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Do Consultants Follow Up on Tests They Recommend? Insights from an Academic Inpatient Gastrointestinal Consult Service

Benjamin E. Cassell^{1,4}, Ted Walker¹, Saad Alghamdi¹, Jason Bill¹, Pierre Blais¹, Harold Boutté¹, Jeffrey W. Brown¹, Gregory S. Sayuk^{1,2,3}, and C. Prakash Gyawali¹

¹Division of Gastroenterology, Washington University School of Medicine, St. Louis, MO, USA

²Department of Psychiatry, Washington University School of Medicine, St. Louis, MO, USA

³John Cochran VA Medical Center, St. Louis, MO, USA

⁴Division of Gastroenterology and Hepatology, University of Colorado, 1055 Clermont St MS 111-E, Denver, CO 80218, USA

Abstract

Background—Inpatient care is a fundamental part of gastroenterology training and involves the recommendation, performance, and interpretation of diagnostic tests. However, test results are not always communicated to patients or treating providers. We determined the process of communication of test results and recommendations in our inpatient gastroenterology (GI) consult service.

Methods—Test recommendations on 304 consecutive new GI consults (age 60.2 ± 1.0 year) over a 2-month period were recorded. Demographic factors (age, race, gender, zip code, insurance status) were extracted from the electronic medical record (EMR). Charts were independently reviewed 6 months later to determine results of recommended tests, follow-up of actionable test results, 30-day readmission rates, and predictors of suboptimal communication.

Results—Of 490 recommended tests, 437 (89.2%) were performed, and 199 (45.5%) had actionable findings. Of these, 48 (24.1%) did not have documented follow-up. Failure of follow-up was higher for upper endoscopy (31.9%) compared to colonoscopy (18.0%, $p = 0.07$). Women ($p = 0.07$), patients on Medicare ($p = 0.05$), and procedures supervised by advanced GI fellows ($p = 0.06$) were less likely to receive follow-up. Median income and identification of a primary provider did not influence follow-up rates; 30-day readmission rates were not impacted. Female gender, insurance (Medicare) status, and attending type remained independent predictors of failure of follow-up on multivariate regression ($p = 0.03$).

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Author's contribution BC contributed to study concept; data acquisition, analysis and interpretation; and drafting of manuscript. TW, SA, JB, PB, HB, and JB contributed to data acquisition, revision of manuscript. GSS contributed to study concept and design; data analysis and interpretation; and drafting and revision of manuscript. CPG contributed to study concept; analysis and interpretation; drafting and critical review of manuscript; and study supervision.

Compliance with ethical standards

Conflict of interest None of the authors have any conflicts of interest to report. No writing assistance was obtained.

Conclusions—Failure to follow up test results on inpatient services at a large academic center was unacceptably high. Maximizing personnel participation together with diligence and technology (EMR) will be required to improve communication.

Keywords

Gastrointestinal tests; Endoscopy; Quality improvement; Gastroenterology training

Introduction

Inpatient gastrointestinal (GI) illness is a very common problem. In 2013, ten of the top 100 diagnosis-related groups (DRGs) billed to the Centers for Medicare and Medicaid Services were GI-related illnesses, representing over 677,000 hospital discharges for that year [1]. It is likely that gastroenterology consultants were involved in the care of many of these patients. Since gastroenterology has a considerable procedure base, endoscopic procedures are routinely performed on inpatients, during which biopsies are obtained frequently. Gastroenterologists also order imaging studies and niche laboratory tests for their consult patients (e.g., *H. pylori* testing, celiac serology). A GI consult therefore generates tests in need of result follow-up and interpretation in the context of patient symptoms, communication of these results and management recommendations to patients and primary care providers (PCPs). In other settings, it has been demonstrated that up to 40% of inpatients will have test results pending at the time of discharge, and when measured on a per-test basis, these results are not communicated over 60% of the time [2, 3]. Although statistics specific for GI inpatients are not available, these numbers can potentially be extrapolated across medical specialties.

