Community pharmacy-based SOAP notes documentation

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Abstract

There is still scarce and sparse evidence regarding documentation of the subjective, objective, assessment and plan (SOAP) note in community pharmacies despite its long implementation history in clinical and academia settings. Hence, we aimed to document and maintain SOAP notes for individual patients visiting community pharmacies for their health problems.

We conducted a community-based cross-sectional study at 2 community pharmacies in Nepal from July to December 2019. We recruited 400 patients from all age groups suffering from any health problem using simple random sampling. Patients' subjective complaints were retrieved from their respective prescriptions and verified by interviewing them. Data were collected on the standard format of the SOAP notes and all data related to patients' subjective and objective evaluations, and assessments and plans were descriptively analyzed with R programming 4.0.3. Drug interaction profile was checked with the Medscape Drug Interaction Checker.

A total of 87 (21.8%) patients aged 42 to 51 years participated in the research, out of whom 235 (58.8%) were female, 208 (52%) illiterate, 359 (89.8%) were facing mild polypharmacy, and 40 (9.9%) were suffering from joint, leg, ankle, and knee pain. There were 41 minor (11.4%), 130 major (32.7%), and 3 severe (0.9%) drug interaction cases (i.e., medication-related problems), with 11 (2.8%) occurring between amlodipine and metformin, which required close monitoring. There were 226 (56.5%) cases with follow-up planned for the patients when necessary.

This novel approach in documenting SOAP notes at community pharmacies during dispensing would be an extended form of the same being applied in clinical settings. Hence, this would open a new arena for the community pharmacists to expand their professionalism beyond the clinical and academia by documenting patients' complex disease and medication profiles in their documentation.

Abbreviations: ATC = anatomic/therapeutic/chemical, CCI = Charlson Comorbidity Index, EHR = electronic health records, ICD = International Statistical Classification of Diseases and Related HealthProblems, MRPs = Medication-related problems, MTM = medication therapy management, PCP = patient care process, PPCP = pharmacists' patient care process, SES = socioeconomic status, SOAP = subjective, objective, assessment, plan

Keywords: community pharmacy, drug interaction, electronic health record, medication-related problems, SOAP note

1. Introduction

The subjective, objective, assessment, plan (SOAP) note was formulated by Lawrence Weed at the University of Vermont in 1968 as a problem-oriented medical record to standardize the documentation of patient care process (PCP) and help communicate with health care providers, especially in hospital settings.[1–7] These notes help in patients' chronological clinical evaluation with the comprehensive analysis of their health problems and formulate treatment plans accordingly.[2,3,6–8] Although it is a structured note, there is no single definitive format for SOAP documentation as health professionals across diverse health care settings may differently maintain SOAP documentation.[9] However, the widely adopted format is subjective (S), objective (O), assessment (A), and plan (P), where the subjective data are disease/symptoms-related information or chief complaints obtained from the patients and/or their caretakers, and the objective data are taken from observation, physical examination, and diagnostic studies (such as clinical laboratory and radiologic investigations). Similarly, the third dimension of the note (i.e., assessment) includes analysis of the problem(s) with their progress based on the clinician's

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diagnostic and therapeutic impressions. The fourth (i.e., plans) includes the proposed future prognosis strategies, including follow-up(s).[1,7,9–12]

The SOAP note plays one of the central roles in the pharmacists' PCP (PPCP) to achieve the utmost patient care within the integrated health care team.[5] The PPCP approach represents a framework for consistent, quality, and uninterrupted delivery of pharmaceutical services via 5 steps: collect, assess, plan, implement, and follow-up, where the SOAP note may get integrated.[13] These help in clinical reasoning[14] and medication therapy management to improve patient care initiatives[15] promoting continuity of care focusing on safety concerns.[9]

Some variants of SOAP notes have also been trialed. For example, Donnelly[16] suggested that SOAP note be modified to HOAP (history, observations, assessment, and plan) note to ensure comprehensive history taking at the early stage of the PCP. Similarly, the "systems SOAP" note (SSOAP or S-SOAP) was developed in a structurally similar format as a typical SOAP note format. This was an 8-item survey tool developed to make data collection conceptually and structurally easy.[9,17] Another variant named SOAPIE/SOAPIER format ("I" being interventions, "E" evaluation, and "R" reflection) has been trialed in the nursing field, although this format could not meet the documentation requirements in the busy clinical settings and could focus only on a single problem.[18] Weiss et al[19] also extended a SOAP note to a SOAPS note (the last "S" representing safety, all others remaining the same as the SOAP note) to address the real-time interactions among patients and health care providers to improve the quality of PCP. This modified documentation helps the providers explore and document potential safety concerns (including medication errors) during each health care visit in the form of morning reports, clinical rounds, or exit interviews.[19] However, the essence of all the variants of SOAP notes remains the same.

There are many research works conducted on SOAP notes in clinical and academia settings, but as pharmacists are increasingly working in community pharmacies these days, SOAP note-related research has been felt necessary at community pharmacies settings. However, there is sparse evidence regarding documentation of the SOAP note in community pharmacies. Hence, this research aimed to expand the documentation of SOAP notes at community pharmacy settings beyond the usual clinical and academia settings.

