International Journal of Pharmacy Teaching & Practices 2014, Vol.5, Issue 3, 989-996.

Drug Therapy Problem among Patients with Cardiovascular Diseases in Felege Hiwot Referral Hospital, North East, Ethiopia

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Research Article

Please cite this paper as: Gobezie Temesgen Tegegne [1*], Belay Yimam[2], Elias Ali Yesuf [2], Belayneh Kefale Gelaw[1], Amsalu Degu Defersha[1]. Drug therapy problem among patients with cardiovascular diseases in Felege Hiwot Referral Hospital, North East, Ethiopi. IJPTP, 2014, 5(3), 989-996.

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Abstract

Background: The identification of drug therapy problems is the focus of the assessment and the last decision made in that step of the patient care process. Although drug therapy problem identification is technically part of the assessment process, it represents the truly unique contribution made by pharmaceutical care practitioners. It is also a common scenario in chronic non communicable diseases, like cardiovascular diseases.

Objective: The objective of the research is to characterize the prevalence of drug therapy problems among hospitalized patients with cardiovascular diseases in Felege Hiwot Referral hospital.

Methods: Hospital based general cohort study design was used. All admitted patients with cardiovascular disease/s, in Felege Hiwot Referral hospital were included. Pharmacists in collaboration with a nurse were involved in collecting the data. The data were analyzed using SPSS version 20.0. Descriptive analysis was used.

Result and discussion: The most common cardiovascular disease encountered were hypertensive heart disease (26, 32.9%), rheumatic heart disease (24, 31.6%) and ,functional heart failure and cor pulmonalae (14, 18.4%). A total of 105 number of DTPs were identified with the mean number of DTP was 1.38 $\pm$ 0.8. Most of the patients had drug therapy problem, of which indication related problems constituted the highest part.

Keywords: *Drug therapy problems, cardiovascular diseases, DRPS, Clinical pharmacy*

Introduction

Background

A. History and concept of Drug therapy problems

The availability of large number of medicines and the constant efflux of new information make them practically impossible for any health care professional to be updated in all aspects. Hepler and strand define pharmaceutical care as, 'the responsible provision of drug therapy for the purpose of achieving definite outcomes which improve the patient's quality of life' (1).

According to Pharmaceutical Care Network Europe (PCNE) classification volume 6.2, drug therapy problems is 'an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes '(2).

Drug therapy problem has not achieved uniform meaning in most of the published articles. Hepler used the terms like drug-related problem, drug-treatment failure, and pharmacotherapeutic problem in one article to describe DTPs (3). Other researchers used the term medication errors, which is the error in the hospital medication use process (4-5). Drug-therapy problems are relatively common in hospitalized patients and can result in patient morbidity and mortality, and increased costs (6). Here drug related problems and drug therapy problems describe the same concept.

B. Classification and assessment of Drug therapy problems

According to Robert J. Cipolle text book of pharmaceutical care practice (third edition), there are seven basic categories DTPs. These are: indication, effectiveness, safety and compliance (7). The drug related problems (DRPs) and their possible causes will be identified from the patients' medical records, with reference to the standard guidelines and established literatures.

C. Cardiovascular diseases

Epidemiologic transition which is taking place in every part of the world, among all races, ethnic groups, and cultures has resulted in the global rise in cardiovascular disorders (CVD). Cardiovascular

diseases are a group of disorders of the heart and blood vessels.

Cardiovascular diseases account for 7-10% of all adult medical admissions in African hospitals, heart failure contributing to 3-7% (8-9).

Statement of the problem

Drug related problems are of a major concern in health care because of increased cost, morbidity and mortality. The cost of drug related morbidity and mortality exceeded $177.4 billion in 2000 of total costs, followed by long-term-care admissions, which accounted for 18% ($32.8 billion) 10, 11).

DTP is associated with prolonged length of stay, increased economic burden, and an almost 2-fold increased risk of death (12). Drug therapy problems are the dominant reasons for admission.

A review of the literature concerning DTPs has shown that 28 % of all emergency department visits were medication-related, including adverse events of which 70%-90% were preventable (13,14). Computerized physician order entry (CPOE) has been shown to decrease medication errors by 55–80%, but it is a common even after implementation of CPOE (15,16).

Other researchers try to study the use of (Munger MA) single-pill formulations to simplify the medication regimen and to manage the patient appropriately by avoiding adverse effects in elderly patients with hypertension and co-morbid diabetes (17), but the preparation of such formulation is difficult and the manufactured product is costly.

Cross sectional study in 2006 in high-risk patients, despite a tendency towards more intensive treatment, pharmacological therapy is still under used and the degree of control of blood pressure, cholesterol level and diabetes is largely unsatisfactory (18).

