On-site Colposcopy Services in a Family Practice Residency Clinic: Impact on Physician Test-Ordering Behavior, Patient Compliance, and Practice Revenue Generation

Michael D. Prislin, MD, Truc Dinh, MD, and Mark Giglio, MD

Background: **Using colposcopy as a model, we examined the impact of introducing a new diagnostic technology into the ambulatory primary care setting.**

Methods: **Records of patients with abnormal findings on Papanicolaou smears were reviewed from three study periods: 1 year before, 1 year after, and 5 years after initiation of on-site colposcopy services. Data analyzed include physician management decisions, site of colposcopic service, and patient compliance. Practice revenue estimates were based upon patterns of physician management and patient compliance found during each study period.**

Results: **Management of low-grade squamous intraepithelial lesions varied during each study period. By period 3, however, most patients were undergoing colposcopy ($P = 0.03$). High-grade squamous intraepithelial lesions were uniformly managed with colposcopy during all study periods ($P < 0.001$). Introduction of on-site colposcopic services resulted in a rapid shift to the on-site location for evaluation of low-grade squamous intraepithelial lesions and a more gradual shift to the on-site location for evaluation of high-grade squamous intraepithelial lesions. Patient compliance was not affected by the introduction of on-site services. On-site colposcopy resulted in a nearly 100 percent transfer of revenue to the practice, but the economic benefit was quite modest.**

Conclusions: **Although offering on-site colposcopy services might have had some impact on physician management of low-grade squamous intraepithelial lesions, the lack of benefit regarding patient compliance, the relatively small patient volume for this procedure, and its modest impact on practice revenue cause us to question the value of including colposcopy in everyday practice. (J Am Board Fam Pract 1997;10:259-64.)**

Observers of contemporary American health care might well describe the current period in medicine as the era of ambulatory care. Radical change during the past two decades has resulted in the transfer of many health care services from the hospital to the ambulatory care setting. A key factor influencing this change has been the development of sophisticated diagnostic and therapeutic technologies that permit a greater proportion of health care services to be provided in the ambulatory setting.

The diffusion of diagnostic technologies will likely have particular impact on primary care ambulatory practice. In family medicine, for example, although controversy surrounds the relative importance of outpatient procedures,[1-3] use of visualization technologies, such as endoscopy, colposcopy, and diagnostic sonography, is expanding rapidly.[4] Accordingly, programs instructing physicians in these diagnostic procedures are becoming common.[5-10]

Yet, while anecdotal reports exist,[11,12] the impact of incorporating these activities into a family practice clinic has not been well studied. In this report we examine how introducing colposcopy services into a family practice residency teaching center affected physician test-ordering behavior, patient compliance, and practice revenue generation.

Submitted, revised, 6 September 1996.

From the Department of Family Medicine (MDP, TD, MG), University of California, Irvine. Address reprint requests to Michael D. Prislin, MD, Department of Family Medicine, Building 200, Rt. 81, Room 512, University of California, Irvine, 101 The City Drive South, Orange, CA 92668-3298.

Methods

This study was conducted at the Community Clinic of Orange County. Located in Santa Ana,

Calif, this facility, a US Public Health Service (USPHS) section 330 community health center, serves as the continuity training site for the University of California (UC), Irvine, family practice residency program.

Because it is a USPHS-sponsored community health center, the Community Clinic has a comprehensive health care plan, and cervical cancer screening and appropriate management of abnormal Papanicolaou smear findings represent major objectives of this plan. Residents receive didactic instruction in caring for patients with abnormal Papanicolaou smear results, and all resident activities are supervised by either full-time attending faculty from the Department of Family Medicine at UC, Irvine, or part-time community-based volunteer faculty serving at the Community Clinic.