2. Methods

2.1. Research design, duration and area

Community-based cross-sectional study was conducted at 2 community pharmacies in Nepal - Nishan Pharmacy (Thimi, Bhaktapur) and Melamchi Pharmacy (Jorpati, Kathmandu) from July to December 2019. These pharmacies were providing 12-hour services to the medical care seekers as these were near 2 hospitals (i.e., Nepal-Korea Municipality Hospital and Nepal Orthopedic Hospital). Therefore, 2 pharmacies were selected to implement the SOAP notes in community pharmacy levels in an optimum patient number. Previously, SOAP note was widely applied in clinical settings and academia for documenting patients' health status and research purposes, respectively.

2.2. Ethics approval, patient and public involvement

Approval to conduct research was obtained from the administration of both community pharmacies. Ethics approval was achieved from Nobel College Institutional Review Committee, Kathmandu, Nepal (Reg. No. 220/2019). The patients were involved from the data collection stage but without invasive interventions. Data collection sheet in the form of SOAP format was disseminated to the patients before data collection from them. They were provided with the details of the research

objectives and requested to fill out the consent form before data collection. Their privacy and confidentiality were maintained throughout the research period.

2.3. Inclusion and exclusion criteria

All age group patients having details of laboratory reports were included in the research. Their subjective complaints were retrieved from their respective prescriptions and verified by interacting. Those without laboratory reports (as these were the basis for the objective evaluations) and those not willing to participate were excluded.

2.4. Sampling and sample size

Simple random sampling was undertaken to calculate the sample size by applying the Cochran's formula:

$$n = Z^2 \times P(1 − P)/d^2$$

Here,

z = 1.96 (standard normal variate); P = .5 (expected portion in population as it was unknown); and d = 0.05 (absolute error or precision).

Then the sample size taken was computed as 384, which was rounded to 400.

2.5. Study procedure

The following study procedure was adopted for the present research:

1. Patients' prescriptions were reviewed for their subjective complaints and objective evaluations.
2. Subjective information was verified by interacting with them. Laboratory data served as the objective ones and prescribed medications with full regimens were also retrieved from the prescriptions.
3. Patients' diagnoses mentioned by the physicians, based on their subjective and objective evaluations, were considered for the analysis for the research purpose. However, all S, O, A, and P aspects were profiled for an individual patient.
4. Then the drug interaction profile and status were later checked with the Medscape Drug Interaction Checker,[20] and the report was discussed later with the pharmacies where the study was conducted.
5. The Charlson Comorbidity Index (CCI) was used to index the comorbidities and explore the 10-year survival percentage, based on Charlson[21] and Charlson et al[22] research and was computed from the CCI online calculator.
6. The report was later handed to the concerned community pharmacists to assist them in assessments and plans for the individual patients.

2.6. Data collection and analysis

The second and third investigators collected data on the standard format of the SOAP notes [Supplemental Digital Content (Annex 1), http://links.lww.com/MD/G933]. All information was extracted from the patients on their visits to the community pharmacies. All data relating to the patients' subjective and objective evaluations and their assessments and plans were descriptively presented with R programming 4.0.3.[23] Comorbidities of the patients were coded as per the International Statistical Classification of Diseases and Related Health Problems (ICD)-10 coding system.[24] The anatomic/therapeutic/chemical classification of medicines was performed based on the World Health

Organization Guidelines for the anatomic/therapeutic/chemical classification and defined daily dose assignment 2020 23rd edition.[25]

3. Results

There were 87 (21.8%) patients in the age range 42 to 51 years, out of whom 235 (58.8%) were female, 384 (96%) from Bhaktapur district, 208 (52%) illiterate, and 359 (89.8%) were experiencing mild polypharmacy (i.e., consuming 1–4 medicines) during the study period. (Table 1) There were 40 (9.9%) patients with joint, leg, ankle, and knee pain. The CCI profile showed that the CCI of 1 was the highest (136, i.e., 34%), showing the estimated 10-year survival of 96% among 137 (34.3%) patients (Table 2). There were 41 minor (11.4%), 130 major (32.7%), and 3 severe (0.9%) drug interaction cases in the research. There were 11 (2.8%) cases of interaction between amlodipine and metformin, which required close monitoring (Table 3).

There were 226 (56.5%) cases with follow-up planned for the patients, when necessary, but the study investigators did not perform these follow-ups during the study period. After 1 month, follow-up was planned for 68 (17%) cases (Table 4). Pantoprazole tab. 40 mg was the most prescribed medication (i.e., 77; 19.3% times), followed by diclofenac gel (i.e., 38; 9.5% times) [Supplemental Digital Content (Annex 2), http://links.lww.com/MD/G933]. Therapeutic category-wise, various proton pump inhibitors and various nutraceuticals were prescribed most commonly (i.e., 137, 34.4% and 106, 26.9%,

Table 1

Demographic characteristics of study population (n = 400).

