Medical Student Education

Early Introduction to Pregnancy Care and Delivery for Medical Students

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Background and Objectives: *We developed a curriculum designed to expose first-year medical students to the longitudinal experience of prenatal care and delivery. The curriculum included reinforcement throughout clinical training to increase their knowledge of pregnancy care and to encourage inclusion of pregnancy care in their future family practice.* Methods: *The program was implemented at the University of Minnesota Medical School Duluth, and titled the Obstetric Longitudinal Program (OLP). It provided continuity care experiences among medical students, family physician preceptors, and obstetric patients. Students were enrolled by lottery. Students who were not selected in the lottery to participate in the program served as a control group. All students completed knowledge and attitude tests before and after the program.* Results: *Compared to the control group, OLP participants had higher knowledge scores at the end of the program and expressed greater likelihood to include deliveries in their future practice. The OLP was well received by all participants.* Conclusions: *The OLP provided a continuity of care experience for first-year medical students. Further studies are needed to determine if such early medical education experiences actually change the future practice of family physicians.*

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The number of US family physicians who deliver babies continues to decrease.[1-3] Factors affecting family physicians' decisions to provide pregnancy care include time demands, fear and cost of malpractice litigations, preference to locate in non-rural areas, and comfort level related to management of delivery room emergencies.[4-6] Personal satisfaction appears to be the main reason motivating family physicians' choice to deliver babies.[7,8] The decline in the number of family physicians who deliver babies has implications for the health of pregnant women and their newborns, especially for the one in four Americans who reside in rural areas, where obstetricians constitute fewer than 1% of physicians.[7,9,10]

The attitudes of medical students toward including deliveries in their future practice may form early in their medical education.[11-13] An early exposure to the positive, comprehensive care of a pregnant woman, coupled with increased knowledge about pregnancy care, could provide medical students with a strong, family-centered health care experience. Such positive experiences may encourage students to include deliveries in a future family practice.

Curricular innovations such as games, problem-based learning cases, and community-based experiences have been shown to enhance medical students' knowledge about pregnancy and deliveries.[14-17] Although many skills necessary for successful family practice can be taught in the classroom or small-group settings, "They are unlikely to be transformed into long-term learning unless they are also modeled and reinforced in the setting of clinical medicine."[18] Medical school experiences that include interactions with community-based physicians and exposure to continuity of care have been shown to improve the preparation of medical students for future clerkships and practice in rural areas.[19-22] The contact of medical students during early clinical training to pregnancy care is usually limited to portions of prenatal care or parts of the labor and delivery process.

This paper describes the Obstetric Longitudinal Program (OLP) for first-year medical students at the University of Minnesota Medical School Duluth. The

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goals of the program were to display pregnancy care practice management by family physicians and to encourage students to include pregnancy care in their future practice.

Setting

Since its establishment in 1972, the University of Minnesota Medical School Duluth has emphasized family medicine and has sought to lessen gaps in geographic and specialty distribution of physicians. The Duluth campus has designed programs to increase the number of well-trained physicians in family medicine and primary care practicing in rural and American Indian communities. Among University of Minnesota Medical School graduates matriculating from the Duluth campus, 52.7% of practicing alumni physicians are in family medicine, with an additional 15.3% in the other primary care specialties. Currently, 40.6% of alumni physicians practice in communities of less than 20,000, and 61% practice in Minnesota.[23] In 2006, 35.9% of the graduates who matriculated at the Duluth campus selected family medicine residencies, compared to the national rate of 8.1%.[24]

Methods

OLP Curriculum

All Duluth campus first-year medical students participate in the required longitudinal general family medicine preceptorship course. Each medical student is matched to a family physician preceptor and attends 10 sessions in the physician's office throughout the year. The OLP program described here is an additional component in this preceptorship course. The OLP evaluation was approved by the University of Minnesota Institutional Review Board.

Developed with support from family physician preceptors, the OLP contains two components. The first is the connection among a first-year medical student, a family physician preceptor, and a woman receiving pregnancy care from the preceptor. The second involves small-group sessions on the Duluth campus facilitated by the faculty from the Department of Family Medicine and Community Health Duluth. The core of the OLP is the continuity among the medical student, the family physician preceptor, and the pregnant patient. Family physicians included in the OLP are also experienced educators.

