# The Testing Process in Family Medicine: Problems, Solutions and Barriers as Seen by Physicians and Their Staff

## *A study of the American Academy of Family Physicians' National Research Network*

*Nancy C. Elder, MD, MSPH,* Deborah Graham, MSPH,† Elias Brandt,†*
*Susan Dovey, PhD, MPH,‡ Robert Phillips, MD, MSPH,†§*
*James Ledwith, MD,|| and John Hickner, MD, MSc¶*

**Objective:** Family physicians order laboratory, imaging, and diagnostic tests on a significant portion of their patients. Problems with the testing process, including the steps of ordering tests, tracking and responding to results, notifying patients, and following up with patients, and potential improvement strategies have not been well described. Our objective is to assess problems with the testing process, potential solutions, and barriers to implementation of solutions, as perceived by family physicians and their office staff.

**Methods:** Focus groups were held with physicians and staff at 8 geographically diverse practices of the American Academy of Family Physicians' National Research Network who were participating in an errors-reporting study. Participants were asked about testing process errors, problems, and potential improvements. Analysis was by the editing method.

**Results:** A total of 139 people participated in 18 focus groups. Participants identified problems with all steps in the testing process, and also noted that filing and charting problems existed in most steps in the testing process. Underlying contributing factors included not following procedures, inadequate systems, lack of standardization, and communication problems. Perceived barriers to improvements were both cultural (leadership and staff support, tension for change) and process-related (costs, staff and work environment, external support). Desired improvements included technology, more staffing, and improved systems.

**Conclusions:** Family physicians and their staff easily identified errors and their contributing factors in their testing processes. Desired improvements tended to be quick fixes that may not adequately address the identified errors and barriers to improved safety in the testing process.

From the *Department of Family Medicine, University of Cincinnati, Cincinnati, OH; †American Academy of Family Physicians, Leawood, KS; ‡University of Otago, Dunedin, New Zealand; §Robert Graham Center for Health Care Policy, Washington DC; ||Private Practice, Tappahannock, VA; and ¶Pritzker School of Medicine, The University of Chicago, Chicago, IL.

Funded through the Agency for Healthcare Research and Quality, grant 5 R21 HS013554-02.

Correspondence: Nancy C. Elder, MD, MSPH, Department of Family Medicine, University of Cincinnati, PO Box 670582, Cincinnati, OH 45267-0582 (e-mail: Eldernc@fammed.uc.edu).



**Key Words:** primary care, patient safety, medical errors

(*J Patient Saf* 2006;2:00–00)

Primary care physicians and their staff know well the importance of diagnostic tests in the care of their patients. Tests done in the physician's own office and those sent to outside laboratories, radiology facilities, and hospitals are important in both the diagnosis and management of patients' problems.[1] According to data from the National Ambulatory Medical Care Survey, the average family physician sees about 100 outpatients per week and orders diagnostic tests on 39% of them.[2] Thus, a 4-physician family practice center manages about 30 diagnostic test reports per day, and each test report may contain 1 to 20 individual test results. Beyond the sheer numbers of tests ordered is the complexity of the testing process in primary care. Physicians order tests in many different situations, and tests can go to multiple facilities. Many primary care offices accept payment from multiple insurers who may require that tests be performed at different locations.[3]

Recent studies estimate that 15% to 54% of reported family medicine medical errors are related to the testing process.[4,5] The Agency for Healthcare Research and Quality stressed the potential harm from diagnostic test errors in their report *Making Health Care Safer*: "One of the most distressing safety issues of the clinical encounter is the failure to follow-up on diagnostic tests, particularly when a patient is not notified of an abnormal result."[6] Patients also describe harm from delays and poor communication of results.[7,8]

The testing process encompasses a series of decisions and actions that occur from the time a test is ordered to the time the appropriate follow-up action is taken with the patient.[9–11] In a primary care office, these steps (excluding the actual performance of the test) can be grouped into the following steps[1]:

- *Ordering and implementation* includes test ordering, transmitting the order to the person obtaining the specimen and/or performing the test, obtaining the specimen, storing

the specimen before sending it to a laboratory for testing, and sending the specimen.
- *Tracking and return* is the monitoring to assure the results are returned to the ordering physician. Results may be returned to the office by computer, fax, mail, and phone; and a number of clinic personnel may be involved.
- *Response and documentation* includes physicians' response to the test results and documentation of that response in patients' medical records.
- *Patient notification* is the process by which the test result and recommendations for action are transmitted to the patient.
- *Patient follow-up* is the process whereby abnormal results and results needing action are monitored until such action is taken or a patient refuses such action.

