CrossMark
click for updates

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

Pooja Sudarsan (iD), Aishwarya Gowda Murulya Balakrishna, Jerlin Anusha Rajasingh Asir, Deepan Balu, Sadagoban Gopal Krishnamoorthy (iD), Swathi Swaroopa Borra* (iD)
Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education & Research, Ooty, Nilgiris, Tamil Nadu, India.

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.*,

Corresponding Author
Swathi Swaroopa Borra, Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education & Research, Ooty, Nilgiris, Tamil Nadu, India. E-mail: swasasree @ jssuni.edu.in

2016); (c) Kibble *et al.* (2006) 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, comprehendible, 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

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

List of published SOAP forms from pharmacy schools	Components of respective university SOAP notes	Components added in A-SOAP
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.
	P: Drug therapy, efficacy, and toxicity parameters to detect drug-related adverse drug reactions (ADRs) and therapeutic outcomes, patient education, specific goals, and alternative therapies.	
Oregon state University	A: Prioritized problem list and drug-related problems, justification for drug-related problems	P: Treatment plan, education and counseling, monitoring, follow-up, and referrals
	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
	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
	Pharmacokinetic monitoring, appropriateness of dose calculation, evidence-based medication therapy	Pharmacokinetic monitoring, appropriateness of dose calculation, evidence-based medication therapy
	Cost-effective drug products, medication-related problems, and treatment plan	Cost-effective drug products, medication-related problems, and treatment plan

A = Assessment; P = Plan.

authors and it is applicable to all hospital settings. The assessment section in A-SOAP was categorized based on the most commonly encountered interventions like disease, drug, and administration-related problems. A suitable justification has to be stated to every problem identified. Provision was provided to prioritize the interventions. "Plan" was segregated into goals of therapy, therapeutic recommendation, and patient education. The basic structure of A-SOAP is provided in Table 2.

A feedback questionnaire was carefully crafted in order to capture the student comments on A-SOAP (Sherman *et al.*, 2019; Storjohann *et al.*, 2019). These comments can help in improvising and assessing the quality of the newly designed SOAP note. The questionnaire was developed to capture the relevancy, simplicity, and efficiency of the SOAP note. The feedback was on a Likert-type scale graded as strongly agree, agree, disagree, and strongly disagree. The questionnaire has provisions for comments and suggestions.

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 2. Structure of A-SOAP.

