Does the System of Papanicolaou Test Nomenclature Affect the Rate of Referral for Colposcopy?

A Survey of Family Physicians

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Objective: To determine whether a new system of Papanicolaou test nomenclature (the Bethesda system) or other physician variables influence recommendations for colposcopy and biopsy for women with borderline to moderately abnormal Papanicolaou test results. We hypothesized that physician demographic and practice variables, in addition to Papanicolaou test nomenclature, would influence recommendations for colposcopy.

Design: A survey was mailed to a random sample of 510 active members of the American Academy of Family Physicians.

Participants: Three hundred thirty-five (66%) of the eligible physicians responded, representing all 50 states. Of those in active practice, 78% were in private practice, with a mean age of 44 years and a mean time in practice of 10 years. Ninety-three percent of respondents in active practice performed Papanicolaou tests.

Main Outcome Measure: Rates of recommendation for colposcopy and biopsy in response to abnormal Papanicolaou test reports framed by a single clinical scenario.

Results: Physicians recommended colposcopy more often when the Bethesda nomenclature system was used to describe the results of the Papanicolaou test. These differences were significant for four specific Papanicolaou smear pairs. Inclusion of recommendations for further evaluation strongly influenced physicians to recommend colposcopy. In multivariable analyses, demographic and practice variables were not associated with recommendations for colposcopy.

Conclusions: The Bethesda system of nomenclature, when compared with a traditional descriptive nomenclature system, influenced family physicians to recommend colposcopy and biopsy more often for abnormal Papanicolaou test results presented in a clinical scenario. Greater utilization of technology and higher medical care costs may result from use of the Bethesda system. Guidelines for evaluation of abnormal Papanicolaou test results are needed for use in conjunction with the Bethesda system guidelines for Papanicolaou test reports.

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THE PAPANICOLAOU test (cervical smear), widely credited with decreasing mortality from cervical cancer,[1] is a commonly performed preventive screening test in primary care. Seventy-five percent of women in the United States are estimated to have had one in the past 3 years.[2] Physicians and other providers who obtain cervical smears must make decisions about a variety of abnormal results.

In response to concerns that cervical/vaginal cytologic results were being reported with varied and ambiguous wording, an expert panel was convened by the National Cancer Institute in 1988 to standardize and clarify cervical smear terminology. A new descriptive cytologic system, known as the Bethesda system, was developed and recommended by the panel to serve as a guideline for reporting cervical smear results. In addition to modifying the format of the report and the descriptive nomenclature, the panel conceived of the Papanicolaou test report as a medical consultation, with more information provided by the physician obtaining the

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SUBJECTS AND METHODS

A nationwide, random sample of 510 family physicians was obtained from the American Academy of Family Physicians. A mailed survey was conducted with three mailings spaced at 4- to 6-week intervals. To maximize the response rate, handwritten notes were included in the second and third mailings,[13] and token financial remuneration was included in the third mailing.

The survey collected basic demographic and practice information from each respondent. Although demographic information was collected on all physicians, those indicating that they had not been in active practice in the previous 12 months or that they had never performed Papanicolaou tests were excluded from the analysis of referral patterns. Surveyed physicians were not informed about the hypotheses of the study. No mention of the Bethesda system was made in the cover letter or the survey.

The survey presented the following clinical scenario: a 25-year-old married woman undergoes a routine cervical smear, having had normal results 12 months previously. Following the clinical scenario, eight Papanicolaou test results were presented in two formats, ie, the Bethesda system and a traditional descriptive Papanicolaou smear interpretation. The reports were written by a board-certified pathologist (A.S.) with a certificate of added qualification in cytopathology conversant with both nomenclature systems. These cervical smear results were presented in random order rather than paired, so that there appeared to be 16 different cervical smear reports.

For each report, physicians were asked to indicate whether they would refer the patient for colposcopy and biopsy, perform colposcopy and biopsy in the office, perform acetic acid wash with direct visualization, repeat the cervical smear, or obtain more information from the cytopathologist. If the cervical smear was repeated, physicians were asked to indicate at what interval the test should be repeated. When comparisons were made to evaluate recommendations for colposcopy, referrals for colposcopy and performing colposcopy in the office were combined. This category was contrasted with all other options.

