We examine a newly designed, interdisciplinary education program and clinical rotation for the first-year obstetrics and gynecology resident, implemented at the University of Colorado, Denver, Colorado, between the College of Nursing midwifery faculty and the School of Medicine Department of Obstetrics and Gynecology. The barriers to program development, along with the advantages and disadvantages of collaboration between nursing and medical schools, are reviewed. The clinical experience, consisting of 5 clinical shifts, was designed using the conceptual model of collaborative intelligence. A formal rotation with the midwife was constructed for the first-year resident on the labor and delivery unit, providing care to intrapartum and postpartum women and families. The program included didactic and clinical teaching, with an emphasis on the normal physiologic process of birth and introduction to the midwifery scope of practice and philosophy of care. Formative evaluation of the clinical rotation demonstrated strong interest for continuation of the program and an ability to appreciate midwifery components of care in a limited exposure. Moreover, program development was successful without requiring large curricular changes for the resident. Future planning includes expansion of the program with increased emphasis on the postpartum and breastfeeding woman and continued program evaluation. The long-term success of such collaborations will depend on the continued support of the American College of Nurse-Midwives and the American Congress of Obstetricians and Gynecologists in developing and improving interdisciplinary educational teams. This article is part of a special series of articles that address midwifery innovations in clinical practice, education, interprofessional collaboration, health policy, and global health.

Keywords: Certified nurse-midwife, collaborative intelligence, interdisciplinary education, interprofessional education, normal physiologic birth, obstetrics, residents

INTRODUCTION

There is substantial evidence to support the midwife as a key player in improving the quality and safety of maternal health nationally and globally. The authors of the recently published *The Lancet* series on the power of midwifery report that an analysis of 461 systematic reviews shows that “56 outcomes, including survival, health, well-being of women and infants, and efficient use of resources can be improved by practices that lie within the scope of midwifery.” There is also strong evidence to support the midwife not only as a clinical leader but also as a lead educator and key player within the field of obstetrics. Academic centers with a long history of midwifery educators within resident training programs have documented their successes from the perspective of the midwife, resident, and patient. In 2009, a survey of 112 academic centers found that the number of midwives identifying themselves as educators of medical or resident students was 547, triple the number reported a decade prior. To further these efforts, the president of the American College of Nurse-Midwives (ACNM), Ginger Breedlove, CNM, PhD, and the outgoing president of the American Congress of Obstetricians and Gynecologists (ACOG), John C. Jennings, MD, are urging their respective members to develop interprofessional and interdisciplinary educational teams. The presidents’ call for a renewed focus on interdisciplinary education reflects the shared concern for rising health care costs, patient safety and quality of care, residency work restrictions, increasing health care provider shortages in rural areas, and the rise of the primary cesarean rate. Interprofessional and interdisciplinary education can appear daunting because it requires systems changes yet is of utmost importance to expose physicians in training to the expertise of the nurse-midwife.

At the University of Colorado, collaborative practice within maternity care is not new, with midwifery and physician-led practices coexisting successfully. The College of Nursing (CON) faculty maintain their own clinical practices, providing full-scope care, with the primary learner being student midwives. There are clinical collaborative efforts within the obstetric triage unit, mechanisms for consultation and comanagement in the antepartum and intrapartum settings, and interdisciplinary teams within hospital and university committees. The primary organizational structure is a model of coexistence, with the triage unit operating under a more blended model. To continue the collaboration, an interdisciplinary teaching program, which was designed using collaborative intelligence, was introduced in 2013. In this article, we will illustrate our education model developed between the CON and the School of Medicine (SOM). We will describe how the program was developed, the initial outcomes of the program, the lessons learned, and future programmatic goals. We aim to demonstrate that an interdisciplinary education curriculum, tailored to a site, can be successful without demanding large structural changes within departments.