Study variables	Frequency (%)
Age (in yr) (mean ± SD: 43.91 ± 20.40)	
≤1	4 (1)
2–11	32 (8)
12–21	25 (6.2)
22–31	39 (9.8)
32–41	65 (16.2)
42–51	87 (21.8)
52–61	66 (16.5)
62–71	48 (12)
72–81	27 (6.8)
82–91	4 (1)
92+	3 (0.8)
Gender	
Male	165 (41.2)
Female	235 (58.8)
District	
Bhaktapur	384 (96)
Sindhuli	3 (0.8)
Surkhet	1 (0.2)
Lalitpur	1 (0.2)
Kathmandu	7 (1.8)
Ilam	2 (0.5)
Sindhupalchowk	1 (0.2)
Ramechhap	1 (0.2)
Education	
Illiterate	208 (52)
Preprimary	7 (1.8)
Primary level	73 (18.2)
Secondary level	70 (17.5)
Higher secondary level	22 (5.5)
Undergraduate level	12 (3)
Postgraduate level	8 (2)
Polypharmacy status: (mean ± SD: 2.74 ± 1.36)	
Mild (1–4 medicines)	359 (89.8)
Moderate (5–9 medicines)	40 (10)
Severe (≥10 medications)	1 (0.2)

Table 2

Disease profile of the patients (subjective and objective evaluation) (n = 400).

Disease	ICD classification[24]	Frequency (%)
DM-II, HTN	5A14, BA00.Z	22 (5.5)
DM-II	5A14	38 (9.5)
Eye infection	9A01	19 (4.8)
Joint, leg, ankle, knee pain	ME82	40 (9.9)
Toothache and gum bleeding	DA0A.Y	24 (6)
Throat pain	MD36.0	7 (1.8)
Rashes on body	ME66.61	7 (1.8)
Backache	ME84.2Z	11 (2.8)
Cough	MD12	11 (2.8)
Myopia	9D00.0	1 (0.2)
Headache	MB6Y	12 (3)
Abdominal pain	MD81.1Z	20 (5)
Vaginal infection	GA02.0	6 (1.5)
Asthma	CA23.30	2 (0.5)
Thumb pain	NC5Z	1 (0.2)
URTI	CA07.0	4 (1)
Anorexia	MG43.7	3 (0.8)
Burning micturition	MF50.6Z	2 (0.5)
Hyperthyroidism	5A02.Z	3 (0.8)
Otalgia	AB70.2	2 (0.5)
Epilepsy	8A6Z	5 (1.2)
Gastritis	DA42.70	13 (3.2)
Shoulder pain	FB53.Y	5 (1.2)
Contact dermatitis	9A06.Y	3 (0.8)
Growth retardation	MG44.1Z	1 (0.2)
Paresthesia of whole body	MB40.3	9 (2.2)
Hypothyroidism, HTN	5A00.Z, BA00.Z	4 (1)
Chest pain	MD30.Z	4 (1)
Osteoarthritis	FA0Z	1 (0.2)
Fever	MG26	6 (1.5)
Generalized pain	MG3Z	5 (1.2)
Hyperuricemia	5C55.Y	5 (1.2)
Elbow pain	FB56.4	2 (0.5)
Tonsillitis	CA03.Z	6 (1.5)
Uterine problem	GA01.Y	3 (0.8)
Hyperthyroidism, HTN	5A02.Z, BA00.Z	1 (0.2)
Coronary artery disease	BA8Z	3 (0.8)
DM-II, depression	5A14, 6A7Z	1 (0.2)
COPD	CA22.Z	6 (1.5)
Anal fissure	DB50.Z	1 (0.2)
Dizziness	MB48.Z	4 (1)
Hypothyroidism	5A00.Z	8 (2)
HTN, hyperlipidemia	BA00.Z, 5C80.1	2 (0.5)
Anxiety disorder	6B00	1 (0.2)
Scabies	1G04.Y	1 (0.2)
Neck pain	ME84.0	1 (0.2)
Mastodynia	GB23.5	2 (0.5)
Candidiasis	1F23.Z	1 (0.2)
Otitis media	AB0Z	4 (1)
HTN, BPH	BA00.Z, GA90	3 (0.8)
Peptic ulcer	DA61	1 (0.2)
Fungal infection	1F2Z	1 (0.2)
Glossitis	DA03.0	2 (0.5)
Postsurgical follow-up	QA07	2 (0.5)
UTI	GC08.Z	3 (0.8)
Constipation	ME05.0	2 (0.5)
Recurring hiccough	8A06.21	1 (0.2)
Anemia	3A9Z	1 (0.2)
HTN	BA00.Z	41 (10.2)
Charlson Comorbidity Index (CCI) (Mean ± SD: 1.26 ± 1.23)		
0		132 (33)
1		136 (34)
2		55 (13.8)
3		54 (13.5)
4		19 (4.8)
5		4 (1)

(Continued)

Table 2

(Continued)

Disease	ICD classification[24]	Frequency (%)
Estimated 10-yr survival (%) (Mean ± SD: 90.49 ± 13.01)		
21		4 (1)
53		19 (4.8)
77		54 (13.5)
90		54 (13.5)
96		137 (34.3)
98		132 (33)

International Statistical Classification of Diseases and Related Health Problems (ICD)-10 (ICD-10) for Mortality and Morbidity Statistics (Version: 09/2020).[24]

BPH = benign prostatic hyperplasia; COPD = chronic obstructive pulmonary disease; DM-II = type II diabetes mellitus; HTN = hypertension; URTI = upper respiratory tract infection; UTI = urinary tract infection.

respectively) [Supplemental Digital Content (Annex 3), http://links.lww.com/MD/G933].