The Papanicolaou test reports presented (**Table 1**) ranged from benign reactive changes to moderate dysplasia. While near consensus was found in the literature that colposcopy is appropriate for moderate dysplasia (pair 1) and not necessary in the initial evaluation of reactive changes or inflammation (pairs 6, 7, and 8), appropriate management of atypia, parakeratosis, and changes associated with human papillomavirus is controversial.[14-19]

The final section of the survey solicited physician opinion about whether they considered a Papanicolaou test report to be a medical consultation, and questioned which aspects of the report the physician found clinically useful. Before mailing, the survey was pretested by family physicians in local departments of family medicine at an academic medical center and a community hospital.

For each pair of equivalent Papanicolaou test results, colposcopy referral rates under each system were compared using McNemar's Test for correlated proportions.[20] For pairs exhibiting differences, multiple logistic regression was performed to identify variables associated with a greater likelihood of recommending colposcopy. Separate analyses were conducted to evaluate associated variables for the descriptive system Papanicolaou test result and for the Bethesda system result. In addition, multiple logistic regression analysis was done to compare recommendations for colposcopy under the Bethesda system with recommendations under the descriptive system. Statistical analysis was performed with computer software (SPSS PC, SPSS Inc, Chicago, Ill).[21]

smear, and a provision that the cytopathologist should make recommendations for further patient evaluation when appropriate.[3]

Controversy exists as to the effect that this new system will have on the utilization of medical care, particularly colposcopic evaluation, and consequently on the costs of medical care.[4-9] No evaluation of these potential effects has been reported to date.[10] Confusion among obstetricians/gynecologists, pathologists, and cytotechnologists regarding criteria and definitions for specific terms in the Bethesda system has been noted in a university hospital study.[11] The Bethesda system terminology has recently undergone minor revisions in an attempt to address the concerns of clinicians and cytopathologists.[12]

To evaluate the potential impact of changes in cervical smear nomenclature on medical practice, a nationwide random sample of family physicians was surveyed in the fall of 1991. The survey was designed to determine whether rates of recommendation for colposcopy and biopsy are influenced by the system of terminology used to describe cervical smears and by the inclusion of varying recommendations for additional evaluation. The survey also asked these physicians whether they considered a Papanicolaou test report to be a medical consultation and which elements of a Papanicolaou test report they have found useful in interpretation.

RESULTS

The overall response rate to three mailings was 66% (335 of 510 surveys). Three hundred twenty-one (96%) of the respondents were in active practice. The mean age of respondents was 44 years. Nineteen percent were women. Two hundred eleven (63%) of the respondents had completed a family practice residency and 281 (84%) were board certified (**Table 2**).

Urban, small town, and rural practices were well rep-

Table 1. Paired Papanicolaou Test Results*

Pair	Descriptive System	Bethesda System
Colposcopy indicated		
1	Moderate squamous dysplasia	Sample adequacy, satisfactory; high-grade SIL encompassing moderate dysplasia
Treatment controversial		
2	CIN 1 and condyloma	Sample adequacy, satisfactory; low-grade SIL encompassing mild dysplasia and evidence of HPV infection
3	Parakeratosis	Sample adequacy, satisfactory; parakeratosis is present; further evaluation recommended
4	Squamous atypia of uncertain significance	Sample adequacy, satisfactory; squamous atypia of uncertain significance
5	Cellular changes compatible with HPV infection (condyloma)	Sample adequacy, satisfactory; low-grade SIL encompassing dyskeratocytes and/or koilocytes consistent with HPV infection; recommend further evaluation with colposcopy
Colposcopy not indicated		
6	Reactive cellular changes	Sample adequacy, satisfactory; reactive cellular changes
7	Acute inflammation; negative for malignancy	Sample adequacy, unsatisfactory; acute inflammation
8	Benign reactive changes	Sample adequacy, less than optimal; partially obscured by neutrophils; benign reactive changes

*SIL indicates squamous intraepithelial lesion; CIN, cervical intraepithelial neoplasia; and HPV, human papillomavirus.

resented among the respondents, who came from all 50 states. Characteristics of respondents' practices are shown in **Table 3**. Respondents averaged 14 years in practice; they saw an average of 113 patients per week.