To aid in recruitment of patients, the faculty created a patient-oriented brochure about the OLP for distribution to family physician preceptors who deliver babies. All family physician preceptors participating in the OLP selected a pregnant woman from their practice who was willing to have a medical student involved in her care. All patients included in the program gave informed consent.

The OLP students attended seven small-group sessions throughout their first year. The sessions addressed topics about pregnancy care (Table 1). Recommended readings for each topic were available on the OLP Web site.

Patients were selected with due dates in late spring of the students' first year, with the OLP beginning in October. This improved the continuity experience and enhanced the students' knowledge of prenatal care by timing the educational sessions prior to the prenatal visits.

Study Sample

The study population consisted of 163 first-year medical students enrolled between 2001 and 2003 at the Duluth campus of the University of Minnesota Medical School (Table 2). Inclusion in the OLP was based on a random selection of students from the entire first year class in 2001 and a lottery from students interested in participating in subsequent years. There were about 30 students each year from a class of 54–55 students who participated in the lottery.

The number of students participating in the OLP was limited by the number of family physician preceptors with OB patients in their practice. Since the number of students interested in the program but not chosen through the lottery in the last 2 years of the program was small, the control group consisted of all students who did not participate in the program.

Data Sources and Variables

All first-year students responded to questionnaires at the beginning (pretest) and at the end (posttest) of the academic year. The pretest and posttest questionnaires were identical and included an evaluation of knowledge about pregnancy care and attitudes toward the inclusion of pregnancy care in family medicine practice. In addition, all OLP participants (students, preceptors, and patients) were asked to evaluate the program, providing their experiences and comments.

Knowledge of pregnancy-related topics was measured by a test consisting of 20 multiple-choice questions.[25] The knowledge score was expressed as a percent of correct answers. The attitude toward pregnancy care was measured in a number of ways. The intent of pursuing family medicine was evaluated by asking, "Do you plan to go into family medicine?" The intent to include deliveries in a future practice was measured by asking, "Do you foresee yourself including obstetrics when you practice medicine?" The attitude about the role of gender toward inclusion of deliveries in practice was measured by asking, "Are female doctors predisposed to have obstetrics as a more significant part of their practice?"

All attitude questions were measured on the Likert scale from 1 (not likely) to 5 (very likely). Since the