|	
Subjective	
1	Patient demographics (chief complaints, past medical, past medication, social, and family history, provisional diagnosis)
Objective	
1	Objective data (height, weight, body mass index, altered lab parameters)
Assessment	
(provide justification or evidence)	
1	Disease-related problems (condition untreated, prophylactic therapy, immunization, scales to be administered)
2	Monitoring parameters (laboratory, non-laboratory, therapeutic drug monitoring)
3	Administration errors (extravasation, dilution, rate, dose, time)
4	Rationality for antibiotic use (choice of antibiotic, sensitivity, resistance pattern, etc.)
5	Drug-related problems (indication, side-effects, efficacy, adherence, interaction/duplication, contraindication, dose, dosage form, frequency, duration, route of administration, and cost-effectiveness)
6	Prioritize interventions
Plan	
1	Goals of therapy (prioritize goals)
2	Therapeutic recommendation (include drug dose route regimen and duration)
3	Patient education/counseling (disease, drug, lifestyle modification)
4	Monitoring for safety and efficacy (include frequency interval follow-up plan)
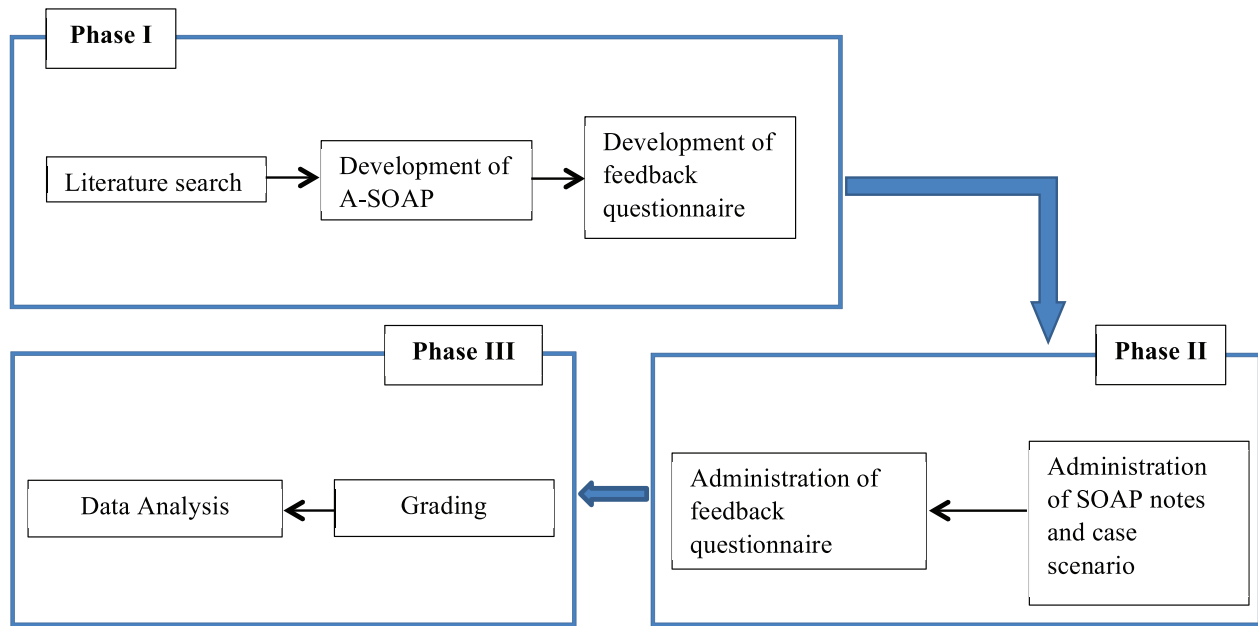
Figure 1. Study flow diagram.

Table 3. Overview of SOAP 1 and A-SOAP overall scores.

Parameter	Category	Mean ± SD
Overall scores	SOAP 1	14.49 ± 12.95
	A-SOAP	57.94 ± 15.86
A-SOAP score distribution based on curriculum level	Fourth-year Pharm D	66.4 ± 12.6
	Fifth-year Pharm D	43.9 ± 16.7
	Sixth-year Pharm D	63.7 ± 8.9

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 4. Student feedback analysis on A-SOAP.

Questions	Strongly agree (%)	Agree (%)	Disagree (%)	Strongly disagree (%)	Total (%)
The objective of A-SOAP was stated clearly and met	88%	12%	0%	0%	100%
The format was easy to follow	62%	35%	0%	3%	100%
Components of the A-SOAP were relevant and useful	79%	21%	0%	0%	100%
This SOAP note increased my ability in identifying interventions	76%	15%	9%	0%	100%
The time allocated for documentation was sufficient	38%	47%	9%	6%	100%
Thoughtful critique of patient–drug therapy	74%	24%	0%	3%	100%
Efficiency in the summarization of case scenario	76%	21%	3%	0%	100%
Overall rating for A-SOAP	68%	32%	0%	0%	100%

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.

ACKNOWLEDGMENTS

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.

ETHICAL APPROVAL

Not applicable.

FUNDING

None.

REFERENCES

Accreditation Council for Pharmacy Education. Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree. Accreditation Council for Pharmacy Education, Chicago, IL, 2015. Available via https://www.acpe-accredit.org/pdf/Standards2016FINAL.pdf (Accessed 29 April 2020).

Cameron S, Turtle Song I. Learning to write case notes using the SOAP format. J Couns Dev, 2002; 80(3):286–92.

Chan A, Lee JYC, Han Z. Perception of electronic peer review of SOAP notes among pharmacy students enrolling in their first pharmacotherapeutics course. Curr Pharm Teach Learn, 2019; 11(12):1259–64.

Crausman, RS. The ethics SOAP note. Chest, 1998; 113(2):558.

Kibble J, Hansen PA, Nelson L. Use of modified SOAP notes and peer-led small-group discussion in a Medical Physiology course: addressing the hidden curriculum. Adv Physiol Educ, 2006; 30(4):230–6.

