Development and validation of A-SOAP notes: Assessment of efficiency in documenting patient therapeutic records

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ABSTRACT
Subjective, Objective Assessment and Plan (SOAP) notes have a major significance in healthcare; but there is no standard format for documentation. The objective of this study is to develop and validate advanced SOAP (A-SOAP) notes for effective documentation of patient health status. "A-SOAP" was designed based on the results of several published studies. 34 postgraduate Doctor of Pharmacy students were randomized and administered with two SOAP notes, case scenario, and a feedback form. The SOAP notes were evaluated using a grading tool. Paired t-test and one-way analysis of variance were carried out to measure the difference in scores and its significance. The scores of A-SOAP were more noteworthy (57.94 ± 15.86) in comparison to SOAP 1 (14.49 ± 12.95) at p < 0.001. The distribution of scores was also significantly different among participants of various academic years. The efficiency in problem identification and documentation had improved with A-SOAP.

INTRODUCTION
“SOAP,” which stands for subjective, objective, assessment, and plan, is a tool used for documenting patient care notes in a structured and organized way. It was developed in the year 1960 by Dr. Lawrence Weed at the University of Vermont as a part of the problem-orientated medical record (Weed, 1968; Wright et al., 2014). In recent years, documentation of patient information during the therapeutic hour has gained importance in treatment optimization (Podder et al., 2020). Healthcare providers often feel frustrated to decide what to include and what not to include in these notes. Structured therapeutic notes help in accountability, delivery of appropriate service, and support clinical decisions (Cameron and Turtle Song, 2002). SOAP notes also serve as a source of communication that is widely used by various healthcare professionals, such as physician, nurse, physiotherapist, pharmacists, etc. Pharmacists play an integral role in providing pharmacotherapeutic recommendations that include treatment alternatives, drug interactions, major side effects, and dose adjustments (Mowery et al., 2012). Therapeutic notes also help in tracking patient prognosis on a daily basis (O’ Sullivan and Odegard, 2013; Vijayakumar, 2016). Crausman (1998) had described the use of this instrument to capture student the perspectives in clinical decisions. It helps in mapping different components of a medical record (Crausman, 1998).

The Accreditation Council for Pharmacy Education Accreditation Standards states that a pharmacy student must master the skills of documentation and provide recommendations to the healthcare team for effective patient care (Accreditation Council for Pharmacy Education, 2015). Trainings on documentation must be prioritized for students. SOAP notes have to be reviewed and modified periodically (Lisenby et al., 2018; Sherman et al., 2019).

Unavailability of a standardized SOAP note is one of the challenges faced by healthcare professionals. Some of the modified versions of SOAP are (a) SOAPIE “or” SOAPIER (I, Intervention; E, Evaluation of the interventions; R, Revisions made to the existing plan) (Using SOAP, SOAPIE, and SOAPIER Formats, 1999); (b) S-SOAP (a tool exclusively used in psychiatry to include systemic complexities into practice) (Mitsuishi et al.,...
had reframed SOAP as subjective, objective, and assessment of physiology; it was used as a modality for teaching medical physiology; (d) SOAP has also been combined with other teaching methods such as peer-evaluation and self-assessment which have been proven to be effective in improving the quality of student assessments (Storjohann et al., 2019).

A poorly organized SOAP note can give rise to misinterpretation of information. This increases the need for a validated SOAP note that is concise, comprehensible, less time-consuming, confidential, and legitimate (Santiago et al., 2016). Studies have been conducted by healthcare professionals to evaluate the accuracy and appropriateness of SOAP notes. Seo et al. (2016) had observed incompleteness and inaccuracy in the SOAP notes filled by medical students. Additionally, studies pertaining to validation and evaluation of SOAP notes for clinical pharmacists are limited. This increases the need for devising and evaluating an effective documentation tool that is applicable to all case scenarios. The objective of this study is to design a pharmacy SOAP note and validate its quality in improving the documentation skills of pharmacy students pursuing clinical rotations.

