

A Brief, Low-cost Intervention Improves the Quality of Ambulatory Gastroenterology Consultation Notes

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ABSTRACT

BACKGROUND: Effective communication between primary care providers and specialty providers is important to facilitate high-quality specialty care. Few studies have assessed the quality of communication from specialist to primary care providers or implemented interventions to improve quality. We developed a brief, low-cost intervention designed to improve the quality of ambulatory gastroenterology consultation notes written by fellows and nurse practitioners in our urban health care system.

METHODS: Six physicians (3 specialists and 3 primary care providers) scored pre- and postintervention notes using an objective quality assessment instrument that had excellent inter-rater reliability. They were blinded to note date, author, and pre/postintervention status. The primary outcome was improvement in Composite Quality Score, an objective, comprehensive assessment of quality. Secondary outcomes included improvements in 3 specific domains, and Global Quality Score (a subjective measure of quality).

RESULTS: Two hundred pre- and 200 postintervention notes written by 6 fellows and 2 nurse practitioners were included. Composite Quality Score improved from 3.74 (of 5) to 4.09 ($P < .001$ in adjusted analysis). All secondary outcomes improved in adjusted analyses as well. The largest increase was seen in Communication Domain (22% increase). Fellow-written notes had higher scores than nurse practitioner-written notes, but nurse practitioner-written notes improved to a greater degree.

CONCLUSION: A brief, low-cost intervention significantly improved the quality of ambulatory gastroenterology consultation notes written by fellows and nurse practitioners. Communication between primary care providers and specialists is an important area for further study.

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Specialty care is used with increasing frequency in the US. Over the past decade, the proportion of office visits resulting in referral to a specialist rose by more than 150%, and in 2009, nearly 20% of all primary care visits were associated

with referral to a specialist.¹ High-quality specialty care depends on accurate and effective communication between the referring primary care provider and the specialty provider.² Inadequate exchange of information may result in

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unnecessary office visits, repeated testing (which can be costly and invasive), and patient complications.^{3,4} In a recent review of the specialty referral process, Mehrotra et al identified few studies that evaluated transfer of information between primary care providers and specialists; only one of these was published during the past decade.⁵ In the identified studies, communication between primary care providers and specialists was often completely absent or lacking in adequate content. Additionally, few studies evaluated the information transferred from specialist to primary care provider, and all were based on subjective self-report.

Because high-quality communication from specialist to primary care provider is important, yet understudied, we designed and implemented a brief, easily adaptable quality-improvement intervention to assess and enhance the quality of ambulatory consultative notes from gastroenterologists to referring primary care providers in our health care system. Gastroenterology may be a good specialty in which to examine these issues. A large proportion of patients are referred to gastroenterologists either for a procedure, or for a complaint requiring a brief work-up, followed by recommendations, and return of the patient to the primary care provider.⁶ Unlike some other internal medicine-based subspecialties, there are relatively few gastroenterological conditions that require long-term specialist follow-up. The high frequency of hand-offs from gastroenterologists to primary care providers enhances the importance of high-quality specialist-to-primary-care-provider communication.

Our intervention was designed with 2 specific aims: to assess the quality of ambulatory gastroenterology consultation notes in our health care system; and to assess the effectiveness of a brief intervention for improving the quality of ambulatory gastroenterology consultation notes. We focused our intervention on fellows and nurse practitioners, as they write the majority of ambulatory consultation notes in our clinic.

METHODS

Study Setting

San Francisco General Hospital and Trauma Center is the main referral center for the San Francisco's safety net health care system's 26 primary care clinics. The Gastroenterology Clinic at San Francisco General Hospital and Trauma Center is the primary source of gastrointestinal specialty care within the system, receiving nearly 5000 patient referrals per year via an electronic referral system that facilitates iterative communications between referring primary care providers

and specialists.⁷ Usually, patients are seen initially by either a gastroenterology fellow affiliated with the University of California San Francisco (UCSF), or a trained gastroenterology nurse practitioner. Trainees are required to discuss all cases with attending gastroenterologists, all of whom are UCSF faculty. Nurse practitioners may manage appropriate patient cases autonomously. Fellows and nurse practitioners dictate notes that are transcribed into the electronic medical record, and are later edited and signed. These notes are electronically available to all primary care providers.