Lisenby KM, Andrus MR, Jackson CW, Stevenson TL, Fan S, Gaillard P, Carroll DG. Ambulatory care preceptors' perceptions on SOAP note writing in advanced pharmacy practice experiences (APPEs). Curr Pharm Teach Learn, 2018; 10(12):1574–8.

Mathioudakis A, Rousalova I, Gagnat AA, Saad N, Hardavella G. How to keep good clinical records. Breathe, 2016; 12(4):369–73.

Mitsuishi F, Young JQ, Leary M, Dilley J, Mangurian C. The systems SOAP note: a systems learning tool. Acad Psychiatry, 2016; 40(1):164–71.

Mowery D, Wiebe J, Visweswaran S, Harkema H, Chapman WW. Building an automated SOAP classifier for emergency department reports. J Biomed Inform, 2012; 45(1):71–81.

Nguyen T, Wong E, Wang Z, Goldberg T. SOAP notes during APPEs: assessment of student performance. J Pharm Pract, 2019; 34(4):665–8.

O'Sullivan T, Odegard P. Communicating care in writing: a primer on writing SOAP notes. University of Washington, Seattle, WA, 2013. Available via: https://sop.washington.edu/wp-content/uploads/Student_SOAP_Note_Primer.pdf (Accessed 29 April 2020).

Oregon State University. College of pharmacy standardized SOAP note, Rubric, & Expected Components. Oregon State University, Corvallis, OR, 2017. Available via https://pharmacy.oregonstate.edu/sites/ pharmacy.oregonstate.edu/files/soap_rubric_and_components_-_final_nov_2017.pdf (Accessed 30 April 2020)

Podder V, Lew V, Ghassemzadeh S. SOAP notes. In: StatPearls. Stat Pearls Publishing, Treasure Island, FL, 2020.

Santiago LM, Neto I. SOAP methodology in general practice/family medicine teaching in practical context. Acta Med Port, 2016; 29(12):854–9.

Seo JH, Kong HH, Im SJ, Roh H, Kim DK, Bae HO, Oh YR. A pilot study on the evaluation of medical student documentation: assessment of SOAP notes. Korean J Med Educ, 2016; 28(2):237.

Sherman JJ, Johnson CD. Assessment of pharmacy students' patient care skills using case scenarios with a SOAP note grading rubric and standardized patient feedback. Curr Pharm Teach Learn, 2019; 11(5):513–21.

Storjohann T, Pogge E, Peckham A, Raney E, Barletta JF. Evaluation of a peer-and self-grading process for clinical writing assignments. Curr Pharm Teach Learn, 2019; 11(10):979–86.

University of Alberta. Portfolio – alternate format for documenting pharmacy notes. University of Alberta, Edmonton, AB, 2002. Available via: http://www.pharmacy.ualberta.ca/PreceptorResources/docs/Patient%20Care%20Process%20Document.pdf (Accessed 25 April 2020).

University of Florida. Portfolio – alternate format for documenting pharmacy notes. University of Florida, Gainesville, FL, 2012. Available via: https://pharmacy.ufl.edu/files/2012/05/Pharmacy-Note-Alternate-Format.pdf (Accessed 20 April 2020).

Using SOAP, SOAPIE, and SOAPIER formats. Charting tips. Nursing, 1999; 29(9):75. Available via: https://journals.lww.com/nursing/Citation/1999/09000/Using_SOAP,_SOAPIE,_and_SOAPIER_formats.28.aspx (Accessed 29 April 2020).

Vijayakumar TM. SOAP progress notes: a systematic approach to record pharmaceutical care interventions. Curr Med Res Pract, 2016; 6(3):129-130.

Virginia Pharmacists Association. Preceptor resources. SOAP notes – comprehensive. 2019. Available from: https://virginiapharmacists.org/resources/preceptor-resources/ (Accessed 29 April 2020).

Weed L. Medical records that guide and teach. N Engl J Med, 1968; 278(11):593–600.

Wright A, Sittig DF, McGowan J, Ash JS, Weed LL. Bringing science to medicine: an interview with Larry Weed, inventor of the problem-oriented medical record. J Am Med Inform Assoc, 2014; 21(6):964–8.