Table 1

Obstetric (OB) Longitudinal Program Curriculum

Small-group Sessions		***OB Program Activities With Patients and Preceptors***
Session 1 (1 hour)—Introduction to OB Prenatal Care		
Goals • To orient the students to the OB Program • To discuss connection expectations between the family physician and OB patient • To provide an overview of normal OB prenatal care	*Objectives* • To acquaint the medical students to the OB Program Web site • To discuss the prenatal history and OB office notes • To identify OB terms such as EDD, gravity, and parity	*Student expected to:* • Keep the lines of communication open with the patient • Be available for office visits, labor, and delivery • Keep journal of all events • Log contact information into the computer
Session 2 (1 hour)—First-trimester OB Care		
Goals • To provide an overview of first-trimester OB care	*Objectives* • To present the initial prenatal exam and laboratory testing • To identify the physical exam findings of normal first-trimester pregnancy • To discuss first-trimester symptoms of pregnancy	*Student expected to:* • Conduct a prenatal history on their patient during the first trimester (at home, office, or school) or as soon as the patient is assigned • Be present at patient's office visits (at least five overall) • Follow the OB patient with the preceptor through to delivery • Complete written prenatal history and SOAP notes (five overall)
Session 3 (1 hour)—Second-trimester OB Care		
Goals • To provide an overview of second-trimester OB care	*Objectives* • To identify the normal exam findings and labs during the second trimester • To discuss maternal genetic testing • To discuss Rh factor and treatment • To address potential complications in the second trimester	*Student expected to:* • Be present at patient's office visits (at least five overall) • Follow the OB patient with the preceptor through to delivery • Complete written SOAP notes (five overall)
Session 4 (1 hour)—Third-trimester OB Care		
Goals • To provide an overview of third-trimester OB care	*Objectives* • To discuss potential complications during pregnancy in the third trimester • To identify measurements of fetal well-being • To discuss the delivery plan and patient wishes	*Student expected to:* • Be present at patient's office visits (at least five overall for prenatal, postpartum, and infant care) • Follow the OB patient with the preceptor through to delivery • Complete written SOAP notes (five overall)
Session 5 (1 hour)—Labor and Delivery		
Goals • To provide an overview of normal labor and delivery	*Objectives* • To discuss the stages of labor • To identify the presentation of the infant with the use of simulation tools • To practice a "mock delivery" with the use of simulation tools • To present pain management during labor and delivery	*Student expected to:* • Receive a beeper when a patient is near term to attend the delivery • Keep journal of all events • Log contact information into the computer • Complete written L&D Form
Session 6 (1 hour)—Newborn and Postpartum Care		
Goals • To provide an overview of postpartum care • To provide an overview of newborn care	*Objectives* • To discuss postpartum bleeding and postpartum depression • To identify benefits of breast-feeding • To present the normal newborn exam and newborn nursery orders/tests	*Student expected to:* • Be present at patient's office visits (at least five overall) • Follow the OB patient with the preceptor 4–6 months for postpartum and infant care • Complete written SOAP notes (five overall)
Session 7 (1 hour)—Infant Care and Postpartum Care		
Goals • To provide an overview of infant care • To provide a further overview of postpartum care	*Objectives* • To identify normal infant growth and development to age 4 months • To present immunizations for infants up to age 4 months • To discuss feeding for infants up to age 4 months • To discuss contraception options	*Student expected to:* • Be present at patients' office visits (at least five overall) • Follow the OB patient with the preceptor 4–6 months for postpartum and infant care • Complete written SOAP notes (five overall)

EDD—expected date of delivery, SOAP—subjective, objective, assessment and plan, L&D—labor and delivery

Table 2

Study Population and Selection Method for Inclusion in the OB Program by Year

Academic Year	Selection Method	OB Program	Control
		# (# Female)	# (# Female)
2001–2002	Random	18 (9)	36 (10)
2002–2003	Lottery	19 (14)	35 (16)
2003–2004	Lottery	20 (8)	35 (14)
Total		57 (31)	106 (40)
Complete data		55 (29)	94 (38)

objective was to identify those students who intended to pursue family medicine and include pregnancy care as part of their practice, the response categories were collapsed (1–3—not likely/neutral) and (4–5—likely/very likely) for the analysis. In addition to OLP participation, other explanatory variables were chosen on the basis of their potential relevance: gender and an ordinal variable reflecting three separate cohorts of first-year medical students (1=2001–2002, 2=2002–2003, and 3=2003–2004).

Statistical Analysis

A univariate analysis of variance (ANOVA) was used to examine the effect of explanatory variables on knowledge scores, while a chi-square test was performed to examine the effect of explanatory variables on attitude outcomes. The effects of OLP participation on knowledge and attitude responses were examined using general linear models adjusted for pretest response, gender, and cohort. Any inequity resulting from the choice of the control group was adjusted by including pretest scores in the models. Analyses were performed using SPSS for Windows (version 12.0, SPSS Inc, Chicago).

Results

Subjects

Data for both pretest and posttest evaluations were available for 149 students (96% of OLP participants and 89% of controls). The OLP group had a higher proportion of female students compared to controls (54% versus 38%, Table 2).

Pretest Evaluation

There was no effect of program inclusion or gender on knowledge at pretest. However, students in cohort 3 had higher pretest scores compared to the other cohorts (Table 3). Analyses of the relationships between the attitude outcome variables and explanatory variables at pretest are given in Table 4. There were no differences between OLP and control groups in inclusion of obstetrics and possible role of gender. However, a higher proportion of OLP students expressed likelihood to pursue family medicine. There were no differences between female and male students in attitude questions, or cohort effect on intention to pursue family medicine and on the role of gender. A lower proportion of students in cohort 3 expressed likelihood of inclusion of pregnancy care in the future practice.

