Increased Patient Communication Using a Process Supplementing an Electronic Medical Record

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ABSTRACT

Background. Importance: Patients with cervical cytology abnormalities may require surveillance for many years, which increases the risk of management error, especially in clinics with multiple managing clinicians. National Committee for Quality Assurance (NCQA) Patient-Centered Medical Home (PCMH) certification requires tracking of abnormal results and communicating effectively with patients.

Objectives: The purpose of this study was to determine whether a computer-based tracking system that is not embedded in the electronic medical record improves (1) accurate and timely communication of results and (2) patient adherence to follow-up recommendations.

Methods. *Design:* Pre/post study using data from 2005-2012. Intervention implemented in 2008. Data collected via chart review for at least 18 months after index result. *Participants: Pre-intervention:* all women (N=72) with first abnormal cytology result from 2005-2007. *Post-intervention:* all women (N=128) with first abnormal cytology result from 2008-2010. Patients were seen at a suburban, university-affiliated, family medicine residency clinic. *Intervention:* Tracking spreadsheet reviewed monthly with reminders generated for patients not in compliance with recommendations. *Main Outcome and Measures:* (1) rates of accurate and timely communication of results and (2) rates of patient adherence to follow-up recommendations.

Results: Intervention decreased absent or erroneous communication from clinician to patient (6.4% pre- vs 1.6% post-intervention [*P*=0.04]), but did not increase patient adherence to follow-up recommendations (76.1% pre- vs 78.0% post-intervention [*P*=0.78]).

Conclusions: Use of a spreadsheet tracking system improved communication of abnormal results to patients, but did not significantly improve patient adherence to recommended care. Although the tracking system complies with NCQA PCMH requirements, it was insufficient to make meaningful improvements in patient-oriented outcomes.

BACKGROUND

Although the incidence of cervical cancer is declining over time, cervical cancer and dysplasia still occur and require clinical vigilance, sometimes tracking abnormalities over several years.[1] Inadequate follow-up could result in failure to diagnose cancer or delay treat-

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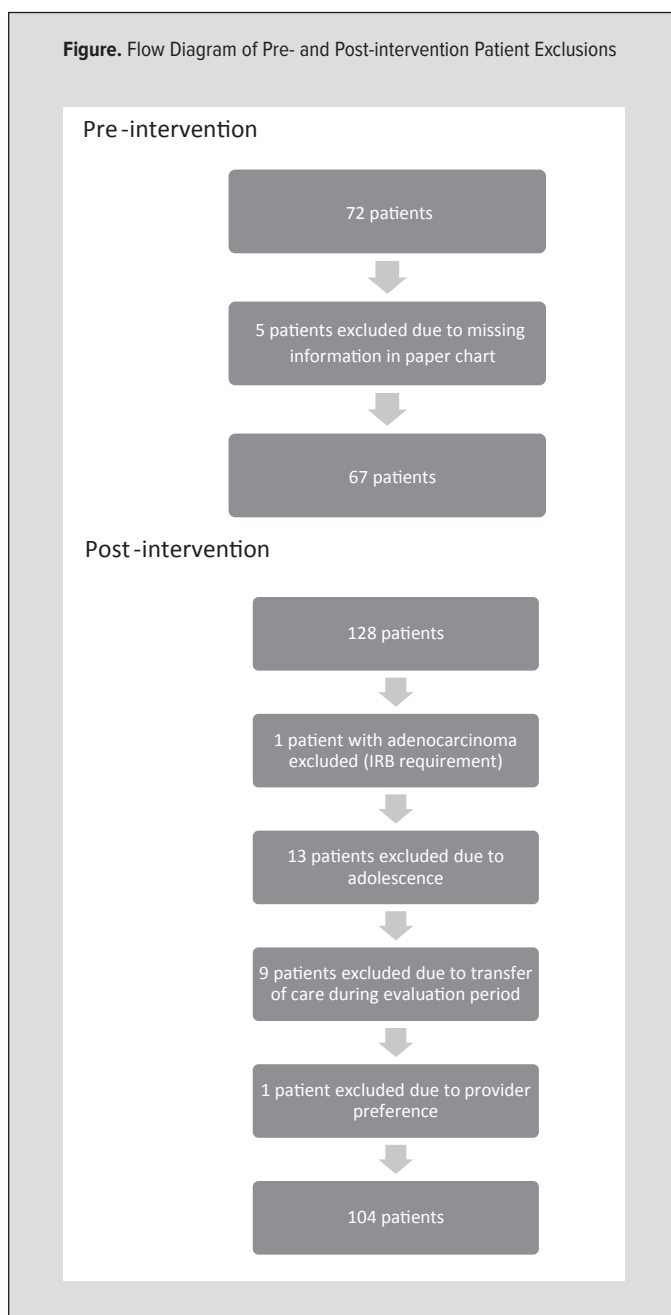
ment of cancer, two of the most common reasons for litigation in the United States.[2]