Data on nonrespondents were supplied by the American Academy of Family Physicians and are shown in Table 2. Nonrespondents to the survey were more likely to be male (88%), older, and in solo practice (52%). Fewer nonrespondents than respondents (56%) were board certified. Among all 1991 active members of the American Academy of Family Physicians, 85% were male, 40% were in solo practice, and 69% were board certified; the mean age of members was 45 years.

Two hundred ninety-nine (93%) of respondents in active practice performed Papanicolaou tests in their offices, and 43 (14%) performed colposcopy. Among respondents who completed the survey, 56% believed that Papanicolaou test terminology used in the survey was confusing. A substantial minority (25%) of respondents believed that their patients' access to a gynecologist was limited, primarily by availability or financial considerations (Table 3).

For each pair of cervical smears, the percentage of physicians indicating they would perform colposcopy or refer their patients for the procedure is shown in **Table 4.** A higher percentage of physicians indicated evaluation with colposcopy for changes associated with human papillomavirus than for moderate squamous dysplasia (cervical intraepithelial neoplasia II), regardless of nomenclature system.

Referral for colposcopy for each pair was evaluated with McNemar's χ^2 analysis for correlated proportions. Four specific cervical smear pairs ranging in severity from reactive cellular changes to moderate squamous dysplasia (high-grade squamous intraepithelial lesion) showed significantly more discordance toward colposcopy under the Bethesda system (**Table 5**). Two of these pairs (Nos. 3 and 5) contained recommendations for further evaluation in the Bethesda system report but not in the descriptive system report.

In multiple logistic regression analyses, the following independent variables were evaluated for pairs 1, 3, and 5: sex of physician, residency training, board certification, years in practice, patients seen per week, type of practice, location of practice, performance of colposcopy in the office, and confusion because of the terminology in the survey. The dependent variable was referral for colposcopy. No independent variable was consistently associated with recommendations to perform colposcopy using the descriptive system or the Bethesda system or when the two systems were compared.

The Bethesda system of nomenclature . . . influenced family physicians to recommend colposcopy and biopsy more often . . .

Family physicians' recommendations for the appropriate interval for repeating a Papanicolaou test in a woman with two previously normal test results ranged from a mean (±SD) of 15 (±6) months for women aged 18 years to menopause and 20 (±12) months for women older than

Table 2. Characteristics of Respondents (n=335) and Nonrespondents (n=175)*

Characteristic	Respondents	Nonrespondents
Mean (±SD) age, y	44 (±11)	48 (±12)
Male	271 (81)	142 (88)
Female	64 (19)	19 (12)
Board certified	281 (84)	91 (56)
Completed family practice residency	211 (63)	NA
Currently in active practice	321 (96)	146 (91)

*Unless otherwise indicated, data are numbers (percent) of physicians. NA indicates not available. Not all respondents answered every question. Percentages are based on the actual number of respondents and nonrespondents for whom data were available.

Table 3. Characteristics of Sample Practices (n=321)*

Characteristic	Respondents
Mean ±SD time in practice, y	14 ±12
Mean ±SD patients seen per week	113 ±49
Practice site	
Urban	127 (40)
Small town	119 (37)
Rural	74 (23)
Practice type	
Solo	99 (31)
Group	153 (48)
Health maintenance organization	18 (6)
Health center	16 (5)
Academic	20 (6)
Other	15 (5)
Perform Papanicolaou tests in practice	299 (93)
Perform colposcopy in office†	43 (14)
Limited availability of gynecologist referral†‡	74 (25)
By distance to gynecologist	26 (9)
By availability of gynecologist	54 (18)
By financial considerations	36 (12)

*Physicians not in active practice were excluded. Unless otherwise indicated, data are numbers (percent) of respondents. Not all respondents answered every question. Percentages are based on the actual number of respondents for whom data were available.

