Impact of Deliveries on the Office Practice of Family Medicine

Wm. MacMillan Rodney, MD; Damion Hardison, MD; Kelly Rodney-Arnold, MD; and Larry McKenzie, DO

Nashville, Memphis and Chattanooga, Tennessee; and Tulsa, Oklahoma

Introduction: To prospectively evaluate the frequency of late-night deliveries and the cost of lost office hours, physicians serving mainly uninsured and Medicaid patients in an urban area established databases tracking office demographics and detailed information on each delivery.

Subjects and Methods: Time needed in the hospital during routine office hours and late night was tabulated for each delivery. Complete calendar years 2000–2003 were tabulated separately and in total. Overhead and opportunity costs were calculated using historical norms and actual costs.

Results: During the study, there were 490 deliveries, with 113 (23%) occurring late at night. Physicians retrospectively self-reported an average of 2.8 hours in the hospital for the average delivery, which included 105 (21%) Cesarean deliveries. There were an average of 9.5 prenatal visits with each delivery, and 23% of deliveries occurred late at night (11 p.m.–6 a.m.). The average delivery produced a net revenue of $1,339. Deliveries caused physicians to be absent from the office for 371.5 hours over the four years. After deducting opportunity cost and continuing overhead, net revenue for the 48-month study period was $646,858. Ancillary revenues were beyond the scope of the study design.

Conclusion: These data suggest that delivery services in this community of urban underserved minorities can be self-supporting. This is the first study in the medical literature to provide data describing the impact of deliveries on physician practices outside of residency. Loss of physician sleep and revenue lost secondary to time away from the office were successfully measured. These data suggest that common beliefs frequently overestimate lifestyle interruptions and underestimate the financial losses of failure to deliver babies in this region. Future studies are suggested.

Key words: prenatal care ■ family medicine physicians

 From the Department of Family and Community Medicine, Meharry-Vanderbilt Alliance, Memphis, TN (W. Rodney); Meharry Medical College, Nashville, TN (Hardison); University of Tennessee, Chattanooga, TN (Rodney-Arnold); and University of Oklahoma Health Sciences Center, Tulsa, OK (McKenzie). Send correspondence and reprint requests for *J Natl Med Assoc.* 2006;98:1685–1690 to: Dr. Wm. MacMillan Rodney, Department of Family and Community Medicine, Meharry-Vanderbilt Alliance, 6575 Black Thorn Cove, Memphis, TN 38119; e-mail: wmrodney@aol.com

The American Academy of Family Physicians (AAFP) Task Force on Obstetrics[1-3] and the AAFP Task Force on Procedures (1989–1995) observed that physicians question the persistence of delivery services in family medicine.[4-6] A rural family physician summarized much of the concern by stating that deliveries took him out of the office, decreased his availability to his patients and "cost money."

Larimore, Rodney and others[7-10] have published data describing the negative public health impact of unavailable maternity care and the misperceptions that persist among medical students, residents and physicians. In a study focused on obstetrical ultrasound teaching within family medicine residencies, 19% of programs revealed that they did not teach obstetrics.[11] In 1997, the Residency Review Committee for Family Practice (RRC-FP) reaffirmed the need for role models by requiring each residency program to have some family physician faculty who could deliver babies. Since some educators cite lack of student interest as cause for eliminating this part of the curriculum,[12] there is a need for data drawn from the community practices of family physicians who provide maternity care. This continues to be a controversial area with many opinions, little data, and covert noncompliance by some educators.[13-15] This has a negative effect on communities seeking family-centered maternity services.

There appears to be a reality gap between the average intern's experiences in the culture of the academic medical center versus the more-supportive environment available in many community hospitals. In these community hospitals, the nurses function as interns for all routine labor checks and progress of routine labor. As former residency directors, two of the authors (W. Rodney, McKenzie) have observed that experiences in academic medical centers can be demoralizing and impractical. For example, at one academic medical center in the study state, all family medicine deliveries require the physical presence of a family physician in the hospital from the time of admission until delivery. In cases of labor induction, the physician and/or his physician colleague were(was) required to stay in the hospital for several days. Although community physicians would rotate

in 12-hour shifts, the cost of this regulation predictably discouraged family physicians from participating in deliveries. Residents in this academic medical center correctly expressed disbelief that anyone could maintain an office practice and perform deliveries. Obstetrical physicians' bias and nurse bias against the family physician have been documented and contribute to negative educational experiences.[16]