Research on the testing process in primary care is scant and consists mainly of collection of error reports from physicians and office staff,[4,5,12,13] and physician surveys about their test results management activities.[10,14] We can identify only one previous study that examined the overall testing process and included input from office staff and nurses.[9] To describe and understand the range of errors occurring during the testing process in primary care and the potential solutions and perceived barriers to improvements, we held focus groups of family physicians and their staff to discuss testing process errors.

## METHODS

### Setting

This study took place in 8 selected volunteer family physician offices: 4 private practices and 4 family medicine residency clinics. All offices had at least one physician-member of the American Academy of Family Physician National Research Network. This study received approval from the University of Missouri–Kansas City Institutional Review Board and by individual site institutional review boards as required.

### Error Reporting

This focus group study occurred within the context of a larger study designed to collect and describe testing process errors. At each practice, physicians, nurse practitioners (NPs), physician assistants (PAs), office staff, and nurses submitted anonymous reports of errors observed in the course of clinical care related to the testing process. A physician and a designated study coordinator from each of the 8 participating offices attended a mandatory 1½-day training session, and they in turn trained the physicians and staff at their respective offices in the reporting methods. Reporting occurred for 8 months. Data from these error reports will be reported elsewhere.

### Focus Groups

We chose focus groups as the best method to achieve a wide breadth of responses and to allow discussion around these important issues.[15] We visited each practice approximately 6 months after beginning the reporting. All practice staff were invited to participate; and the groups were held before or after office hours, or during lunch. Depending on the size of the practice, between 1 and 3 groups were held at each office. In the larger practices, physicians, residents,

**TABLE 1.** Focus Group Participant and Practice Characteristics

| Focus Group Participants (n = 139) | |
|---|---|
| Primary role | |
| Physician, PA, NP | 45 |
| RN, LPN | 21 |
| Medical assistant | 20 |
| Office manager | 5 |
| Front office | 30 |
| Medical records/billing | 13 |
| Other | 2 |
| Missing | 3 |
| Sex | |
| Male | 31 |
| Female | 108 |
| Ethnicity | |
| Hispanic | 14 |
| Non-Hispanic | 113 |
| Missing | 12 |
| Race | |
| White | 101 |
| African American | 9 |
| Asian American | 3 |
| Native American | 3 |
| Other (Predominantly Hispanic) | 14 |
| Missing | 9 |
| Years at Practice (average) | 5 |
| Age in years (average) | 39 |
| Participating Practices (n = 8) | |
| Residency | 4 |
| Nonresidency | 4 |
| Rural | 2 |
| Nonrural | 6 |
| Community Health Center | 1 |
| Non–community Health Center | 7 |
| EHR | |
| No | 5 |
| Partial EHR | 2 |
| Full EHR | 1 |
| No. physicians | |
| 1–2 | 2 |
| 3–5 | 2 |
| 6–10 | 0 |
| 11–15 | 2 |
| 16+ | 2 |
| No. staff | |
| 1–5 | 1 |
| 6–15 | 2 |
| 16+ | 5 |

RN indicates registered nurse; LPN, licensed practical nurse; EHR, electronic health record.