The Community Clinic of Orange County, which serves an ethnically diverse urban population, is situated in a federally designated underserved area and a level 1 health profession shortage area. Ninety-eight percent of the clinic patients fall below the 200 percent poverty level; 62 percent of these patients receive Medicaid benefits, 9 percent receive county-sponsored medically indigent benefits, and 29 percent have no health insurance benefits whatsoever. There were approximately 40,000 patient visits each year to the Community Clinic during this study. Of these visits, 13,000 to 15,000 encounters each year were by female patients 15 years old or older.

A record of all Papanicolaou smears performed at the Community Clinic is maintained to assess whether the clinic meets its comprehensive health care plan objectives. Annual concurrent reviews, performed to assure compliance with the clinic's health care plan performance objective that all reproductive-age female patients receive a Papanicolaou smear evaluation at least once every 2 years, indicated an 80 to 90 percent compliance during the study period.

On-site colposcopy services were introduced at the Community Clinic in 1988. Currently one to two colposcopy clinics are conducted each week. Residents provide colposcopy services under the direct supervision of 2 members of UC, Irvine, full-time family medicine faculty.

We reviewed all Papanicolaou smears performed in 1987, 1 year before the introduction of on-site colposcopy services; in 1989, 1 year after the introduction of on-site colposcopy services; and in 1993, 5 years after the introduction of on-site colposcopy services. All Papanicolaou smears were submitted to the same clinical pathology laboratory during each study period. During the study period the method of reporting Papanicolaou smear cytopathology changed from a numerical to a descriptive Bethesda-type classification system.[13] For purposes of comparison, we converted numerical classifications used during 1987 and 1989 to descriptive classifications according to a scheme described by Miller and colleagues.[14]

Patients whose Papanicolaou smears showed low-grade squamous intraepithelial lesions, high-grade squamous intraepithelial lesions, squamous cell carcinoma, and adenocarcinoma were included in the study. Retrospective chart audits were performed to analyze the initial management of cases with abnormal Papanicolaou smear findings during each of the three study periods. Data were also collected on physician management decisions, site of colposcopic testing, and patient compliance.

Statistical analysis of comparisons was performed using chi-square tests. Because of small sample sizes, valid comparisons were limited to performance of colposcopy for low-grade squamous intraepithelial lesions during study periods 1 and 2 compared with study period 3; performance of colposcopy for high-grade versus low-grade squamous intraepithelial lesions; and patient compliance or noncompliance with physician orders for colposcopy during the three study periods.

Estimates of practice revenue were derived from the product of the number of colposcopic procedures likely to be performed and the clinic's established procedure fee of $100. The Community Clinic used a sliding fee scale, and no patient was denied access to services for financial reasons.

Results

Table 1 displays the results of the Papanicolaou smears performed during each study period. Clinically important cytopathologic abnormalities were found in 3 percent of Papanicolaou smears during the first study period, in 5 percent of Papanicolaou smears during the second study period, and in 2 percent of Papanicolaou smears during the third study period. Thirty-eight percent of relevant patient records from the first period, 59 percent from the second period, and 100 percent from the third study period were available for audit.

Table 1. Summary of Papanicolaou Smear Results.

Year	Total Number of Papanicolaou Smears	Normal No. (%)	Nonspecific Abnormality or Inflammation No. (%)	Low-grade SIL No. (%)	High-grade SIL or Cancer No. (%)
1986-1987	2066	1760 (85.2)	248 (12.0)	52 (2.5)	6 (0.3)
1988-1989	2160	1928 (89.3)	125 (05.8)	67 (3.1)	40 (1.9)
1993-1994	1531	1330 (86.9)	178 (11.6)	15 (1.0)	8 (0.5)

SIL - squamous intraepithelial lesions.

Table 2 displays case management when abnormal changes were found on Papanicolaou smears during the three study periods. Considerable variation existed in the initial management of low-grade squamous intraepithelial lesions across the three study periods. Several patients had no specific intervention during the first two study periods, and some patients during these study periods had their conditions reassessed with follow-up Papanicolaou smears. By the third study period, however, nearly all patients with low-grade squamous intraepithelial lesions were undergoing colposcopic examination ($P = 0.03$).