While evaluating career options, residents and medical students overestimate malpractice insurance costs,[17] lifestyle interruptions and lost sleep associated with deliveries. Lost sleep is equated with time away from family and is reported as decreasing the quality of lifestyle.[18] Therefore, a prospective study was designed and implemented to examine the relationship between sleep disruption and hospital delivery services. In an office providing prenatal care and delivering babies in a community hospital, what would be the number of office hours lost when a physician was called to a delivery during the normal work day, and how much sleep would be lost for deliveries "late at night"?

METHODS

With the opening of the index practice in August 1999, three databases were established. A prenatal database assembled standard demographic data, including name, date of birth, medical record number, last menstrual period (LMP), expected due date (EDD), gravida (G), para (P), prenatal laboratory examinations and any history of obstetrical/newborn complications. Prenatal tests included blood type, hemoglobin and screening exams for cervical cancer, syphilis, chlamydia, gonorrhea, group-B streptococcus, diabetes and blood antibodies. A second database was the delivery database, including date of delivery, hour of delivery, hours spent by the physician in the hospital and delivery/newborn information. Newborn data included the baby's weight, Apgar scores, viability and the need for neonatal intensive care. Delivery complications included the method of delivery and all surgical repairs of the perineum. The third database was an electronic medical record system containing age, gender, ethnicity, payer characteristics, codes for each service billed and net collections for all patients.

All pregnant patients were tracked for prenatal lab results, number of prenatal visits (starting year 2: 2001), deliveries, newborn and subsequent child visits. To tabulate hours spent in the hospital, each physician recorded the number of hours from arrival to departure from the hospital for each delivery. The amount of time spent in the hospital was recorded within one working day of the delivery. Time spent managing labor from home or from the office (i.e., in consultation with labor nurses) was not counted here. When more than one patient was in the hospital giving birth, physicians did not count time twice. Departure from the birthing room was tabulated as hospital departure time for delivery 1 and as arrival-at-the-hospital time for delivery 2.

Prenatal patients were given instructions about signs and symptoms of labor directing them to report to the hospital where they would be evaluated by nurses on the labor and delivery unit. The average number of phone calls to the physician arriving 11 p.m.–6 a.m. was calculated monthly for OB-related patients, and face validity was assessed by one of the authors who wrote down the time of each OB-related call during a convenience sample of 30 nights each year.

Table 1. Total deliveries to date—August 20, 1999 to December 31, 2003

	Baseline First 4 Months 09/01/99–12/31/99	First Calendar Year 2000	Second Calendar Year 2001	Third Calendar Year 2002	Fourth Calendar Year 2003
Average office visits/month	331	564	958	1617	1995
Percent uninsured	100	52	34	32	25
Percent Medicaid	0	45	56	59	60
Total office visits per year including prenatal visits	1,322	6,674	11,491	19,400	23,939
Total prenatal visits	NA	NA	690	1325	1939
Deliveries per year	7	72	75	144	192
Average deliveries per month	1.8	6.0	6.3	12.0	16.0
Number of C-sections	0	14	18	42	31
Number of infants to NICU	1	2	6 (1 death)	3 (1 death)	5[2 deaths]
Average infant weight					
<2,500 g	n/a	3	0	2	4
>4,500 g	n/a	2*	1	6	3
# with 1-minute APGAR<7	n/a	6*	9	8	4
# with 5-minute APGAR>7	n/a	1*	3	2	2
Average number of prenatal visits	NA	NA	9.2	9.2	10.1

n/a: not applicable; NA: not available; Maternal average age was 24 with a range of 13–42 during the study period. Average gravida was 4.2 and the average para was 1.2. Yearly averages not available.

When a delivery occurred between 9 a.m. and 5 p.m., Monday through Friday, the number of hours required for the physician to attend a delivery in the hospital was noted. These were tabulated as "office hours lost." When the physician was required to perform a delivery between the hours of 11:01 p.m. and 6 a.m., that night was counted as a "sleep cycle interrupted" night.

