

Successful Implementation of APSO Notes Across a Major Health System

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ABSTRACT

OBJECTIVES: To determine whether inpatient and outpatient clinicians prefer and/or adopt the APSO (Assessment, Plan, Subjective, Objective) notes versus the SOAP (Subjective, Objective, Assessment, Plan) format of notes for their clinical documentation.

STUDY DESIGN: This is a retrospective chart review of inpatient and outpatient clinician notes performed in early 2014. A clinician satisfaction survey was performed to measure satisfaction with APSO format notes.

METHODS: We documented the note format, SOAP versus APSO, of almost 2000 progress notes from a large, integrated health delivery network comprising 1 academic and 4 community hospitals and more than 100 outpatient clinics. We surveyed clinician authors who were attending academic and community physicians, medical residents, and advanced practice providers to determine their satisfaction with APSO format notes.

RESULTS: Of 894 outpatient notes reviewed, 94% were APSO format. Of 1057 inpatient notes reviewed, 79% were APSO format. At the academic hospital, 94% of inpatient notes were APSO, and there were no dictated inpatient notes. Our clinician satisfaction survey response rate was 18% (564 of 3170). Eighty-percent of respondents were "satisfied" or "very satisfied" with APSO notes as both authors and readers.

CONCLUSIONS: We were able to demonstrate widespread adoption of APSO notes in the inpatient and outpatient academic and community settings. A large number of clinicians demonstrated willingness to use new tools to improve note efficiency and communication among care teams. This study evaluates APSO as a novel note type that could decrease the time clinicians spend in chart review by placing the integral assessment and plan components at the top of the note.

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Clinical notes are critically important to clinicians who must review these documents, synthesize data, and construct treatment plans for patients in a timely and efficient manner. Electronic health record (EHR) documentation has many recognized benefits, including legibility, accessibility, robust content, and simultaneous availability of clinical notes.¹ However, some studies have reported that the quality of clinical documentation has deteriorated since the widespread adoption of EHRs.¹⁻²³ Reasons cited for this decline in quality include copy-forwarding of outdated or erroneous information, inclusion of standard phrases for regulatory purposes, and automatic insertion of large amounts of laboratory results that produce unnecessarily long notes.

In 1997, Dr Larry Weed, founder of the traditional, problem-oriented SOAP (Subjective, Objective, Assessment, Plan) note, described the need for electronic tools that "reveal the actions and thought processes of providers."⁴ Sixteen years later, the challenge to implement and structure EHRs that maintain the essential components of the problem-oriented note continues.

In June 2013, the Associated Medical Directors of Information Systems proposed guiding principles for electronic documentation, including consideration of notes structured with the Assessment and Plan sections at the top and Subjective and Objective sections below (ie, APSO format). That same year, Lin et al reported that 83% of outpatient clinicians found the APSO note was faster to write than the traditional SOAP note, and 81% thought that it was easier to find data in APSO versus SOAP notes.⁵

Interestingly, there is a strong inverse correlation in the literature between successful EHR adoption and decreased time spent in clinical documentation tasks, such as finding and reviewing relevant information.⁶ Because readers can more quickly find the Assessment and Plan sections in APSO notes, we hypothesized that most clinicians would prefer to both read and write notes in APSO rather than SOAP format. To this end, we examined the degree of APSO adoption by inpatient and outpatient clinicians at a large, integrated healthcare delivery network. We also studied clinician satisfaction with APSO notes from their perspectives as both note writers and readers.

METHODS

Study Design

This study had 3 components: a retrospective review of outpatient APSO note adoption, a retrospective review of inpatient APSO note adoption, and a clinician satisfaction survey.

Setting

This study was conducted at University of Colorado (UC) Health, Aurora, Colorado, from January to July 2014. UC Health is a large, integrated health delivery network with 1 academic hospital, 4 community hospitals, and more than 100 outpatient clinics. All hospitals and outpatient clinics were studied. All sites were using an EHR system (EPIC Systems, version 2010, Verona, Wisconsin) and had implemented this EHR between February 2011 and September 2014.