GI fellowship training aims to develop critical thinking in trainees, partly through encouragement of development of independent testing and management plans by trainees, under expert supervision. In tertiary care teaching institutions, gastroenterological care is provided through GI consults, typically performed by GI fellowship trainees as they learn the essentials of functioning as a gastroenterology consultant. The learning environment has the potential to generate a higher number of tests ordered compared to practicing gastroenterologists, similar to that reported for ICU patients [4]. However, the volume of tests ordered by a GI teaching service is not known. Further, the frequency of actionable findings, the likelihood of documented recommendations made on the basis of these findings, and the frequency of communication of test results and recommendations to patients and PCPs are largely unknown.

In this retrospective, observational cohort study performed as part of our fellowship program's quality improvement initiative, we sought to identify the volume of consults requested of the GI consult service over a 2-month time span at our institution. We wanted to determine the volume of testing recommendations made in evaluating these consults and the rate at which test results were successfully communicated to patients or their PCP. A secondary aim was to determine factors predicting suboptimal communication of actionable test results.

Methods

Patients

Consecutive adult patients evaluated by the general GI consult service at a single academic medical center over a 2-month period (January to March 2015) were identified and included in this observational cohort study. The GI consult service evaluates patients with acute inpatient gastrointestinal (GI) illness including GI bleeding, unexplained GI symptoms (e.g., nausea, pain, diarrhea) or other acute issues. Specifically, the general GI consult service does not evaluate patients with certain pre-existing gastrointestinal illnesses (e.g., inflammatory bowel disease, liver disease, biliary disease, pancreatic disease), conditions requiring specific invasive intervention (e.g., endoscopic retrograde cholangiopancreatography, esophageal, or colonic stent placement), or established patients followed up by faculty gastroenterologists in their outpatient practices; other services are designated for evaluation and follow-up of patients fulfilling these criteria. While data were collected with the primary purpose of quality improvement within the ACGME-mandated patient safety guidelines, the protocol for analysis and report of these data was approved by the Human Research Protection Office (institutional review board) at Washington University School of Medicine in St. Louis.

Data Collection

Patients and testing recommendations were extracted from an electronic sign-out document ("sign-out list") which is created and maintained by fellows rotating through the consult service as a record of current and past consults seen by the service. The sign-out list contains a brief summary of the presenting illness and a plan for evaluation and treatment, including recommended tests or procedures. New consults were identified by their first appearance on the sign-out list. Only tests recommended on the initial consult visit as reflected in the sign-out list were recorded. Patient demographic information including age, race, gender, zip code, insurance carrier, and name of primary care physician was extracted from the electronic medical record (EMR). The EMR programs used at our institution and for data collection for this study are Allscripts Sunrise (inpatient), Allscripts TouchWorks (outpatient), and a proprietary inpatient system (Clinical Desktop).

Testing recommendations were grouped into five broad categories as follows: endoscopy, biopsy, laboratory tests, imaging studies, and other (including esophageal physiologic studies). Details regarding testing performed were extracted, and 30-day readmission rates were also captured. US Census data were used to extract median income data based on patients' home zip code. An online calculator was used to calculate linear distance between the patient's zip code and that of our hospital (<https://www.melissadata.com/lookups/zipdistance.asp>). The patient database was generated and populated by a single investigator (BC) who was not involved with the GI consult service during the period of the study and therefore did not have any role in the evaluation and management of the study patients.

Follow-Up of Test Results

After the patient database was created, additional trainee investigators (TW, SA, JB, PB, HB, JB) with no direct involvement in management of the study subjects were recruited to

independently interrogate the EMR and extract additional data. Six months following the end of the enrollment period, the EMR was reviewed to determine whether patients or their PCP received appropriate follow-up of test results. Independent review of the test results was performed by the additional fellow investigators to identify tests with actionable findings that required further intervention. Patients were considered to have received appropriate follow-up if communication of results (to the patient or PCP) or plan for further testing or treatment was recorded in the EMR. Additionally, appropriate follow-up was assumed for an endoscopic procedure that did not require additional follow-up testing, or if test results or recommendations were mentioned in the hospital discharge summary for the inpatient stay.

Statistical Analysis

Grouped values are reported as mean $\pm$ standard error of mean (SEM) unless otherwise specified. Comparisons between groups were performed using Student's *t* tests, and Chi-square analyses were performed for binomial data, as appropriate. A multivariate logistic regression model was generated to establish the independent predictive value of demographic factors and test characteristics in adequate test follow-up. All statistical analyses were carried out using SPSS Statistics version 20 (IBM, Armonk, NY, USA). In each instance, $p < 0.05$ was required for statistical significance.