To calculate the financial impact of office hours lost, the study assumed that non-MD office staff had regularly scheduled hours and that office overhead continued when the doctor was called away from the office. For the purpose of this study, it was assumed that the physician would see ≥3 visits per hour and have 40 scheduled hours in the office each week (i.e., 120 visits per week for 48 weeks of the year for a projected total of 5,160 visits per year). Average charges per hour were calculated and a projection was made for net collections. This projection was created from historical net collections after deleting revenue from prenatal and delivery activities. A second method of cost accounting was derived from national FP survey data published by the Medical Group Management Association (MGMA).[19] Costs for liability insurance in the study state were tabulated annually after subtracting the baseline cost for a family medicine physicians performing laceration repairs and flexible sigmoidoscopies in the office.

Physicians visited patients in the hospital in the morning before office hours or in the evening after office hours—i.e., the nature of these visits was not sufficiently urgent to displace scheduled office hours. Since postdelivery visits in the hospital could be scheduled electively, hours spent in discharging the patient or routine hospital visits were not viewed as taking time away from the office.

There was no answering service and all physicians carried cell phones while in town. Phone calls made to the covering physician were tabulated to determine time for sleep interruptions by phone calls from patients. Calls on the telephone were monitored weekly by review of logs. The frequency was monitored for a week every three months or a total of one month per year of the study. This was done during the last two years of the study.

RESULTS

The office was located in an urban underserved area where access to prenatal care was not readily available in the community. Clinical volume at the index practice grew steadily throughout the study, reaching 23,939 office visits and 192 deliveries in the fourth complete year (2003), which is slightly more than a delivery every other day in calendar year 2003. The average mother was 24 years of age with a range of age 13–42 years of age. The average gravida was 2.4 and para 1.2. In 2003, the office saw 38% African-American, 42% Latino and 20% Caucasian patients. The case mix for deliveries in 2001 and 2002 was 62.4% TennCare (Medicaid), 25.2% uninsured and 12.5% other insurance. In 2003, the case mix was 65.4% TennCare, 28.8% uninsured and 5.8% other insurance.

During 52 consecutive months, there were 113 out of 490 (23.1%) deliveries during the hours designated as sleep disruptive (11 p.m.–6 a.m). Overall family physicians reported an average of 2.8 hours in the hospital for

Table 2. Delivery time and impact on office/physician sleep cycle

	Baseline First 4 Months 09/01/99–12/31/99	First Calendar Year 2000*	Second Calendar Year 2001	Third Calendar Year 2002	Fourth Calendar Year 2003	Total
Total number of deliveries	7	72	75	144	192	490
Total office visits including prenatal	1,322	6,674	11,491	19,400	23,939	62,826
Total prenatal visits	n/a	n/a	690	1,325	1,939	na
Number of deliveries occurring during hours 9 a.m.–5 p.m. M–F	4 2 Sat/Sun	20 4 Sat/Sun	22 7 Sat/Sun	56 14 Sat/Sun holiday	76 17 on Sat/Sun	178; 36.3% 44 on Sat/Sun
Number of deliveries occurring during evening hours 5:01–11 p.m.		21	22	33	53	129; 26.3%
Number of deliveries occurring during sleep hours 11:01 p.m.–6 a.m.	1	22	21	28	41	113; 23.1%
Early morning (6:01–9 a.m.)	2	9	10	26	22	69 (14.1%)
Average hours spent in hospital on delivery	2.57	3.60	2.44	2.73	2.6	2.8
Office hours lost by going to hospital, M–F	4	37	34	122	174.5	371.5

Physician extenders were not used in this practice, but there were always 2–4 physicians in the group to share call and allow vacation. Individual physician analysis is beyond the scope of this paper. It is about the system.

each delivery. A sleep-disruptive delivery occurred once every 4.336 (round off to 4.3) births.

The yearly delivery volumes are depicted in Table 1. The average frequency of a late-night delivery during the sum of all consecutive years was 1 out of 4.3 deliveries. A year-by-year tabulation of delivery times is depicted in Table 2.