Participants

For all components of our study, clinicians included attending academic and community physicians, medical residents, and advanced practice providers. All outpatient UC Health clinicians who wrote an office visit note on any patient in January 2014 were included in the outpatient chart review. Inpatient clinicians were only included in the study if they wrote a note on a patient who was discharged from any of our 5 hospitals on the day of the inpatient chart review in March 2014. For the satisfaction survey, 3170 clinicians with EHR access at UC Health received a link to the survey by e-mail.

EHR Design

In the outpatient setting, clinicians have several options for creating EHR progress notes: the system-standard ambulatory note in APSO format; a clinic-specific or personalized note template, which can be custom-built in the SOAP format; or a blank, free-text note. As an enterprise, we do not mandate elements of note construction. The ability to insert dictated and transcribed text into a note is permitted for the History of Present Illness and the Assessment and Plan portions of outpatient notes. When clinicians dictate narrative in these sections, the transcribed text is inserted into a note template. Thus, it is impossible to distinguish transcribed text from typed text in the outpatient notes during chart review.

In the inpatient setting, a system-standard APSO format note is

available for all clinicians, but personalized note templates can be used. Inpatient clinicians may also choose to dictate a full note when templates are not satisfactory. Our informatics and training teams actively promoted notes in APSO format throughout our rolling EHR deployment. Clinicians participating in this study had used the EHR for at least 3 months and up to 3 years at the time of the chart review and satisfaction survey.

Outpatient APSO Adoption

We performed a retrospective review of outpatient clinician notes in January 2014. The reviewers searched each clinician's schedule and located the first day in January that the clinician saw patients in clinic, then they reviewed the first note written in that clinic session. This process was repeated for every outpatient clinician. Each note was classified as having been written in APSO, SOAP, or short format, with short format being defined as a note with less than 30 vertical lines on a computer display of 80 characters in width. Short note format was categorized separately because the reader typically does not have to scroll to review these brief notes efficiently.

Inpatient APSO Adoption

We retrospectively reviewed the charts of patients discharged from all 5 hospitals in our system. For each hospital, we chose 1 day in the first 2 weeks of March 2014. We then reviewed the chart of every patient discharged in the prior 24 hours from that hospital. All notes written by clinicians in a selected patient chart were reviewed, including primary care, medical specialty, surgical specialty, and emergency department (ED) notes. We excluded patients discharged directly from the ED, operating rooms or perioperative areas, labor and delivery units, and procedural areas (including the cardiac catheterization, endoscopy, and bronchoscopy labs).

Using the EHR, we identified all clinician progress notes and included the first note per unique clinician. Notes were categorized as constructed in SOAP format, APSO format, or short format. We included 1 history and physical note per patient, as well as all progress notes and consult notes. We excluded the following: attending attestation statements, which addend the notes of medical residents; interval history and physicals written when there is a change in the patient care team; discharge summaries; and operative notes.

Clinician Satisfaction Survey

We used an online, anonymous, password-protected questionnaire (via SurveyMonkey, Inc; Palo Alto, California) to assess clinician satisfaction with APSO notes. Lin et al originally described this survey in their 2013 study of APSO notes.⁵ Our modified survey was distributed to 3170 clinicians with EHR access at UC Health. We attempted to measure overall satisfaction with the APSO format, as well as perceived ease of construction and readability of APSO compared with SOAP notes. The survey was sent out by broadcast e-mail 3 times over a 2-week period in June 2014.

RESULTS

Outpatient APSO Adoption

We reviewed 894 unique clinician notes from 101 outpatient clinics (Table 1). Of all notes reviewed, 94% were APSO (84.5%) or short (9.5%) format, and 6% were SOAP format (Table 2).

Inpatient APSO Adoption

A total of 1057 inpatient clinician notes were reviewed (Table 1). Of these, 791 (79%) were written in APSO (74%) or short format (5%), and 21% were in SOAP format. At the academic site, we reviewed 279 notes, 94% of which were in APSO (92%) or short format (2%). At the community hospitals, we reviewed 778 notes: 74% were written in APSO (69%) or short format (5%). Overall, 85% of primary care/hospitalists', 77% of medical specialists', 68% of surgeons', and 94% of emergency medicine specialists' notes were written in APSO or short format (Table 2). Finally, 61% of history and physical notes, 93% of daily progress notes, and 51% of consult notes were in APSO or short format (Table 3).