Cardiovascular diseases are the number one cause of death globally, more people die annually from CVDs than any other causes (8). Most developing countries will experience the double burden of pre-transitional and post-transitional disease (9). Although HIV/ADIS is the leading cause of death in the sub Saharan region, CVD is the second leading killer over the age of 30 year (31-32). Now a days the developing countries contribute a greater share to the global burden of CVDs than the developed countries (19).

The potential costs of CVDs epidemic for African countries are staggering. It is estimated to cost (direct and indirect) $300 billion annually in USA, equal to the entire gross domestic product of the African continent.

The study in public and private hospital in Addis Ababa showed greater than half of the deaths were due to cardiovascular diseases (20). This shows appropriate management should be used to decreases such problem. On the hand other researcher found, even single-disease management does not appear promising as a strategy to care for patients (21).

The conceptual frame work

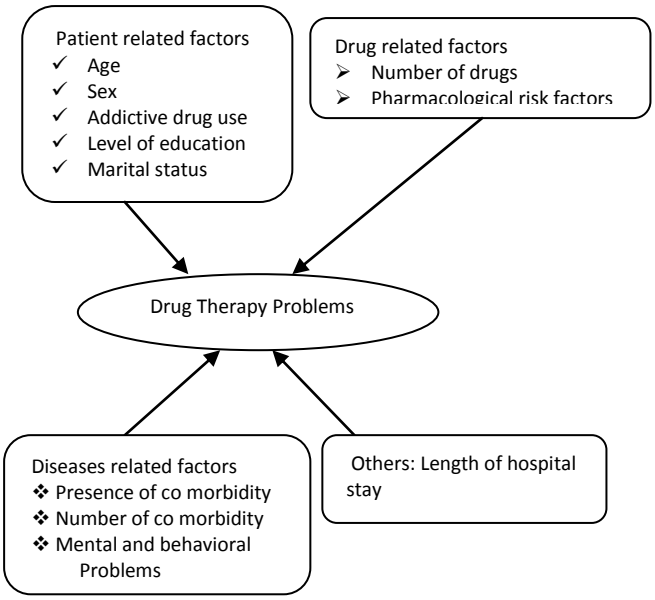

Figure 1: conceptual frame work showing factors involved in Drug Therapy Problems

Drug therapy problem among cardiovascular diseases will lead health care professionals to optimize drug therapy that may influence health expenses; save lives, improves health, reduces morbidity and increases quality of life. Awareness of drugs carrying a high risk for DTPs, are important elements of drug therapy and may contribute to diminishing drug-related morbidity and mortality.

Since early identification of the types and patterns of DRPs and the factors associated to them may enhance the prevention and management of DRPs. Categorizing and identifying drug related problems will also enable the practitioner in collaboration of the patient to construct a better care plan.

Generally the result of this study will have good impact on the clinical practice among CVD patients.

Objectives

a. To know drug therapy problems among hospitalized patients with cardiovascular diseases in FHRH

b. To measure the percentage of each types of drug therapy problems on cardiovascular diseases

c. To determine the odds of DTPs among CVD patients with heart failure

Material and Method

Study area and period

The study was carried out among patients admitted with CVD in Felege Hiwot Referral hospital. FHRH is one of the referral hospitals in North Eastern Ethiopia. It is found in Bahir Dar town, which is located approximately 578 km northwest of Addis

Ababa. The hospital has a total of 284 beds. It has also 275 technical and 187 administrative staffs. The hospital serves the people of East and West Gojjam, Bahir Dar town and its surroundings, Awie zone and South Gondar. The study was conducted from 03-29 March 2013 EC.

Study design

Hospital based general cohort study design was used.

Population

Source and Sample population

It includes patients admitted with cardiovascular diseases in FHRH during the data collection period.

Inclusion and exclusion criteria

Inclusion criteria

Patients admitted with cardiovascular diseases

Exclusion criteria

a. Unconscious and patients who have no care giver that facilitates communication with the interviewer (Intensive care patients)

b. Those not willing to participate

Sample size and sampling technique

The sample size was depending on the number of patients admitted during data collection time. Convenient sampling technique was used as per the data collection period and inclusion criteria.

Variables

Independent variable (predictive variables)

Age, sex, number of drugs and co morbidities

Dependent variables

Presence of Drug Therapy Problem

Data collection procedures

Data collection was undertaken from 03-29 March 2013 in FHRH. Data were collected through medical record reviews of patients using a prepared standard checklist and structured questionnaire. The structured questionnaire was translated to their local language. The content of the checklist include patient details, investigations, procedures, current and past medication and diseases conditions. Other like biochemistry and hematology results were also found. The contents of standard questionnaire include social history, drug and diseases related questions, and allergies. Two pharmacists, who took clinical pharmacy in service training, and one Nurse with bachelor degree, were involved to collect the data.

The first working diagnosis after one day of admission was taken as a provisional diagnosis for the patient disease condition. The patient was followed till discharge. Within these time interval, study subjects' symptoms, clinical and laboratory values were recorded to predict adverse drug reactions. Drug related problems were identified by evaluating the appropriateness of prescriptions in terms of indication, dosage, safety and efficacy. Finally the existence of DTPs was identified using Ethiopian guide line, European society of cardiology and American heart association.