During the first four months of operation (1999), there were seven deliveries total. During the subsequent next two complete calendar years (2000 and 2001), 147 deliveries occurred with 43 (29.3%) of them being late-night deliveries. Over these two years, a late-night delivery occurred 43 nights in two years for a frequency of one night in 17. During the next two calendar years, 2002 and 2003, there were 69 late-night deliveries occurring over two years (730 days). This averages one late-night delivery occurring every 10.6 nights for the years 2002 and 2003. The study period was subdivided to demonstrate the effect of volume on the frequency of sleep disruption. As the absolute number of deliveries increases, the frequency of late-night deliveries increases.

During the year of maximum activity (2003), physicians self-reported an average late-night phone call frequency for pregnancy-related problems of one call per night lasting 2–3 minutes each.

The revenue analysis is depicted in Table 3. Newborn care was billed separately except for the uninsured, who qualified for a special hospital program that "bundled" mother and baby into one financial package. The average collected revenue for global obstetrical services (CPT 4 code 59400) was $1,349 after deducting time lost for being called away from the office. This included a deduction for fixed overhead.

During the course of 490 deliveries, 372 office hours were lost. The average number of office hours lost per delivery was calculated to be 0.76 hours, or 46 minutes. Average collections per visit without deliveries and OB were $55 for the time 2001–2003. An hour of lost office revenue was calculated to represent $165. The opportunity cost of each delivery was calculated to be 0.76 x 1 hours' revenue ($165) = $125.40.

A secondary analysis was performed using national data describing family medicine. From the 2003 survey of the MGMA, overhead is 59.1% of collections for one family physician.[19] In this survey, the average family physician pays $278,228 annually in overhead. MGMA data includes overhead for payment of liability insurance. Since overhead is continuous, a lost week of revenue represents $5,796.42 ($145 per hour) based on a 48-week per year, or $134 per hour during a 52-week year.

Marginal costs of medical liability insurance can be calculated by subtracting the base cost of insurance from the premium cost of insurance covering normal vaginal deliveries in a claims-made policy covering $1 million per occurrence or $3 million per year aggregate. This is the required insurance in this community. For this practice, the total four-year (marginal) additional cost incurred for delivery related malpractice insurance was slightly <$70,000.

DISCUSSION

This study contributes new data toward the financial benchmarking of office and hospital practice in the medical specialty of family medicine.[20-23] Other family medicine faculty and practicing physicians have stated that maternity care services would have a negative financial impact on the ability to sustain an office practice when costs for lost office visits were compared to revenue. Despite overhead and lost opportunity costs, $651,357 in

Table 3. Revenue for deliveries and maternity care services

Service	2000	2001	2002	2003
Total revenue and deliveries per year	$99,636 (n=72)	$124,916 (n=75)	$251,103 (n=144)	$285,254 (n=192)
Prenatal visits (number)	na	690	1325	1939
Average revenue collected from each delivery	$1,384	$1,665	$1,424	$1,486
Revenue lost by unscheduled absence of the physician to deliver—opportunity cost	$5,735 (37 hrs)	$5,270 (34 hrs)	$20,130 (122 hrs)	$28,875 (175 hrs)
Revenue lost for continuing overhead while physician absent	$4,958	$4,556	$16,348	$23,450
Total Net Revenue Lost due to Absence from the Office	$10,693	$9,826	$36,468	$52,325
Total 48-Month Revenue from Deliveries and Associated Prenatal Visits				$760,669
Total 48-month revenue lost due to absence				$109,312
Net total 48-month revenue				$651,357
Average net revenue per delivery over 48 months				$1,349

For each delivery, 9–10 prenatal visits were made to the office. Without these prenatal visits, other patients could have been seen. Lost revenue accrues to the office assuming that only one physician is gone to do each delivery. The number of physicians in the call group will not affect this number. All calculations have been rechecked and some minor changes have been made based on lost revenue calculation of $165 per hours.

collected net revenue remained. Average revenue collected per delivery was $1,349, and this money also paid for the 9–10 prenatal visits per delivery.

Should prenatal visits be counted as a visit-opportunity lost? Using average revenue of $55 per visit, 10 prenatal visits could have been replaced with nonpregnant visits worth $550 in revenue. In a $1,349 net collection, $799 remain for use by the practice and/or allocation to the physician that produces the work. Since the average delivery required a little less than three hours, this group chose to bonus the delivering physician with $300 for each delivery under the assumption that $100 per hour would be fair. Overall, the net balance remains positive.