CLINICAL SIGNIFICANCE

- Effective communication between specialists and primary care providers is important for providing high-quality specialty care.
- A brief intervention improved the quality of ambulatory gastroenterology consultation notes as measured both objectively and subjectively. This simple intervention is low cost and easily adaptable to multiple settings.
- Postgraduate medical training programs should place greater emphasis on communication between specialists and primary care providers.

Intervention

We developed and implemented a brief intervention to improve the quality of ambulatory consultation notes written by gastroenterology fellows and nurse practitioners. First-year gastroenterology fellows rotate through our site in 2-month blocks, including one block during the first half of the academic year (July-December) and one block during the second half of the academic year (January-June). The intervention took place during the second half of the academic year (January-June 2012) so that fellows would have completed 6 months of specialty training, and would be familiar with the medical record. Participating nurse practitioners were included during the first 2 months of the study to avoid incidental exposure to the intervention before inclusion. **Figure 1** depicts the flow of the intervention.

The intervention consisted of a 5-minute discussion by a member of our study team (JLS) with fellows and nurse practitioners emphasizing the importance of clear communication through consultation notes. During the discussion, trainees and nurse practitioners were provided a "GI [gastroenterology] Clinic Note Guide" on a 3 × 5-inch laminated card (**Figure 2**), which emphasized 3 primary communication domains. Based on work by our group and others,⁸⁻¹⁰ these domains of note quality included: 1) *Assessment Domain*: clear reason for consultation specified and appropriate differential diagnosis discussed; 2) *Plan Domain*: specialist's rationale for diagnostic and therapeutic plan clearly explained; and 3) *Communication Domain*: note clearly communicates which diagnostics and therapeutics the specialist will take responsibility for (including timeframe), which diagnostics and therapeutics the primary care provider should take responsibility for (including timeframe), and patient disposition and follow-up. Providers were encouraged to use the note guide during dictation. During intervention months, note guides were posted near telephone stations used for dictation. No further encouragement or reminders to use the note guides were given at any time.

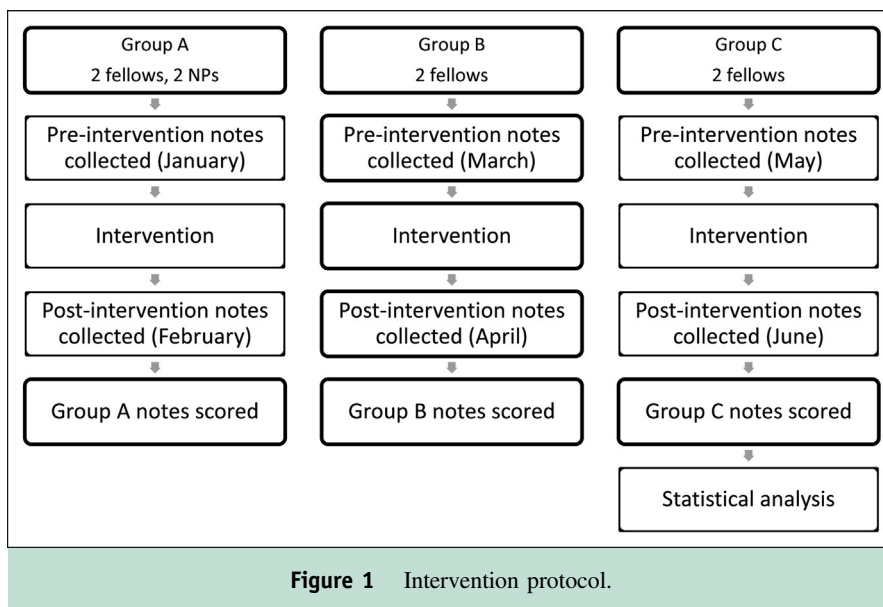


Figure 1 Intervention protocol.

Outcome Measures

We adapted an existing instrument to objectively rate the quality of consultation notes based on the 3 domains.⁸ Scores for the 3 domains were combined to create a *Composite Quality Score*, which was the primary outcome. The instrument also included a subjective assessment of note quality, the *Global Quality Score*, which was used to internally

validate the Composite Quality Score. The primary outcome was change in Composite Quality Score. Secondary outcomes included changes in any of the 3 individual domains or the Global Quality Score.