4. Discussion

Medical records play a means of liaison and communication among diverse health professionals as these document clinical data, the decision-making process, and the decisions taken regarding patients' health status.[8] Clear, accurate, concise, and consistent documentation help them provide the patients with safe and effective medication therapy management.[26] Systematic documentation patterns most commonly used during PCP include SOAP, TITRS (title, introduction, text, recommendation, signature), and FARM (findings, assessment, recommendations/resolutions, management).[12,27,28] Out of these, SOAP notes have been well accepted as one of the primary documentation methods by the interdisciplinary health care providers, including physicians, pharmacists, nurses, and others, especially within the hospital (in both inpatient and outpatient) and clinical settings (such as ward rounds).[1,4,6,15,26,27] These are mainly popular worldwide as communication tools to facilitate the PCP, pharmacotherapy recommendations, and progress reports on health outcomes.[2,5,18,29–31]

The SOAP note is a prominent time-tested and problem-oriented type of electronic health records used to assess the patients' signs and symptoms and their therapies.[9] Maximum patients (87, i.e., 21.8%) were in the age range 2 to 51 years, nearly similar to the study conducted by Tetuan et al[32] at the independent community pharmacy chain in Missouri, USA. This might indicate the burgeoning health problems in these active but adult age groups and the geriatric population. However, Kassam et al[33] reported that maximum patients aged 74 years were suffering from medical problems and required pharmaceutical care in their research conducted at 5 independent community pharmacies in Alberta, Canada. We found that maximum patients (40 i.e., 9.9%) had joint, leg, ankle, and knee pain. Since people of diverse backgrounds in the same community, health problems may also be diverse. Tetuan et al[32] had also reported miscellaneous diagnoses for 24 patients in their research.

Genderwise, Tetuan et al[32] reported a nearly equal number of male and female patients out of 35 participants. The present research could handle the prescriptions of maximum female patients (235, i.e., 58.8%) out of 400 in the nearly similar pattern reported by Kassam et al,[33] who reported that 64% of women participants out of 159 required pharmacists' intervention for their health problems. Such differences in demographic characteristics among various researches might be the beauty of epidemiological diversity as many societal factors may play a significant role in these. Education-wise, the present research indicated 208 (52%), illiterate participants. In contrast, Kassam et al[33] reported 45% of high school level participants in their research. This difference in the education level might result from the difference in socioeconomic status (SES) and awareness toward education in country-specific settings. However, another dimension might indicate that illiterate people may suffer more from health problems in underdeveloped countries.

There were 359 (89.8%) patients with mild polypharmacy in the present research but without any significant health problems resulting from such medicine consumption, as interviewed with them, but the drug interactions incurred some medication-related problems (MRPs). Kassam et al[33] found that the average number of prescription medications per day was 8.7 among their study participants. The scenario of the underdeveloped country was better from the perspective of polypharmacy, which might be due to the poor or below-average SES and provision of out-of-pocket payment in Nepal. The preventable polypharmacy events should be avoided as far as possible, irrespective of the SES of patients, and even the country's economy.

There were 41 minor (11.4%), 130 major (32.7%), and 3 severe (0.9%) drug interaction cases, with maximum (11, i.e., 2.8%) interaction cases between amlodipine and metformin, which even necessitated close monitoring in the present research. Assessing MRPs is one of the vital components of the SOAP note, which was also agreed upon by all participants in the research by Sando et al.[27] Researchers documented the MRPs and interventions to resolve them using the SOAP notes.[32,33] Tetuan et al[32] documented so at an independent community pharmacy and later transferred the report to the hospital and primary care providers and concluded that community pharmacists could identify MRPs and propose recommendations for patients (at both inpatients and outpatients settings). Pharmacists identified 69 MRPs and made 145 recommendations for 35 patients in research conducted in the USA,[33] whereas 559 cases of all MRPs and 428 vaccination-excluded MRPs were reported, which required pharmaceutical care intervention in another research conducted in Canada.[34]

There were 226 (56.5%) cases with follow-up planned for the patients, when necessary, followed by 68 (17%) cases of scheduled follow-up after 1 month. Sando et al[27] conducted a study to evaluate current methods of assessing SOAP notes in colleges and schools of pharmacy in the USA and found that 35 out of 39 pharmacists responded that they would plan for follow-up for their participants. Kassam et al[33] also reported 218 follow-up events for actual and 333 for potential MRPs. These all conclude that doing necessary follow-up to monitor and assess the progress status and intervening accordingly may be an integral part of the PPCP.

Developing and maintaining legible (if manual), accurate, complete, and scientifically valid SOAP notes are the all-time professional obligation of the health care providers in respective practice areas to make these easily understandable by other health care practitioners[5] because these notes are widely used to improve and ensure continuity of patient care and outcomes, quality assurance in health care delivery and research.[5,31] However, Hussein et al[34] reported 57 poor assessments of medical records at the surgery ward and altogether 235 poor progress notes while conducting research among 268 in-patients at 4 departments of Basrah General Hospital (i.e., medicine, surgery, pediatrics and obstetrics, and gynecology) in June 2016. As the traditional SOAP notes translate poorly from paper medical charts to the electronic health records, these can be integrated in an electronic database to expedite data collection, report and extract clinical indicators, schedule follow-up visits and solve the problems of illegibility.[12] This also promotes the exploration of drug interaction cases and facilitates easy reporting. One of the burning examples was set by old research by Heun et al,[2] who reported the performance of the SOAP Note Plus program (a computer-based SOAP-integration approach) at Kirksville College of Osteopathic Medicine in 1995. The program helped modify the closed-ended assessment into an open-ended one to address the broad range of clinical problems, promote standardized patient assessment, and automate the postvisit evaluation and documentation.[2]

Table 3

Drug interaction profile (assessment stage*) (n = 400, 100%).