**TABLE 2.** Problems with the Testing Process: Errors and Contributing Factors

| Category (Percentage of Offices Mentioning Errors in This Category) | Subcategory | No. Offices/Focus Groups Mentioning Specific Subcategory |
|---|---|---|
| | Testing process errors | |
| Errors in charting and filing systems (100%) | Filing and chart problems | 8 offices/11 groups (6 S, 3 P, 2 M) |
| Sample quote | *I think the most common errors are, I think, the filing problems—clerical and electronic medical records—I notice just misfilings, and inconvenience.* | |
| Error in ordering or implementation (100%) | Problems getting laboratory test implemented | 5 offices/5 groups (2 S, 1 P, 2 M) |
| | Problems with order forms | 3 offices/3 groups (1 S, 1 P, 1 M) |
| | Order not transmitted fully | 1 office/1 group (S) |
| | Wrong test ordered | 3 offices/3 groups (2 S, 1 M) |
| | Specific x-ray problems | 2 offices/2 groups (2 P) |
| Sample quote | *He told the patient he wanted this test done. He didn't tell the nurse he was working with and he didn't tell me so 3 weeks later the patient calls me about her test has it been scheduled?* | |
| Errors in tracking and return (88%) | Delayed or no return of laboratories | 6 offices/12 groups (6 S, 6 P) |
| | Results to wrong provider | 3 offices/4 groups (2 S, 1 P, 1 M) |
| | Unclear results | 1 office/1 group (P) |
| Sample quote | *We have a problem that we can't fix—it has to do with how the ordering doctor's name shows up on the lab. Try as we might, we cannot get it fixed. It still comes back, frequently, in error, which results in the wrong provider occasionally getting the lab even though we've set up a system to double check that.* | |
| Errors in response and documentation (50%) | Provider response problem | 3 offices/3 groups (1 S, 2 P) |
| | Results but no clinical context | 2 offices/2 groups (1 S, 1 P) |
| Sample quote | *The lab was getting file copy, we were getting people calling back 3 or 4 days later saying they never heard about their lab yet it's signed and in the chart. When you sign off on labs there needs to be some type of comment. I'm pretty guilty of that.* | |
| Errors notifying patients (75%) | Delayed patient notification | 2 offices/4 groups (2 S, 2 P) |
| | Not all patients notified | 5 offices/6 groups (1 S, 4 P, 1 M) |
| | Wrong results to patient | 1 office/1 group (S) |
| Sample quote | *Yeah, I found something from this summer in the chart and the nurse had missed it. It was from May and I found it in September. It was severe that is was several months ago and the patient didn't know that it was abnormal.* | |
| Errors in follow-up (38%) | No follow-up system | 3 offices/4 groups (2 S, 2 P) |
| | Contributing factors | |
| Not following procedures (100%) | Protocols and procedures not followed | 8 offices/10 groups (5 S, 3 P, 2 M) |
| Sample quote | *We stopped using the lab log.…Basically yeah, nobody was putting in the dates of when stuff was coming back.…It just didn't happen, the dates didn't get put in; it just wasn't completed.* | |
| Inadequate systems (75%) | No tracking systems | 5 offices/7 groups (4 S, 3 P) |
| | Partial or flawed tracking system | 6 offices/8 groups (3 S, 5 P) |
| Sample quote | *So a lot of it, if the patient doesn't call and say, I haven't heard about my test results, we really don't know that they're not back.* | |
| Lack of standardization (75%) | Clinician choice on notification | 5 offices/7 groups (3 S, 3 P, 1 M) |
| | Lack of standardization | 5 offices/8 groups (3 S, 3 P, 2 M) |
| Sample quote | *Some of us will tell a patient if it's not abnormal, you won't hear from us. There are others that send everything out. It's a mix. I wasn't even sure if everybody notifies for everybody that's abnormal.* | |
| Communication (75%) | Communication | 4 offices/7 groups (5 S, 1 P, 1 M) |
| | Transition from laboratory to office | 5 offices/9 groups (6 S, 2 P, 1 M) |
| Sample quote | *It amazes me how often you'll write an order and say, "fax report to me as soon as possible" or you'll give them a pager number and say "page me" and that never gets done.* | |
| Duplication of effort (63%) | Multiple handoffs | 1 office/1 group (P) |
| | Duplication of effort | 5 offices/8 groups (4 S, 4 P) |
| Sample quote | *But there's a lot of duplication. The electronic medical record is good but it ends up tripling the paper work because what happens is we print a copy, then you get a final report, then ultimately radiology sends you a report so here you've got, so instead of one report in chart, the wrong one may be thrown away or the unofficial one.* | |
| Insufficient staff (50%) | Insufficient staff | 4 offices/5 groups (2 S, 3 P) |
| Sample quote | *I sign the report but it's never been entered into the chart, I'm seeing patients 2 weeks later and its not there so I think there's inadequate staff in the filing department so everything is really backed up.* | |
| Insurance problems (38%) | Insurance confusions | 3 offices/4 groups (2 S, 2 P) |
| No continuity of care (13%) | Lack of provider continuity | 1 office/2 groups (2 P) |

S indicates staff and nursing group; P, physician group; M, mixed group of staff, nurses, and physicians.

AQ1

NPs, and PAs were interviewed separately from the nurses and staff. However, this was not possible at the smaller practices, where groups were mixed.

### Data Collection

An initial interview guide was developed from the literature,[4,9,10,13] reviewed by the research team and revised before being used. Minor modifications were made after the initial focus group to improve clarity and understanding. Questions asking about testing process problems were as follows: (1) What kinds of problems did you think you had with the testing process before this study began? What kinds of problems do you now perceive you have? (2) If money were no object, what kind of changes would improve the quality of the testing process? (3) What stands in the way of these changes? (4) What sort of changes would be hard or easy for your practice to adopt? In addition, spontaneous comments made throughout the focus group interviews related to testing process problems, improvement changes, and barriers to change were considered in the analysis.