Results

Demographics and Test Characteristics

304 patients (mean age 60.3 ± 1 years, range 18–95 years, 47.4% female) were evaluated by the GI consult service over the 2-month study period (Table 1). Following consultation by the GI service, 490 individual tests (mean of 1.6 tests per patient seen) were recommended. The most frequent recommendation was for endoscopic evaluation, recommended in 364 instances, and consisting of 227 upper endoscopic examinations (including upper endoscopy and small bowel enteroscopy), 127 lower endoscopies (colonoscopy and flexible sigmoidoscopy), 2 endoscopic ultrasounds, and 8 video capsule endoscopies; endoscopic biopsies were also obtained in 88 patients. Other test recommendations included laboratory (blood) tests (23 patients), imaging studies (13 patients), and esophageal manometry (2 patients). Of the 490 potential tests, 53 (10.8%) were not performed during the hospital stay; these consisted of 27 upper endoscopies, 17 lower endoscopies, 2 capsule endoscopies, 1 endoscopic ultrasound, 3 laboratory studies, 2 imaging studies, and 1 esophageal manometry (Fig. 1). When performed, 193 endoscopic procedures (42.7%) were performed by clinically based faculty, 46 (10.2%) were performed by research faculty and 173 (38.3%) were performed by advanced 4th-year fellows (who, despite their title, are credentialed as attending gastroenterologists at our facility).

Follow-Up of Results

Based on study definitions, appropriate follow-up for test results was documented for 355 (81.2%) of the 437 tests performed, and 154 (78.2%) of the tests were deemed to have an actionable result (Fig. 1). Endoscopic findings necessitating a repeat procedure were among the most frequent actionable findings that were not followed up appropriately, despite the

fact that need for a repeat procedure may have been documented in the procedure report (Table 2).

Age and race had no impact on follow-up. However, women had a numerically higher likelihood of actionable findings in the test results, trending toward statistical significance (women 30.2% vs. men 18.4%, $p = 0.07$), and were significantly more likely to have failure of follow-up (women 27.5% vs. men 17.4%, $p = 0.037$). Patients on Medicare were less likely to receive appropriate follow-up than those with other types of insurance ($p = 0.05$). Patients who had a PCP listed on their discharge summary were no more likely to receive follow-up of results than those who did not ($p = 0.26$ for all results, $p = 0.19$ for actionable results). Socioeconomic status, as measured by median income per zip code had no effect on follow-up of results, actionable or not ($p = 0.87$ and 0.89 , respectively). Finally, distance of residence from our hospital was not associated with disparities in result communication ($p = 0.55$).

Follow-up of test results was different between the types of attending gastroenterologist supervising the procedures (Fig. 2). Tests, particularly endoscopic procedures supervised or completed by 4th-year advanced (interventional GI and transplant hepatology) fellows, were numerically less likely to be followed up, compared to those performed by clinical faculty ($p = 0.06$ for all results, $p = 0.08$ for actionable results). There was no difference in result follow-up between research-based and clinically based faculty ($p = 0.56$ for all results, $p = 0.42$ for actionable results). Patients with actionable findings on upper endoscopy were less likely to have adequate follow-up compared to those on lower endoscopy (31.9 vs. 18% failure of follow-up, respectively, $p = 0.07$). Thirty-day readmission rates were not affected by failure to follow up results.

Independent Predictors of Suboptimal Follow-Up

Multivariate logistic regression analysis was performed to determine statistically significant predictors of failure to follow up results (Table 3). Female gender, attending type, and having Medicare as primary insurance emerged as clinically significant predictors for failure to follow up results ($p = 0.03$), while other demographic features and prior identification of PCP did not predict suboptimal follow-up.