Medicine 1 – Medicine 2 interactions†	Interaction report	Number of patients (prescriptions) [n (%)]		
		Minor	Monitor closely	Serious - use alternative
Acarbose - insulin regular human	Either increases effects of the other by pharmacodynamic synergism.	0	1 (0.3)	0
Aceclofenac - aspirin	Aceclofenac and aspirin both increase anticoagulation. (monitor closely) Aceclofenac increases level or effect of aspirin by acidic (anionic) drug competition for renal tubular clearance (minor).	1 (0.3)	2 (0.5)	0
Aceclofenac - methylprednisolone	Either increases toxicity of the other by pharmacodynamic synergism. Increased risk of GI ulceration.	0	3 (0.8)	0
Albuterol - formoterol	Albuterol and formoterol both decrease serum potassium, sedation. Albuterol and formoterol both increase sympathetic (adrenergic) effects, including increased blood pressure and heart rate.	0	1 (0.3)	0
Albuterol - salmeterol	Albuterol and salmeterol both decrease serum potassium, sedation. Albuterol and salmeterol both increase sympathetic (adrenergic) effects, including increased blood pressure and heart rate.	0	1 (0.3)	0
Amiloride - aspirin	Amiloride and aspirin both increase serum potassium. Modify Therapy/Monitor Closely.	0	1 (0.3)	0
Amiloride - furosemide	Amiloride increases and furosemide decreases serum potassium. Modify Therapy/Monitor Closely.	0	2 (0.5)	0
Amiloride - ramipril	Pharmacodynamic synergism. Use Caution/Monitor. Risk of hyperkalemia.	0	1 (0.3)	0
Amiodarone - losartan	Amiodarone increases level or effect of losartan by affecting hepatic enzyme CYP2C9/10 metabolism.	0	2 (0.5)	0
Amiodarone - metformin	Amiodarone increases level or effect of metformin by basic (cationic) drug competition for renal tubular clearance.	0	2 (0.5)	0
Amitriptyline - glimepiride	Amitriptyline increases effects of glimepiride by pharmacodynamic synergism.	1 (0.3)	0	0
Amitriptyline - metformin	Amitriptyline increases effects of metformin by pharmacodynamic synergism.	1 (0.3)	0	0
Amlodipine - metformin	Amlodipine decreases effects of metformin by pharmacodynamic antagonism. Patient should be closely observed for loss of blood glucose control.	0	11 (2.8)	0
Amoxicillin - aspirin	Either increases levels of the other by plasma protein binding competition and by decreasing renal clearance.	0	1 (0.3)	0
Aspirin - bisoprolol	Aspirin decreases effects of bisoprolol by pharmacodynamic antagonism. Bisoprolol and aspirin both increase serum potassium.	0	1 (0.3)	0
Aspirin - clopidogrel	Either increases toxicity of the other by pharmacodynamic synergism.	0	1 (0.3)	0
Aspirin - furosemide	Aspirin increases and furosemide decreases serum potassium (monitor closely). Aspirin decreases effects of furosemide by pharmacodynamic antagonism (minor).	1 (0.3)	1 (0.3)	0
Aspirin - glimepiride	Aspirin increases effects of glimepiride by unknown mechanism. Risk of hypoglycemia (monitor closely). Aspirin increases effects of glimepiride by plasma protein binding competition (minor).	3 (0.8)	2 (0.5)	0
Aspirin - hydrochlorothiazide	Aspirin increases and hydrochlorothiazide decreases serum potassium (monitor closely). Hydrochlorothiazide increases level or effect of aspirin by acidic (anionic) drug competition for renal tubular clearance (minor).	1 (0.3)	1 (0.3)	0
Aspirin - ibuprofen	Ibuprofen increases toxicity of aspirin by anticoagulation. Increases risk of bleeding. It decreases effects of aspirin. It decreases the antiplatelet effects of low-dose aspirin by blocking the active site of platelet cyclooxygenase. Administer ibuprofen 8 h before aspirin or at least 2-4 h after aspirin (serious - use alternative). Aspirin and ibuprofen both increase anticoagulation and serum potassium (monitor closely). Aspirin increases level or effect of ibuprofen by acidic (anionic) drug competition for renal tubular clearance (monitor closely).	0	1 (0.3)	1 (0.3)
Aspirin - indomethacin	Aspirin and indomethacin both increase anticoagulation (monitor closely). Aspirin increases level or effect of indomethacin by acidic (anionic) drug competition for renal tubular clearance (minor).	1 (0.3)	1 (0.3)	0
Aspirin - losartan	Either increases toxicity of the other. Aspirin decreases effects of losartan by pharmacodynamic antagonism. Losartan and aspirin both increase serum potassium.	0	6 (1.5)	0
Aspirin - metoprolol	Aspirin decreases effects of metoprolol by pharmacodynamic antagonism. Metoprolol and aspirin both increase serum potassium.	0	4 (1)	0
Atenolol - amlodipine	Either increases effects of the other by pharmacodynamic synergism. Both drugs lower blood pressure.	0	5 (1.3)	0
Atenolol - losartan	Pharmacodynamic synergism Losartan and atenolol both increase serum potassium.	0	1 (0.3)	0
Atenolol - salmeterol	Atenolol decreases effects of salmeterol by pharmacodynamic antagonism. Atenolol increases and salmeterol decreases serum potassium.	0	1 (0.3)	0
Atorvastatin - amitriptyline	Atorvastatin increases level or effect of amitriptyline by P-glycoprotein (MDR1) efflux transporter.	0	1 (0.3)	0
Atorvastatin - tinidazole	Atorvastatin increases level or effect of tinidazole by affecting hepatic/intestinal enzyme CYP3A4 metabolism.	0	1 (0.3)	0
Azithromycin - atorvastatin	Azithromycin increases level or effect of atorvastatin by affecting hepatic/intestinal enzyme CYP3A4 metabolism.	0	1 (0.3)	0
Azithromycin - cetirizine	Azithromycin increases the level or effect of cetirizine by P-glycoprotein (MDR1) efflux transporter.	0	1 (0.3)	0
Azithromycin - fluconazole	Azithromycin and fluconazole both increase QTc interval.	0	5 (1.3)	0
Calcium carbonate - aspirin	Passive renal tubular reabsorption due to increased pH.	1 (0.3)	0	0
Calcium carbonate - levothyroxine	Calcium carbonate decreases levels of levothyroxine by inhibition of GI absorption. Separate by 2 h.	0	2 (0.5)	0
Chlorzoxazone - topiramate	Chlorzoxazone and topiramate both increase sedation. Modify therapy/monitor closely.	0	1 (0.3)	0
Clonazepam - baclofen	Clonazepam and baclofen both increase sedation.	0	2 (0.5)	0
Clotrimazole - tinidazole	Clotrimazole increases level or effect of tinidazole by affecting hepatic/intestinal enzyme CYP3A4 metabolism.	0	1 (0.3)	0
Diclofenac topical - aspirin	Either increases effects of the other by pharmacodynamic synergism.	1 (0.3)	0	0
Diclofenac topical - ibuprofen	Either increases effects of the other by pharmacodynamic synergism.	1 (0.3)	0	0