Inpatient Clinician Dictation

Of the 1057 notes reviewed from all inpatient sites, 15% were fully dictated. At the academic hospital, there were no dictated notes. At the community hospital, 25% (163/658) of all notes were fully

dictated. We found only 4% (6/163 notes) of dictated notes were in APSO format. Fully dictated notes accounted for 71% of all consult notes, 47% of all histories and physicals, and 1% of all progress notes at the community hospitals.

Clinician Satisfaction Survey

A 20-question clinician satisfaction survey was sent to 3170 unique clinicians, including 1313 clinicians at the academic center and 1857 clinicians at community sites. We received 564 completed surveys for a response rate of 18%. Of those who responded: 54% were academic clinicians and 46% were community clinicians; 76% were physicians and 22% were advanced practice providers.

Writing APSO Notes

In our survey, 66.1% of clinicians reported writing "most" or "all" of their notes in APSO format, whereas 9.4% "frequently" write in APSO, and 15.8% never did. Overall, 80.6% of clinicians were "satisfied" or "very satisfied" with writing APSO notes. Eighty-four percent felt writing in APSO format was "easy" or "very easy" and 77.4% found the change from writing in SOAP to APSO format to be "easy" or "very easy." In fact, 71.7% of clinicians said that the time it takes to construct a note in APSO is the same as the time it takes to construct a note in SOAP format (Table 4).

Reading APSO Notes

In our survey, 70.6% of clinicians reported that it was "easier" or "much easier" to find clinically relevant data, 76.3% of clinicians reported it "faster" or "much faster" to browse through multiple EHR notes, and 67.7% of clinicians found it "easier" or "much easier" to follow clinical reasoning in APSO format compared with SOAP format. Overall, 68.1% of clinicians "preferred" or "strongly preferred" APSO over SOAP when reading clinical notes. Finally, 79.5% of clinicians were "satisfied" or "very satisfied" with APSO as note readers (Table 5).

Table 1. Clinician Role as Author of Note

	Inpatient Notes (n = 1057)		Outpatient Notes (n = 894)	
	Academic	Community	Academic	Community
Primary care/hospitalist	49	252	166	48
Medical specialist	129	192	319	90
Surgical specialist	66	228	212	59
Emergency medicine specialist	35	106	-	-

Table 2. Adoption of APSO and Short Note Format Notes

	Inpatient Notes		Outpatient Notes	
	Academic	Community	Academic	Community
Primary care/hospitalist	98% (48/49)	82% (207/252)	100% (166/166)	100%(48/48)
Medical specialist	97% (125/129)	64% (123/192)	96% (306/319)	96%(86/90)
Surgical specialist	97% (64/66)	60% (137/228)	84% (179/212)	93% (55/59)
Emergency medicine specialist	74% (26/35)	100% (106/106)	-	-

APSO indicates Assessment, Plan, Subjective, Objective (format).

Table 3. Inpatient APSO Adoption by Note and Hospital Type

	Academic Hospital	Community Hospital
History and physical	98% (57/58)	49% (89/182)
Progress note	99% (140/141)	91% (323/355)
Consult note	87% (40/46)	38% (46/121)

APSO indicates Assessment, Plan, Subjective, Objective (format).

Table 4. Clinician Satisfaction With APSO Format From a Writer's Perspective

How often do you write in APSO format?	All or most of the time	Frequently	I tried it a few times but did not continue	I have never documented in APSO format	
	373 (66.1%)	53 (9.4%)	49 (8.7%)	89 (15.8%)	

