

Direct Reporting of Laboratory Test Results to Patients by Mail to Enhance Patient Safety

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BACKGROUND: Missed test results are common in clinical practice and compromise patient safety. Direct reporting, whereby testing centers systematically notify both patients and providers of important test results, constitutes a potential solution, but provider acceptance is unknown.

OBJECTIVE: To assess provider interest in direct reporting of selected test results and how interest varied across different tests.

DESIGN, SETTING, AND PARTICIPANTS: Survey of primary care physicians at a tertiary care academic medical center.

MEASUREMENT: Five-point Likert scores were used to gauge each physician's interest (1 = not at all interested to 5 = very interested) in scenarios pertaining to the direct reporting of 3 diagnostic tests of low (DXA scan), intermediate (genital herpes testing), and high (breast biopsy) "emotional impact" and whether interest varied with each test's result (normal vs abnormal). Physicians were also asked to cite specific advantages and disadvantages of direct reporting.

RESULTS: The response rate was 73% (148/202). Physician interest in direct reporting decreased progressively as scenarios shifted from low (DXA scan) to high (breast biopsy) emotional impact ($P < .001$); interest in direct reporting was also higher when results were normal rather than abnormal ($P < .001$). Common advantages of direct reporting cited by respondents were reductions in workload (selected by 75% of respondents) and reductions in missed diagnoses (38%). The most common concerns were that patients would become unnecessarily frightened (70%) and would seek unreliable information (65%).

CONCLUSION: Direct reporting of selected test results to patients is one system for insuring that important results are not missed, but implementation should consider the specific test in question, the test result, and provider preferences.

KEY WORDS: medical errors; diagnostic errors; result follow-up.
DOI: 10.1111/j.1525-1497.2006.00553.x
J GEN INTERN MED 2006; 21:1075-1078.

There is growing evidence that the failure to follow-up on abnormal test results is a common medical error that can compromise patient safety.¹⁻³ For example, Roy et al.⁴ found that approximately 6% of patients hospitalized in a major academic medical center had potentially actionable test results return after their discharge without the knowledge of the responsible physician. Similarly, Schiff et al.^{5,6} have found clinically significant rates of missed hypothyroidism and hyperkalemia that were uncovered by laboratory testing in an urban county hospital.

Ms. Sung presented this work at the 2005 Midwest SGIM Meeting in Chicago.

None of the authors have any conflicts of interest to declare.

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Despite the growing recognition of problems in the follow-up of test results, designing robust solutions is challenging. This challenge relates to a number of factors including the broad spectrum of tests that must be communicated to patients, the wide array of methods that testing centers use to report test results to providers (e.g., telephone, e-mail, fax, letter), and the large number of steps involved in communicating test results to patients. These factors create multiple opportunities for errors to occur.^{7,8} One solution proposed by some investigators has been the use of computerized "in-boxes" to assist in results management.^{9,10} However, such systems rely on electronic communication of results from each testing center to an electronic repository that can be accessed by clinicians—technology that may not be available in many practice settings.

Another potential solution is for testing centers to directly notify both patients and providers of important test results via mailed letter (a.k.a. direct result reporting); there are a number of potential advantages to such a system. First, many clinicians and patients already have experience with direct result reporting as a consequence of the 1998 *Mammography Quality Standards Act*.¹¹ This congressional legislation requires all mammography centers to report mammography results to both providers and patients in writing within 30 days of the examination. Available data suggest that the mammography system has been successful, resulting in more timely patient notification and greater patient satisfaction.¹² Second, a number of studies suggest that patients are interested in the enhanced access to their test results that direct reporting would provide.¹³⁻¹⁷ Third, direct result reporting systems could be implemented rapidly using currently available technology, pending the development of more comprehensive computerized health information systems to assist in this task.¹⁸

Despite the potential for direct result reporting systems to enhance patient safety, we know little about providers' acceptance of such systems. Provider acceptance would be critical before any widespread implementation, given the central role that communication of test results plays in the doctor-patient relationship.⁷ In an effort to clarify provider views, we conducted a survey of primary care physicians at a large academic medical center to assess their current management of test results and their views regarding the potential benefits and risks of a direct result reporting system. We hypothesized that providers would generally be interested in the direct reporting of test results. We also hypothesized that providers would view direct reporting of normal test results and test results with lower "emotional impact" as more helpful than the direct re-

Manuscript received November 30, 2005

Initial editorial decision February 7, 2006

Final acceptance May 11, 2006

porting of abnormal results and results with greater “emotional impact,” respectively.

