

Narrative, Written Sign-Outs and Interns' and Senior Medical Students' Confidence: A Randomized, Controlled Crossover Trial

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Abstract

Background Failures of communication during the transfer of patient care errors.

Methods We created a new format for written sign-out material, based on aviation industry practice and cognitive psychology theory, designed to improve interns' and senior medical students' communication during transfers of patient care responsibility. We carried out a randomized, blinded, crossover trial, comparing a new, narrative, written sign-out report to a usual written sign-out. Thirty-two interns and fourth-year medical students rated their confidence across various clinical

tasks and answered clinical questions regarding hypothetical patients presented to them in written, new, narrative sign-out compared with the customary format.

Results There was no statistical difference in confidence when interns and senior medical students received usual versus narrative sign-outs.

Conclusions Although a limited measure suggested some improvement in competence, the narrative format did not improve participants' self-rated confidence during patient-care transfer.

Editor's Note: The online version of this article contains a sample sign out, questionnaires, and the information sheet used in this study.

Background

Between 44 000 and 98 000 deaths are attributed to medical errors in the United States each year.¹ Many of those errors are caused by faulty or incomplete communication between

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Presented as a poster at the New York University Department of Medicine Research Day; May 7, 2008; New York City, New York.

Funding: The authors report no external funding source for this study.

The authors would like to thank the following individuals for their direct input and support: Marc Gourevitch, MD, FACP; Ellie Grossman, MD; Adina Kalet, MD; Nathan Link, MD; and Gregory Mints, MD. Elizabeth Chuang, MD, had full access to all data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Received January 27, 2011; revision received July 20, 2011, and October 17, 2011; accepted October 25, 2011.

DOI: <http://dx.doi.org/10.4300/JGME-D-11-00026.1>

clinicians.²⁻⁵ Resident work hour restrictions have increased the importance of communication between the primary team and other clinicians caring for the patient.⁶

Traditionally, residents receive little training in effective handoffs.³ A review of oral and written sign-out reports found that critical information about the patient's current clinical condition and trajectory are frequently omitted.⁷ In addition, residents reported that incomplete information in written sign-outs has caused confusion and delayed care, particularly if anticipatory guidance is omitted.⁸⁻¹⁰

Medical educators have designed training programs to standardize sign-out reports.¹¹⁻¹³ Although these programs seem likely to improve patient handoffs, we are unaware of any randomized, controlled trials comparing standardized sign-outs with usual practice. A review of written sign-out reports at New York University Langone Medical Center revealed loosely organized and poorly integrated information (E. Chuang, unpublished data, 2008). We hypothesized that a change from the current practice to a narrative form, with the aim of improving situational awareness (SA), would decrease medical errors. As a first step, we examined whether fourth-year students and interns were more confident when provided information in a standardized form compared with the current, unstandardized format.

Conceptual Model

Aviation researchers define SA as "a shared understanding of 'what's going on' and 'what is likely to happen

next.”^{14(p159)} Situational awareness has 3 levels. Level 1 involves perception of the facts in the environment. Level 2 involves the integration of the level 1 information to determine its relevance to the person’s goals and objectives. Level 3 is the ability to forecast future events based on the information in level 1 and level 2.

The concept of SA can be adapted to medical communication. Level 1 includes only the basic facts of a clinical case, for example: “A 60-year-old woman with diabetes mellitus presented to the emergency room with 3 days of cough productive of yellow sputum, fever to 102°F [39°C], and a chest x-ray showing consolidation in the left lower lobe of her lung. She has been placed on ceftriaxone and azithromycin.” Level 2 incorporates the working diagnosis. For example: “A 60-year-old woman with diabetes mellitus is being treated with ceftriaxone and azithromycin for community-acquired pneumonia.” Level 3 adds the planned treatment course and potential adverse events or pitfalls of treatment in a particular patient. For example: “A 60-year-old woman with diabetes mellitus was admitted with community-acquired pneumonia. She has already improved on 2 days of ceftriaxone and azithromycin. We anticipate discharge to home tomorrow if she is no longer symptomatic when ambulating.”

Narrative texts are easier to process and comprehend than other formats, such as expository texts, because they follow a familiar and predictable pattern making more cognitive resources available for higher-level processing.¹⁵ When a clinical case is described using SA, the history is presented as a coherent narration, with a beginning (patient presentation), middle (hospital course), and end (anticipated disposition).

Methods

Participants

Seventy-two fourth-year medical students and first-year residents (18 medical students [25%]; 43 interns [60%]; 11 [15%] declined to participate in the first survey, which collected demographic information) were invited to participate in our study between March and April of 2008. The New York University Ethics Board reviewed and approved our study (H07-792) (FIGURE 1).