Table 3

Medical Students' Knowledge About Obstetrics: Univariate and Multivariate Analyses

	Pretest		***Posttest***		***Multivariate Analysis***	
	Unadjusted Score	P *Value*	*Unadjusted Score*	P *Value*	*Adjusted Score**	P *Value*
Group						
OB Program	44.7	.544	56.5	.001	56.4	.003
Control	43.4		49.9		50.3	
Gender						
Female	45.4	.172	54.1	.115	54.4	.257
Male	42.7		50.9		52.2	
Cohort						
2001–2002	41.4	.003	52.4	.527	53.9	.727
2002–2003	41.6		51.0		52.2	
2003–2004	48.6		53.7		53.8	

* From general linear model with posttest knowledge score as the dependent variable and Obstetric Longitudinal Program participation, gender, cohort and baseline score as covariates

Effect of OB Program Participation

After adjustment for pretest scores, gender, and cohort, OLP participants had higher knowledge scores at posttest compared to controls (Table 3). The number of students who were likely to pursue family medicine in the future, however, decreased in both groups, but there was no effect of OLP participation on this outcome in multivariate analysis (Table 4). The number of students who were likely to include pregnancy care in a future practice increased in the OLP group and decreased in the control group. After adjustment for baseline response, OLP students were more likely to express intention to include pregnancy care in their practice compared to controls (Table 4). The number of students who thought that female physicians

Table 4

Effects of Covariates on Medical Students' Attitudes: Univariate and Multivariate Analyses

	Pretest		*Posttest*		*Multivariate Analysis*	
	*Percent**	P *Value*	*Percent**	P *Value*	*Adjusted Percent†*	P *Value*
Likely to pursue family medicine						
Group						
OB Program	89.1	.044	69.1	.570	66.0	.796
Control	75.5		64.5		68.0	
Gender						
Female	80.6	.987	71.6	.204	72.5	.148
Male	80.5		61.7		61.5	
Cohort						
2001–2002	88.6	.053	76.7	.187	74.6	.374
2002–2003	70.4		59.3		62.1	
2003–2004	84.3		64.7		64.2	
Likely to include obstetrics						
Group						
OB Program	74.5	.273	81.8	.001	80.0	.003
Control	66.0		54.8		58.9	
Gender						
Female	73.1	.339	82.1	<.001	83.1	<.001
Male	65.9		50.6		55.8	
Cohort						
2001–2002	79.5	.021	76.7	.052	79.2	.141
2002–2003	74.1		66.7		66.7	
2003–2004	54.9		52.9		6.24	
Role of gender in OB practice						
Group						
OB Program	43.6	.759	47.3	.140	47.0	.051
Control	46.2		59.8		62.9	
Gender						
Female	46.3	.824	65.7	.018	66.6	.004
Male	44.4		46.3		43.3	
Cohort						
2001–2002	56.8	.118	60.5	.063	58.8	.042
2002–2003	35.8		42.6		41.5	
2003–2004	45.1		64.0		64.6	

* Percent of "likely/very likely" responses
† From general linear model with posttest outcome measure as the dependent variable and OB Program participation, gender, cohort, and baseline response as covariates

were more likely to include deliveries in their practice increased in both groups. There was no effect of OLP participation on this outcome in multivariate analysis (Table 4).

Effect of Gender

At posttest, there was no effect of gender on intention to pursue family medicine. However, the number of female students who expressed intention to include deliveries in the future practice increased, while the number of male students expressing this intention decreased. An independent effect of gender was also observed in the multivariate analysis; female students were more likely than male students to express intention to include deliveries in their future practice (Table 4). Similar results were observed for the question on the role of gender in inclusion of pregnancy care in family medicine (Table 4). In multivariate analysis, female students were more likely than male students to feel that gender affected the inclusion of deliveries (Table 4).

Evaluation of the OB Program by Participants

Students' evaluations of OLP have been positive. According to the majority of students, the OLP helped them learn about pregnancy care and relate to care and concerns of a pregnant woman. Students' comments included statements such as "It was a great intro to the world of obstetrics," "It was an amazing and fulfilling experience," "It solidified my interest in obstetrics," "I learned a great deal about the care an OB patient required from my preceptor, and I learned the thoughts, concerns, emotions of pregnancy from my OB patient." Comments from family physicians included "Keep doing the program" and "It shows the medical students the family practice way of obstetrics care." Patients' comments included "I would gladly do it again," and "Great program."