METHODS

The survey requested information including provider demographics (e.g., age, race, gender), position (attending or resident), years since completion of medical school, and specialty (general internal medicine, family practice, and obstetrics and gynecology). Two separate questions asked providers the percentage of the time they notify their patients of their normal (and abnormal) test results. Potential answers included: never, 1% to <25% of the time; 25% to <50% of the time; 50% to <75% of the time; 75% to <100% of the time; and always. An additional question asked providers how many hours per day they spent communicating with patients about test results.

Next, providers were given a series of 3 scenarios that assessed their interest in a system that directly reported the results of specific tests to patients by mail; providers were instructed that the direct result reporting system was at least as reliable as the current system. Each scenario consisted of 3 similar questions that differed only in the fact that each scenario referred to 1 of 3 different diagnostic tests: (1) bone density (DXA) scanning; (2) genital herpes testing; and (3) breast biopsy results. The questions asked:

- How interested would you be in a system that automatically notified all patients *with normal (DXA or herpes or biopsy) results* via mailed letter of those results?
- How interested would you be in a system that automatically notified all patients *with normal (DXA or herpes or biopsy) or abnormal results* via mailed letter of those results?
- How interested do you believe *your patients* would be in a system that automatically notified them of their (DXA or herpes or biopsy) results?

Answers were categorized using a 5-point Likert scale ranging from 1 (not at all interested) to 5 (very interested).

These 3 specific tests were selected because they met the following criteria: (1) each test is commonly ordered in primary care; (2) an abnormal result warrants further action; (3) each condition affects women; and (4) these 3 tests can be considered to represent a wide spectrum in terms of the “emotional impact” to patients and providers, ranging between low (DXA scanning), intermediate (genital herpes), and high (breast biopsy). The final 2 questions asked providers to select all significant benefits and concerns they had about the direct result reporting system from a list of potential choices. In addition, space was provided for open-ended comments related to the survey. Five providers pilot tested the survey. Based upon their suggestions, only minor changes were made to the survey.

We then e-mailed the survey to all attending and resident physicians in general internal medicine, family practice, and obstetrics and gynecology departments at the University of Iowa Hospitals and Clinics between June and August, 2005. We e-mailed each physician up to 3 times and then contacted him/her by telephone to request their completion of the survey. Participants were given a 5 dollar credit at a hospital concessionary in appreciation of their time. The study was approved by the Institutional Review Board.

We conducted analyses by first examining distributions of responses (e.g., means, medians, standard deviations) to each

of the survey’s 21 questions. After reviewing the Cronbach’s α statistics for all relevant questions (all of which were in the good to excellent range [$\alpha \geq 0.6$]), 6 summary measures were calculated for each provider: 3 scenario summary measures (DXA, herpes, biopsy) calculated by adding the normal, abnormal, and perceived patient receptiveness items for each scenario (range 3 to 15), and 3 test result summary measures (normal, abnormal, patients’ interest) representing levels of interest in direct reporting calculated by adding these items across each of the 3 scenarios (range 3 to 15). All free-text responses were reviewed by 2 of the authors (S.S. and P.C.) and distinct concepts were identified; these concepts were then combined into common themes based upon author consensus. We used *t* tests or Wilcoxon’s rank-sum tests to compare continuous variables for normally and nonnormally distributed responses, respectively, while χ^2 tests were used to examine relationships between categorical variables. All analyses were conducted using Stata SE Version 8.2 (StataCorp., College Station, TX).

RESULTS

The survey response rate was 73% (148/202). The characteristics of respondents are displayed in Table 1. The physicians reported spending an average of 1.3 h/d following up on and communicating test results to patients (median 1 hour; standard deviation 1.1 hours). Twenty-four percent of respondents reported that they always communicated normal test results to their patients, while 19% reported that they communicated normal results less than 25% of the time. When asked about communication of abnormal test results, 92% of physicians responded that they provided abnormal results to their patients 75% of the time or greater, while 4% reported doing so less than 50% of the time.

