# Duly noted: Lessons from a two-site intervention to assess and improve the quality of clinical documentation in the electronic health record

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**Summary**
**Background:** Communication errors are identified as a root cause contributing to a majority of sentinel events. The clinical note is a cornerstone of physician communication, yet there are few published interventions on teaching note writing in the electronic health record (EHR). This is a prospective, two-site, quality improvement project to assess and improve the quality of clinical documentation in the EHR using a validated assessment tool.
**Methods:** Internal Medicine (IM) residents at the University of Kentucky College of Medicine (UK) and Montefiore Medical Center/Albert Einstein College of Medicine (MMC) received one of two interventions during an inpatient ward month: either a lecture, or a lecture and individual feedback on progress notes. A third group of residents in each program served as control. Notes were evaluated with the Physician Documentation Quality Instrument 9 (PDQI-9).
**Results:** Due to a significant difference in baseline PDQI-9 scores at MMC, the sites were not combined. Of 75 residents at the UK site, 22 were eligible, 20 (91%) enrolled, 76 notes in total were scored. Of 156 residents at MMC, 22 were eligible, 18 (82%) enrolled, 40 notes in total were scored. Note quality did not improve as measured by the PDQI-9.
**Conclusion:** This educational quality improvement project did not improve the quality of clinical documentation as measured by the PDQI-9. This project underscores the difficulty in improving note quality. Further efforts should explore more effective educational tools to improve the quality of clinical documentation in the EHR.

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# Background

Electronic health records (EHRs) have largely ameliorated the access and legibility limitations of paper records. Conversely, the widespread use of EHR efficiency tools like copy-forward infringes on the validity of notes, and contributes to communication errors [1–3]. Communication errors are identified as a root cause contributing to a majority of sentinel events [4].

The clinical note is a cornerstone of communication, yet there are few published interventions on improving note writing in the EHR [5–7]. Two tools validated for evaluating note quality, the Physician Documentation Quality Instrument 9 (PDQI-9) for inpatient notes [8], and QNOTE for outpatient notes [9], have not been applied in an educational intervention to improve the quality of notes.

Our study is a prospective quality improvement (QI) project in the internal medicine (IM) residency training programs at the University of Kentucky College of Medicine (UK) in Lexington, KY, and Montefiore Medical Center/Albert Einstein College of Medicine (MMC) in Bronx, NY. The aim of the project is to assess and improve clinical documentation quality using the PDQI-9 as a scoring and feedback tool. The study was approved by the Institutional Review Board (IRB) of both institutions.

# Methods

The QI project took place between July and September, 2013. At UK, IM resident physicians (PGY1–3) were identified via review of the clinical rotation schedule, divided into three project groups, and informed consent was obtained. At MMC, IM residents are divided into three Firms, which was the basis for the project groups (informed consent not required). The three groups were: lecture plus feedback (LF), lecture (L), and control (C). LF and L groups included residents who attended an hour-long lecture and were on an inpatient medicine rotation during the project period, whereas the C group was on elective or other non-ward rotation during this same time. At UK, residents who were unable to attend the lecture (due to night shifts or vacation) were assigned to the C group by default and served as controls. At both sites, progress notes written during the month prior to the lecture were scored for the L and LF groups using the PDQI-9 and compared to a second set of progress notes written after the lecture took place. The LF group received an additional individual feedback session at which they reviewed the results of the PDQI-9 from their pre-lecture set of notes with a faculty member. A "set" of progress notes was defined as two consecutive notes written by the same resident about the same patient; the later note was scored with the PDQI-9 and the earlier note served as reference to assess copy-paste and originality. Progress notes were identified within the EMR by searching by resident name and date range and selecting patients from the list obtained using a random number generator. Charts with fewer than two consecutive days of progress notes were excluded.

The project leaders ran the hour-long didactic lecture sessions, which consisted of a PowerPoint presentation describing the elements of a good note, with examples of appropriate and inadequate documentation. Multiple blinded faculty at each site scored notes and provided feedback. Feedback sessions were one-on-one with the resident and faculty member reviewing notes and PDQI-9 results.

The summary PDQI-9 scores for the three groups were treated as ordinal variables and the median pre-post score differences of each group were compared using the Kruskal-Wallis Test. All statistical analyses were conducted using NPAR1WAY procedure in SAS® version 9.3.

# Results

## Participation rate

At UK, 22 out of a total of 75 IM residents were on inpatient wards rotations during the 3-month project period, and 20 enrolled for a 91% participation rate. There were 9 residents in the LF group,

5 in the L, and 6 in the C groups. One resident in the LF group was excluded because the feedback session did not occur. Two sets of notes for each resident were evaluated with the PDQI-9, for a total of 76 notes (►Figure 1).

At MMC, 22 out of a total of 156 IM residents were on inpatient wards rotations, and 18 enrolled for an 82% participation rate. There were 5 residents in the LF group, 8 residents in the L group, and 5 in the C group. For the 8 residents in the L group the lecture session occurred earlier than planned, leaving no pre-intervention notes; thus, these 8 residents were excluded from analysis. For the LF and C groups, a total of 40 notes were evaluated (►Figure 1).

## Note Evaluation

The PDQI-9 scores for the three groups at UK are summarized in ►Table 1. There were no statistically significant differences in baseline PDQI-9 scores between the 3 groups $\chi^2$ (2, N = 19) = 1.92, p = .38, nor did the scores change significantly pre- and post- intervention $\chi^2$ (2, N = 19) = 4.67, p = .10 (►Table 1).