Design and Procedure

We based usual written sign-out reports, which were of similar poor quality when compared with other studies that have examined the written sign-out,¹⁰ on examples from actual patients with identifiers changed to protect patient privacy. They included sentence fragments and abbreviations commonly found in sign-out reports at New York University and contained mostly level 1 and some level 2

What was known

Patient handovers are frequent events and communication problems may lead to errors and omissions in subsequent care.

What is new

In a randomized study, a “narrative sign-out,” based on aviation industry practice and cognitive psychology, did not increase participants’ self-rated confidence, compared to a standard sign-out.

Limitations

Small sample, single-site study, participants’ self-rated confidence may correlate poorly with actual performance.

Bottom line

A limited measure of competence suggested improved performance with the narrative sign-out, suggesting a need for future research with a larger sample and a more robust measure.

information. We chose cases that had some complexity in clinical presentation to avoid ceiling effects. We created narrative, written sign-outs that incorporated the principles of SA and all 3 levels of data. As much as possible, both formats contained the same clinical information.

To control for variability in individual participant characteristics and prior experience, the study was performed in a crossover, double-blind design on 2 separate days at mandatory academic conferences at 1 of 3 hospitals: Tisch Hospital, the Manhattan Campus of the New York Harbor Veterans Administration Healthcare System, and Bellevue Hospital Center (FIGURE 2). On week 1, participants were given either a narrative or a usual sign-out report describing a patient with shortness of breath, a questionnaire, and an information sheet. In week 2, participants were given either a narrative or usual sign-out describing a patient with gastrointestinal bleeding and another questionnaire and information sheet. (All documents are available as online supplemental material). Using a unique identifier, participants were given a sign-out report that was in the opposite format compared with the one they received in week 1.

The questionnaire rated participant self-efficacy on a 5-point Likert scale (1 = not at all confident; 5 = very confident) on performing specific clinical tasks related to the case (3 questions); communication with the patient, family, or a consulting physician (3 questions); and overall confidence (2 questions). These scales were adapted and simplified from a validated scale used to measure physicians’ confidence performing clinical procedures.¹⁶ Similar Likert scales have been used in studies of medical students, residents, and attending physicians with good reliability.^{17–19} Competence and diagnostic reasoning were assessed using 2 multiple-choice questions. A panel of 5 New York University attending physicians agreed on the correct answers for the