The level of interest in direct reporting of test results, as measured by the summary Likert scores, declined progressively as the scenarios were shifted from DXA scan (mean 12.8; median 13) to genital herpes (mean 10.6; median 11) to breast biopsy (mean 10.1; median 10) ($P < .001$ for DXA scan compared with herpes; $P = .01$ for herpes compared with breast biopsy). When provider interest was summarized across

Table 1. Survey Respondents

Characteristic	Total Respondents (N=148)
Age, (y), mean (standard deviation)	35.6 (10.0)
Women, number (%)	76 (51)
Race/Ethnicity, number (%)*	
White	123 (84)
Asian	10 (7)
Black	2 (1)
Job position, number (%)	
Resident/fellow	83 (56)
Attending	65 (44)
Years in practice, number (%)*	
<5	73 (49)
5 to 14	34 (23)
15 or more	37 (25)
Specialty, number (%)*	
General medicine	79 (53)
Family practice	25 (17)
Obstetrics and gynecology	34 (23)

*Responses add up to less than 100% because of responses that were missing and/or other categories.

Table 2. Advantages and Disadvantages of Direct Result Reporting

	Number (%), N=148
Advantages of direct reporting of test results	
More rapid patient notification of their results	118 (79)
Decreased workload	111 (75)
Make patients feel more involved in their care	62 (42)
Reduction in missed diagnoses	56 (38)
More thorough patient care	44 (29)
Encourage patient-provider discussion of test results	26 (18)
Other	9 (6)
Disadvantages of direct reporting of test results	
May make patients unnecessarily frightened	103 (70)
Patients may seek unreliable information after receiving their results	96 (65)
Patients lack the expertise to interpret their results	77 (52)
Interferes with the practice of medicine	18 (12)
Patients may seek care without consulting their provider	40 (27)
May increase provider workload	6 (4)
Other	49 (33)

diagnostic tests, there was significantly higher interest in direct reporting of normal results (mean 13.0; median 14) than abnormal results (mean 9.0; median 9), with providers reporting that their patients' interest would lie in the middle (mean 11.4; median 11) ($P < .001$ for all comparisons). Identical trends were observed when looking at each of the 3 scenarios for each of the 3 specific test results (normal, abnormal, patients' interest) individually.

When we stratified physicians by the number of years that they had been in clinical practice, we observed that those in practice for 15 or more years were more likely to always report normal results to their patients than those in practice for less than 5 years (37% vs 14%; $P = .004$) as well as abnormal results (71% vs 55%; $P = .11$). Physicians in practice for 15 or more years were also significantly more interested in direct reporting of DXA scan results than physicians in practice for less than 5 years (mean Likert score for each of the 3 scenarios 13.2 vs 12.4; $P = .05$), but were less interested in direct reporting of herpes results (mean 10.1 vs 10.9; $P = .17$) and biopsy results (9.2 vs 10.5; $P = .05$).

The median number of benefits of direct result reporting identified by physicians was 3 (mean 2.9, standard deviation 1.4); only 5 providers (3%) identified no benefits. The most common advantages cited were more rapid patient notification of results (selected by 79% of respondents), reductions in workload (75%), and making patients feel more involved in their care (42%) (Table 2). The median number of specific concerns cited by physicians was 4 (mean 3.6, standard deviation 1.3); only 7 physicians (4.7%) had no concerns. The most common concerns cited by physicians were that patients would become unnecessarily frightened (selected by 70% of respondents), patients would seek unreliable information (65%), and that patients lacked necessary expertise to interpret their test results (52%) (Table 2).

An additional 20 physicians (14% of respondents) provided additional free-text responses to the survey. Common themes that emerged included the following: concern that the mailed letters might contain information that the provider did not agree with; concern that the letters would provide the patients with their test results but would not provide important information on the "next steps" to be taken; concern that the

automated letter would not be nuanced to reflect the individual patient and provider preferences; and concerns over lack of privacy regarding sensitive results. Examples of these responses included one provider who wrote that, "patients need explanation and the next course of action in case of positive results," while another wrote that "the patients should always receive their results. It will be a difficult transition, but this is absolutely where we need to go."