At MMC, there was a statistically significant difference in the baseline PDQI-9 scores between LF and C groups $\chi^2$ (1, N = 10) = 8.11, p = 0.004. No further comparisons were made, and the data for the two sites were not combined.

## Lessons Learned

We anticipated that individual feedback would be more effective than a group lecture in changing resident behavior around clinical documentation, and that both would be better than no educational intervention. However, our intervention to assess and improve the quality of clinical documentation was not successful as measured by the PDQI-9. While we hoped that conducting the same project at two training programs would improve our ability to detect a change, we were unable to combine the data because of the significant differences in baseline PDQI-9 scores. As the PDQI-9 had been previously validated, and did not include recommendations for evaluator training, we did not conduct training or benchmarking sessions. On further review of the MMC data, we found that one rater consistently scored notes much higher than other raters (data not shown). This observation suggests that it is important to calibrate raters when using the PDQI-9.

There are other important limitations to our educational intervention. It occurred over a short period of time, and the time period for notes obtained pre-didactic was not consistent between the LF and L groups due to variability in resident schedules. The sample size was small, thus we were unable to adjust for resident seniority. Furthermore, though MMC has a note template, we did not create one at UK, nor did we focus the didactic lecture or feedback on a template or specific format.

Consideration of the properties of complex adaptive systems, such as nonlinearity, emergence, coevolution, and patterns of interaction [10] is highly relevant to efforts to improve the quality of clinical documentation. Melvin, et al (2015) found that feedback coupled with a written communication tutorial improved the quality of medical student documentation as measured by their internally-developed tool [5]. These authors included a curriculum on giving feedback, which speaks to the emergence and coevolution aspects of complex adaptive systems, and may have made their intervention more successful. We did not assess the skills of our faculty to give feedback on quality note documentation, nor did we provide any training in this skill. In addition, we did not specify the use of a standardized template, which may improve some elements of note quality and make evaluation less subjective simply by encouraging a pattern of interaction and standard work [6, 7]. Thus our faculty may have been hindered in rendering an objective assessment of note quality, despite using a validated tool.

Watling, et al (2012) have suggested that residents are most engaged when learning objectives are clearly and immediately imbedded in their clinical work [11], an illustration of the emergence aspect of complexity theory. Feedback efforts, therefore, while highly emphasized in medical education, may fail if they lack such contextual credibility. For example, March, et al (2016) showed a wide variability in intern's clinical documentation even when using a simulated exercise that closely approximated clinical care [12]. In keeping with the behaviors of complex adaptive systems, perhaps

our intervention fell short due to the residents' relatively low perceived importance associated with clinical documentation, the many competing demands on trainee time, and minimal incentive to create documentation that is accurate and of high quality.

## Conclusion

In conclusion, our educational quality improvement project did not improve the quality of clinical documentation for a group of IM trainees as measured by the PDQI-9. This project underscores the difficulty in improving note quality despite validated instruments and individualized feedback. Our intervention may not have been successful due to its short duration as well as the characteristics of complex adaptive systems that we were unable to address. Residency is the time when clinical behaviors essential to quality care are solidified [13], and it is a time of tremendous opportunity for teaching best practices for communicating through the EHR. We suggest that prepping educators in the available assessment tools is likely important, and we anticipate that ongoing longitudinal interventions will be more effective than time-limited interventions.
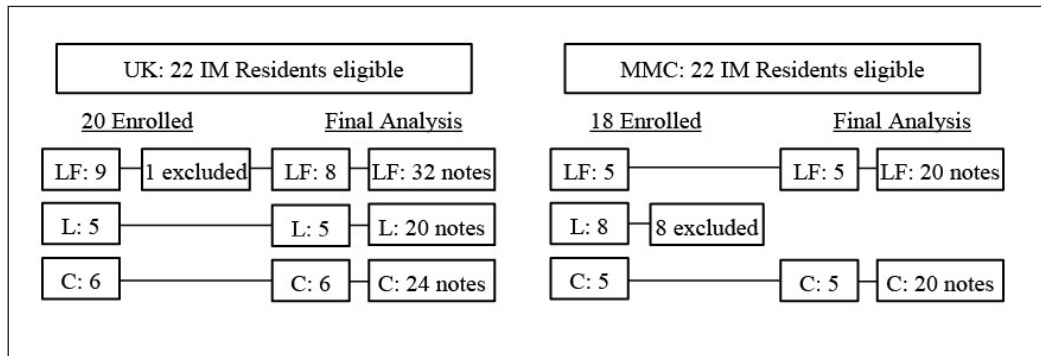
**Fig. 1**    Project enrollment flow diagram; LF: lecture plus feedback, L: lecture only, C: no intervention control group.

Table 1   PDQI-9 scores pre- and post-educational intervention for the three groups at UK.

| Group (n) | Lecture plus Feedback (8) | Lecture Only (5) | Comparison (6) | p |
|---|---|---|---|---|
| PDQI-9 Pre-score, Median (range) | 35 (31 – 42) | 31 (29 – 37) | 35 (22 – 38) | 0.38 |
| PDQI-9 Post-score, Median (range) | 32.5 (30 – 42) | 39 (24 – 45) | 35.5 (28 – 39) | |
| PDQI-9 Difference, Median (range) | -1.5 (-7 – 7) | 8 (-6 – 9) | 1.5 (-1 – 9) | 0.10 |

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