Discussion

For most medical students entering family medicine, the longitudinal experience with pregnancy care does not occur until residency training. The OLP provided such an experience for first-year medical students. The OLP established a learning relationship with family physician preceptors and OB patients, providing a family-centered health experience. Through this longitudinal interaction both in the classroom and a clinical setting, the students gained knowledge about management of pregnancy. The students were positive about maintaining the connection with their pregnant patients throughout the first year of medical school.

The intent toward including pregnancy in their future practice increased among OLP participants, but we do not know if this intention will translate into a decision to actively include pregnancy care in their future practice. Students who participated in the program are still in residencies, so it is difficult at this time to establish the long-term effect of the OLP on future practice patterns.

Similar to other studies,[12,26,27] female students were more likely to express intention to include deliveries in their future practice. Moreover, students in our study also thought that female physicians were more predisposed to provide pregnancy care in a future practice. Medical student gender in career decision is clearly important. Therefore, understanding specific gender factors that influence the decision to include pregnancy care in future practice may help medical educators to influence career choice decisions in both male and female students.[27,28]

The intention to pursue family medicine in the future decreased in all students by the end of the first year, regardless of the program participation. Although the Duluth campus admission policies are focused on selecting individuals most likely to have an interest in the practice of family medicine, students, once admitted, may change their intentions and interest. The number of students choosing residencies in obstetrics-gynecology from the Duluth campus matriculates has not changed since introduction of the OLP.

The most difficult part of OLP curricular organization was patient recruitment. Similar to trends reported in the literature,[1-3] over the course of the program we noticed a decrease in the number of family physician preceptors who were including deliveries in their practice. This created a challenge for matching medical students to family physician preceptors and decreased the number of students who could participate in the program.

Limitations

This study has several limitations. Changes in the student recruitment strategy between the first cohort and subsequent cohorts (random versus lottery) and a greater proportion of female students through self-selection may have caused a selection bias. Inclusion of baseline outcomes, gender, and cohort in the models helped to statistically adjust the study outcomes for possible differences in the comparison groups. However, these statistical adjustments do not entirely eliminate the bias. Since all medical students were involved with family physician preceptors, the enthusiasm of the family physician preceptors and the inclusion of deliveries in their practice may have also confounded our results. Students who did not participate in the OLP may also have gained some knowledge about pregnancy care through the interactions with their family physician preceptors. However, such experiences were episodic.

Conclusions

The OLP provides a supportive atmosphere for students during the first year of their medical education, with a focus on continuity of pregnancy care. OLP participants demonstrated increased knowledge and reported a higher likelihood of including pregnancy care in their future practice compared to the control group. Further studies are needed to determine if the OLP experience is associated with an increase in inclusion and retention of pregnancy care in future family medicine practices.

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References

1. Chen FM, Huntington J, Kim S, Phillips WR, Stevens NG. Prepared but not practicing: declining pregnancy care among recent family medicine residency graduates. Fam Med 2006;38(6):423-6.