BACKGROUND

The faculty nurse-midwifery education program at the University of Colorado, Denver, Colorado, was started in 1980.
Quick Points

- College of Nursing and School of Medicine faculty can collaborate to build interdisciplinary education teams between midwifery faculty and residents without requiring large structural changes for the respective departments.
- Use of collaborative intelligence can aid in the development of an interdisciplinary curriculum.
- Limited clinical exposure to the midwifery model of care was not a barrier to the program’s success.

Since that time, midwives have worked and taught alongside family medicine physicians and obstetricians in the outpatient and inpatient settings. Midwives have educated medical students and residents throughout the years but in an informal manner. The midwives’ primary teaching responsibility was to the nurse-midwifery students and occasionally to other advanced practice nurses. The midwifery and physician practices coexisted well but did not maximize the potential of a collaborative relationship or expose the obstetrics and gynecology resident formally to the profession and expertise of midwifery.

Prior to initiating change, discussions took place with interprofessional education champions on the University of Colorado medical campus and then with key players within the department of obstetrics and gynecology and the CON. The information garnered from the leadership within both departments and the interprofessional education program, coupled with the analysis of the existing practice structures, led to the decision to start moving toward the goal in a stepwise fashion. The first step was to introduce the nurse-midwife to the obstetrics and gynecology clerkship orientation lecture series and match a medical student with the nurse-midwife in the triage unit and labor and delivery unit. The second step was to evaluate this program, reinitiate discussion between midwifery and obstetrics and gynecology leadership, and then collaboratively plan for implementation of curriculum for the first-year resident.

The clerkship curriculum included a one-week rotation for all rotating third-year medical students with the midwives in the obstetric triage unit and one overnight shift in the labor and delivery unit. A faculty midwife lectured on normal birth and electronic fetal monitoring during the orientation period and was involved in the clerkship skills lab. The goal was multilayered and included promoting normal physiologic birth, continuity of care, and modeling of interdisciplinary education. Evaluation of the program consisted of daily clinical evaluations of the student by the midwifery preceptor, evaluations of the midwives by the students at the end of their rotation, and a formal pre-post survey assessing change in student’s attitudes toward interdisciplinary education. From the successes of this 2-year program, a curriculum to expand the reach of the midwifery educator into the residency program was developed. Qualitative data collected from medical students in their clerkship evaluations suggested that the addition of clinical and didactic education delivered by a midwife improved their overall clerkship experience. Themes from their evaluations spoke of the inclusive nature of the midwives (with midwives bringing the student into the team process), their interactive teaching process, attention to individual learning styles, strength in teaching skills, and an appreciation for learning about the normal physiologic process of birth.

With this information in hand, the director of the midwifery faculty practice and the associate residency program director met to discuss the curriculum taught by midwives for the first-year resident, with emphasis on the normal physiologic process of birth and the midwifery philosophy of care. To guide the process of curriculum development, a decision was made to draw from the model of collaborative intelligence.

COLLABORATIVE INTELLIGENCE

In 2012, former president of ACOG, Richard Waldman, MD, and former president of ACNM, Holly Powell Kennedy, CNM, PhD, joined in writing a preface to a series of journal articles on collaborative practice. In this preface, as well as in a special communication by Dr. Waldman, reference is made to using collaborative intelligence as a tangible means of increasing the maternity workforce.\textsuperscript{16,25} Collaborative intelligence is used within many disciplines to describe the process within decision making of harnessing group wisdom, with less dependence on an expert opinion. Russ Linden, management educator and author, proposes that there are 6 key factors that set the foundation for sound collaboration or collaborative intelligence\textsuperscript{24,25} (Table 1). The use of collaborative intelligence, as well as establishing relationships with leaders across the medical campus and thereby building networks of support, was believed to be a superior process for curriculum implementation, which would be amenable to all parties involved. Building consensus by incorporating the input from many invested members supported a systems approach to curriculum development, which we believed would contribute to the sustainability and success of the program. In this way, as conflicts or unexpected circumstances arose, these networks of invested people could be continuously called upon to aid in the process of revising the curriculum and/or creating new program components.