Spearman's rank correlation between the Composite Quality Score and the Global Quality Score produced a ρ of 0.71 ($P < .0001$). Importantly, the instrument had excellent inter-rater reliability, with intraclass coefficients among the 3 domain scores ranging from 0.80 for the Plan Domain (95% confidence interval [CI], 0.51-0.94) to 0.94 for the Assessment Domain (95% CI, 0.85-0.98). The intraclass coefficient for the Composite Quality Score was 0.88 (95% CI, 0.71-0.97).

Data Collection and Processing

De-identified consultation notes were collected pre- and postintervention. At the end of each 2-month block, 25 pre- and 25 postintervention notes were randomly selected for each fellow and nurse practitioner. These notes were randomly assigned to 6 raters, who were blinded to the note dates, authors, and pre- or postintervention status. Three of the reviewers were primary care providers (RA, AHC, AY), and 3 were specialists (LWD, JLS, DT). Note packets were distributed after each 2-month time block and included a random sample of pre- and postintervention notes. The quality assessment instrument was administered using REDCap, a secure, web-based electronic data capture application hosted at UCSF.¹¹ Data were exported from REDCap into a Stata spreadsheet (StataCorp LP, College Station, Tex), where they were linked with data about note characteristics to which reviewers had been blinded.

Data Analysis

Composite Quality Score was assessed for the entire group of providers, for fellows and nurse practitioners separately,

GI Clinic Note Guide – INITIAL CONSULTATION

1. Date of service, attending physician
2. **Specific reason for consultation**
3. HPI/PMHx/Rx/SocHx/FamHx/ROS/physical exam/labs and studies
4. **Impression with detailed diagnostic and therapeutic plan**
5. **Recommendations listed by number**
 - a. **What diagnostics and therapeutics will GI be responsible for?**
 - b. **What diagnostics and therapeutics will PCP be responsible for, and within what time frame?**
 - c. **When will the patient follow up in GI clinic, or are they being discharged from clinic?**

GI Clinic Note Guide – FOLLOW UP VISITS

1. Date of service, attending physician
2. **Specific reason for follow up visit**
3. Interim history
4. Rx/physical exam/labs and studies as appropriate
5. **Impression with detailed diagnostic and therapeutic plan**
6. **Recommendations listed by number**
 - a. **What diagnostics and therapeutics will GI be responsible for?**
 - b. **What diagnostics and therapeutics will PCP be responsible for, and within what time frame?**
 - c. **When will the patient follow up in GI clinic, or are they being discharged from clinic?**

Figure 2 Dictation guide used for intervention. FamHx = family history; GI = gastroenterology; HPI = history of present illness; PCP = primary care provider; PMHx = past medical history; ROS = review of systems; Rx = medications; SocHx = social history.

and for individual providers. Secondary outcomes were assessed for all providers combined.

We used means and proportions to calculate summary statistics. We used 2-tailed *t*-tests for univariable analyses and linear regression models for adjusted analyses of primary and secondary outcomes. We chose a priori to adjust multivariable models for training of note reviewer (primary care provider vs. specialist) and type of visit (initial consultation vs follow-up visit). Stata 11.2 was used for all analyses.

Ethical Considerations

This study met criteria for a Quality Improvement project, as defined by the UCSF Committee on Human Research, and therefore did not require formal review by our Institutional Review Board.

RESULTS

Summary of Notes Reviewed

There were 602 ambulatory consultation notes written by 8 providers (2 nurse practitioners and 6 fellows) over the 6-month study period. For each provider, 25 preintervention notes and 25 postintervention notes were randomly selected, for a total sample size of 400 notes. The most common reason for gastroenterology visits was abdominal pain or dyspepsia (17.5%). Other common causes included personal history of colorectal cancer or colonic polyps (14.5%) and inflammatory bowel disease (10.3%). The proportion of patients seen for initial versus follow-up visits was similar

among pre- and postintervention notes (40% vs 32% for initial visits, $P = .1$). **Table 1** summarizes these data.

Primary and Secondary Outcomes—Univariable Analysis

The mean baseline Composite Quality Score (primary outcome) for preintervention notes was 3.74 (of 5). This increased postintervention by 9% to 4.09 ($P < .0001$, **Figure 3**). Statistically significant improvement was seen in 3 of 6 fellows, and in both nurse practitioners (**Figure 4**).