Ten percent to 40% of patients do not receive adequate follow-up care for cervical screening abnormalities.[3,4] Thirteen percent of invasive cervical carcinomas are attributable to failure to follow-up an abnormal cervical screening result.[5] Appropriate surveillance of abnormal cervical cytology results may be more difficult in a residency clinic and in other clinics with multiple clinicians due to attrition, clinic expansion, part-time employment status, or patient choice of a new primary physician.[6,7] In addition, resident physicians may lack experience with cervical cancer surveillance algorithms.

Many programs have been evaluated to increase patient adherence to cervical cancer screening follow-up recommendations including, interventions intended for patients (eg, transportation incentives or telephone counseling), clinicians (eg, increased discussion of monitoring and treatment options with patients), and systems (eg, use of reminder letters from cytopathologists to clinicians or the presence of on-site colposcopy).[3,4,8-13] Based on these studies and others, the use of tracking systems is recommended by the American College of Obstetricians and Gynecologists to reduce medical errors in the screening and evaluation of laboratory and radiology abnormalities.[14] However, the effective use of tracking systems in clinics with large numbers of clinicians and/or clinician turnover has not been adequately studied. Swanson et al studied a tracking system in a residency clinic population, but the patients were those who had cervical cryotherapy, suggesting a population open to procedures and compliant with follow-up. With this study we evaluated the real-world effectiveness of a tracking system based in a residency clinic and included all clinic patients with an abnormal cervical cytology result.

Figure. Flow Diagram of Pre- and Post-intervention Patient Exclusions

Pre-intervention

| 72 patients |

↓

| 5 patients excluded due to missing information in paper chart |

↓

| 67 patients |

Post-intervention

| 128 patients |

↓

| 1 patient with adenocarcinoma excluded (IRB requirement) |

↓

| 13 patients excluded due to adolescence |

↓

| 9 patients excluded due to transfer of care during evaluation period |

↓

| 1 patient excluded due to provider preference |

↓

| 104 patients |

METHODS

This research was granted an exemption from further review by the university institutional review board (IRB); no informed consent was required. This was a pre- and post-intervention study evaluating a process to identify and track patients with abnormal cervical cytology cases. The pre-intervention group was all patients (N=72) from a university-affiliated, suburban, family medicine residency clinic with a first abnormal cytology result between November 2005 and November 2007. The post-intervention group was all patients (N=128) from the same clinic with a first abnormal cervical cytology result between November 2008 and November 2010. Identification of cases was possible through review of an aggregate monthly abnormal cytology report from

our pathology laboratory. Study data was collected via paper and electronic medical record review. Five patients were excluded from the pre-intervention group because of difficulties with their paper chart review, such as difficulty establishing the existence of prior Papanicolaou (Pap) smears or cervical intraepithelial neoplasia treatment (Figure). One patient was excluded from the post-intervention group at her primary physician's request. Thirteen patients were excluded from the post-intervention group because they were less than 21 years of age, and screening was no longer indicated in this age group.[15] Nine patients were excluded because they transferred care out of our clinic system prior to the need for follow-up. In compliance with the requirements of our IRB, one patient was excluded due to the presence of adenocarcinoma.

