pandemic and resulting shutdowns across the United States affected the return of follow-up surveys in April and May 2020. Nonetheless, we achieved a high rate of return at baseline and a reasonable follow-up rate. IPEC Survey and ICCAS scores were high at baseline, possibly blunting the improvement measured because of a ceiling effect.

Strengths of this study are the inclusion of multiple midwifery and obstetrics and gynecology programs, the size of programs and characteristics of those communities, teaching and learning innovations flexible to individual learning environments, the ability to collaborate at a distance, and faculty-developed modules and practical learning activities based on national IPE competencies. The project was nationally funded and grew out of a collaboration between the American College of Nurse-Midwives and the American College of Obstetricians and Gynecologists aimed at promoting IPE among learners in both professions, a concept supported by the organizations[21,22] and recommended nationally to improve perinatal care.[23] Longitudinal collaborative education between midwifery students and obstetrics and gynecology residents is a novel process to facilitate IPE. Enthusiasm among faculty and learners throughout the project provides inspiration for other midwifery and obstetrics and gynecology programs to build on this work.

Our results support ongoing study of IPE among midwifery students and obstetrics and gynecology residents and expanding the number of programs using this approach. Residency programs with capacity for additional learners that do not have a midwifery program partner can welcome midwifery students to their sites for interprofessional clinical experiences. This approach would increase the number of clinical sites for midwifery students and enhance IPE opportunities for residents, and the evaluation method from this study is available for use in scaling up IPE. Similar IPE programs for graduate level health professions learners in other health professions and specialties represent an opportunity for further adaptation.

Policy makers at institutions and government agencies can use this evaluation study to support innovative interprofessional programs. Researchers can build on our study by evaluating learners over their entire education programs and developing methods for examining their graduates' future practice in interprofessional settings. Partnerships between education and health care institutions may be necessary in measuring the impact of IPE on health outcomes.[23] Examination of the impact of IPE on interprofessional practice and patient and related health care outcomes remains a critical need.[24]

CONCLUSION

This study evaluated midwifery and obstetrics and gynecology learners' IPE competencies and activities at 4 demonstration sites resulting in self-assessed better overall interprofessional collaboration skills for all learners and specific self-assessed improvements in interprofessional and collaborative competencies among midwifery students. Open-ended responses from learners suggested these IPE activities were positively received and can be enhanced with additional activities, particularly working together in clinical settings. Assessing learner change in interprofessional and collaborative competencies over the duration of entire education programs is recommended for future study. Ultimately, evaluating the impact of IPE on interprofessional practice, patient outcomes, and health systems is needed.

ACKNOWLEDGEMENTS

The authors thank their learners for participating in this project and express gratitude to the Josiah Macy Jr. Foundation for funding support. The research was also supported in the use of the REDCap program by the National Institutes of Health's National Center for Advancing Translational Sciences, grant UL1TR002494. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health's National Center for Advancing Translational Sciences. A summary of information in this article was presented at the American College of Nurse-Midwives Annual Meeting, May 2021.

CONFLICT OF INTEREST

Melissa Avery, Editor-in-Chief of the *Journal of Midwifery & Women's Health*, was not involved in the editorial review of or decision to publish this article. The authors have no other conflicts of interest to disclose.

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