Discussion

In this report, we demonstrate that the rate of suboptimal follow-up of actionable test results in inpatient tests ordered by the GI consult service at a busy tertiary care service is as high as 18%. While consistent with prior reports on general medicine inpatients in the literature [3], this observation is much higher than was anticipated, yet our experience potentially reflects the status at many similar tertiary care settings. Although similar studies have been done for missed test results based on various test types [5–7], diseases [8, 9], and practice locations [10], to our knowledge, this appears to be the first study to focus exclusively on GI inpatients. We demonstrate that there are differences between genders, insurance coverage, and affiliation of attending gastroenterologist performing endoscopic procedures in how often test results are communicated adequately to patients and their PCPs. Upper endoscopy findings were less likely to be successfully communicated or acted on compared to lower

endoscopy or other test results. However, patient age, race, socioeconomic status or distance of residence from our hospital had no effect on result follow-up. This quality improvement study sheds light on considerable deficits in communication and perhaps points to a need for dedicated mechanisms for capturing results and updating recommendations based on tests ordered by gastroenterologists, particularly in academic settings.

Although consistent with data in the literature, we deem follow-up failure rate approaching 20% to be unacceptably high. This is even more pertinent as the model for healthcare reimbursement moves toward a quality-/value-based model. Pertinent to this study, the American Society of Gastrointestinal Endoscopy (ASGE) and the American College of Gastroenterology (ACG) have put forward documentation of plan for pathology follow-up and communication with referring providers as two of its 23 quality indicators for endoscopy, with the target goal for the former being 98% of procedures [11]. There is already a quality metric within colon cancer screening requiring documentation of prior colonoscopic findings including polyp histopathology in scheduling and performing further surveillance colonoscopic procedures [12]. In the future, it is anticipated that even more thorough documentation of result follow-up will be required for full reimbursement for procedures.

Currently at our institution, follow-up of results of non-endoscopic-based tests as well as scheduling of follow-up procedures is the primary responsibility of the trainees rotating through the service, although the ultimate accountability rests on the faculty attending supervising the procedure. Endoscopic biopsy results are routed to the performing attending gastroenterologist through the outpatient medical record, and then communication to patients and/or PCPs is coordinated through their support staff. Referring physicians ideally are identified and included on the endoscopy report and discharge summary which leads to transmission of these documents. We recognized from our research methodology that there was wide variation in how supervising attending physicians ensured follow-up of test results; mechanisms of follow-up were most consistent for endoscopic procedures, where a paper or electronic trail (i.e., a pathology report) was generated and transmitted to the supervising gastroenterologist. However, there was no similar trail for non-endoscopic procedures, and it was up to the individual trainees or attending gastroenterologist to follow up and direct further management for patients who would have left the hospital by the time many of these results were reviewed. We did not evaluate how often these documents did or did not make it to the intended physician, but did find that presence of a PCP on either of these documents had no impact on communication rates.

There are several possible methods by which this system could be improved. One method is by designating a dedicated nurse or medical assistant to follow up inpatient test results, who can be given the responsibility of alerting trainees on service and faculty gastroenterologists of the test results, obtaining further recommendations, and communicating these to PCPs and the patients themselves. However, in the era of tightening healthcare costs, funding such a position may be difficult, especially since tangible revenue benefits will not be enhanced by such a position. EMR software and result tracking are potentially helpful, though our specific system does not use pop-up alerts but instead requires providers to actively seek results among an often lengthy list of tasks. In other settings, more active notifications have

made some modest improvements, but can be hampered by providers never accessing EMR terminals [3, 13]. Finally, an interesting option is automatic staged release of records directly to patients. This system gives providers a set amount of time to contact patients with results before finally entrusting the responsibility of follow-up of actionable results on the patients themselves. This has been implemented successfully at other large academic medical centers [14]. However, this algorithm may be hamstrung by physician discomfort in allowing patients direct access to innocuous as well as significant test results without filter and interpretation, and by lack of interest on the part of patients for electronic communication of test results [15, 16]. In the end, improvement will likely require increasing or optimizing the efficiency of current ancillary staff and customizing the EMR to provide an effective, fail-safe system for ensuring that results are communicated to patients and that follow-up procedures are scheduled.

