

# Improving Electronic Inpatient Progress Notes Using Voice: Results from the VGEENS Project

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## Abstract

*We implemented a system to create inpatient progress notes on hospital rounds (VGEENS), integrating voice recognition, automated note formatting, and EHR links. In a randomized trial we compared VGEENS with usual note writing on note timeliness, quality and physician satisfaction. Results show VGEENS notes were available within 5 minutes after dictation. Notes were on average available sooner, and physicians' satisfaction greater in control, perhaps due to copy/paste practices. Workflow changes may improve note timeliness.*

## Introduction

Physician progress notes are an important record for clinical care and communication with care team members and patients. However, electronic notes are criticized for poor readability, overuse of copy and paste, and excessive note length.<sup>1</sup> Physicians have voiced concerns that writing notes in EHRs takes more time than using paper or dictation; a consequence is that inpatient progress notes may not be completed and available to other team members until long after rounds.<sup>2</sup>

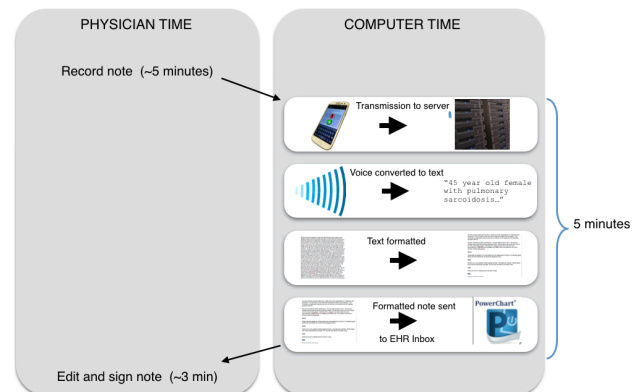
This project is an attempt to address these problems. Here we describe the development, implementation, and evaluation of a voice-generated enhanced electronic note system, integrating voice recognition and transcription with natural language processing (NLP) and integration with the EHR, designed to match physician rounding workflow. We also present results of a randomized controlled trial to determine the effect of using this new method of writing inpatient progress notes on note timeliness, quality, and physician satisfaction, in comparison with writing notes in the usual way, through typing into partially populated templates.

## Methods

VGEENS (voice-generated enhanced electronic note system), was used by study intervention physicians while on hospital rounds. At the bedside or later, the physician records a voice file on a cell phone application we (DA) developed. The completed dictation voice file is securely sent to a server where it is converted to text using automated speech recognition software (Dragon Medical Practice Edition, Nuance). Voice commands are used to break the note into sections corresponding to the preferred UW progress note format and to insert formatted patient vital signs and select laboratory results. The transcribed note is sent to the EHR Inbox.

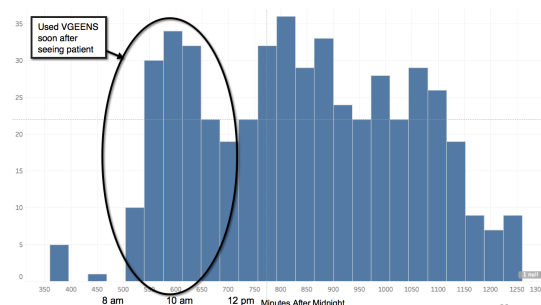
We randomly assigned physicians on medical services of two UW teaching hospitals to the intervention group, using VGEENS, and control group, entering notes using a keyboard. We compared: 1. The **time** between when the patient is seen on hospital rounds and the availability of the note in the EHR; 2. Physician **satisfaction** with note writing and 3. Note **quality** as assessed by manual quality review using instrument PDQI-9.

## Results



**Figure 1.** Use of VGEENS—physician and system

Thirty-one subjects wrote 1,852 inpatient progress notes during the study period, 1,143 by controls and 709 notes by intervention subjects. The median number of minutes between the patient encounter and the availability of a progress note in the EHR for others to view was 190 minutes for the control group and 227 minutes for the intervention group. For the subset of physicians who used VGEENS on rounds (intended workflow—circled at right), notes were available within 5 minutes.



**Figure 2.** Time VGEENS notes available in EHR.

Physician satisfaction survey response rate among the 31 of the 49 subjects who completed at least one note was 100%. Among intervention subjects, an equal number (40%) rated satisfaction with the VGEENS tool as either highly or moderately satisfied (6) and moderately dissatisfied or not at all satisfied (6). Among controls, 50% of subjects rated their satisfaction with note writing as either highly or moderately satisfied (8) and one subject (6%) was moderately dissatisfied. Note quality assessment is underway. (18 subjects were not on a medical service rotation in which their responsibilities included writing daily progress notes during the study period or for other reasons.)

## Discussion

We successfully developed and implemented a new note writing method using voice to create inpatient progress notes. Where the physician used VGEENS on rounds, notes were available within 5 minutes, were properly formatted and included patient data in response to voice command. The system was integrated with a commercial EHR. Physicians preferred traditional note writing methods, in part because younger physicians are inexperienced with dictation yet facile with copying the previous day’s note, editing and saving as the current day’s note. VGEENS began each day’s note with the voice dictation and did not carry forward information such as problem list and ‘checklist’ information, though these features could be added.

Preliminary comparison of progress note content shows more preservation of text between successive days’ notes in control than with VGEENS, likely a reflection of copying/pasting workflow common in control notes. Note accuracy was not assessed, but highly similar physical examinations in successive days’ notes raise questions of accuracy. Using voice can potentially permit history and exam findings to be quickly documented reducing need to copy them from previous notes; this was a motivator for our work. We have not yet leveraged advanced NLP techniques to correct semantic errors within the note, nor to extract encoded concepts from the narrative text. Perhaps the greatest promise for this work is that we have developed a system to create notes that capture physician thinking as close to rounds as possible; we have the potential to suggest diagnostic and therapeutic interventions based on that thinking in near-real-time. The VGEENS approach has potential to directly address physician concerns with excessive documentation time requirements and declining note quality, and may also improve progress note accuracy

## Conclusion

VGEENS permits voice dictation on rounds to create progress notes and can reduce note availability and may reduce dependence on copy/paste within notes. Timing of dictation determines when notes are available; in this early trial most notes were dictated after rounds, delaying note availability. Capturing notes in near-real-time has potential to apply NLP and decision support sooner than when notes are typed later in the day, and to improve note accuracy.

## Acknowledgements

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