All interviews were led by an experienced qualitative researcher and focus group moderator (N.C.E.) or the research associate (D.G.), who was trained and observed by N.C.E. All practices except one allowed audiotaping; however, technical problems at one other practice meant that, for 2 practices, extensive notes were taken. Audiotapes were transcribed and compared with the original recording for accuracy. All names and identifying information were removed from the transcripts. Focus group participants also provided demographic information.

### Data Analysis

Data were analyzed using the "editing method,"[16,17] with the use of NVivo 2.0 software. In this method, while acknowledging our previous constructs, we sorted the interview data into coding categories derived from the data, explicitly checking them against other categories and the original data, and then searched for patterns and themes. Each transcript was read and coded by N.C.E. An additional analyst (D.G.) read and coded one-third of the transcripts. During coding, categories were added or modified as needed as we drew on the original transcripts for meaningful segments of text. The analysts then met and compared coding, making changes as needed to achieve consensus. N.C.E. then recoded all the transcripts a second time. Coding categories, illustrative quotes, and initial theme formation were then reviewed and discussed by all the study team members through meetings, phone conferences, and e-mail discussions. From this analysis, themes related to perceived problems in the testing process, desired changes, and barriers to changes were developed.

## RESULTS

The demographics of our office sites and the focus group participants are found in Table 1. Nearly all of the nurses and staff were women, whereas 64% of the physicians, NPs, and PAs were men. The offices were located in 7 states and included 2 rural locations. Eighteen focus groups were convened. Two practices had 1 combined group each, 2 offices had 2 groups (separate for clinicians and staff), and 4 practices had 3 groups (separate for clinicians and staff). T1

### Problems with the Testing Process

As we analyzed our participants' stories of problems with the testing process, we realized they described not only specific testing process errors, but also factors that contributed to the errors (Table 2). Contributing factors have also been called *latent errors*[18] and are those systems and processes that allow errors to happen (Fig. 1). Our participants T2 F1

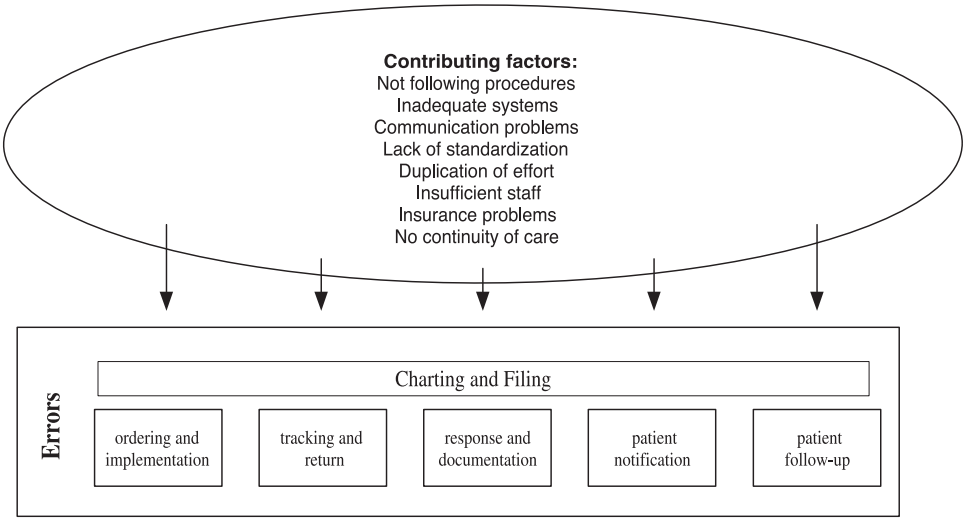


**FIGURE 1.** Relationship between error types and contributing factors reported by family physicians and their office staff from 8 practices.

described errors within all the steps of the testing process; and another category, filing and charting errors, permeated all of these steps. Problems with ordering and implementation, tracking and return, and patient notification were mentioned most frequently. The perceived contributing factors to these errors are also found in Table 2. Not following procedures, inadequate systems, communication problems, and lack of standardization were most commonly mentioned.

We found no major differences among groups of physicians, staff, or mixed participants in the frequency of their responses, except that staff groups were more likely to mention communication problems as a contributing factor. Not surprisingly, however, participants told stories of these problems associated with their specific work tasks. For example, regarding errors in filing results, a physician noted, "…the most recent lab might be buried several pages down so you think its not there," whereas a staff member reported, "Most of what we catch is incorrect information…a patient that had the same first and same last name, same year, everything, just a different birthday."