(Continued)

Table 3

(*Continued*)

Medicine 1 – Medicine 2 interactions†	Interaction report	Number of patients (prescriptions) [n (%)]		
		Minor	Monitor closely	Serious - use alternative
Diclofenac topical - indomethacin	Either increases effects of the other by pharmacodynamic synergism.	1 (0.3)	0	0
Diclofenac topical - naproxen	Either increases effects of the other by pharmacodynamic synergism.	2 (0.5)	0	0
Enalapril - glimepiride	Enalapril increases effects of glimepiride by pharmacodynamic synergism.	0	1 (0.3)	0
Enalapril - metformin	Enalapril increases toxicity of metformin by unspecified interaction mechanism. Increases risk for hypoglycemia and lactic acidosis.	0	1 (0.3)	0
Esomeprazole - clonazepam	Esomeprazole increases level or effect of clonazepam by affecting hepatic enzyme CYP2C19 metabolism.	2 (0.5)	0	0
Esomeprazole - levothyroxine	Esomeprazole decreases levels of levothyroxine by increasing gastric pH.	1 (0.3)	0	0
Esomeprazole - methotrexate	Esomeprazole increases levels of methotrexate by decreasing renal clearance.	0	1 (0.3)	0
Esomeprazole - theophylline	Esomeprazole increases toxicity of theophylline.	1 (0.3)	0	0
Fenofibrate - glimepiride	Fenofibrate increases effects of glimepiride by plasma protein binding competition. Hypoglycemia; increased risk in hypoalbuminemia.	0	1 (0.3)	0
Fenofibrate - warfarin	Fenofibrate increases effects of warfarin by pharmacodynamic synergism and by plasma protein binding competition.	0	0	1 (0.3)
Ferrous fumarate - levothyroxine	Ferrous fumarate decreases levels of levothyroxine by inhibition of GI absorption.	0	1 (0.3)	0
Flucloxacillin - ibuprofen	Either increases levels of the other by plasma protein binding competition and by decreasing renal clearance.	0	2 (0.5)	0
Fluconazole - pantoprazole	Fluconazole increases the level or effect of pantoprazole by affecting hepatic enzyme CYP2C19 metabolism.	4 (1)	0	0
Fluconazole - tinidazole	Fluconazole increases level or effect of tinidazole by affecting hepatic/intestinal enzyme CYP3A4 metabolism.	0	5 (1.3)	0
Folic acid - methotrexate	Folic acid decreases effects of methotrexate by pharmacodynamic antagonism.	1 (0.3)	0	0
Furosemide - levothyroxine	Furosemide increases toxicity of levothyroxine.	1 (0.3)	0	0
Furosemide - metformin	Metformin decreases levels of furosemide by unspecified interaction mechanism. Furosemide increases levels of metformin by unspecified interaction mechanism. Patient should be closely observed for loss of blood glucose control.	1 (0.3)	0	0
Gabapentin - amitriptyline	Either increases effects of the other by pharmacodynamic synergism. Use lowest dose possible and monitor for respiratory depression and sedation.	0	1 (0.3)	0
Glimepiride - insulin regular human	Either increases effects of the other by pharmacodynamic synergism.	0	1 (0.3)	0
Glimepiride - linagliptin	Lower dose of the sulfonylurea may be required to reduce risk of hypoglycemia.	0	1 (0.3)	0
Hydrochlorothiazide - indomethacin	Indomethacin increases and hydrochlorothiazide decreases serum potassium (monitor closely). Hydrochlorothiazide increases level or effect of indomethacin by acidic (anionic) drug competition for renal tubular clearance (minor).	1 (0.3)	1 (0.3)	0
Ketoconazole - clobetasone	Ketoconazole increases level or effect of clobetasone by affecting hepatic/intestinal enzyme CYP3A4 metabolism. Avoid or use alternate drug (serious - use alternative). Ketoconazole increases level or effect of clobetasone by P-glycoprotein (MDR1) efflux transporter (monitor closely).	0	1 (0.3)	1 (0.3)
Levothyroxine - metformin	Levothyroxine decreases effects of metformin by pharmacodynamic antagonism. Patient should be closely observed for loss of blood glucose control.	0	1 (0.3)	0