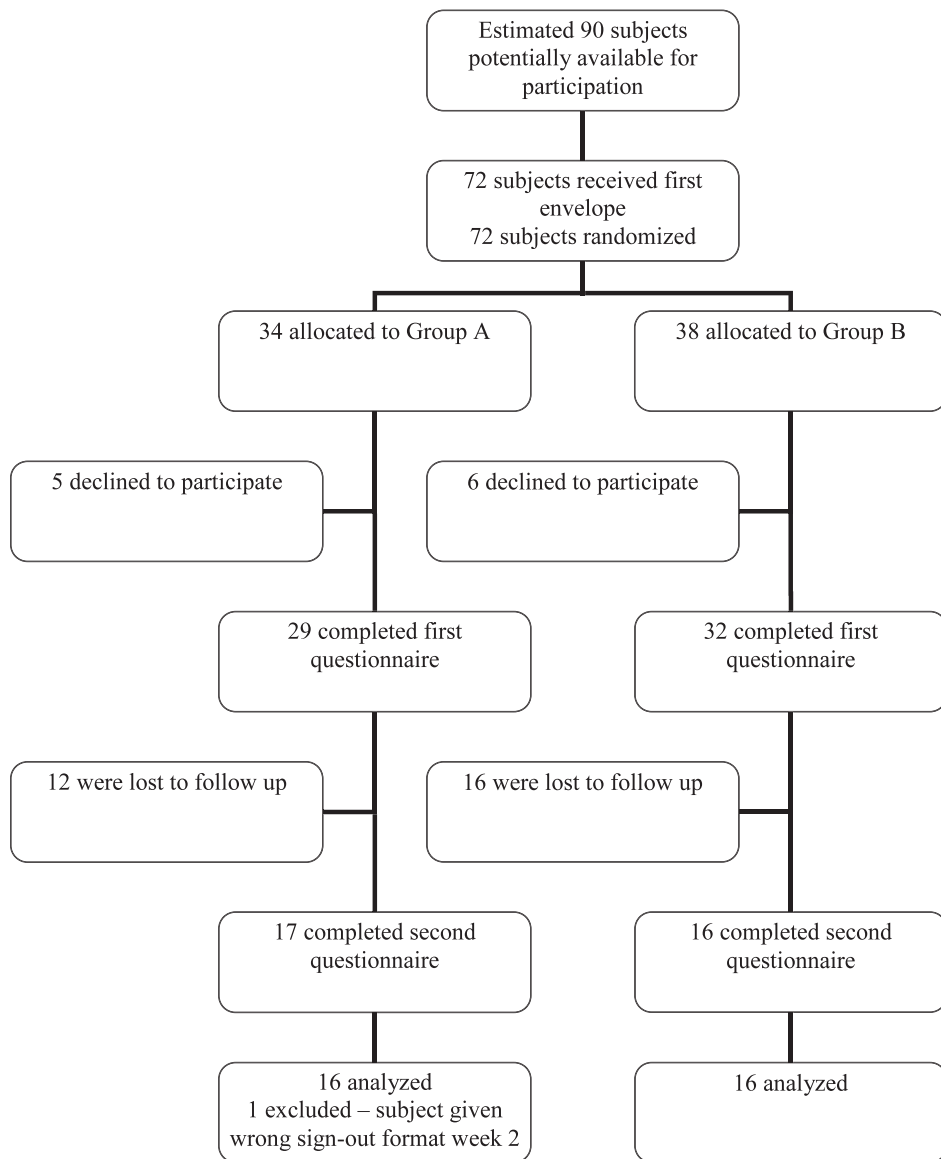


FIGURE 1 | PARTICIPANT FLOW

clinical questions. Demographic information was also collected.

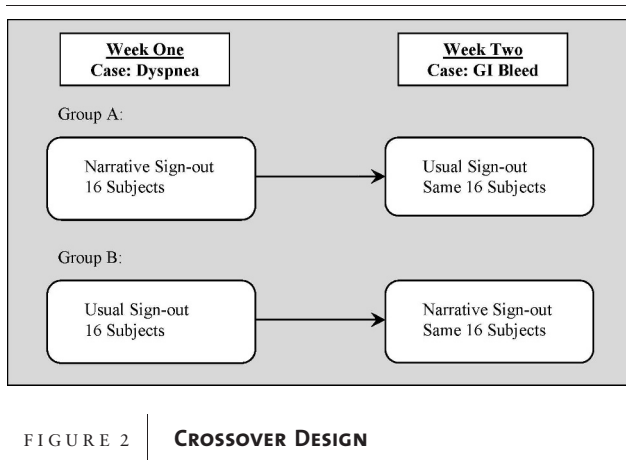
Data Analysis

To avoid multiple comparisons, we limited the primary outcomes of interest to (1) overall confidence (mean of the responses of each participant to all Likert-scale questions), (2) confidence in clinical performance (mean response to 3 clinical task items), and (3) confidence in communicating with patients, families, and consults (mean response to 3 communication task items). Cronbach α was used to confirm internal consistency of these scales. The secondary outcome was clinical competence measured by the number

of correct answers to clinical questions. A repeated measures analysis of variance was conducted on task, communication, confidence, and competence. To control for patient scenarios that were different in week 1 and week 2, order (narrative followed by usual versus usual followed by narrative) was used as the between-subject grouping factor. Sign-out group and items were included as the within-subject repeated measures.

Results

Seventy-two participants completed at least 1 questionnaire. Of those, 32 (44%) (7 medical students [22%]; 25 first-year residents [78%]) were included in the analysis



after completing both questionnaires, allowing for >95% power to detect a mean Likert scale difference of 0.5 at the 5% significance level. Internal consistency was high for communication (Cronbach $\alpha = 0.81$), and task (Cronbach $\alpha = 0.85$). There were no significant differences in any outcome between those completing only 1 questionnaire and those completing 2. The characteristics of the participants were similar between groups (TABLE 1).

No significant order effects were found ($P = .48$). No differences were found in overall confidence, confidence in communication items, or confidence on task items ($P > .05$) between the usual and the narrative formats. There was a significant main effect of sign-out group on the proportion of correct answers to clinical questions (narrative = 95% versus usual = 81%; $P = .02$) (TABLE 2). A

post hoc, paired t test revealed a significant difference between confidence on clinical items and confidence on communication items when each participant's scores from the narrative and usual formats were combined (clinical task = 3.67 versus communication = 2.75; $P = .001$).