DEVELOPMENT OF A RESIDENT EDUCATION PROGRAM

Practice Setting

The program that we present was piloted at the University of Colorado involving the CON midwifery faculty and the SOM Department of Obstetrics and Gynecology faculty. Within the CON, there are 2 faculty midwifery practices, the Center for Midwifery, a private practice model of 6 full-time midwives, and the University Nurse Midwives, a practice of 15 midwives.
Table 1. Collaborative Intelligence Key Factors and Application to Program

<table>
<thead>
<tr>
<th>Key Factors</th>
<th>Program Alignment</th>
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<tbody>
<tr>
<td>Shared purpose</td>
<td>School of Medicine and College of Nursing in support of interdisciplinary education</td>
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<tr>
<td></td>
<td>Improve patient satisfaction</td>
</tr>
<tr>
<td>Desire to pursue partnership now and willing to contribute to the effort</td>
<td>New associate residency program director trained with midwives</td>
</tr>
<tr>
<td>Appropriate people at the table</td>
<td>Established successful medical student clerkship program by midwifery champion with desire to pilot with residents</td>
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<tr>
<td>Partners have open, credible process</td>
<td>Strong presence of interprofessional education champions on the University of Colorado, Denver, Colorado, campus</td>
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<tr>
<td>Passionate champion</td>
<td>Midwifery director pursuing means of interdisciplinary education</td>
</tr>
<tr>
<td>Partners have trusting relationships</td>
<td>Opportunities to improve relationships between certified nurse-midwives and resident physicians, promote normal physiologic birth, reduce risk</td>
</tr>
</tbody>
</table>

primarily providing care to the underserved. Combined, the 2 midwifery practices attend 42% of the births at the University of Colorado hospital. Both practices educate midwifery learners, as well as other advanced practice nurses. Select midwives from both practices were involved with the resident clinical rotation to expose the learner to 2 models of midwifery care.

Goals

The goals of the resident rotation experience were similar to the medical student program, with stronger emphasis on teaching normal physiologic birth and care of the postpartum and breastfeeding woman, as well as outlining midwifery care and scope of practice. Furthermore, by instituting a collaborative education program early in the residents’ career, we endeavored to develop stronger relationships between future collaborative maternity care providers. These relationships, in turn, could serve to reduce risk issues by developing trust between these providers and perhaps begin to reconfigure the culture of maternity care education at the University of Colorado.

Program Description

The program constructed was designed as a blended model, with the faculty appointments of the midwives housed within the CON but recognized by the SOM as secondary appointments. In Collins-Fullea’s article, a blended model of midwifery care is one in which the midwives function as independent providers with their own practice, collaborating and consulting with physician partners and residents, and serve as faculty for the SOM. Other academic programs have an integrated model of care whereby the midwives have faculty appointments within the SOM and do not have a private midwifery practice.

The nurse-midwifery clinical rotation for the residents was implemented at the beginning of the 2013 to 2014 academic year. With implementation of the new program, representatives of the midwifery group introduced the interns to the program during their intern orientation week. At that session, they were provided with a comprehensive handbook, which included a rotation description, expectations, a reading list and readings, biographies of the involved midwives, and the Faculty Nurse-Midwifery Practice Guidelines.

The interns were scheduled to rotate with a small and select group of midwives one day per week during the resident’s outpatient rotation. The resident arrived at the start of the shift to work alongside the midwife in comanagement of the postpartum and intrapartum patients on the midwifery service. The day included postpartum rounds, breastfeeding education, labor management, and consultation with the physician...
service, as needed. As time permitted during the day, the midwife and resident engaged in established lectures/discussions of key topics (Supporting Information: Appendix S1). These topics were preselected and prepared in advance of the rotation.

A skills checklist (Supporting Information: Appendix S2) was utilized as a guide for key procedures for the resident to be involved in during their rotation, if possible. At the completion of each shift, the midwife completed a daily evaluation to provide formative feedback for the resident. A pre- and post-survey was completed by the resident at the start and finish of the clinical rotation to assess baseline and postrotation knowledge of, and attitudes toward, midwifery care (Supporting Information: Appendix S3).