Sleep and lifestyle disruption are commonly discussed but difficult to quantify. This study is the first to prospectively and objectively tabulate the hours of sleep disruption using commonly accepted normal sleep time 11 p.m.–6 a.m.) as the norm. Based on their experiences from residency training, most physicians recall significant sleep deprivation during a majority of assigned call nights.[24] Regular sleep cycle interruptions are one of the major reasons for the recent Accreditation Council for Graduate Medical Education (ACGME) revisions known as the 80-hour-work-week rule.[25]

In this sample, approximately 23% (113out of 490) of the overall total of deliveries occurred late at night, but the range varies. In 2003, with 192 deliveries, a solo physician would have experienced every fourth or fifth as a late-night delivery, if that physician had attended all of the deliveries. However, the night call and deliveries were distributed among four physicians in the call group. This seems to be a comfortable range for family physicians. External validity is provided from AAFP data suggesting that the average family physician who does deliveries reports doing about 40–60 deliveries per year.

The study creates a design for the study of probable sleep interruptions based on absolute numbers of deliveries, and it provides some data on the frequency of lost office time. Young physicians and faculty who have not experienced deliveries in a community hospital seem to exaggerate the perils of this practice style before they have actual data. These data may be helpful in designing realistic career expectations and job descriptions in support of community based family practice/obstetrical services.

A weakness of this study is that it is localized to one urban community in the state of Tennessee. Liability overhead may be more prohibitive in other urban areas, and privileging issues may be prohibitive in others. A weakness of this study is that night-call stress could not be measured directly, but the study did tabulate the actual frequencies of late-night deliveries. Future studies might consider providing indirect measures of stress by evaluating staff perceptions, requests for relief time and postnight-call performance on standardized tests. These were beyond the scope of the current study.

Sleep disruption from phone calls could have been undercounted in this study.

Late-night phone calls were anecdotally reported to occur at the rate of slightly less than one per night of call, or 1.73 per delivery; the measured length of the average call was <3 minutes. However, these data require more rigorous structure and study.

Choosing a seven-hour period (11 p.m.–6 a.m.) was arbitrary and may have skewed the frequency slightly downward, but physicians in this group did not view it as a misrepresentation of usual sleep time. Failure to incorporate a formal study of hospital rounds postpartum undercounts the effort, but routine hospital rounds rarely have any impact on the routine office hours. Impact on office hours was the major focus for this study.

Data for prenatal visit numbers and average revenue per visit were not available for 1999–2000, and the study used sequential data from the 36-month period of 2001–2003 to calculate the average number of prenatal visits per delivery. These data and revenue data were used to make generalizations regarding the entire study period. Although there is some variation year to year, the variation is small, and errors of assumption are unlikely.

This area and other ancillary revenues associated with the provision of prenatal and delivery service should be considered by future investigators. It is a weakness of the study that revenue attributable to children's office visits has not been tabulated as a part of the revenue equation. However, if anything, revenue data in this paper are conservative and underestimate other revenues derived from maternity care. Revenues from ancillary activities were not tabulated as a part of this paper and deserve further study.

Medical liability insurance costs vary, with overhead being much higher in some states. In this region, liability insurance premiums have stabilized, but this situation is not a stable one. Changing conditions in the insurance market could invalidate some of the conclusions described n this paper.

This is the first study in the medical literature to provide data on night-call quantity and impact. Career choice and professional expectations are frequently formed from inaccurate perceptions of potential lifestyle interruptions and financial implications. The overly simplified concept of "night call" regarding deliveries for family physicians requires further study. This study adds new dimensions to this dialogue.[26,27]

REFERENCES

1. Rodney WM. A personal reflection from the AAFP Task Force on Obstetrics. *Tenn Fam Phys.* 1990;1(3):4-5.

2. Board of Directors Report C. To the 1992 Congress of Delegates at the American Academy of Family Physicians Annual Assembly, October 14–18, 1992 in San Diego, CA.

3. "Congress Emphasizes Importance of Obstetrical Training," 1992 AAFP Congress Report, p. 7. Kansas City, MO; 1992.