An Excel spreadsheet was created and included patient identifiers, cytology results, and recommended and actual management steps (see addendum online at www.wisconsinmedicalsociety.org/publications/wmj/pdf/114/1/114no1_evensen_addendum.pdf). The tracking process was implemented in November 2008 and reviewed monthly until May 2012. Cytology and pathology data was entered manually into the tracking spreadsheet. If a patient did not follow up as recommended, a reminder was sent first to the managing clinician and, if patient did not respond, she was sent a certified letter. Monthly spreadsheet reviews initially were done by a physician (AE); later the task was transitioned to a nurse. Data entry and reminder letters for all actively managed patients typically required 1 to 2 hours per month.

This study used care steps as a unit of measurement. A care step was defined as an action recommended by the American Society for Colposcopy and Cervical Pathology (ASCCP) guidelines such as "perform colposcopy" or "repeat cytology." If the recommended care step occurred within 3 months of the interval recommended by the ASCCP, it was scored as "appropriate." If the recommended step was not done or was delayed more than 3 months, the step was scored as "inappropriate." More frequent or vigilant follow-up (such as recommending colposcopy where only repeat cytology was indicated) was scored as "appropriate" because: (1) the 2001 ASCCP guidelines recommended more aggressive testing, and (2) colposcopy is indicated not only for abnormal Pap results, but also clinical concern regarding patient history or appearance of the cervix. Referrals to a gynecologist and transfer of care to another clinician were considered "appropriate." Scoring continued for at least 18 months after the index abnormal cervical cytology result and was halted when an inappropriate step occurred.

If a patient did not have a care step completed after appropriate clinician communication it was scored as "patient error." If communication was inappropriate it was scored as "clinician error." For all steps that were inappropriate, chart review was performed seeking documentation of communication (telephone call, letter, or office visit) from clinician to patient regarding the need for follow-up. Both a recommended next care step and a time frame

in which to complete this care step were required to be present and in accordance with the ASCCP algorithms for the communication to be considered "adequate." When communication was not adequate, the communication error was categorized as either an absent or delayed communication or as a clinician misinterpretation of the ASCCP algorithms. The management context of the error also was documented (ie, whether it occurred after a colposcopy or cytology care step).

One author (TG) performed unblinded chart reviews of all patients in the pre- and post-intervention groups. The clinical steps performed were compared to the care recommended in the 2001 ASCCP guidelines[16] for the pre-intervention group and the 2006 ASCCP guidelines[7] for the post-intervention group. In general, the 2006 guidelines recommend less aggressive management of atypical squamous cells of undetermined significance (ASCUS) and low-grade squamous intraepithelial lesion (LSIL) cytology results as compared to the 2001 guidelines. One author (AE) reviewed a random selection of patient medical records (20 of 171, 11.7%). Inter-rater reliability was 0.95 (agreement in 19 out of 20 reviewed medical records).

The percentage of care steps that were appropriate was calculated. For care steps that were inappropriate, the percentage that had adequate clinician-patient communication (ie, correct step and correct time frame communicated to patient) was determined. For care steps that had inadequate communication, the percentage that had absent/delayed preceding communication and the percentage that had documented communication that was erroneous (clinician misinterpretation of results) were determined. In addition, for steps with inadequate communication, those that followed a colposcopy or cytology care step were tallied. These analyses were repeated using patients instead of care steps as the unit of analysis. Results were analyzed with Fischer's test to determine significance and two-tailed *P*-values were recorded.

RESULTS

There were 109 care steps recommended for 67 patients in the pre-intervention group and 191 care steps recommended for 104 patients in the post-intervention group. The most common index cytology result in both groups was ASCUS (68% to 69%) followed by LSIL (22% to 26%). High grade cytology results were found in 6% to 9% of patients in both groups. The frequency of abnormal results was not statistically different between the 2 groups.