MATERIALS AND METHODS

Phase I

A prospective study was conducted in a pharmacy school from November 2019 to February 2020, wherein a qualitative approach was incorporated to validate the caliber of a newly designed advanced SOAP (A-SOAP) note for pharmacists. Phase I included the preparation of relevant study documents, such as A-SOAP note and feedback questionnaire. As there is no gold standard tool for documentation, the newly designed SOAP note (A-SOAP) was validated using a basic template (SOAP 1). SOAP 1 consisted of general headings: “subjective,” “objective,” “assessment,” and “plan.” Feedback was collected from the faculties handling Doctor of Pharmacy (Pharm D) graduates using SOAP 1. They stated that the responses of students on SOAP 1 were indefinitely varied due to their vague structure and did not meet the purpose of documentation clearly. Hence, a new SOAP note was framed to overcome these limitations. An electronic search on PubMed, Scopus, and Cochrane CENTRAL was conducted by three reviewers: Reviewers 1, 2, and 3. A total of 52 articles were obtained wherefrom four pharmacy SOAP notes were identified (Oregon State University, 2017; University of Alberta, 2002; University of Florida, 2012; Virginia Pharmacists Association, 2019). Full text of the SOAP notes was retrieved and reviewed by two reviewers (Reviewer 4 and 5). The selected SOAP notes were dismantled and the significance of each component was critically reviewed. The components that were specific for documenting pharmacy notes were selected and included. All discrepancies were sorted out by Reviewer 6. The review comments which were used in creating A-SOAP are stated in Table 1. The newly designed SOAP note was considered to be an advanced version since all relevant components were included in a concise manner. The “Subjective” and “Objective” components are similar to any physician’s SOAP notes. “Assessment” entailed subheadings which can be thought-provoking for students to identify interventions and improve the quality of documentation. A-SOAP was drafted based on several criteria identified by the

| Virginia Pharmacists Association | A: Diagnosis or differential diagnosis | P: Drug therapy, efficacy, and toxicity parameters to detect drug-related ADRs and therapeutic outcomes, patient education, specific goals, and alternative therapies. |
| Oregon state University         | A: Prioritized problem list and drug-related problems, justifi cation for drug-related problems | P: Treatment plan, education and counseling, monitoring, follow-up, and referrals |
| University of Alberta           | A: Diagnosis or differential diagnosis | P: Goals of therapy, drug therapy recommendations, monitoring parameter (safety and efficacy), follow-up, name and sign of student, and preceptor with contact number |
| University of Florida           | A and P: Appropriate data from patient medication-related to evidence-based | A and P: Appropriate data from patient medication-related to evidence-based |

A = Assessment; P = Plan.

Table 1. List of SOAP notes and its components (Assessment and Plan) added in A-SOAP.
Phase II

Postgraduate Pharm D students from fourth to sixth year were eligible to participate in the study. A total of 34 students were randomly selected using a computer-generated sequence from fourth, fifth, and sixth years. The following objectives were planned to be met in the course of the study: ability to interpret the case scenario, documentation of case details and interventions, assessment of the quality of interventions, and time taken for documentation. The investigator had addressed all the participants on the study objectives, the constituents of A-SOAP, and the study procedure. A common case scenario was prepared and administered to the participants. The case scenario included patient demographics, complaints on admission and relevant histories, allergies, immunization status, diagnosis, laboratory/non-laboratory parameters, and day-to-day treatment chart. Students were asked to fill two SOAP notes for the same case scenario. The time taken to fill out both the SOAP notes was noted. They were also asked to provide feedback pertaining to A-SOAP. This study cleared ethical approval and informed consent was obtained from all study participants.

Phase III

Both SOAP notes were evaluated using a rubric grading tool published by Sherman et al. (2019). The grading tool aimed to evaluate the efficiency in reporting interventions. The number of interventions of both SOAP notes were compared and analyzed. A better score indicated proficient understanding and reporting skills. An answer key was prepared and circulated among the evaluators. Instructions were provided to them on different components of the grading rubric. All evaluators involved in grading the SOAP notes were blinded. The grading tool was used to assess the quality of interventions, therapy goals, and plans set by the pharmacist. Points were allotted for prioritization of interventions, providing patient-specific education, listing out the monitoring parameters, and providing appropriate recommendations to the problems identified on a scale of 1–5. Points were awarded for additional interventions identified. The overall score was in 100 points, which was statistically analyzed. An overview of the study design is shown in Figure 1.