Once the rotation was complete, the intern was asked to submit a case study to the midwife course director for review and discussion. The intent of the case study was to allow the resident to reflect on an experience from the rotation that highlighted midwifery care and/or interprofessional care. The assignment was to include a brief case description, introduction to the chosen topic, discussion of the subject, and personal reflection of the experience. The associate program director for the residency then received the daily evaluations, as well as the case study for each resident's personnel file. All feedback from the rotation was synthesized and presented to each resident again during semiannual evaluations by the associate program director.

In addition to the clinical rotation, a formalized mentorship program was also established. Each intern was matched with one of the participating nurse-midwives. The mentors and mentees were to meet at least quarterly in-person, with check-ins by phone approximately once per month. The quarterly meetings were to discuss clinical cases, journal articles, interpersonal concerns or conflicts, or to review resident goals. The mentorship program was to continue through the subsequent residency years, with ongoing communication as established by the partnership.

Although considered with the initial development of the program, reciprocity was not created by midwifery students being placed with SOM faculty. Barriers to placement include lack of clinical space, with the competing interests of the medical students and residents, as well as increased clinical hours being placed on the midwifery learner. Observation of obstetrics and gynecology care would indeed add to the professional development of a midwifery learner because it can improve a midwife's knowledge of higher risk care but cannot replace the experience of learning from a midwife. Future considerations include adding clinical rotations for the observation of high-risk ultrasound, the diabetes clinic, and the high-risk clinic, as well as establishing interdisciplinary teams in the obstetric triage unit with the medical and midwifery student.

**PROGRAM ASSESSMENT**

We used multiple modalities to assess our first year of the nurse-midwifery program. Each intern completed a survey prior to the rotation and again at completion of the rotation (Supporting Information: Appendix S3). We evaluated previous experience with collaborative care, as well as attitudes regarding midwifery care. Nine of the first-year residents (10 in total) had never worked with midwives previously. The attitudes of residents toward midwifery care were positive both before and after their rotation. They believed midwives offered evidence-based care and did not feel that patients had more complications. However, more than half of the residents prior to their clinical rotation believed that the scope of practice for midwives was not clearly defined. We believe this represents the residents' misunderstanding of the scope of practice of a midwife.

Once the year was complete, we asked each participating resident to complete an anonymous evaluation of each midwife, the lecture/discussion points, and the rotation as a whole. The results were returned to the program's supervising physician to maximize honest feedback. Overall, the residents enjoyed their experience with the rotation. They did ask for more experience with lactation education. Also, many reported frustration with the limited time on the rotation, feeling they could have gained more of a connection with both patients and midwives if they had more time to work together. The reviews of the discussion topics revealed that those likely not taught elsewhere (eg, birth positions, waterbirth, and non-pharmacologic pain control) were most popular. Those that are likely reviewed elsewhere in the resident curriculum (eg, electronic fetal monitoring, second-stage management) were least popular.

Review of the case study reflection papers was most revealing of the outcomes of the clinical program. In the short time that the residents were able to spend on the rotation, many were insightful about their future care of patients and their future collaboration with the midwife team. Their case studies were centered on common themes including therapeutic use of self, relationships with midwives, and the birth experience (Table 2).

**FUTURE**

Based on our first-year experiences and feedback received, we have made changes and improvements to the rotation for the second year. To meet the first-year residents educational needs, we have added 2 elements to the curriculum. First, the midwives will place a larger emphasis on bedside breastfeeding education, as well as incorporating breastfeeding into the discussion/lecture topics. Second, the midwife team has developed a birth skills lab, which occurs at the outset of every rotation for the day and night intern on the physician service. Not only will this allow for new interns to review and practice basic birth procedural skills, but it will allow them to spend more time with the midwife team.