2. Rabinowitz H. Recruitment and retention of rural physicians: how much progress have we made? J Am Board Fam Pract 1995;8(6):496-9.
3. Brotherton SE, Rockey PH, Etzel SI. US graduate medical education, 2004–2005: trends in primary care specialties. JAMA 2005;294(9):1075-82.
4. Taylor HA, Kiser WR. Reported comfort with obstetrical emergencies before and after participation in the Advanced Life Support in Obstetrics course. Fam Med 1998;30(2):103-7.
5. Topping DB, Hueston WJ, MacGilvray P. Family physicians delivering babies: what do obstetricians think? Fam Med 2003;35(10):737-41.
6. Nesbitt TS. Obstetrics in family medicine: can it survive? J Am Board Fam Pract 2002;15(1):77-9.
7. Roberts RG, Bobula JA, Wolkomir MS. Why family physicians deliver babies. J Fam Pract 1998;46(1):34-40.
8. Larimore WL, Sapolsky BS. Maternity care in family medicine: economics and malpractice. J Fam Pract 1995;40(2):153-60.
9. Eidson-Ton WS, Nuovo J, Solis B, Ewing K, Diaz H, Smith LH. An enhanced obstetrics track for a family practice residency program: results from the first 6 years. J Am Board Fam Pract 2005;18(3):223-8.
10. Benedetti TJ, Baldwin LM, Skillman SM, et al. Professional liability issues and practice patterns of obstetric providers in Washington State. Obstet Gynecol 2006;107(6):1238-46.
11. Ruderman J. Obstetrics in family medicine. CMAJ 2002;167(1):16-7; author reply 17.
12. Bedard MJ, Berthiaume S, Beaulieu MD, Leclerc C. Factors influencing the decision to practise obstetrics among Quebec medical students: a survey. J Obstet Gynaecol Can 2006;28(12):1075-82.
13. Stretch N, Voisin A, Dunlop S, Voisin A. Survey of rural family physician-obstetricians in Southwestern Ontario. Can J Rural Med 2007;12(1):16-21.
14. Casey PM, Magrane D, Lesnick TG. Improved performance and student satisfaction after implementation of a problem-based preclinical obstetrics and gynecology curriculum. Am J Obstet Gynecol 2005;193(5):1874-8.
15. O'Leary S, Diepenhorst L, Churley-Strom R, Magrane D. Educational games in an obstetrics and gynecology core curriculum. Am J Obstet Gynecol 2005;193(5):1848-51.
16. Nalesnik SW, Heaton JO, Olsen CH, Haffner WH, Zahn CM. Incorporating problem-based learning into an obstetrics-gynecology clerkship: impact on student satisfaction and grades. Am J Obstet Gynecol 2004;190(5):1375-81.
17. Nicholson S, Osonnaya C, Carter YH, Savage W, Hennessy E, Collinson S. Designing a community-based fourth-year obstetrics and gynecology module: an example of innovative curriculum development. Med Educ 2001;35(4):398-403.
18. Wilkes MS, Hoffman JR, Usatine R, Baillie S. An innovative program to augment community preceptors' practice and teaching skills. Acad Med 2006;81(4):332-41.
19. Maudsley RF. Role models and the learning environment: essential elements in effective medical education. Acad Med 2001;76(5):432-4.
20. Peters AS, Feins A, Rubin R, Seward S, Schnaidt K, Fletcher RH. The longitudinal primary care clerkship at Harvard Medical School. Acad Med 2001;76(5):484-8.
21. Prislin MD, Morrison E, Giglio M, Truong P, Radecki S. Patients' perceptions of medical students in a longitudinal family medicine clerkship. Fam Med 2001;33(3):187-91.
22. Rabinowitz HK, Diamond JJ, Markham FW, Paynter NP. Critical factors for designing programs to increase the supply and retention of rural primary care physicians. JAMA 2001;286(9):1041-8.
23. Boulger J. Residency choices and practice locations (The University of Minnesota Medical School Duluth). Duluth, Minn: The University of Minnesota Medical School Duluth Alumni Office, 2006.
24. American Academy of Family Physicians. National Residency Matching Program (Table 14). www.aafp.org/match/table14.htm. Accessed August 2, 2006.
25. Beckman C, Ling F, Herbert W, Laube DW, Smith R, Barzansky B. Obstetrics and gynecology, third edition. Baltimore: Lippincott Williams & Wilkins, 1998.
26. Ruderman J, Holzapfel SG, Carroll JC, Cummings S. Obstetrics anyone? How family medicine residents' interests changed. Can Fam Physician 1999;45:638-40, 643-7.
27. Schnuth RL, Vasilenko P, Mavis B, Marshall J. What influences medical students to pursue careers in obstetrics and gynecology? Am J Obstet Gynecol 2003;189(3):639-43.
28. Bienstock JL, Laube DW. The recruitment phoenix: strategies for attracting medical students into obstetrics and gynecology. Obstet Gynecol. 2005;105(5 part 1):1125-7.