

## SHORT COMMUNICATION



# A pilot study on the evaluation of medical student documentation: assessment of SOAP notes

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**Purpose:** The purpose of this study was evaluation of the current status of medical students' documentation of patient medical records.

**Methods:** We checked the completeness, appropriateness, and accuracy of 95 Subjective-Objective-Assessment-Plan (SOAP) notes documented by third-year medical students who participated in clinical skill tests on December 1, 2014. Students were required to complete the SOAP note within 15 minutes of an standard patient (SP)-encounter with a SP complaining rhinorrhea and warring about meningitis.

**Results:** Of the 95 SOAP notes reviewed, 36.8% were not signed. Only 27.4% documented the patient's symptoms under the Objective component, although all students completed the Subjective notes appropriately. A possible diagnosis was assessed by 94.7% students. Plans were described in 94.7% of the SOAP notes. Over half the students planned workups (56.7%) for diagnosis and treatment (52.6%). Accurate documentation of the symptoms, physical findings, diagnoses, and plans were provided in 78.9%, 9.5%, 62.1%, and 38.0% notes, respectively.

**Conclusion:** Our results showed that third-year medical students' SOAP notes were not complete, appropriate, or accurate. The most significant problems with completeness were the omission of students' signatures, and inappropriate documentation of the physical examinations conducted. An education and assessment program for complete and accurate medical recording has to be developed.

**Key Words:** Medical records, Documentation, Medical students

## Introduction

Medical records are part of a healthcare team's communication tool [1]. Medical records include clinical data, and document decisions made regarding a patient's status and the procedures followed in the treatment of

that patient, in order to facilitate communication among his/her healthcare providers [2]. Clinical records should be documented clearly, accurately, and legibly [3]. Incomplete, inaccurate, or inappropriate documentation can have adverse effects on patient care, and even lead to legal action [1]. The ability to communicate in writing is an important educational outcome, not only for resi-

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dents, but also for undergraduate medical students [4]. The Subjective–Objective–Assessment–Plan (SOAP) note is the documentation method used by physicians to create a patient’s chart, and to document progressive notes in both inpatient and outpatient clinics [5].

No study is available to evaluate Korean students’ competence in documenting medical records. Therefore, to evaluate the quality of medical students’ completion of medical records, we assessed SOAP notes written by third–year medical students during the standard patient (SP)–based test for completeness, appropriateness, and accuracy.

## Subjects and methods

Following their third–year clerkship, medical students’ clinical skills were tested in an examination prepared by the Busan–Gyeongnam Consortium, from December 1 to 3, 2014. This consortium consists of five universities—Gyeongsang National University, Kosin University, Pusan National University, Inje University, and Dong–A University. On the clinical skills test, students had to complete the SOAP notes within 15 minutes of an SP–encounter who complains of rhinorrhea, and is

warring about meningitis. The 95 SOAP notes on the first day of the clinical skills test were reviewed and determined the components to code for evaluation of student’s medical recording by six faculties. Two faculties coded the SOAP notes individually as the criteria presented in Table 1. Reliability analyses revealed a high level of inter–rater consistency between two faculties for Subjective (0.94), for Objective (0.94), for Assessment (0.96) and for Plan (0.98). Reliability was obtained by Cronbach  $\alpha$  score.

We checked the SOAP notes against three measures: completeness, appropriateness, and accuracy.

The completeness of SOAP notes was evaluated with respect to whether the patient’s information (name and hospital number) had been recorded, whether the note was dated and signed, and whether the following four components were documented: S (chief complaints, description of the method used, onset, writing sequence, and past–medical history, social history, and family history); O (description of nasal mucosa, vital signs, meningeal irritation signs, and other physical examinations); A (diagnosis); and P (workups, management, and education).

The appropriateness of SOAP notes under the Subjective component was assessed on the basis of whether the patient’s own words were used to describe symptoms;

Table 1. Coding of Subjective and Objective Symptoms, Assessment, and Plans

Coding	Subjective	Objective	Assessment	Plan
1	Rhinorrhea Runny nose Nasal obstruction	Nasal mucosal examination	Rhinitis Common cold Upper respiratory tract infection	Antihistamine Common cold drug
2	Fever, headache & vomiting	Meningeal irritation signs	Meningitis	Lumbar puncture Cerebrospinal fluid study Brain image
3	Other symptoms except 1 & 2	Other physical examinations including vital signs	Other diagnosis except 1 & 2	Other plans except 1 & 2
4	None	None	None	None
5	Inappropriate <sup>a)</sup>	Inappropriate <sup>a)</sup>	Inappropriate <sup>a)</sup>	Inappropriate <sup>a)</sup>

<sup>a)</sup>Inappropriate: symptoms reported in the Objective component, diagnoses reported in the Plan, plans discussed in the Assessment component, and physical examinations discussed in the Subjective component.

under the Objective component findings of the physical examination were considered; under the Assessment component the possible diagnosis; and the plan was assessed on the basis of the treatment, workup, and educational plans identified.

A note's accuracy was evaluated by comparing it to the SOAP note created by the physician who drafted the scenario. Prior to evaluating its accuracy, the preceptors coded the students' records, as shown in Table 1. The rhinitis-related symptom-sign-diagnosis-plan was labeled 1. The meningitis related SOAP was labeled 2. Any other symptom-physical examination-diagnosis-plan, with the exceptions of 1 and 2, was labeled 3. There was no 4, and an inappropriate description was labeled 5. We analyzed the association between symptom-sign-diagnosis-plan using this coding. Spearman correlations between Subjective-Objective-Assessment-Plan were analyzed, using IBM SPSS version 18.0 for Windows (IBM Corp., Armonk, USA).