### Suggestions to Improve the Testing Process

Our participants' desired changes to improve their testing processes can be grouped into 5 categories: technology, staffing, systems, communication, and knowledge (Table 3). Technology and improved staffing were suggested most frequently. Although almost all practices and groups mentioned these 2 desired changes, groups consisting of staff and nurses were more likely to mention "more staff, more help" as their initial answer, whereas physician groups usually responded first with, "I'd like to see electronic medical records—fully implemented" and then added comments like, "Number two, enough staff to adequately be available per clinician to adequately deal with the problems."

### Barriers to Changing the Testing Process

Barriers to changing the testing process were grouped into 2 main categories: culture and process (Table 4). Barriers related to culture included problems with leadership and staff involvement and support, the perceived tension for change, and understanding patient needs. Process barriers included costs, sources of ideas, external supports, the work environment, feedback, and staffing changes. Despite explicit acknowledgment from the group moderator that finances were a given problem for all practices, participants in several groups still stressed costs and funding.

## DISCUSSION

Family physicians and their staff discussed openly with us their problems with managing testing processes. Our data confirm earlier physician reporting studies about the types of test processing errors that occur in primary care offices,[4,5,13] but our study adds further breadth to prior research because we solicited input from both staff and physicians and because we used a qualitative approach.[1] The qualitative approach is

**TABLE 3.** Suggestions to Improve the Testing Process

| Category (Percentage of Offices Mentioning Suggestions in This Category) | Subcategory | No. Offices/Focus Groups Mentioning Specific Subcategory |
|---|---|---|
| Technology (100%) | Electronic health record | 8 offices/17 groups (9 S, 6 P, 2 M) |
| | New or better equipment | 3 offices/3 groups (3 S) |
| | Improved space | 4 offices/5 groups (3 S, 1 P, 1 M) |
| | New or onsite laboratory or x-ray | 3 offices/4 groups (4 S) |
| Sample quote | *(I want) Everything computerized. In other words, when you pull up a patient, in that patient profile you can look at their labs and their notes, all on the computer.* | |
| Staffing (88%) | More staff | 7 offices/15 groups (8 S, 6 P, 1 M) |
| | Increased pay | 1 office/1 group (S) |
| Sample quote | *More clerical, we definitely need more clerical staff…. You can only do so much filing labs back into the chart when you're a filing person with two other jobs.* | |
| Systems (63%) | Simple, unified system | 4 offices/4 groups (2 S, 2 P) |
| | Tracking system | 4 offices/5 groups (2 S, 3 P) |
| | Notification system | 2 offices/2 groups (1 S, 1 P) |
| | Better filing and chart system | 2 offices/2 groups (1 S, 1 P) |
| | Better protocols | 1 office/2 groups (1 S, 1 P) |
| Sample quote | *Systems have to be simple or people don't do it.* | |
| Communication (38%) | Patient education and communication | 3 offices/5 groups (2 S, 2 P) |
| | Improved communication | 2 offices/2 groups (1 S, 1 P) |
| Sample quote | *I guess it's about teamwork and about process, about understanding each other, how we want to knit together as a group and so I think that it may be a matter of time.* | |
| Knowledge (13%) | Best practices or evidence-based medicine | 1 office/1 group (P) |
| Sample quote | *I think would be important, would be to know what the evidence is about, what works and what doesn't work.…We need to know what the best practices are to consider.* | |

S indicates staff and nursing group; P, physician group; M, mixed group of staff, nurses, and physicians.

**TABLE 4.** Barriers to Changing the Testing Process

| Category (Percentage of Offices Mentioning Barriers in This Category) | Subcategory | No. Offices/Focus Groups Mentioning Specific Subcategory |
|---|---|---|
| | Culture barriers | |
| Leadership or staff involvement and support (88%) | No buy-in from staff or providers | 4 offices/7 groups (4 S, 2 P, 1 M) |
| | People do not follow protocols | 3 offices/3 groups (3 S) |
| | Must do things own way | 4 offices/6 groups (4 S, 2 P) |
| | Powerlessness | 2 offices/2 groups (1 S, 1 M) |
| Sample quote | *They're all really gung ho for these positive changes and we're going to start doing things this way and then you implement it and then everyone of them are, yes, I think we all should do that, but for me, I should be able to do it this way. They all want to do their own thing. Their own thing, their own system, their own way of charting, their own way of documenting, everything.* | |
| Tension for change (63%) | Expectation of mediocrity | 2 offices/2 groups (2 P) |
| | Personal resistance to change | 3 offices/3 groups (2 S, 1 P) |
| | No perceived consequences | 2 offices/2 groups (2 P) |
| Sample quote | *It's a huge amount of time with no perceived consequences so it has not been a priority.* | |
| Understanding patient needs (38%) | Patient expectations | 3 offices /3 groups (3 S) |
| | Process barriers | |
| Costs (88%) | Cost | 7 offices/8 groups(3 S, 4 P, 1 M) |
| | Technology | 2 offices/2 groups (1 S, 1 P) |
| Sample quote | *Like the Internet, just link up to a paperless medical record and everything would happen really quickly—But that is prohibitive in terms of the cost.* | |
| Staff changes required (63%) | Labor intensive | 5 offices/6 groups (2 S, 3 P) |
| External support (50%) | Outside system problems | 4 offices/4 groups (2 S, 1 P, 1 M) |
| Sample quote | *It would literally take an act of God to get those computers to talk to each other.* | |
| Work environment (50%) | Too busy, too many patients | 4 offices/4 groups (3 S, 1 P) |
| Monitoring and feedback (25%) | No feedback and communication | 2 offices/3 groups (1 S, 2 P) |
| Sample quote | *We don't have a way of tracking what types of errors that people are picking up on….So we don't have a way of saying, okay, it's obvious that we've got a problem in this area and let's focus on it.* | |
| Source of ideas (25%) | Lack of evidence-based medicine | 2 offices/3 groups (1 S, 2 P) |
| Sample quote | *This is kind of a newer area so there probably isn't a lot of evidence but we need to know what the best practices are to consider those and assess those for how it would fit with our system here.* | |