4. Smith MA, Howard KP. Choosing to do obstetrics in practice: factors effecting the decision of third-year family practice residents. *Fam Med.* 1987;19:191-194.

5. Kruse J, Phillips DM, Wesley R. A comparison of the attitudes of obstetricians and family physicians toward obstetric practice, training, and hospital privileges of family physicians. *Fam Med.* 1990;22:219-225.

6. Nesbitt TS. Obstetrics in family medicine: can it survive? *J Am Board Fam Pract.* 2002;15:77-79.

7. Larimore WL, Griffin ER. Family practice maternity care in central Florida. Increased income, satisfaction, and practice diversity. *Florida Fam Phys.* 1993;53(1):28-30.

8. Larimore WL, Sapolsky BS. Maternity care in family medicine: economics and malpractice. *J Fam Pract.* 1995;40(2):153-160.

9. Allen DI, Kamradt JM. Relationship of infant mortality to the availability of obstetrical care in Indiana. *J Fam Pract.* 1991;33:609-613.

10. Rodney WM, Hahn RG, Martin J. Enhancing the family medicine curriculum in maternity care (OB) and emergency medicine to establish a rural teaching practice. *Fam Med.* 1998;30:712-719.

11. Connor PD, Deutchman ME, Hahn RG. Training in obstetric sonography in family medicine residency programs: results of a nationwide survey and suggestions for a teaching strategy. *J Am Board Fam Pract.* 1994;7(2):124-129.

12. Goldsmith GA. Interest in family medicine; 1982 revisited? *Fam Med.* 2004;36:447-448.

13. Rodney WM, Manahan M. Obstetrics in Family Practice. *J Am Board Fam Pract.* 2002; 15:255-257 (letters).

14. Phillips RL, Green LA. Making choices about the scope of family practice. *J Am Board Fam Pract.* 2002;15:250-254.

15. Ratcliff SD, Newman SR, Stone MB, et al. Obstetric care in family practice residencies. *J Am Board Fam Pract.* 2002;15:20-24.

16. Topping DB, Hueston WJ, MacGilvray P. Family physicians delivering babies: What do obstetricians think? *Fam Med.* 2003;35:737-741.

17. Rodney WM. Obstetric malpractice fee phobia among medical students in the United States. *Fam Pract.* 1986;3:113-117.

18. Larimore WL. Assessing the risks and benefits of including obstetrics in family practice. *Fam Pract Recertification.*1991;13(11):18-29.

19. Medical Group Management Association 2003 Cost and Physician Compensation Survey Reports. Englewood, CO: MGMA. www.mgma.com. Accessed 07/ 17/03.

20. Pauweis J, Oliviera A, Stevens N. Benchmarking the costs of residency training in family practice. *Fam Med.* 2003;35:330-336.

21. Rodney WM, Hahn RG. Impact of the limited generalist (no hospital, no procedures) model on the viability of family practice. *J Am Board Fam Pract.* 2002;15:191-200.

22. Schneeweiss R, Ellsbury K, Hart LG, et al. The economic impact and multiplier effect of a family practice clinic on an academic medical center. *JAMA.* 1989;262:370-375.

23. Dresang LT, Rodney WM, Dees J. Teaching prenatal ultrasound to family medicine residents. *Fam Med.* 2004;36:98-107.

24. Papp KK, Stoller EP, Sage P, et al. The effects of sleep loss and fatigue on resident-physicians: a multi-institutional, mixed-method study. *Acad Med.* 2004;79:394-406.

25. Rosen IM, Bellini LM, Shea JA. Sleep behaviors and attitudes among internal medicine housestaff in a U.S. university-based residency program. *Acad Med.* 2004;79:407-416.

26. Halvorsen JG. Reflections in family practice: who am I, professionally speaking? *J Am Board Fam Pract.* 1999;12:173-177.

27. Saultz JW, David AK. Is it time for a four-year family medicine residency? *Fam Med.* 2004;36:363-366. ■

We Welcome Your Comments

The *Journal of the National Medical Association* welcomes your Letters to the Editor about articles that appear in the *JNMA* or issues relevant to minority healthcare. Address correspondence to EditorJNMA@nmanet.org.