As an author of EHR documentation, please check the button that most closely reflects your experience or feelings.					
Writing notes in APSO format is:	Very easy 192 (41.5%)	Easy 197 (42.6%)	Neutral 0 (0%)	Difficult 56 (12.1%)	Very difficult 18 (3.9%)
Making the change to writing notes in APSO format was:	Very easy 161 (34.8%)	Easy 197 (42.6%)	Neutral 0 (0%)	Difficult 83 (17.9%)	Very difficult 22 (4.8%)
The time it takes to write EHR notes is:	Much faster with APSO 13 (2.8%)	Faster with APSO 41 (8.9%)	About same for APSO or SOAP 332 (71.7%)	Faster with SOAP 56 (12.1%)	Much faster with SOAP 21 (4.5%)
Skipping around within the note I'm writing is:	Much more likely with APSO 102 (22%)	More likely with APSO 105 (22.7%)	About same for APSO or SOAP 215 (46.4%)	More likely with SOAP 31 (6.7%)	Much more likely with SOAP 10 (2.2%)
Forgetting to complete segments of the note I'm writing is:	Much more likely with APSO 65 (14%)	More likely with APSO 121 (26.1%)	About same for APSO or SOAP 258 (55.7%)	More likely with SOAP 12 (2.6%)	Much more likely with SOAP 7 (1.5%)
As an author, the EHR note structure reflects how I think:	Much better with APSO 69 (14.9%)	Better with APSO 136 (29.4%)	About the same for APSO or SOAP 0 (0%)	Better with SOAP 168 (36.3%)	Much better with SOAP 90 (19.4%)
When writing notes I am:	Very satisfied with APSO 110 (23.8%)	Satisfied with APSO 263 (56.8%)	Neutral 0 (0%)	Dissatisfied with APSO 54 (11.7%)	Very dissatisfied with APSO 36 (7.8%)

APSO indicates Assessment, Plan, Subjective, Objective (format); EHR, electronic health record; SOAP, Subjective, Objective, Assessment, Plan (format).

grated health delivery network consisting of academic, community, inpatient, and outpatient clinicians. APSO notes made up 87% of inpatient and outpatient notes across 5 hospitals and 100 clinics. Interestingly, of the 15% of inpatient notes that were dictated, only 4% were in APSO format. From their perspectives as both note writers and readers, 80% of clinicians were “satisfied” or “very satisfied” with the APSO note format.

Previous studies have suggested that clinicians prefer the APSO format over the SOAP format.^{5,7} When offered a choice between electronic APSO notes and handwritten or dictated notes for inpatients, clinicians chose to use APSO electronic notes 74% to 100% of the time.⁷ We previously published an outpatient APSO adoption study demonstrating 51% to 100% adoption (optional vs mandatory approach) and 80% preference for APSO among 84 studied clinicians.⁵

In this study, APSO notes were introduced at the same time as the implementation of the EHR. Introducing these changes simultaneously may have influenced our results positively if clinicians were open to change or negatively if they felt strongly opposed to either APSO or the new EHR. Overall, we found widespread adoption of APSO notes in the outpatient (94%) and inpatient (79%) settings.

One difference we noted in the inpatient setting was a higher rate of APSO adoption at the academic hospital compared with the community hospitals. We also found no dictated inpatient notes at the academic hospital. This is likely due to the significant involvement of the medical and surgical residents in clinical documentation at the academic center. Most of these trainees have not practiced in an environment with paper charting and are less likely to have developed specific clinical habits (ie, dictating notes or SOAP notes). In addition, they may be more comfortable with computers and EHR functionality and may have more time to spend optimizing documentation efficiency.

In contrast, many of our community hospitals have medical specialists and surgeons who spend only a small fraction of their clinical time in the inpatient setting. Many of these clinicians do not have the same EHR in their offices as they do at the hospital and, thus, may be less willing to experiment with new EHR concepts or to forgo dictation. In addition, 25% of inpatient notes at the community hospitals were dictated and 96% of dictated notes were SOAP format, accounting for a large fraction of the non-APSO statistic.

Table 5. Clinician Satisfaction With APSO Format From a Reader's Perspective

When reading EHR notes, finding clinically relevant data is:	Much easier with APSO notes 194 (37.2%)	Easier with APSO notes 174 (33.4%)	Easier with SOAP notes 92 (17.7%)	Much easier with SOAP notes 61 (11.7%)
Browsing through multiple EHR notes is:	Much faster with APSO 168 (32.3%)	Faster with APSO 229 (44%)	Faster with SOAP notes 74 (14.2%)	Much faster with SOAP notes 50 (9.6%)
Following the flow of clinical reasoning across multiple notes is:	Much easier with APSO notes 131 (25.1%)	Easier with APSO notes 222 (42.6%)	Easier with SOAP notes 97 (18.6%)	Much easier with SOAP notes 71 (13.6%)
I prefer reading EHR notes in the following format:	Strongly prefer APSO 147 (28.2%)	Prefer APSO 208 (39.9%)	Prefer SOAP 95 (18.2%)	Strongly prefer SOAP 71 (13.6%)
As a reader of APSO notes I am:	Very satisfied with APSO 140 (26.9%)	Satisfied with APSO 274 (52.6%)	Dissatisfied with APSO 74 (14.2%)	Very dissatisfied with APSO 33 (6.3%)

APSO indicates Assessment, Plan, Subjective, Objective (format); EHR, electronic health record; SOAP, Subjective, Objective, Assessment, Plan (format).