S indicates staff and nursing group; P, physician group; M, mixed group of staff, nurses, and physicians.

an excellent method for delineating administrative and communication issues in medical error,[19] and our focus group discussions with both staff and physicians significantly expands our understanding of testing process problems. It allowed us to better see the entire story of testing process errors and to explore the relationships between contributing factors, errors, barriers to improvement, and desired improvements. We believe the most significant findings are how the perceived barriers, the contributing factors, and the desired improvements relate to each other.

Conducting separate focus groups for physicians and staff at 6 practices allowed us to look for differences in the responses of physicians compared with staff. It is important to note that, for the most part, all the groups described similar errors and contributing factors and that, consistent with previous research, ordering and implementation errors were the most pervasive type of error, occurring at all practices.[4,13] The only major difference was that staff groups were more likely to mention communication problems than were physician groups. Stories of communication problems included problems communicating with patients and also with physicians, with the laboratory, and with staff. This finding may be related to sex (they were predominantly female) or task performance (staff and nurses tend to communicate more with each other).

It is in the details of the stories that we found differences among our participant groups. Errors in tracking and return, for example, were seen differently depending on the point at which the individual's responsibilities interfaced with the tracking process. A physician noted that a laboratory result was not yet back when she was seeing a patient, whereas a medical records clerk told us about results returned to the office with incorrect names and birth dates, and the office manager talked about computer interface problems that changed ordering physicians' names on printed results. The importance to practices in seeking to decrease testing process errors is that a limited focus on one groups' awareness will not solve the problem—all participants in a practice need to tell their story.

The contributing factors that exist throughout the entire testing process are closely related to the barriers to improvement perceived by our participants. The most

commonly reported contributing factors (not following procedures, lack of standardization, and inadequate systems) were seen again in the cultural barriers noted by our participants (personal resistance to change, lack of buy-in from staff or providers, no perceived consequences). Our participants seemed to understand that the reasons they have errors now are the same reasons they have not improved their testing process errors. A physician who insists on "doing things his own way" and does not follow existing procedures also exhibits no support for proposed officewide changes. These cultural barriers are much harder to overcome than process barriers when effecting organizational change.[20]

Interestingly, the most frequently mentioned desired improvements are NOT related to the most frequently mentioned contributing factors or perceived barriers. The most frequently mentioned desired improvements were technology and more staff. As mentioned, the most frequently mentioned contributing factors were not following procedures, inadequate systems, standardization, and communication. Improved systems (including tracking systems and better protocols) were mentioned by 63% of offices, however, so their need was acknowledged. Still, the major focus of our participants was improvement by "more staff" or "better technology." Trying to improve by doing more of the same is consistent with existing literature in which most physicians suggest preventing errors by being more diligent within the same system.[21] Both physicians and staff stressed the importance of technology, and electronic health records (EHRs) are being promoted to physicians by many organizations, including the American Academy of Family Physicians, as a way to improve efficiency, quality, and billing. Evidence exists that some EHRs may improve quality and decrease errors, especially when they include a digital interface to the laboratory and results management software,[22–24] but technology can also introduce other errors.[25] Unfortunately, for many practices, EHRs digitally integrated with all diagnostic and laboratory facilities are not yet available.[1,26]