The availability of colposcopic services at the Community Clinic had an immediate impact on the site at which colposcopic examinations were performed for low-grade squamous intraepithelial lesions. Nearly all colposcopic studies were performed at the Community Clinic as soon as these services became available.

Initial physician management of high-grade squamous intraepithelial lesions or carcinomas was far more uniform across all three study periods. Essentially, all patients underwent colposcopic examination ($P < 0.001$). Having on-site colposcopic services available initially resulted in only slightly more than one half of the patients with high-grade lesions being evaluated at the Community Clinic. By 5 years after the introduction of colposcopic services, however, nearly all patients with high-grade lesions were also having their studies performed on-site.

Table 3 displays patient compliance with physician orders for colposcopic evaluation. Overall patient compliance ranged from 73 to 81 percent during the three study periods. No significant differences in compliance occurred relative to whether the colposcopic evaluation was performed at the Community Clinic or off-site.

Table 4 presents revenue projections for colposcopy performed at the Community Clinic for each study period, based upon prevailing patterns of initial physician management and patient compliance rates. Introducing on-site colposcopic services resulted in a transfer to the clinic of nearly 100 percent of revenue generated by this procedure by year 5. Nevertheless, the relatively small number of procedures performed, particu-

Table 2. Physician Management and Site of Colposcopy of Abnormal Papanicolaou Smear Results.

Study Period	Abnormal Results	Records Audited	Physician Management			Site	
			None	Repeat Smear	Colposcopy No. (%)	CCOC No. (%)	Other No. (%)
1. Before on-site colposcopy	Low-grade SIL	16	5 (31)	3 (19)	8 (50)	NA	8 (50)
	High-grade SIL or cancer	6	0 (0)	1 (17)	5 (83)	NA	5 (83)
2. 1 year after on-site colposcopy	Low-grade SIL	37	7 (19)	8 (22)	22 (59)	20 (54)	2 (5)
	High-grade SIL or cancer	22	0 (0)	0 (0)	22 (100)	12 (55)	10 (45)
3. 5 years after on-site colposcopy	Low-grade SIL	15	0 (0)	2 (13)	13 (87)	13 (87)	0 (0)
	High-grade SIL or cancer	8	0 (0)	0 (0)	8 (100)	7 (88)	1 (13)

CCOC - Community Clinic of Orange County, SIL - squamous intraepithelial lesions, NA - not available.

Table 3. Patient Compliance With Physician Order for Colposcopy as a Function of Site of Colposcopy Services.

Year	Site	Compliant No. (%)	Noncompliant No. (%)
1986-1987	CCOC	NA	NA
1986-1987	Off-site	11 (79)	3 (21)
1988-1989	CCOC	22 (73)	8 (27)
1988-1989	Off-site	8 (73)	3 (27)
1993-1994	CCOC	16 (80)	4 (20)
1993-1994	Off-site	1 (100)	0 (0)

CCOC - Community Clinic of Orange County, NA - not available.

larly during study period 3, generated only a very modest level of increased revenues.

Discussion

Several limitations in this study necessitate interpreting its results with caution. First, this study was a retrospective analysis that relied on patient record review. Unfortunately, several patient records were lost from the first two study periods because of medical record purging. Thus data obtained from these first two study periods might not fully reflect our management approach to abnormal findings on Papanicolaou smears. Yet management patterns for low-grade and high-grade squamous intraepithelial lesions during these two periods were similar, indicating an inherent consistency within the available data. We therefore believe our data strongly suggest that introducing on-site colposcopic services had little or no immediate impact on physician case management when abnormalities were found on Papanicolaou smears.