Improvement was seen in all secondary outcomes as well (**Figure 3**). Baseline Assessment Domain score was 4.25 (of 5). This increased significantly by 7% to 4.54 postintervention ($P = .01$). Baseline Plan Domain score was 4.39 (of 5). This increased by 4% to 4.58 postintervention, but this was not statistically significant in univariable analysis ($P = .1$). Baseline Communication Domain score was 2.61 (of 5). This showed the greatest increase postintervention. Postintervention score was 3.18, a 22% increase ($P = .0001$). Baseline Global Quality Score (a subjective assessment) was 4.04 (of 5). This increased significantly by 6% postintervention to 4.27 ($P = .007$).

Fellows had higher scores than nurse practitioners for both pre- and postintervention notes for Composite Quality Score, Global Quality Score, Assessment Domain, and Plan Domain ($P < .05$ for all comparisons, both pre- and post-intervention). However, magnitude of improvement was greater among nurse practitioners than among fellows. For example, Composite Quality Score improved by 20.1% (from 2.98 to 3.73) among nurse practitioners, compared

Table 1 Characteristics of Consultation Notes

	Preintervention n = 200	Postintervention n = 200	All Time Periods n = 400
Type of visit, n (%)			
Initial visit	80 (40.0)	64 (32.0)	144 (36.0)
Follow-up visit	120 (60.0)	136 (68.0)	256 (64.0)
Primary indications for visit, n (%)			
Abdominal pain or dyspepsia	39 (19.5)	31 (15.5)	70 (17.5)
Personal history of colonic polyps or colorectal cancer	27 (13.5)	31 (15.5)	58 (14.5)
Crohn disease or ulcerative colitis	19 (9.5)	22 (11.0)	41 (10.3)
Positive FOBT or FIT	15 (7.5)	23 (11.5)	38 (9.5)
GERD	15 (7.5)	10 (5.0)	25 (6.3)
Gastrointestinal bleeding	15 (7.5)	14 (7.0)	29 (7.3)
Anemia	8 (4.0)	11 (5.5)	19 (4.8)
Change in bowel habits	9 (4.5)	4 (2.0)	13 (3.3)
Dysphagia	5 (2.5)	6 (3.0)	11 (2.8)
Abnormal weight loss	4 (2.0)	5 (2.5)	9 (2.3)
Documented pancreatic disease	5 (2.5)	4 (2.0)	9 (2.3)
Documented biliary tract disease	5 (2.5)	3 (1.5)	8 (2.0)
Family history of cancer	4 (2.0)	4 (2.0)	8 (2.0)
Diverticular disease	1 (0.5)	4 (2.0)	5 (1.3)
Other	20 (10.0)	22 (11.0)	42 (10.5)
Unclear/not specified	9 (4.5)	6 (3.0)	15 (3.8)

FOBT = fecal occult blood test; FIT = fecal immunochemical test; GERD = gastroesophageal reflux disease.

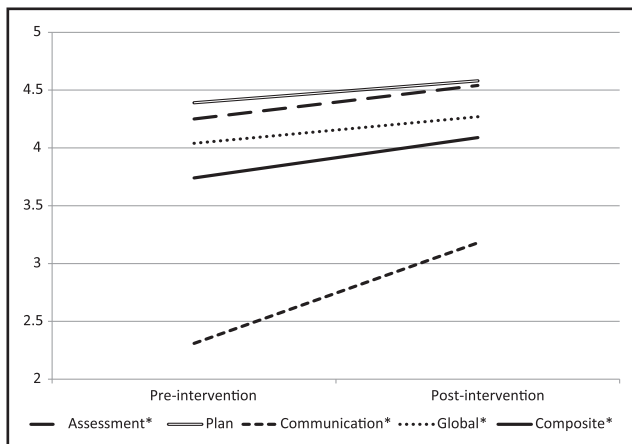


Figure 3 Effect of intervention on primary and secondary outcomes for all providers combined. * $P < .05$ comparing pre-intervention score with postintervention score in univariable analysis.

with a 6.6% increase (from 3.95 to 4.21) among fellows. Similarly, Communication Domain score increased by 52% (from 2.12 to 3.23) among nurse practitioners, compared with 16% (from 2.74 to 3.17) among fellows. Pre-intervention, there was a statistically significant difference between fellows and nurse practitioners for the Communication Domain ($P = .01$), but postintervention, there was no difference ($P = .8$).