This study has several limitations. As a focus group study, we cannot quantify the absolute frequency or importance of comments made by our participants, but we were able to get a broad description of the testing process problems facing family practices. Our participants belonged to practices where at least one provider was a member of the American Academy of Family Physician National Research Network. This membership may set these practices apart from those that do not participate in a research network, but years of such research has found that research networks do offer an accurate assessment of practice.[27] Not all staff and physicians at each practice were able to participate in a focus group, which may have led to incomplete responses. However, groups were held at times felt by the practices to allow the fullest participation. None of our practices belonged to closed, digitally integrated health systems, so the responses of our participants are unlikely to reflect that situation. However, as previously mentioned, that type of practice is still unusual for family physicians.[2] The most significant limitation of this study is that it does not include patients' perspectives on the testing process. Understanding patients' perspectives is essential because they offer a unique and most important perspective of the problems and harms that may result in managing testing.[28]

## CONCLUSIONS

Family physicians and their staff are well aware of problems with the testing process in their office practice. Whereas individuals in a practice may see only selected aspects of an error or contributing factor, by soliciting input from the entire practice staff, the entire story of testing process problems can be understood. Fixing and improving the testing process is difficult; and despite understanding by our participants of the contributing factors and barriers to improvement, the desire is still for the quick and easy fix. With competing demands on their time to provide quality care in so many areas and with limited financial resources, many practices seem resigned to the mediocrity of the current situation.[26] This study helps define and clarify the problems of the testing process in primary care. Future research must test interventions that solve the problems expressed by our participants, while taking into account the practical barriers that face primary care practices today.

## REFERENCES


1. Hickner JM, Fernald DH, Harris DM, et al. Issues and initiatives in the testing process in primary care physician offices. *Jt Comm J Qual Saf*. 2005;31(2):81–89.
2. Cherry D, Burt C, Woodwell D. *National Ambulatory Medical Care Survey; 2001 Summary. Advance Data from Vital and Health Statistics*. Hyattsville, MD: National Center for Health Statistics; 2003.
3. Sox HC. Saving office practice. *Ann Intern Med*. 2003;139(3):227–228.
4. Dovey SM, Meyers DS, Phillips RL Jr, et al. A preliminary taxonomy of medical errors in family practice. *Qual Saf Health Care*. 2002;11:233–238.
5. Fernald DH, Pace WD, Harris DM, et al. Event reporting to a primary care patient safety reporting system: a report from the ASIPS Collaborative. *Ann Fam Med*. 2004;2(4):327–332.
6. Murff H, Bates D. Information Transfer in Making Health Care Safer: A Critical Analysis of Patient Safety Practices: University of California at San Francisco–Stanford University Evidence Based Practice Center; 2001. Report No.: AHRQ publication no. 01-E058.
7. Elder NC, Jacobson C, Zink T, et al. How experiencing medical error has changed patients' interactions with the primary healthcare system. *Ann Fam Med*. 2005;3:537–544.
8. Kuzel A, Woolf SH, Gilchrist V, et al. Patient reports of preventable problems and harms in primary health care. *Ann Fam Med*. 2004;2(4):333–340.
9. Mold JW, Cacy DS, Dalbir DK. Management of laboratory test results in family practice. An OKPRN study. Oklahoma Physicians Resource/ Research Network. *J Fam Pract*. 2000;49(8):709–715.
10. Boohaker EA, Ward RE, Uman JE, et al. Patient notification and follow-up of abnormal test results. A physician survey. *Arch Intern Med*. 1996;156(3):327–331.
11. White B. Four principles for better test-result tracking. *Fam Pract Manag*. July/August 2002:41–44.
12. Elder NC, Vonder Meulen MB, Cassedy A. The identification of medical errors by family physicians during outpatient visits. *Ann Fam Med*. 2004;2(2):125–129.
13. Nutting PA, Main DS, Fischer PM, et al. Toward optimal laboratory use. Problems in laboratory testing in primary care. *JAMA*. 1996;275(8):635–639.
14. Poon EG, Gandhi TK, Sequist TD, et al. "I wish I had seen this test result earlier!" Dissatisfaction with test result management systems in primary care. *Arch Intern Med*. 2004;164(20):2223–2228.