Losartan - aceclofenac	Losartan and aceclofenac both increase serum potassium.	0	1 (0.3)	0
Losartan - furosemide	Losartan increases and furosemide decreases serum potassium.	0	1 (0.3)	0
Losartan - hydrochlorothiazide	Losartan increases and hydrochlorothiazide decreases serum potassium.	0	1 (0.3)	0
Losartan - insulin regular human	Losartan increases effects of insulin regular human by unspecified interaction mechanism.	0	1 (0.3)	0
Losartan - metoprolol	Pharmacodynamic synergism Losartan and metoprolol both increase serum potassium.	0	3 (0.8)	0
Losartan - propranolol	Pharmacodynamic synergism Losartan and propranolol both increase serum potassium.	0	5 (1.3)	0
Losartan - tinidazole	Losartan increases level or effect of tinidazole by affecting hepatic/intestinal enzyme CYP3A4 metabolism.	0	1 (0.3)	0
Metformin - insulin regular human	Either increases effects of the other by pharmacodynamic synergism.	0	2 (0.5)	0
Metoprolol - amiloride	Metoprolol and amiloride both increase serum potassium.	0	2 (0.5)	0
Metoprolol - furosemide	Metoprolol increases and furosemide decreases serum potassium.	0	2 (0.5)	0
Metronidazole - acetaminophen	Metronidazole increases level or effect of paracetamol by affecting hepatic enzyme CYP2E1 metabolism.	3 (0.8)	0	0
Metronidazole - ibuprofen	Metronidazole increases level or effect of ibuprofen by affecting hepatic enzyme CYP2C9/10 metabolism.	1 (0.3)	0	0
Omeprazole - cefpodoxime	Omeprazole decreases effects of cefpodoxime by increasing gastric pH.	0	1 (0.3)	0
Pantoprazole - clopidogrel	Pantoprazole decreases effects of clopidogrel by affecting hepatic enzyme CYP2C19 metabolism.	0	1 (0.3)	0
Pantoprazole - levothyroxine	Pantoprazole decreases levels of levothyroxine by increasing gastric pH.	2 (0.5)	0	0
Phenytoin - acetaminophen	Phenytoin decreases levels of paracetamol by increasing metabolism. Enhanced metabolism increases levels of hepatotoxic metabolites.	1 (0.3)	0	0
Prazosin - amlodipine	Prazosin and amlodipine both increase anti-hypertensive channel blocking.	0	1 (0.3)	0

Table 3

(Continued)

Medicine 1 – Medicine 2 interactions†	Interaction report	Number of patients (prescriptions) [n (%)]		
		Minor	Monitor closely	Serious - use alternative
Propranolol - amlodipine	Propranolol and amlodipine both increase anti-hypertensive channel blocking.	0	2 (0.5)	0
Rabeprazole - cefpodoxime	Rabeprazole decreases level or effect of cefpodoxime by increasing gastric pH.	0	1 (0.3)	0
Rabeprazole - levothyroxine	Rabeprazole decreases levels of levothyroxine by increasing gastric pH.	1 (0.3)	0	0
Ramipril - furosemide	Pharmacodynamic synergism. Risk of acute hypotension, renal insufficiency.	0	1 (0.3)	0
Rosuvastatin - warfarin	Rosuvastatin increases effects of warfarin by unspecified interaction mechanism.	0	1 (0.3)	0
Salicylates - clobetasone	Either increases toxicity of the other by pharmacodynamic synergism.	0	1 (0.3)	0
Sitagliptin - glimepiride	Either increases effects of the other by pharmacodynamic synergism.	5 (1.3)	0	0
Sitagliptin - insulin regular human	Either increases effects of the other by pharmacodynamic synergism.	0	1 (0.3)	0
Telmisartan - aceclofenac	Telmisartan and aceclofenac both increase serum potassium.	0	1 (0.3)	0
Telmisartan - atorvastatin	Telmisartan increases toxicity of atorvastatin.	0	3 (0.8)	0
Topiramate - acetaminophen	Topiramate decreases levels of acetaminophen by increasing metabolism. Enhanced metabolism increases levels of hepatotoxic metabolites.	1 (0.3)	0	0
Vitamin D - calcium carbonate	In some patients this combination may result in hypercalcemia.	0	1 (0.3)	0

*Medications presented in Supplemental Digital Content (Annex 1), http://links.lww.com/MD/G933.
†Medscape drug interaction calculator.