CONCLUSIONS

The results of the current study confirm a number of our a priori hypotheses. First, the study demonstrated that providers were more interested in the direct reporting of normal test results than abnormal test results. Second, we found that provider interest in direct reporting of test results was strongly related to the particular test in question, with higher interest in direct reporting for tests with less emotional impact. Finally, we found that while providers were generally interested in direct result reporting systems, they recognized that such systems had both advantages and disadvantages.

The finding that providers were less interested in direct reporting of abnormal results than normal results is interesting and has important implications for patient safety. Studies have shown that providers believe that it is their professional responsibility to communicate important results to patients.^{7,19} Yet, there are now robust data demonstrating that 1% to 10% of clinically important abnormal test results are missed by providers, with potential adverse consequences for patients' health.^{4-6,8} This suggests that while providers believe that communication of test results is an important part of their jobs, they have difficulty communicating results consistently in busy clinical practices. Our finding that providers were less interested in the assistance of an automated result reporting process for abnormal test results (which are likely to require some sort of action and thus can least afford to be "missed"), as opposed to normal results, creates an interesting paradox: providers appear more accepting of automation of the mundane task of notifying patients of their normal results when, in actuality, automating the reporting of abnormal results may be far more important to patients' welfare. Likewise, providers appear less interested in direct notification for test results with greater emotional impact such as breast cancer, despite the fact that tests with greater emotional impact are likely to be the results that patients most want to be informed of.

The reluctance expressed by providers toward direct reporting, particularly as related to abnormal test results of high emotional impact (e.g., breast biopsy results), contrasts with the available literature concerning patients' preferences for notification of their own test results. For example, Baldwin et al. found that 90% of patients wanted to be notified of all normal and abnormal results and other investigators have demonstrated similar findings.^{16,17,20} This discrepancy between patient and provider preferences constitutes an important barrier that must be reconciled.

Implementing direct result reporting in clinical practice is challenging and there are a number of issues that must be addressed. First, it is important to decide which tests warrant direct result reporting. If the primary objective is to insure that clinically important abnormal results are not missed, then direct reporting should include tests that identify significant abnormalities requiring prompt action (e.g., lung mass on chest

x-ray); such an intervention is currently being implemented at the Iowa City Veteran's Administration Hospital with precisely such an objective in mind. Alternatively, if the primary objective is to assist providers with the burden of notifying patients of normal results, a far different system is required. Second, it is important to decide what information should be conveyed to the patients: the actual numeric results (e.g., your low density lipoprotein [LDL] cholesterol is 178) or a simplified interpretation (e.g., your cholesterol is high) and whether to supplement the results with educational information or instructions (e.g., please call your doctor immediately). Third, it is important to consider the mechanism for conveying the results to the patients. In a prior investigation, we found that a majority of patients preferred to be notified of their DXA scan results by mail (51%), followed by telephone call (28%), and office visit (11%), but other investigators have demonstrated patient preference for e-mail notification as well.^{17,21}

There are a number of important limitations to the current study. First, this study was conducted at a single academic medical center and thus it may be difficult to extrapolate these findings to other practice settings. Second, the study had a relatively small sample size and consequently may not have been able to pick up important differences between certain provider subgroups of interest (e.g., specialty, gender). Third, given the sensitive nature of this area of research and the potential medico-legal implications, it is important to acknowledge the possibility of bias in the responses physicians provided. Fourth, this study was limited to an assessment of provider interest in the direct reporting of 3 particular test results. Applying these results to the myriad of other tests that providers order will require care. Finally, it is important to acknowledge that while the concept of varying emotional impact related to different test results is intuitively appealing, it has not been a subject of prior research.

In summary, direct reporting of test results to patients represents one potential option for reducing missed test results and enhancing patient safety. Implementation of direct result reporting should be considered, particularly for important abnormal test results, while taking into account the concerns expressed by providers.

Dr. Cram is supported by a K23 career development award (RR01997201) from the NCRR at the NIH.

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