Use of the tracking and reminder system did not significantly increase the number of appropriately completed care steps (pre-intervention 83/109 [76.1%] and post-intervention 149/191

Table. Comparison of Care Steps Pre- and Post-intervention

		Pre-intervention	Post-intervention
Appropriately completed care steps		**83 (76.1%)**	**149 (78.0%)**
Inappropriately completed care steps			
Care steps with *clinician* error	No or late communication	7 (6.4%)	3 (1.6%)
	Erroneous communication due to misinterpretation of results/management algorithms	4 (3.7%)	9 (4.7%)
Care steps with *patient* error		15 (13.8%)	30 (15.7%)
Total care steps		**109**	**191**

[78.0%], *P*=0.78) or the number of care steps with adequate provider communication (pre-intervention 98/109 [90.0%] and post-intervention 179/191 [93.7%], *P*=0.26). Use of the tracking and reminder system, however, significantly reduced the number of care steps with no or late communication (pre-intervention 7/109 [6.4%] and post-intervention 3/191 [1.6%]; *P*=0.04). These data are summarized (Table).

In the pre- and post-intervention groups there were 11 and 12 steps with clinician errors respectively. In the pre-intervention group, 3 of the clinician care errors followed a colposcopy care step and 8 followed a cytology care step. In the post-intervention group, 11 of the clinician care errors followed a colposcopy care step and 1 followed a cytology care step. A common error in guideline interpretation was the return to routine screening for a patient with an index cytology result of ASCUS/HPV negative after a single negative cytology rather than waiting for negative cytology tests at both 6 and 12 months or 1 negative HPV test at 12 months. Another example of an error in guideline interpretation was the return to routine screening for a patient with an index cytology of LSIL followed by a negative colposcopy and then an ASCUS cytology result. These patients should have a repeat colposcopy instead of return to routine screening. In other cases, communication of abnormal results occurred late, not at all, or incorrectly (eg, patient was erroneously told that abnormal results were normal).

The data also was analyzed using patients instead of care steps as the unit of analysis. Use of the tracking system did not significantly increase the number of patients with appropriate care (pre-intervention 40/67 [59.7%] and post-intervention 60/104 [57.7%]; *P*=0.87).

DISCUSSION

Use of a tracking and reminder system improved communication of abnormal results to patients, but did not improve patient adherence with recommended follow-up of abnormal cervical cytology. These results are in contrast to a previous randomized controlled trial of a cytopathology laboratory-based tracking system[8] and 2 pre/post studies[9,11] of clinic-based tracking systems that showed modest improvements in follow-up of abnormal cer-

vical cytology results. However, the study design of these trials differed from this design. The Hermens study[8] was done in a setting with universal health care coverage (the Netherlands), which may have made tracking patients easier and could have reduced the potential patient-level barrier of medical costs. The Swanson study[11] included only those patients who had cervical cryotherapy, suggesting a population open to intervention and compliant with follow-up. The Dupuis[9] study had no improvements in patients lost to follow-up, but the patients had fewer days to follow-up. Other studies of complex interventions that include tracking systems have been completed with mixed results.[12,13] Two of these studies evaluated clinician reminder systems[8,9] and 3 studies evaluated patient reminder systems.[11-13] By including all clinic patients with an abnormal cervical cytology result, this study contributes new, clinically relevant information to the growing body of knowledge regarding abnormal result tracking and patient compliance.

The rates of patient adherence to follow-up recommendations in both pre- and post-intervention groups are frustratingly low. There are potential patient-, clinician-, and system-level barriers that may explain these results. We attempted to address some of these barriers with the design of the tracking system. For example, the tracking system was designed to overcome the potential patient- and clinician-level barriers of forgetfulness and misinformation. With reminder letters or phone calls, patients and clinicians were prompted when follow-up appointments were overdue. This study's supervising physician was available on-site to review case management decisions and assist with ASCCP algorithm interpretation. We addressed some systems-level barriers as well. Prior to the introduction of the Excel spreadsheet used in this study, any tracking of abnormal cytology results in our clinic was the responsibility of individual clinicians. Clinicians were not formally surveyed regarding the use of individual tracking systems prior to 2008, but anecdotally this was not being done. Thus, simply introducing this process has helped our clinic create the foundation for further improvements in case management and meets some abnormal laboratory tracking and communication requirements for National Committee for Quality Assurance (NCQA) Patient Centered Medical Home (PCMH) certification.[17] Our system incorporated several features known to improve patient adherence with abnormal cervical cancer screening follow-up recommendations: the use of a patient reminder system, the use of a reminder system from cytopathology lab to clinician, increased communication between clinicians and patients, and the use of on-site colposcopy.[3]