The only exception to higher adoption at the academic hospital was ED clinician notes. We found 100% adoption at the 4 community hospitals compared with only 74% adoption at the academic hospital. This is likely due to the fact that operational leaders at the community hospitals strongly encouraged the use of APSO for all ED clinicians. Our academic center also uses a variety of scribes in the ED, which may result in less consistent note formats.

Among all inpatient clinicians, APSO adoption was highest for primary care/hospitalists, followed by medical specialists, and then surgeons. We suspect this trend is related to the fact that hospitalists spend the majority of their time in 1 clinical setting. Thus, they may be more willing to pilot new clinical documentation strategies to increase their efficiency. Similarly, we found adoption was highest for daily progress notes, which likely correlates with the number of progress notes written by generalists. Although not evaluated in this study, one theory about history and physical notes is that all sections of the admission note are considered more critical to clinical reasoning than those same sections in a daily progress note; thus, they may be written in SOAP format more often.

In addition to demonstrating widespread APSO adoption, we also showed clinician satisfaction with this new note structure. On average, 71% of clinicians found it “easier to find clinically relevant data,” “easier to follow clinical reasoning,” and “faster to browse through APSO notes.” Overall, 80% of survey responders were satisfied with APSO from a reader's perspective. These findings are supported by observations that EHR notes can be diluted by non-clinical information (for billing and regulatory purposes) that makes it difficult to find clinically relevant information and reasoning in SOAP notes.

From their perspective as note writers, 75% of clinicians reported that they “often,” if not “always,” write APSO notes. More than

80% of clinicians reported that they were “satisfied with APSO formatting” and found it “easy to change from SOAP note documentation to APSO note documentation.” In terms of efficiency, 72% of clinicians indicated, “The time it takes to construct a note in APSO is the same as that it takes to construct a note in SOAP format.” It is possible that these factors could vary in different institutions if the use of APSO notes is not supported by a robust EHR or note template. Although there was some concern about “skipping around” or forgetting note segments of the APSO note as a writer, 56% of respondents felt that “missing complete segments could happen with APSO or SOAP construction with the same frequency.” It is possible that general note design influences the ability to miss specific note sections.

Limitations

The limitations of our study included our inability to measure rates of outpatient note dictation. This is due to the technology that is readily available within our EHR to add partial dictation in-line that cannot be differentiated from free-text narrative on chart review. In addition, we did not measure the number of clinicians practicing at the community hospitals who had different EHRs in their home offices. This would have allowed us to analyze reasons for lower adoption among community clinicians. Similarly, we did not calculate the number of months that various clinicians had been using our EHR to determine if more experienced users had higher rates of APSO adoption. Finally, we inadvertently omitted neutral responses from our clinician satisfaction questions on note writing, and thus forced respondents to give only positive or negative answers to these questions. As a result, we may have observed higher rates of positive responses than would have otherwise been found.

CONCLUSIONS

In the absence of a well-validated tool for measuring clinical documentation quality, innovations in clinical documentation tools are needed to increase clinician efficiency while ensuring seamless care for patients. Studying the adoption of APSO notes and the satisfaction of clinicians who use them is a step in the right direction. Future studies could examine the correlation between APSO format and the number of auto-populated tables and statements in notes to determine if other elements of note quality improve when APSO is used. One hypothesis in the literature is that APSO notes may somehow permit more auto-population of data (eg, lab results) because this data is no longer obstructing the retrieval of Assessment and Plan information.¹ Other possibilities for study would be directly measuring the time it takes for clinicians to create APSO notes versus SOAP notes and the ability of clinicians to clearly delineate a treatment plan from clinical documentation in APSO format versus SOAP format.

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