Because of small sample sizes this study also suffers in statistical power. Once again, the lost patient records from the first two study periods had an effect on sample sizes, as did an apparent decline in the number of Papanicolaou smears performed during the course of the study. Given the documented 80 to 90 percent compliance rate, the decline in the number of Papanicolaou smears performed during the three study periods reflects a gradual change in patient demographics rather than in clinical policies. The most notable contributors to small sample sizes, however, were the low case detection rates found in the study. Nevertheless, our case detection rates of 1 to 3 percent for low-grade squamous intraepithelial lesions and 0 to 2 percent for high-grade squamous intraepithelial lesions are consistent with recently published national case detection rates of 2 percent for low-grade squamous intraepithelial lesions and 0.4 percent for high-grade squamous intraepithelial lesions.[15]

Thus, as we have previously indicated, meaningful statistical comparisons can be made only with respect to the differential management of low-grade squamous intraepithelial lesions in the first two study periods compared with the third study period; the differential management of high-grade squamous intraepithelial lesions compared with low-grade squamous intraepithelial lesions; and differences in patient compliance during the three study periods.

While our data suggest that introducing on-site colposcopic services had little immediate impact, analysis of long-term physician management practices indicate a substantial change in the way they managed low-grade squamous intraepithelial lesions. By the fifth year after the introduction of on-site colposcopy services, nearly all patients whose Papanicolaou smears showed low-grade squamous intraepithelial lesions underwent colposcopic examination.

Widespread application of such diagnostic technologies as colposcopy in the ambulatory primary care setting has raised serious concerns regarding their potential indiscriminate use.[1-3] Such practices are often cited as contributing to excessive health care costs and subjecting patients to potentially unnecessary hazards. Whether our finding of a long-term increase in rates of colposcopy for low-grade squamous intraepithelial lesions reflects simply an increased inclination by physicians to perform this procedure is unclear. During the study period there was controversy about how to manage low-grade squamous

Table 4. Projected Revenue Impact of On-site Colposcopic Services.

Study Period	Total Projected Colposcopies	Projected Colposcopies at CCOC	Total Colposcopy Revenue ($)	CCOC Revenue ($)
1	26	0	2600	0
2	66	48	6600	4800
3	17	16	1700	1600

CCOC - Community Clinic of Orange County.

intraepithelial neoplasia, and while some authors recommended continued close cytologic observation, other authors advocated early aggressive colposcopic evaluation.[11,16,17] Furthermore, our study was undertaken in a teaching setting, and it was possible that our clinic pursued a more aggressive approach to performing colposcopic studies than might otherwise occur in a purely clinical practice environment.

The management of high-grade intraepithelial lesions was, on the other hand, much more consistent through each of the three study periods, and our data show that colposcopic evaluation of such lesions was the management approach of choice. Nevertheless, we found that colposcopy for high-grade lesions shifted to the on-site location more gradually than did colposcopy for low-grade lesions. Perhaps this finding represents an incremental development in the competence and thus confidence of our colposcopists or, more likely, an increasing level of confidence on the part of our referring providers.

Our data show no increased patient compliance resulting from offering on-site colposcopic services. This finding was surprising, because many who advocate the expanded use of diagnostic technologies, such as colposcopy, in ambulatory primary care settings believe patient convenience and continuity of patient care lead to enhanced compliance.[11,12] Indeed, such justifications seem even more valid in medically underserved settings, such as ours, where financial, transportation, and cultural factors all can profoundly affect patient compliance.[18]

Recently there has been considerable concern that physicians might more frequently recommend diagnostic studies for which they have been specifically trained, particularly if such activities generate revenue within their practice.[19-21] While our study does show long-term increased use of colposcopy to assess low-grade squamous intraepithelial lesions, we estimated that it would increase revenues only modestly. Perhaps our estimates are low because we included only colposcopies resulting from newly abnormal Papanicolaou smears and not periodic follow-up evaluations. In addition, our procedure fee is low, reflecting the medically underserved characteristics of our population. Published colposcopy fees range between $150 and $300[11] and, if applied in our setting, would generate modest increases in our revenues.