In addition, we checked whether it was written in Korean or in biomedical English.

## Results

### 1. Completeness

No documentation of patients' names and dates was observed in 4.2% and 3.2% of the SOAP notes reviewed (Table 2).

#### 1) Student signatures

Of 95 students, 36.8% did not record their signatures, and only 15.8% of the students signed their names.

#### 2) Subjective-Objective-Assessment-Plan

Ninety students (94.7%) documented all four SOAP components completely, regardless of the appropriateness of SOAP. Notes with no documentation (code 4) on the Subjective, Objective, and Assessment components or the Plan were 1.0%, 3.1%, 4.2%, and 3.1%, respectively.

## 2. Appropriateness

#### 1) Subjective

All students recorded the symptoms, past-medical histories or family histories for the Subjective component. Nineteen students (20.0%) described the symptoms using the patients (SP)'s words. Sixty-four students described the main symptom—rhinorrhea—in the Subjective component. Seventy-four students recorded the onset of symptoms. Eight students (8.4%) documented past-medical histories, and patients' social or family histories.

#### 2) Objective

Sixty-nine students (72.6%) recorded the findings from their physical examinations, including vital signs. The findings of physical examinations were described with various expressions: only nine students (9.5%) described the nasal mucosal findings. Negative findings from the physical examination were described in 45 SOAP notes (47.3%). Twenty-six students (27.4%) re-

Table 2. Students Who Did Not Write Anything in the Various Components of the Medical Records

Components	No. of students who did not write anything by component (%)
Patient's information	4 (4.2)
Date	3 (3.1)
Subjective	1 (1.1)
Objective	3 (3.1)
Plan	3 (3.1)

corded the symptoms in the Objective component.

### 3) Assessment

Possible diagnoses were assessed by 90 of the medical students (94.7%). No record of an assessment was observed in three SOAP notes (3.2%). The various diagnoses included rhinitis, the common cold, and meningitis, and also gastritis, gastroesophageal reflux, gastric cancer, and psychosomatic disorders.

### 4) Plan

Plans were described in 90 of the SOAP notes (94.7%). Over half the students planned workups (56.7%) for diagnosis and treatment (52.6%). Only seventeen students had an educational plan such as, "if fever and headache develop, recommend a revisit." Of 50 treatment plans, 19 students (38.0%) prescribed an antihistamine. Other students described variable treatment plans such as hydration, antibiotics, steroids, and antipyretics.

## 3. Accuracy

Accurate symptoms, physical findings, diagnosis, and plans were described in 74 (78.9%), 9 (9.5%), 59 (62.1%), and 19 (38.0%), notes respectively. Only two students recorded the symptoms, physical examinations, diagnosis, and plans accurately.

When we analyzed the correlation of S-O-A-P after coding, there was mild correlation between Subjective and Objective ( $r=0.215$ ,  $p=0.037$ ) components, and between the Assessment component and the Plan ( $r=0.226$ ,  $p=0.028$ ). There was no correlation between the Subjective, Objective, and Assessment components and the Plans.

## 4. Recording language

Three-fourths of the medical students (74.7%) recorded the patients' symptoms in Korean. Findings from the physical examinations, the diagnosis, and the plan were also written in Korean.

## Discussion

It has been reported the practice of having students' medical records to become problematic in recent years [1]. In present study, incomplete, inappropriate and inaccurate documentation were found to be 36.8% of the SOAP notes, 27.4% in the Objective component, and 97.9% of the SOAP notes, respectively. Notably, this rate of inaccuracy was higher than that reported in Szauter et al.'s study [2], which found that 82% of medical students documented the SOAP components.

In present study, one-fourth of the medical students could not distinguish between the symptoms and signs, and medical students were not good at conducting physical examinations. These findings could be related with the lower rate of accuracy of medical records and these may be a result of their clerkship positions in inpatient venues, and medical students usually receive only copies of the electronic medical records (EMR) documented by residents or physicians because medical students spend too much time observing EMR, and very little time directly participating in patient care on hospital wards [6].

About 95% of the students documented the possible diagnoses and plans and there was mild correlation between the two. This outcome is probably is related to their training to make the possible diagnoses and workup plans for inter-station tests in the SP-based exam.

Compared to physicians' notes, students' notes were reported to be more legible [7]. We could not evaluate the legibility of students' notes, because there were no notes to compare them with. About 75% of the students documented symptoms in Korean, and even the physical examinations, assessments, and plans. Our results showed that medical students were better at using Korean expressions, than biomedical English ex-

pressions, even in the diagnosis and treatment plans. This might be associated with the National Medical Licensing Examination in which all questions are given in the Korean language. However, routine medical documents are written in biomedical English. Medical students are learning and using biomedical English in their clerkship positions. The confusing use of languages in the learning environment makes it difficult for the medical students to complete medical records.

There are several limitations inherent in this study. First, this study was pilot study for evaluating the basic level of medical students. Second, we evaluated the small number of SOAP notes due to on only the first day of the examination. Finally, we did not compare the documentation of the SOAP notes of five medical school students, because no significant differences of teaching medical records between the curriculums of the five medical schools. Our results showed that the SOAP notes of third-year medical students were not complete, appropriate, or accurate. The most significant problems regarding completeness were the omission of their own signatures, and the inappropriate documentation of the findings of the physical examinations. Medical schools have a duty to teach proper documentation skills [1]. Therefore, we should develop an educational program to teach medical students how to complete medical records properly, and to frequently assess the competencies of medical students in regard to their completion of medical records.

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