†Percentage based on the 299 physicians who performed Papanicolaou tests in practice.

‡Respondents could answer yes to more than one question.

age 65 years. For all age groups, the median interval for a repeated test was 12 months.

The opinions of family physician respondents indicated consensus on certain points and divergence of opinion on others (**Table 6**). Ninety-five percent of respondents believed that a report of Papanicolaou test results should note whether the specimen was adequate or unsatisfactory, a specific feature of the Bethesda system. Eighty percent of respondents indicated that a Papanicolaou report should note whether the specimen is benign. Therapeutic recommendations as part of a Papanicolaou report were accepted by 236 respondents as always (12%) or sometimes (68%) indicated. Only 28% of respondents, however, believed that a Papanicolaou test result was a medical consultation as opposed to a laboratory report.

COMMENT

A large-scale change in the report format and nomenclature of a common test has been promulgated nationwide without evaluation of how this change will affect the management of patients with abnormal and borderline abnormal Papanicolaou test results. Based on our survey results, the vast majority of family physicians perform Papanicolaou tests in their practices. Among those physicians most likely to have performed cervical smears in adult women (ie, family physicians, internists, and obstetrician/gynecologists) in 1989, 36% were general and family practitioners.[22] Their understanding of Papanicolaou test terminology and recommendations for colposcopy will have a substantial impact on use and cost of care for abnormal Papanicolaou test results.

Table 4. Percentage of Family Physicians Recommending Colposcopy Under Descriptive and Bethesda Systems (n=285)*

Pair	Descriptive System	Bethesda System
1 Moderate dysplasia	217 (77)	259 (91)
2 CIN 1	245 (86)	239 (85)
3 Parakeratosis	54 (19)	140 (50)
4 Atypia	113 (40)	124 (44)
5 HPV	224 (78)	272 (95)
6 Reactive	6 (2)	14 (5)
7 Inflammation	8 (3)	5 (2)
8 Benign reactive	8 (3)	7 (2)

*CIN indicates cervical intraepithelial neoplasia; and HPV, human papillomavirus. Data are numbers (percent) of respondents. Not all respondents answered every question. Percentages are based on the number of respondents for whom data were available.

In our study, for specific pairs of Papanicolaou smears (pairs 1, 3, 5, and 6) terminology used does appear to influence subsequent management, with the Bethesda terminology leading to greater use of colposcopy. This occurs both in cases in which colposcopy is clearly the appropriate response (ie, evaluation of moderate dysplasia) and for results in which the appropriate follow-up is less clear. For pairs 3 and 5, the influence of recommendations for further evaluation cannot be separated from the effect of other changes in the nomenclature.

This survey indicates that more than half of the family physician respondents found cervical smear terminology confusing. The intent of the Bethesda system is to improve communication between the cytopatholgist and the clinician regarding the interpretation and significance of Papanicolaou test results. The results of our survey in-

Table 5. Number of Discordant Papanicolaou Test Result Pairs Favoring Colposcopy in the Descriptive and Bethesda Nomenclature Systems*

Pair	Descriptive System	Bethesda System	*P*
1 Moderate dysplasia	12	49	<.0001
2 CIN 1	23	21	.88
3 Parakeratosis	3	88	<.0001
4 Atypia	20	28	.31
5 HPV	4	52	<.0001
6 Reactive	1	9	.02
7 Inflammation	5	1	.22
8 Benign reactive	5	4	.99

*CIN indicates cervical intraepithelial neoplasia; HPV, human papillomavirus. Data are numbers of Papanicolaou test result pairs.