One estimate of colposcopy revenue generation in a community clinical practice indicates that 60 procedures per year would generate only about $3000 in net revenues.[11] Given the low case detection rates of 2 percent for low-grade squamous intraepithelial lesions and 0.4 percent for high-grade squamous intraepithelial lesions, a practice such as ours, which roughly equals an 8-physician group, might only occasionally generate 60 procedures per year. If not all patients with low-grade squamous intraepithelial lesions have colposcopic evaluation, then this target would be even more difficult to attain.

Although we believe family physicians can competently perform colposcopy, the lack of benefit regarding patient compliance and its marginal economic impact cause us to question seriously the value of including colposcopy in everyday family practice.

References

1. Dietrich AJ, Kotrady KP. Procedures in family practice. What's best for your patients and for you. Arch Fam Med 1993;2:1028-30.
2. Brady H, Alexander GP. Family physicians as proceduralists: striking a balance. J Am Board Fam Pract 1995;8:58-61.
3. Smith MA, Klinkman MS. The future of procedural training in family practice residency programs: look before you LEEP. Fam Med 1995;27:535-8.
4. Phillips WR. Diagnostic and screening procedures in family practice: past, present, and future use. Arch Fam Med 1993;2:1051-7.
5. Groveman HD, Sanowski RA, Klauber MR. Training primary care physicians in flexible sigmoidoscopy—performance evaluation of 17,167 procedures. West J Med 1988;148:221-4.
6. Rodney WM. Procedure skills in flexible sigmoidoscopy and colonoscopy for the family physician. Prim Care 1988;15:79-91.
7. Hahn RG, Roi LD, Ornstein SM, Rodney WM, Garr DR, Davies TC, et al. Obstetric ultrasound training for family physicians. Results from a multisite study. J Fam Pract 1988;26:553-8.
8. Rodney WM, Prislin MD, Orientale E, McConnell M, Hahn RG. Family practice obstetric ultrasound in an urban community health center. Birth outcomes and examination accuracy of the initial 227 cases. J Fam Pract 1990;30:163-8.
9. Newkirk GR, Granath BD. Teaching colposcopy and androscopy in family practice residencies. J Fam Pract 1990;31:171-8.
10. Caruthers BS, Sheets KJ. Development of a curriculum in colposcopy. J Fam Pract 1991;32:590-7.

11. McKinney L. Should you be doing colposcopy? Fam Pract Manage 1993;1(1):53-6.
12. Zubir TJ, Pfenninger JL. Family physician resistance to office procedures. Fam Pract Manage 1994;1(4):49-52.
13. The 1988 Bethesda system for reporting cervical/vaginal cytological diagnoses. National Cancer Institute Workshop. JAMA 1989;262:931-4.
14. Miller KE, Losh DP, Foley A. Evaluation and follow-up of abnormal Papanicolaou smears. Am Fam Physician 1992;45:143-50.
15. Shingleton HM, Orr JW. Cancer of the cervix. A clinical approach. Philadelphia: Lippincott-Raven, 1995.
16. Jones MH, Jenkins D, Cuzick J, Wolfendale MR, Jones JJ, Balogun-Lynch C, et al. Mild cervical dyskaryosis: safety of cytological surveillance. Lancet 1992;339:1440-3.
17. Brotzman GL, Apgar BS. Cervical intraepithelial neoplasia: current management options. J Fam Pract 1994;39:271-8.
18. Pascoe JM, Milburn M, Haynes K. Correlates of first trimester care in a public health prenatal clinic. Fam Med 1990;22:25-8.
19. Hillman BJ, Joseph CA, Mabry MR, Sunshine JH, Kennedy SD, Noether M. Frequency and costs of diagnostic imaging in office practice—a comparison of self-referring and radiologist-referring physicians. N Engl J Med 1990;323:1604-8.
20. Crump WJ, Marquiss CE, Pierce PJ, Phelps T. The decision to suggest lower gastrointestinal endoscopy: the effect of training. Fam Med 1991;23:267-70.
21. Saad JA, Pirie P, Sprafka JM. Relationship between flexible sigmoidoscopy training during residency and subsequent sigmoidoscopy performance in practice. Fam Med 1994;26:250-3.