Data analysis

Paired t-test was used to compare the scores between the SOAP notes. A p-value less than 0.05 was considered to be statistically significant. One-way analysis of variance (ANOVA) was carried out to determine the difference in the means of independent groups. This was followed by a post-hoc analysis to rule out which specific group differed from others. The positive and negative opinions provided by students were identified and categorized by conducting a feedback analysis. The scores were

<table>
<thead>
<tr>
<th>Table 2. Structure of A-SOAP.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subjective</strong></td>
</tr>
<tr>
<td>1    Patient demographics (chief complaints, past medical, past medication, social, and family history, provisional diagnosis)</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
</tr>
<tr>
<td>1    Objective data (height, weight, body mass index, altered lab parameters)</td>
</tr>
<tr>
<td><strong>Assessment</strong></td>
</tr>
<tr>
<td>(provide justification or evidence)</td>
</tr>
<tr>
<td>1    Disease-related problems (condition untreated, prophylactic therapy, immunization, scales to be administered)</td>
</tr>
<tr>
<td>2    Monitoring parameters (laboratory, non-laboratory, therapeutic drug monitoring)</td>
</tr>
<tr>
<td>3    Administration errors (extravasation, dilution, rate, dose, time)</td>
</tr>
<tr>
<td>4    Rationality for antibiotic use (choice of antibiotic, sensitivity, resistance pattern, etc.)</td>
</tr>
<tr>
<td>5    Drug-related problems (indication, side-effects, efficacy, adherence, interaction/duplication, contraindication, dose, dosage form, frequency, duration, route of administration, and cost-effectiveness)</td>
</tr>
<tr>
<td>6    Prioritize interventions</td>
</tr>
<tr>
<td><strong>Plan</strong></td>
</tr>
<tr>
<td>1    Goals of therapy (prioritize goals)</td>
</tr>
<tr>
<td>2    Therapeutic recommendation (include drug dose route regimen and duration)</td>
</tr>
<tr>
<td>3    Patient education/counseling (drug, lifestyle modification)</td>
</tr>
<tr>
<td>4    Monitoring for safety and efficacy (include frequency interval follow-up plan)</td>
</tr>
</tbody>
</table>
analyzed using IBM Statistical Package for the Social Sciences (SPSS) (V.21.0; SPSS Inc., Chicago, IL). The Likert scale was analyzed using Microsoft excel version 2007.

RESULTS AND DISCUSSION

A total of 34 participants from fourth, fifth, and sixth year Pharm D had completed the study. The scores of both the SOAP notes were presented as mean ± standard deviation. Paired t-test was carried out to measure the significance in the difference in scores ($p < 0.05$). On average, the score attained using A-SOAP was greater (57.94 ± 15.86) than SOAP note 1 (14.49 ± 12.95). This difference ($-43.44$, 95% CI $= -48.73$, $-38.15$) was significant ($t = -16.70$, $p = 0.000$). A statistically significant difference in the scores of A-SOAP between fourth, fifth, and sixth years was identified by one-way ANOVA ($F = 9.907$, $p = 0.000$). Tukey’s post-hoc test indicated that the scores of A-SOAP was significantly higher among the fourth-year (66.4 ± 12.6, $p = 0.002$) and sixth-year students (63.7 ± 8.9, $p = 0.001$) compared to the fifth-year students (43.9 ± 16.7). There was no statistically significant difference between the fourth and sixth years. The scores are summarized in Table 3.

The average time taken by fourth-year students to fill A-SOAP was 45 minutes. Both fifth and sixth years had taken an average of 15–20 minutes. This difference in time consumption is due to the varied understanding of the case scenario. In total, 76% of the respondents rated that A-SOAP had increased their ability to identify interventions. Some of the comments stated by the participants were: (a) the triggering questions and subheadings under assessment and plan sections were thought-provoking. (b) It had enabled them to identify interventions that were specific to the case. However, they found A-SOAP to be more time-consuming in comparison to SOAP 1. The results of the feedback analysis are presented in Table 4.