Table 6. Family Physician Opinions About Papanicolaou Tests (n=292)

Opinion	No. (%) of Respondents
Papanicolaou test terminology in survey confusing	164 (56)
Papanicolaou test report should note whether specimen is benign	233 (80)
Papanicolaou test report should note whether specimen is adequate or unsatisfactory	277 (95)
Papanicolaou test report should include therapeutic recommendations	
Always	36 (12)
Sometimes	200 (68)
Never	39 (13)
Papanicolaou test result is a medical consultation (vs a laboratory report)	81 (28)

dicate that, for family physicians, this goal has yet to be achieved. The potential impact of physician confusion on the utilization and cost of care for women with abnormal Papanicolaou test results may be substantial.

Because the survey was designed to attempt to mirror the conditions of practice, it is not possible to separate confusion about terminology from confusion regarding appropriate management. While not generally conceiving of a Papanicolaou test result as a medical consultation, family physicians were receptive to the inclusion of recommendations in Papanicolaou reports for further evaluation. They responded with more colposcopic evaluation to specific (pair 5) and nonspecific (pair 3) recommendations for further evaluation made in Bethesda system reports in this study. Recommendations for follow-up with serial Papanicolaou tests could also be made in this context and might decrease utilization of colposcopy.

Intervals for repeated Papanicolaou tests in women with previously normal results indicated by survey respondents are considerably shorter than those recommended by the US Preventive Services Task Force,[23] the American College of Physicians,[24] and the Canadian Task Force,[25] and are more consistent with recommendations of the American Cancer Society[26] and the American College of Obstetricians and Gynecologists.[27] The net result of these shorter intervals is greater use of medical services and diagnostic testing.

Nonrespondents (35% of the sample) may have biased the survey results. Although nonrespondents differed from respondents in demographic and practice variables, none of these variables appeared consistently to influence recommendations for colposcopy by the respondents. Therefore, it seems unlikely that nonresponse bias played a role in our major finding.

Results of this survey indicate only physicians' responses to a hypothetical case management scenario. The case scenario format has been recommended for elucidating the decision-making process and for eliciting attitudes and beliefs.[28,29] While questions have been raised about the relationship between physician responses to case simulations and actual practice,[30] the setting in which a physician receives a Papanicolaou test result (remote from the patient both in time and space) and makes decisions about management more closely resembles a response to a questionnaire than most clinical settings. Further work is needed to examine the effects of nomenclature and recommendations on utilization of services in practice.

Because subtle differences in the choice of words used for reporting abnormal Papanicolaou test results may significantly influence physician decision making, considerable responsibility is placed with the cytopathologist. Previous work[31,32] has demonstrated that framing of problems can influence decisions and physicians interpret qualitative expressions of probability with great variability. An evaluation of the Papanicolaou class system found that cytotechnologists, pathologists, and obstetricians/gynecologists were not consistent in assigning numeric classes to descriptive diagnoses, yet clinicians based management decisions on the numeric class.[33] The choice of "moderate squamous dysplasia" in place of "high-grade squamous intraepithelial lesion" may change physicians' perceptions of both frame and probability of adverse outcome.

Guidelines have received increasing attention as a method of improving quality of care and decreasing practice variation.[34-36] The importance of evaluation and field testing of guidelines before they are promulgated is becoming clear as guidelines proliferate.[37,38] The Bethesda system has been promulgated without evaluation as a national guideline for cytopathologists. Its application is further complicated by the lack of guidelines for evaluation and management of abnormal cervical smear results. Guidelines for treatment of patients with abnormal cervical smear results have recently been published in Canada.[39]

. . . more than half of family physician respondents find Papanicolaou smear terminology confusing

Evidence-based guidelines could provide welcome clarity in an area in which management, as well as terminology, is confusing to many physicians. The effectiveness of guidelines in influencing practice has been questioned, however,[40-43] and a strategy for implementing guidelines is likely to be needed. If additional research confirms the influence of specific terminology and recommendations in Papanicolaou test reports on use of medical care, the use of terminology in conjunction with recommendations based on guidelines may be a powerful method to ensure appropriate, but not unnecessary, diagnostic testing and therapy.

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Reprints not available.

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