Nonetheless, the system as designed was not sufficient to change patient adherence to follow-up recommendations. Our system was based on the assumption that clinicians would interpret the ASCCP guidelines correctly. This was often the case, but during data analysis management errors were discovered. Frequent misinterpretation of algorithms previously has been documented

in a study of family physicians, obstetricians, and internists in which only 12% of clinicians made recommendations consistent with ASCCP guidelines for ASCUS.[18] We suspect that these management errors occur because clinicians may incorrectly perceive ASCUS as a "low-risk" result.[19]

Frequent updates and evolution of guidelines for management may have been challenging for clinicians.[7,18,19] One author suggests decreasing the complexity of the cytology management algorithms, but new ASCCP algorithms for managing abnormal cytology results were published in 2013.[18,20] Although the new algorithms recommend less aggressive management of low-grade changes, especially in patients under 24 years of age, the algorithms are more complex (now 20 pages in length) and the recommended surveillance time periods have increased in length, creating potential barriers to use by clinicians. Several mobile devices have applications for navigating the algorithms, but they are neither available for desktop computers nor integrated into our electronic medical record (EMR).[21] It is unclear how the introduction of the human papilloma virus vaccination (2006) during the course of this study may have changed physician awareness of algorithms and potentially confounded the results.

Overcoming additional clinician-, system-, and patient-level barriers may improve patient adherence to follow-up. One clinician-level change that already has been implemented is to give clinicians patient-specific feedback (eg, "since Ms Jones had an ASCUS result following CIN 1 on colposcopy, she should have a repeat colposcopy rather than repeat cytology"). Several additional system-level changes have been suggested by Berkowitz et al. These include increasing ease with which patients can schedule appointment, increasing continuing education, using reimbursement strategies that support guideline-adherent practices, and developing web-based decision and risk analysis tools.[18] Nurse-based, protocol-driven management has been successful in improving immunization rates and could be considered in the setting of cervical cancer screening follow-up.[22] Currently the tracking spreadsheet is electronic but not integrated into the EMR. Our EMR lacks automated scheduling and patient recall functionalities, so a separate tracking system was needed. It would be ideal to have the patient registry embedded in an EMR that could receive and log abnormal results and generate automated reminders for patients or clinicians at the point-of-care.[14,23] Other improvements in patient adherence to recommendations may be achieved by identifying additional patient-level barriers such as lack of transportation, cost of care, or fears associated with diagnosis and treatment.[3,4,6]

LIMITATIONS

Interpretation of our data is limited by the pre/post study design, the publication of more lenient ASCCP guidelines in 2006 (during the post-intervention evaluation period), and a gradual implementation of an EMR at the residency clinic over the course of the

project. We expected that because the 2006 ASCCP algorithms are more lenient than the 2001 algorithms, we would see improvement in patient adherence to follow-up, but this did not occur. The stepwise implementation of the EMR confounds interpretation of results, because it is unclear whether clinicians were more or less likely to document their conversations and recommendations with patients in the paper or electronic medical record. It was also impossible to determine if cancelled patient encounters had been intended to address abnormal cytology or complete the next listed care step.

CONCLUSION

The use of a computer-based tracking system consistent with NCQA PCMH requirements for abnormal laboratory result tracking and communication improved timely communication of abnormal cervical cytology results to patients. The development of an abnormal lab result tracking process was an important first step for our clinic even though this iteration did not improve patient adherence to follow-up recommendations. As recommended abnormal cytology follow-up intervals increase and patient-clinician continuity decreases, it will be increasingly important to have a patient registry fully integrated in the EMR. Many potential patient-, clinician-, and system-level barriers should be examined to create a system that does more than simply meet PCMH requirements and truly improves patient-oriented outcomes.

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