Multivariable Analysis of Intervention Effectiveness

In analysis adjusted for training type (fellow vs. nurse practitioner), type of visit (initial consultation vs follow-up visit), and training of note reviewer (primary care vs specialty care), postintervention notes were associated with significantly higher Composite Quality Scores and scores for all secondary outcomes compared with preintervention

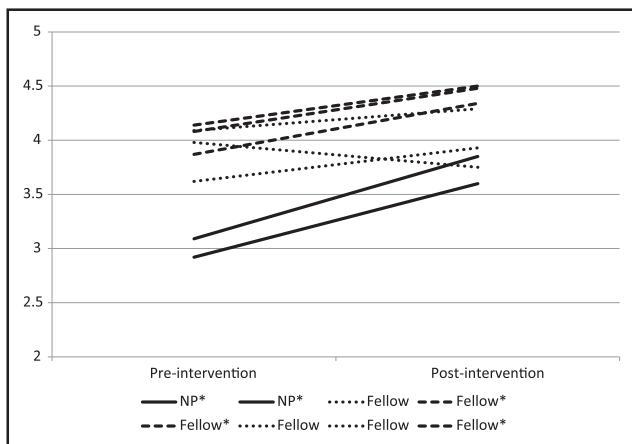


Figure 4 Effect of intervention on Composite Quality Score by provider. * $P < .05$ comparing Composite Quality Score pre- and postintervention. NP = nurse practitioner.

notes (Table 2). Compared with nurse practitioner-written notes, fellow-written notes had higher Composite Quality Score, Global Quality Score, and scores in the Assessment and Plan Domains. However, scores in the Communication Domain did not differ. Although score for the Plan Domain did not change significantly in univariable analysis, post-intervention notes were associated with higher scores in the Plan Domain in the multivariable analysis ($P = .03$).

DISCUSSION

We demonstrate that a brief, low-cost intervention can significantly improve the quality of ambulatory gastroenterology consultation notes written by fellows and nurse practitioners. The Communication Domain had the lowest baseline score (fellow-written notes scored 55% of available points, and nurse practitioner-written notes scored 42% of available points), and the greatest improvement (16% improvement for fellows, 52% improvement for nurse practitioners). The Assessment and Plan Domains had higher baseline scores, but also improved as a result of the intervention.

Several studies have assessed primary care provider preferences for, and frequency of, transfer of information from specialists.¹²⁻¹⁵ However, few have assessed the quality of consultative notes written by specialists, or documented methods to improve specialty note quality.^{10,16,17} In 2002, Tattersall described the use of a template to improve notes from medical, surgical, and radiation oncologists to primary care providers.¹⁷ Postintervention, formatting of notes improved, but only 4 of 10 content items improved. In 2011,

Table 2 Multivariable Analysis of Primary and Secondary Outcomes*

	β -Coefficient (95% Confidence Interval)	P Value
Composite Quality Score (primary outcome)		
Postintervention status	0.36 (0.21-0.52)	<.001
Fellow (vs NP)	0.72 (0.54-0.90)	<.001
Secondary outcomes		
Assessment Domain Score		
Postintervention status	0.33 (0.12-0.54)	.002
Fellow (vs NP)	0.96 (0.71-1.21)	<.001
Plan Domain Score		
Postintervention status	0.24 (0.03-0.46)	.03
Fellow (vs NP)	0.92 (0.67-1.17)	<.001
Communication Domain Score		
Postintervention status	0.53 (0.25-0.82)	<.001
Fellow (vs NP)	0.26 (-0.08-0.59)	.13
Global Score		
Postintervention status	0.25 (0.10-0.41)	.002
Fellow (vs NP)	0.78 (0.59-0.97)	<.001

NP = nurse practitioner.

*All analyses were adjusted for reviewer training (primary care vs specialty care provider) and type of visit (initial consultation vs follow-up visit).

Stille described the use of a template to improve the quality of specialists' notes to primary care providers.¹⁰ They found that providers using the template were more likely to include desired information in their notes. For both of the above studies, the intervention took 1 hour or more. Neither study involved trainees, and both involved substantial risk of participation bias (providers who chose to participate may have been more interested in note quality, thereby biasing the results toward a significant change). Furthermore, quality evaluation was limited to a checklist of formatting and clinical content and did not measure communicative content objectively, arguably one of the most important aspects of a consultation note.