Pharmacy profession is taking a stride toward direct patient care. Hence, there is an increased concern in their ability to document and communicate clinical situations. Nguyen et al. (2019) had examined student performance in documenting SOAP notes in different semesters. Two SOAP notes filled at different time points were scored and analyzed. A non-significant $p$-value indicated adequate performance at various time points. The skill of documentation can be developed through a well-structured SOAP note. Recording patient health status in SOAP notes must be initiated during clinical rotations of students. This can boost their self-confidence and make them more competent in providing patient care (Chan et al., 2019). The framework of A-SOAP was found to be a methodical learning tool for students pursuing clinical rotation.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Category</th>
<th>Mean ± SD</th>
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<tbody>
<tr>
<td>Overall scores</td>
<td>SOAP 1</td>
<td>14.49 ± 12.95</td>
</tr>
<tr>
<td></td>
<td>A-SOAP</td>
<td>57.94 ± 15.86</td>
</tr>
<tr>
<td>A-SOAP score distribution based on curriculum level</td>
<td>Fourth-year Pharm D</td>
<td>66.4 ± 12.6</td>
</tr>
<tr>
<td></td>
<td>Fifth-year Pharm D</td>
<td>43.9 ± 16.7</td>
</tr>
<tr>
<td></td>
<td>Sixth-year Pharm D</td>
<td>63.7 ± 8.9</td>
</tr>
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Figure 1. Study flow diagram.
In general, documentation of patients’ demographics and treatment enables continuity of care and enhances interprofessional communication. Clinical records help to audit the quality of healthcare services and can also be used for investigation of serious incidents, patient complaints, and compensation. Complete up-to-date clinical notes will ensure that proper information is provided to all relevant healthcare workers to optimize treatment plans. This will favor patients to reduce the burden of repetitive tests or by eschewing incorrect diagnosis and receiving inappropriate treatment (Mathioudakis et al., 2016). In this study, a grading rubric was used to evaluate the performance of students. This tool was prepared by Sherman et al. (2019), in their study, to assess patient care skills among pharmacy students using SOAP notes. It was effective and feasible in accessing the improvement in documentation skills, objectively.

In the present study, a significant difference in the performance of fourth-, fifth-, and sixth-year students was found. This could be due to unequal distribution of sample size and varied understanding of case scenarios among participants. The students’ ability of filling and understanding A-SOAP was considerably better in comparison to SOAP 1. The writing ability of the study participants was assessed in this study.

A-SOAP consisted of questions that were easier to comprehend and had enhanced their capability in identifying drug-related problems. It was also time-consuming as stated by the study participants. Critical thinking is required to fill the components of the assessment section; hence, the average time spent by all study participants to provide an evidence-based care plan was 45 minutes. Spending passable time with patients is important for a thorough understanding of their medical condition and treatment. Participants found that the A-SOAP was more specific and helped to understand the patient’s disease condition, which favored in framing a plan. This study had also observed that documentation of patient details was more specific with A-SOAP.

Random selection of study participants and application of a uniform answer key for evaluation had prevented the occurrence of bias with this study. In addition to this, the SOAP note was prepared such that it is applicable to all hospital sectors. All participants were given orientation to the components of A-SOAP and the grading tool used for evaluation. This ensured unvarying understanding among the study participants. Based on the feedback provided by the evaluators, skills such as interpreting the case scenario, summarizing, providing case-specific mitigation strategies, writing, and documentation were upgraded in A-SOAP.

The limitations in this study include smaller sample size and difference in the understanding of case scenario as students’ participation was from three different years; however, this problem was overcome by providing a case that was a part of curriculum. A-SOAP note is applicable to all Pharm D students who are undertaking clinical rotations. The future prospect of this study is evaluating its reliability by conducting a similar study with different case scenarios.

CONCLUSION

The quality of documentation had significantly improved in the A-SOAP. A-SOAP can be used as an effective tool for documenting patient therapeutic records and communicating the same to fellow healthcare providers. In the future, the reliability of A-SOAP can be tested and made specific to therapeutic areas by testing on different case scenarios. It can also be used in combination with other teaching modalities to address nuances in documentation.

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AUTHORSHIP CONTRIBUTIONS

SSB: conceptualization, validation, supervision, project administration, writing, review and editing, and approval of final draft. PS: methodology, investigation, formal analysis, writing of the original draft, and approval of final draft. AG: methodology, writing of the original draft, and approval of final draft. JA: visualization, methodology, investigation, and approval of final draft. DB: investigation, data curation, and approval of final draft. SGK: resources, writing, review and editing, approval of final draft, and project administration. All the listed authors have agreed to be accountable for all aspects of the work.

LIST OF ABBREVIATIONS

SOAP: subjective, objective, assessment and plan; A-SOAP: advanced subjective, objective, assessment and plan; Pharm D: Doctor of Pharmacy; ANOVA: analysis of variance; TDM: Therapeutic Drug Monitoring.
CONFLICT OF INTEREST
The authors have no potential conflicts of interest to declare.

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Not applicable.

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REFERENCES


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