Table 4

Plans for the patients.

Plans	Frequency (%)
Follow-up after 1mo	68 (17)
Follow-up with recent blood sugar lab report of both fasting and PP, Hb, Lipid profile, TFT	7 (1.8)
X-ray of knee and shoulder	4 (1)
Hot fomentation	3 (0.8)
Follow physiotherapy	7 (1.8)
X-ray of spinal cord	2 (0.5)
Follow-up after 5 d	21 (5.3)
Follow-up when necessary	226 (56.5)
Maintenance of personal hygiene	4 (1)
Follow-up after 3 mo	11 (2.8)
Follow-up after 2 wk	9 (2.3)
Advised for more exposure of morning sunlight	1 (0.3)
Follow-up after a week	41 (10.3)
Advised to have a simple diet (Avoid spicy and oily foods.)	3 (0.8)
Follow-up after medication	1 (0.3)
Follow-up after 3 d to rule out viral infection	6 (1.5)
Follow-up after 6 mo	4 (1)
Follow-up on next day	2 (0.5)
Follow-up after 10 d	4 (1)
Follow-up after 3 wk	2 (0.5)
Steam inhalation	2 (0.5)
Alternate day dressing	4 (1)
Advised for glasses	1 (0.3)
Advised to drink plenty of water	4 (1)
Follow-up after 2 mo	1 (0.3)
Continue same therapy (CST)	1 (0.3)
Advised for dental surgery	1 (0.3)
Advised to use lumbar belt	1 (0.3)
Advised to do PAP smear test after 6 mo	1 (0.3)
Advised for moisturizing the skin	1 (0.3)
Advised to visit ophthalmologist	1 (0.3)

Hb = hemoglobin; PP = postprandial; TFT = thyroid function test.

Lin et al[35] proposed another format named APSO (assessment, plan, subjective, objective) by rearranging the SOAP order, retaining the important relationship among these dimensions. These helped the providers extract the most relevant patient care data (i.e., assessment and plan) at the beginning of the note and expedite the documentation of these major phases. They found that majority of health care providers (73%) were satisfied with the APSO note as authors and 82% as readers of the notes. They perceived the APSO note to be better than the typical SOAP notes in terms of speedy documentation, accuracy, and usability for health professionals, especially for visits related to chronic disease management in primary care facilities.[35] Belden et al[36] also reported that the APSO notes provide a simple and inexpensive alternative to the SOAP notes for most organizations.

These days, the SOAP note has trespassed from the academic and guidance tool to serve as the instrument for the disease-focused biomedical practice from the traditional pharmacotherapy approach.[9,18] A well-documented SOAP note saves time in revisits during the history-taking process and expedites uninterrupted care performed by the same or different providers.[9] Despite the many benefits of the SOAP notes, a major weakness of the traditional SOAP note is its inability to document changes over time (as the evidence changes over time) in many clinical situations, requiring the health professionals to reconsider diagnoses made and treatments provided. However, extensions to the SOAP format have been trialed to fulfil such a gap in the form of the SOAPE model ("E" being 'explicit reminder to assess the efficiency of plans and the rest of the parts being same as of the SOAP note).[12]

4.1 Strengths and limitations of this study

The present research was one of the leading researches in documenting and maintaining SOAP notes at community pharmacy settings among optimum patient sizes. It would sensitize the community pharmacists to work on this dimension regularly. To our knowledge, based on the extensive literature reviews on PubMed, Science Direct, ResearchGate, and Google Scholar with the search terms "SOAP note" AND ("clinical pharmacy" OR "community pharmacy"), only one community pharmacy-related SOAP note could be extracted, which was the study by Tetuan et al[32]. However, the study had a very minimal sample size of only 35, which could compromise the generalizability of the findings. However, follow-ups could not be done in the present study due to its cross-sectional nature and owing to the same reason, the present research was deficient in its inherent capacity to explore the causality assessment of any MRP for generalizability. Therefore, large community-based cohort studies would be necessary to help further derive valid and conclusive evidence on the effectiveness of introducing and

implementing SOAP notes at community pharmacies. However, the present research findings could create a small foundation on this.

The SOAP notes could not be incorporated into the electronic system due to the resource constraints and were maintained manually. The present research could explore just the drug interaction cases as the MRPs but it could pave a pathway to help the community pharmacists contribute to exploring other domains of MRPs in the future. Since the study did not include a comparator group, unbiased effects of SOAP documentation at community settings are yet to be explored with future randomized trials.

5. Conclusion

Community pharmacies-based initiatives to document and maintain SOAP notes were taken from a resource constraint country that is Nepal for the first time. This would be a foundation for the SOAP notes documentation and archiving at community pharmacies during dispensing, the most accessible point of care for general people. This would also further strengthen the professional networks among pharmacists, physicians, patients, and other health providers everywhere, provided that these notes could be incorporated into and disseminated via the electronic system.

Acknowledgments

Author contributions

BS conceptualized and designed the study, performed a literature review, analyzed and interpreted data, and prepared the final manuscript.

RS and SRG designed the study, performed literature review, did necessary fieldworks including data collection, performed literature review, drafted and revised the manuscript.

All authors read and approved the final manuscript.

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