Discussion

The need for a standard procedure for transfers of patient care has been previously recognized.^{20–22} Significant work has been done to standardize specific portions of written sign-out reports, including medication lists, code status, and laboratory values with computerized sign-out systems,^{23–25} and to improve verbal sign-out reports between residents.^{11–13,26} To our knowledge, this study is the first randomized, controlled trial of a standardized, written sign-out report, based on SA and narrative texts, compared with the usual, unstandardized practice. The written sign-out report is an important tool because it is what is most readily available at the moment that the clinician is called to the patient's bedside, and the need to refer to other sources or to retake a history from the patient could cause unnecessary delays. Although the standardized, written sign-outs in this study were not developed from previous research, the format has similarities with the SIGN-OUT, SAIF-IR, and SBAR formats for verbal sign-outs.^{11–13}

Participants did not rate themselves as more confident in any domain tested when given the narrative format compared with the usual sign-out procedure. A possible factor is that they may not recognize the value of patient

TABLE 1 | BASELINE CHARACTERISTICS OF PARTICIPANTS

Characteristic	Group A: Usual Sign-Out First (n = 16)	Group B: Narrative Sign-Out First (n = 16)	Z Test ^a
Female, No. (%)	9 (56)	7 (44)	$P > .05$
Age, y, mean (range)	27 (26–30)	28 (25–40)	$P > .05$
Interns in internal medicine, No. (%)	5 (31)	8 (50)	$P > .05$
Interns in primary care, No. (%)	2 (13)	1 (6)	$P > .05$
Fourth-year medical students, No. (%)	3 (19)	4 (25)	$P > .05$
Preliminary year in medicine, No. (%)	5 (31)	2 (13)	$P > .05$
Undergraduate major in arts and humanities, No. (%)	4 (25)	5 (31)	$P > .05$
Undergraduate major in sciences, No. (%)	12 (75)	14 (88)	$P > .05$
Medical school attended was NYU, No. (%)	6 (38)	8 (50)	$P > .05$
Medical school attended other, No. (%)	10 (63)	8 (50)	$P > .05$

Abbreviation: NYU, New York University.

^aExcept age, which was compared using a t test.

TABLE 2 MEAN LIKERT SCORES AND PERCENTAGE OF CLINICAL QUESTIONS ANSWERED CORRECTLY BY SIGN-OUT GROUP^a

	Overall Confidence	Task	Communication	Performance on Clinical Questions
Usual sign-out, mean (SD)	3.25 (0.472)	3.65 (0.496)	2.69 (0.703)	81.3 (21.6)
Narrative sign-out, mean (SD)	3.28 (0.452)	3.69 (0.440)	2.80 (0.671)	95.3 (10.4)

^a Mean Likert scores are presented for overall confidence, confidence completing clinical tasks, and confidence completing communication tasks by sign-out group. Percentage of clinical questions answered correctly is presented by sign-out group.

information presented in this format. In addition, the format was drastically different from what they currently use and may have been viewed as foreign.

The Likert scales were designed to measure clinicians' confidence in performing specific procedures or clinical tasks and may not be valid for measuring confidence in cross-coverage. The correlation between self-rated confidence and performance may be particularly poor for interns and medical students with little experience.¹⁸ Participants may have overestimated their abilities in a hypothetical situation that did not reproduce the stressful nature of a busy on-call shift. Objective measures of competence may be more appropriate than measures of confidence for predicting performance and the likelihood of medical error.

There were no participants who consented to the first survey but refused to participate in the second survey, making it unlikely that there was systematic bias from dropout. Low response rate to repeated surveys has been found in other studies of medical learners.²⁷

This study has several limitations. First, what we considered "usual," like many sign-out reports currently in use, was inadequate and poorly organized. Second, in addition to the sign-out, interns and medical students have access to other sources of information (charts, nursing staff, the patient, among others) in real clinical situations. Third, less than half of the participants completed both surveys because participants rotated off-service or were on postcall duty on conference days. Finally, a battery of independently developed questions or performance with a standardized patient would have increased the validity of the competence measure beyond what is possible with the 2 questions in our study.

In this study, interns and medical students were provided information in the experimental format and did not have to produce it de novo. New types of errors may be introduced if the production of this type of clinical information is not accurate, and it is likely that senior residents or attending physicians will need to be more active in creating narrative sign-outs. The finding that interns and senior students have less confidence in

performing communication-related tasks, when compared with clinical ones, highlights the need for continued focus on this aspect of training.

Conclusions

We found that interns and senior medical students may be more competent when given a narrative sign-out because it may decrease cognitive demands and improve SA by offering anticipatory guidance. However, participants' reported confidence in caring for a hypothetical patient did not change when presented with a narrative format of written sign-out material. Future studies should use a more robust measure of competence.

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