The other large programmatic change that has been made is removal of the formalized mentorship program. It became apparent quickly that a forced meeting of a matched midwife and resident was not successfully fostering relationships. We provide contact information for everyone on the team (residents and midwives alike) to allow for communication as needed or desired. Furthermore, the midwife-run skills lab has provided more one-on-one interaction and education.
We obtained feedback from the residents and midwives involved in the program, but we did not seek out feedback from any SOM faculty. In our second year, the midwife rotation will be presented to the SOM faculty at various departmental meetings to ask for specific feedback in order to continue to move the program forward. This process of obtaining feedback follows within the model of collaborative intelligence to continue to build networks of support for the program.

### SUMMARY OF EXPERIENCES

#### Program Advantages

The advantages to an interdisciplinary teaching program utilizing a blended model are 2-fold. First, it supports the nursing profession and potentially decreases dilution of the midwifery philosophy of care. Second, it allows for both schools to have the unique opportunity to learn about and from one another. Prior to development of the program, there was no formal relationship between the clinical educators of the SOM and CON. Yet, the 2 disciplines work together, frequently managing the obstetric triage unit and consulting or co-managing care in the outpatient and inpatient setting. Formalizing the collaborative efforts between the 2 educational institutions allowed for the sharing of knowledge, building of trusting relationships, and exposure to each other’s educational curricula. Linden, author of a text on collaborative intelligence, suggests that if you want to help others build a collaborative mindset, you need to help them reduce associative barriers: “the chains of association that take us down well-worn mental pathways and inhibit the creative process.” A collaborative mindset is developed via exposure to different cultures, working on a project with people from other disciplines, and challenging our assumptions.

With the intern working alongside a faculty midwife, there was the opportunity for exposure to the culture of midwifery and nursing, projects in the form of joint presentations and joint clinical care, and discussions on the assumptions that we bring into our own respective practices. An added benefit of the program, which was not initially foreseen, was the opportunity for a midwifery student to train alongside the intern when clinical sites were short and the midwife needed to have more than one learner. Because satisfaction was high for both learners, it was immediately apparent, and noted by the midwifery faculty, that interprofessional education had the potential to develop a stronger culture of collaboration and early understanding of the disciplines within maternity care.

The program was specifically designed with a model of one-on-one time with a midwife to allow for conversations about midwifery and nursing, as well as allowing for review of topics and discussions of the readings assigned. Due to the limited available time of the intern and the midwife educator, having only 5 clinical rotations scheduled was viewed as a distinct advantage to implementing the new program. The length of the clinical rotation was important to avoid placing too many responsibilities on the learner and the midwives.

#### Program Disadvantages

In developing a new program between 2 schools, starting small seemed both practical and feasible. It did, however, limit the exposure that the intern had to the midwifery service. If the patient census was low, the rotation exposure was limited to discussion and review of developed slide presentations. Although this type of learning is valuable, more interactive

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Table 2. Feedback from Residents’ Case Studies

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<tr>
<th>Topic</th>
<th>Quotes</th>
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<tr>
<td>Therapeutic use of self</td>
<td>“Reflecting on this experience, I am very cognizant of the tone and volume of my voice as I enter a patient’s room. I also make a point to sit at the bedside to talk with my patients rather than standing and then quickly scurrying away.” “Though time is often not a possibility, being emotionally present when you are in the room is of the utmost importance. I am also more acutely aware the significant impact little things like touch, voice tone, light, and simple gestures that offer comfort can make.”</td>
</tr>
<tr>
<td>Relationship with midwives</td>
<td>“[O]ne of the most valuable aspects of this experience for me was the social interaction. … The exposure to midwifery practices helped me to better understand the capabilities and ethos of my CNM colleagues.” “I have also developed an excellent relationship with my midwife partners and feel comfortable asking for further advice on the subject.”</td>
</tr>
<tr>
<td>Birth experience</td>
<td>“I remember standing there thinking what an amazing experience giving birth truly can be. I am so used to the hustle of finishing up one delivery as quickly as possible so as to move on to the next item on my never-ending ‘to-do list.’ If we haven’t clamped and cut the cord by one minute, we’re falling behind.” “I now feel more confident to explore alternative methods to help patients [with pain control].”</td>
</tr>
</tbody>
</table>

Abbreviation: CNM, certified nurse-midwife.
learning was the goal of the program to understand the management and decision-making process as it relates to normal physiologic birth and postpartum education. The day chosen was initially seen as an advantage for the CON because the midwifery students were in class, yet as a disadvantage for the intern because the intern also needed to attend departmental education in the morning, which led to missed postpartum rounds with the midwife. However ideal it may be for future programming, having multiple learners (midwifery students and residents) was considered a disadvantage and not formally built into the curriculum because it could burden the educator or diffuse learning and/or exposure for the resident.