Our institution proposes to institute a “sign-off” electronic document at the end of each GI consultation that summarizes final recommendations, which will alert all treating physicians regarding tests results that remain pending at the point of sign-off or discharge. Other possibilities include having a mandated time when the entire consult team (fellows and attending) sit down to review test results, develop plans based on those results, and coordinate efforts to communicate the results and plans to the patients and their primary care providers and having a “sign-off checklist” in the fellow hand-off document that would include items such as pathology or laboratory results, need for repeat endoscopy, and whether request for scheduling had been made. This checklist would have to be completed before a patient can be removed from the list. These two measures serve to standardize what is usually current practice and, while they may fall subject to time constraints and high volume of consults, could potentially improve result communication as well. In the interim, fellows do not delete names from their lists until all test results pending have been received and reviewed, and result communicated to treating physicians.

Limitations of this study include reliance on retrospective chart review as the sole means of determining follow-up. It is entirely possible that some results may have been verbally communicated to patients, but this encounter was not clearly documented in the medical record. In addition, our healthcare portal was not analyzed for follow-up of results, primarily because this system is geared toward outpatient and not inpatient encounters. Another potential limitation stems from how failure of communication was defined. The majority of patients with actionable findings without follow-up were patients with endoscopic findings requiring a repeat procedure which was not done by the follow-up interval. For results such as colon polyps, the follow-up interval indeed was likely too short to capture follow-up procedures on these patients. Second, a significant number of patients may not have been candidates for repeat procedures given multiple other acute medical issues. Finally, all of the follow-up on diagnostic tests was given similar weight, without consideration for the potential gravity of failed communications in a particular case. However, we feel that these are balanced by the large number of patients with no exclusion criteria, providing a real-world study population which is likely similar to many other large academic hospitals.

In conclusion, we observe unacceptably high rate of failure of follow-up of actionable test results following recommendation of testing by an inpatient GI consult service at a tertiary

care academic institution. We suspect our institution's experience may potentially reflect the situation in many similar academic institutions and other practice settings. Pragmatic solutions involving a combination of hiring dedicated support personnel and designing functional electronic alerts already embedded in EMR will be necessary in order to correct lapses in the proper follow-up of diagnostic GI testing.

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Fig. 1.

Flow diagram describing tests recommended by the inpatient consult service and frequency of communication of test results to patients and primary care providers. Overall, 21.8% of all tests recommended and 18.8% of tests with actionable results did not have documentation of adequate communication of results

Fig. 2.

Frequency of failure of test result follow-up by attending affiliation. Advanced fellows had the highest rate of failure of test follow-up, with differences strongly trending toward statistical significance compared to clinical faculty ($p = 0.06$ for all results, $p = 0.08$ for actionable results). There were no significant differences between rates of failure of follow-up between clinical and research faculty

Table 1

Patient demographic information

Total number of patients	304
Age (mean $\pm$ SD)	60.35 $\pm$ 17.1
Gender [<i>n</i> (%)]	
Male	160 (52.6)
Female	144 (47.4)
Race [<i>n</i> (%)]	
Caucasian	179 (58.9)
African-American	108 (35.5)
Hispanic	7 (2.3)
Other	1 (0.3)
Not recorded	9 (3)
Insurance type [<i>n</i> (%)]	
Private	48 (15.8)
Medicare	175 (57.6)
Medicaid	25 (8.2)
None	56 (18.4)
Readmitted within 30 days [<i>n</i> (%)]	52 (17.1)

Table 2

Most common actionable results that were not communicated to patients

Finding	Number of patients	Follow-up recommended in endoscopy report (%)
Esophagitis	10	8 (80)
Gastric ulcer	7	2 (28.6)
Polyps ^a	6	6 (100)
Tubular adenoma	4	n/a ^b
Barrett's (suspected)	3	2 (66.7)

^a1 was a small bowel polyp, and the remainder were colonic polyps

^bThese results were from a pathology report rather than an endoscopy report

Table 3

Multivariate logistic regression to identify independent predictors of failure of appropriate follow-up

Factors	Odds ratio (95% CI)	<i>p</i> value
Age	1.02 (0.997–1.036)	0.095
Gender	0.52 (0.289–0.937)	0.03
Race	0.92 (0.653–1.305)	0.652
PCP	1.11 (0.776–1.588)	0.568
Insurance type ^a	0.432 (0.215–0.87)	0.019
Attending type ^b	0.681 (0.516–0.898)	0.006

^aMedicare versus all other types of insurance^bAdvanced fellows versus full-time faculty