 

15. Morgan DL. *Successful Focus Groups. Advancing the State of the Art*. Newbury Park: Sage; 1993.
16. Miller W, Crabtree B. Clinical research. A multimethod typology and qualitative roadmap. In: Crabtree B, Miller W, eds. *Doing Qualitative Research*, 2nd ed. Thousand Oaks: Sage; 1999.
17. Miller W, Crabtree B. Qualitative analysis: how to begin making sense. *Fam Pract Res J*. 1994;14(3):289–297.
18. Reason J. Human error: models and management. *BMJ*. 2000;320:768–770.
19. Andrews LB, stocking C, Krizek T, et al. An alternative strategy for studying adverse events in medical care. *Lancet*. 1997; 349(February 1):309–313.
20. Gustafson DH, Sainfort F, Eichler M, et al. Developing and testing a model to predict outcomes of organizational change. *Health Serv Res*. 2003;38(2):751–776.
21. Tilyard M, Dovey S, Hall K. Avoiding and fixing medical errors in general practice: prevention strategies reported in the Linnaeus Collaboration's Primary Care International Study of Medical Errors. *N Z Med J*. 2005;118(1208):U1264.
22. Smith PC, Araya-Guerra R, Bublitz C, et al. Missing clinical information during primary care visits. *JAMA*. 2005;293(5): 565–571.
23. Poon EG, Kuperman GJ, Fiskio J, et al. Real-time notification of laboratory data requested by users through alphanumeric pagers. *J Am Med Inform Assoc*. 2002;9(3):217–222.
24. Poon EG, Wang SJ, Gandhi TK, et al. Design and implementation of a comprehensive outpatient Results Manager. *J Biomed Inform*. 2003;36(1–2):80–91.
25. Ash JS, Berg M, Coiera E. Some unintended consequences of information technology in health care: the nature of patient care information system-related errors. *J Am Med Inform Assoc*. 2004;11(2):104–112.
26. Elder NC, Hickner J. Missing clinical information: the system is down. *JAMA*. 2005;293(5):617–619.
27. Green L. The weekly return as a practical instrument for data collection in office based research. *Fam Med*. 1988;20:182–184.
28. Kuzel AJ, Woolf SH, Gilchrist VJ, et al. Patient reports of preventable problems and harms in primary health care. *Ann Fam Med*. 2004;2(4):333–340.

 

# AUTHOR QUERY

**AUTHOR PLEASE ANSWER QUERY**

AQ1 = Please verify if the last sentence is accurate.

**END OF AUTHOR QUERY**

# Journal of Patient Safety

**2005/2006 Author Reprint Rates**

**In addition to using this form to order reprints, it is to be used to calculate any additional publication fees your article may incur. Publication fees include color separation charges and page charges. Prices are subject to change without notice. Quantities over 500 copies---contact our Healthcare Dept. at 410-528-4426. Outside the U.S. dial 4420-7981-0700.**

**Fax or mail your order to Lippincott Williams & Wilkins, Author Reprints Dept, 351 W. Camden St., Baltimore, MD 21201. Fax: 410-528-4434**

**Rapid Ordering can be accessed at http://www.lww.com/periodicals/author-reprints. A confirmation of your order will be e-mailed to you.**

**For questions regarding reprints or publication fees please e-mail us at reprints@lww.com or contact us at 1-800-341-2258.**

**Reprint Pricing:**

**100 copies = $208.00**
**200 copies = $257.00**
**300 copies = $303.00**
**400 copies = $360.00**
**500 copies = $405.00**

*Author(s) Name*_____
*Title of Article*_____
*Article #*_____*Publication Mo/Yr*_____

*Payment must be received before reprints can be shipped. Payment is accepted in the form of a check or credit card; purchase orders are accepted for orders billed to a U.S. address.*

☐ *MC* ☐ *VISA* ☐ *Discover* ☐ *American Express*

*Account #*_____ *Exp. Date*_____
*Name*_____
*Address*_____
*Dept/Rm*_____
*City*_____ *State*_____
*Zip/Postal Code*_____*Country* _____
*Telephone*_____*Signature*_____

***Reprint Cost***
*Quantity of Reprints* = _____ $_____

***Covers (Optional)***
*$108.00 for the first 100 copies* $_____
*$18.00 each add'l 100 copies* $_____

***Color Fees (If your article contains color figures, use Rapid Ordering.)***
***Publication Color Charge*** *(You may have included color figures in your article. The costs to publish those figures may be included on the reprint invoice or they may be invoiced separately.)* $_____

***Reprint Color Cost*** *($70.00/100 reprints)* $_____

***Shipping***
*Add $5.00 per 100 reprints for orders shipping within the U.S. and $20.00 per 100 reprints for orders shipping outside the U.S.* $_____

***Tax***
*U.S. and Canadian residents add the appropriate tax, or submit a tax exempt form.* $_____

***Shipping Information***
*Ship:*_____*copies to:*
*Name*_____
*Address*_____
*Dept/Rm*_____
*City*_____ *State*_____
*Zip/Postal Code*_____*Country* _____
*Phone #*_____

Lippincott Williams & Wilkins, Baltimore, MD 21201