There are many logical purposes of consultation notes, including billing, defense in case of medicolegal action, intraclinic communication, or interclinic communication. We designed our intervention from the perspective that the main purpose of a consultative note is to communicate recommendations to the referring primary care provider, which is supported by prior work among our group and others.⁸⁻¹⁰ The importance of this *a priori* focus of our study is supported by the low baseline scores in the Communication Domain in both fellow-written and nurse practitioner-written notes. The nearly 25% improvement in the Communication Domain suggests that our intervention achieved this main objective using a brief, easily adaptable, low-cost intervention.

Unlike prior studies, our intervention targeted subspecialty trainees (gastroenterology fellows), and subspecialty midlevel providers (nurse practitioners). It is known that subspecialty trainees receive little formal instruction in specialist–primary care provider communication.¹⁸ Through this intervention, we taught fellows the components and importance of high-quality consultation notes at an early point in their training, rather than later in practice, when habits may become more ingrained. We theorize that this may result in more durable changes in behavior. Our study is not designed to evaluate behavior at later time points, but this is an area of future interest.

Our inclusion of subspecialty mid-level providers also is unique. Prior studies support the efficacy of nurse practitioners performing endoscopic procedures,^{19,20} and the role of mid-level providers in gastroenterology care seems to be increasing.²¹ However, the role and effectiveness of mid-level providers within nonprocedural aspects of gastroenterological practice has not been rigorously evaluated.²¹ Our study reveals 2 important insights related to midlevel providers in nonprocedural aspects of ambulatory gastroenterological care. Firstly, the baseline quality of notes was lower for nurse practitioners compared with fellows. This could reflect shorter duration of training for nurse practitioners compared with fellows, differences in the type or emphasis of training received, confounding by our small sample size with only 2 nurse practitioners, or other unmeasured factors. Importantly, we found that nurse practitioners' note quality improved to a greater degree than fellows' note quality postintervention. For example, Composite Quality Score improved by 25% for nurse practitioners, compared

with 7% for fellows, and Global Quality Score improved by 17% for nurse practitioners, compared with 4% for fellows. Most interestingly, Communication Domain improved by 52% among nurse practitioners, compared with 16% among fellows. It is likely that, with further training, the quality of nurse practitioner notes would equal the quality of fellow notes. Although the differences we identified between nurse practitioners and fellows are interesting, our study does not permit us to identify definite reasons underlying these differences, and the role of midlevel providers in gastroenterology and other specialty services should be the subject of ongoing examination.

Our brief intervention produced significant improvements in note quality with minimal time, effort, and resources. Although the intervention's cost was not formally measured, its cost-effectiveness is intuitive, as the only expenditures were card printing and laminating, and the intervention took 5 minutes or less to complete. This was intentional, as we wanted our intervention to be easily adaptable and transferable for use in diverse clinical settings.

Our study has several strengths. We adapted a previously published tool for assessing note quality, and our intraclass coefficient was high (0.88 for Composite Quality Score), suggesting excellent inter-rater reliability. Our note raters included both primary care providers and specialists, which increases generalizability of our findings. Note reviewers were blinded to note author, date, and pre/postintervention status, reducing expectation bias in note scoring. Fellows and nurse practitioners who were involved in our study were not aware that their notes were being formally scored, eliminating participant bias. Contamination bias was minimized by the structure of our intervention.

There are several limitations to our study. Our quality assessment tool was not a validated instrument. No such instrument exists, and we used an adapted version of a relevant, previously published tool.⁸⁻¹⁰ Quality was assessed by our study group, and not by referring primary care providers, the ultimate end-users of consultation notes. While it was not feasible for us to directly examine primary care provider satisfaction, our raters included primary care providers from diverse primary care clinics in our health care system. We cannot assess whether improved quality of notes results in higher quality of patient care. We believe that improved quality of consultation notes is an important outcomes measure in and of itself, because excellent communication is necessary for high-quality, coordinated specialty care.⁵ Finally, we evaluated notes from only one specialty field. We believe that the key components of a specialty note are broadly applicable across different specialty fields, and we plan to apply our intervention across multiple medicine-based subspecialties within our health care system.

In summary, we document that a brief, low-cost intervention, requiring minimal time and resources, can improve the quality of gastroenterology consultation notes written by fellows and nurse practitioners. The largest improvements were seen in the area of communication, consistent with our intervention's focus. Postgraduate medical training

programs should place greater emphasis on communication between specialists and primary care providers.

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