The midwife is not a SOM employee; thus, formal exposure to the midwife educator is limited to this program only. The midwife is not involved in the resident clinics nor integrated into other aspects of the training program such as the skills training sessions. It is possible that more joint projects between the midwives and residents may have developed had they spent more time together.

Another distinct disadvantage to using CON midwifery faculty is the competing needs of the midwifery learner and the resident physician. There were times when the midwifery students needed to change their schedules or add clinical time, and the Wednesday shift set aside for the intern was now no longer an available clinical slot. This also meant that midwifery learners from other institutions looking for clinical integration sites had less opportunity to train with the midwifery faculty at the University of Colorado.

**Lessons Learned**

As with any new education program, our lessons learned have been vast. In attempting to start the midwifery experience, we ran into the obstacle of supervision versus education and were initially denied approval to proceed. According to the Center for Medicaid and Medicare Services rules, residents must be supervised by a physician. With discussion from other midwifery faculty involved in resident education, we learned that the midwife can educate the resident but not supervise. This meant that the residents were permitted to observe or work alongside a midwife, but they could not “provide clinical care” without a midwife present. In this manner, the midwife team continues to function as independent practitioners to meet billing requirements and legal standards. The process is no different from educating a midwifery learner, with the midwife performing all procedures with the student, writing individual notes, and billing accordingly for the care provided. With this new information in hand, we presented our program to a committee comprised of the medical staff president, the dean of graduate medical education, the hospital compliance officers, and a representative from the hospital’s risk management department. The initial discussion was spent educating the committee on the definition of the certified nurse-midwife and the midwifery scope of practice, and acquainting them to the faculty practice guidelines. By the end of the meeting, not only was our program approved, but we introduced the profession of nurse-midwifery to a wide range of stakeholders.

We have also learned the limitations of a clinical education program in a variable workload setting. Our residents are most satisfied with their learning when there are many experiences in which to be involved. However, the labor and delivery unit is an unpredictable place, and we have continued to brainstorm effective means of using the downtime to improve upon the learners’ experience. Birth models, suturing models, and the aforementioned lectures/discussion topics have helped in this regard.

**CONCLUSION**

At the University of Colorado, a program was built on a foundation previously constructed by the hard work of many professionals across disciplines and of collaborations and shared knowledge that have served to support the health of women and families. From the model of interdisciplinary education, we constructed a curriculum that best fits our program, and we learned some key points. First, planning a program that is collaboratively intelligent is an imperative. Second, collaborations between 2 schools can be successful without large structural changes, with the potential to build long-term, trusting relationships. Third, the residents were able to appreciate the subtle qualities and utility of midwifery care within the 5 clinical shifts, as demonstrated by their reflection papers. Lastly, it is upon us, the clinical educators, to adopt the behavior of collaboration and develop programs of collaborative education. Hopefully, ACOG and ACNM will continue conversations about collaboration and will support the development of interdisciplinary education programs and encourage their respective members to engage in this ongoing discussion.

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**CONFLICT OF INTEREST**

The authors have no conflicts of interest to disclose.

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**SUPPORTING INFORMATION**

Additional Supporting Information may be found in the online version of this article at the publisher’s Web site:

Appendix S1. University of Colorado checklist for didactic components of clinical rotation.

Appendix S2. University of Colorado checklist for clinical components of rotation.

Appendix S3. Prerotation and postrotation survey for residents.
REFERENCES