Data quality management

Pre-test study was done among 10 patients before two days of data collection period to check for the uniformity and understandability of the questionnaire, and other purposes. The data collectors were trained for two days on how to collect the data. The patient card number and phone number (if the patient has) was used, to check for if there is invalid and incomplete pertinent response. Supervisor was strictly supervising the data collectors daily and the principal investigator was reviewing all filled format daily so that any suggestion regarding to cardiovascular diseases pharmacotherapy is given.

Data analysis

The data was cleaned, coded, entered and analyzed in SPSS 20.0. Categorical variables were described by frequencies and percentages, and continuous variables were described by means and standard deviations. For some variables correlation was tested.

Ethical consideration

Formal letter was obtained from Research Ethics Committee of Jimma university ethical board review, so the letter was given to the hospital and they allowed us to do the research. Written consent was taken so that the patient was willing to give his/her medical information. Patient should be assured that lack of willingness to involve in the study will not affect the service they get from the hospital. If there is any drug therapy problem that affects the patients during the data collection time, the principal investigator tried to contact the physicians about those cases to solve the drug therapy. Any pertinent drug information was also provided to the patient during discharge. Patient confidentiality was ensured, thus name and address of the patient was not recorded in the data collection format. It was also told that his/her medical information was not disclosed to any external subjects/media so that the patient confidentiality was kept.

Operational definitions

A drug therapy problem: is any undesirable event experienced by a patient which involves, or is suspected to involve, drug therapy, and that interferes with achieving the desired goals of therapy, which can be identified using Ethiopian, WHO, European and the American heart association (AHA) cardiovascular diseases management guidelines except compliance and addictive drug use.

Adverse drug reaction: is any harmful and unintended effect associated with the drug till the patient is discharged.
Multi co-morbid disease: is a diseases condition when a patient has at least three diseases.
Poly-pharmacy: is considered when greater than or equal to four drugs are prescribed for the patient.
Poly – DTPs: is a DTP when the number of DTPs is greater than or equal to three DTPs.
Pediatric patients: are patients whose age is less than 19 years.
Middle aged: in the age range of 19-60 years.
Elder patients: are patients whose age is greater than 60 years.
Adherence: is drug taking behavior of a patient measured with Morisky scale in which when a patient says no at least for one of the question, he/she is non-compliant.
Addictive drug use: if a patient used any of the four social drugs at least three times per week.

Results

Socio-demographic characteristics of the study population

A total of 76 cardiac patients were included. Of which, 47(61.8 %) of them were females while 65.8 % and 61.8% of the patients were married and illiterate respectively (Table 1). The mean age was 40.0±21.89 years while the minimum age was 0.75 year and the maximum was 90 years.

Most of (58, 76.3%) the patients used any of the four types of social drugs (coffee, alcohol, chat or cigarette). Most of the patients (50, 65.8%) drank coffee.

According to validated Morisky scale, 42 (55.3 %) number of patients weren't adhere to the medication. 17 and 14 number of patients didn't consider caution and forgot to take the medication respectively.

Provisional diagnosis and medication use status of CVD patients admitted in FHRH

The mean number of hospital stay was 4.9± 3.1 days per patient, while a maximum of 17 and a minimum of 1 day were used to treat some patients on the ward. A maximum of five number of co morbidities were seen, while the mean number of co morbidity was 1.6± 1.2. The most common diseases encountered during the data collection period were hypertensive heart diseases (26, 32.9%), rheumatic heart diseases (24, 31.6%) and functional heart failure and cor pulmonalea (14, 18.4). Heart failure (70, 78.9%) was the common syndrome that accompanied the admission of greater number of patients.

A total of 230 numbers of drugs were used. The mean number of drug was 3 ± 1.4 per patient. A maximum of seven numbers of drugs were prescribed. Diuretics (58, 76.3%) and antibiotics (40, 52.6%) were the commonly used drug.

Type and number of Drug therapy problems among CVD patients admitted in JUSH and FHRH

A total of 73 (96.1%) patients had one or more DTP/s. There was a total of 105 DTPs identified. The mean number of DTP was 1.38 ± 0.8 per patient. The maximum number of DTPs was four. Most of the patients (35, 46.1%) had two DTPs.

There were 70 (90.69), 42 (55.3%), 24 (31.6%) and 11 (14.47%) number of patients had indication, non-compliance, safety and effectiveness related drug therapy problems respectively. Indication was the major problem in FHRH (70, 92.1%). Most of the indication problem was need additional drug therapy (57, 75%). The common untreated indications were anemia (9, 11.8%) and hypertension (2, 2.6%).

Table 1. Drug therapy problems involved and their reasons

Drug therapy involved	Type	Reasons
Indication	Unnecessary drug therapy	No medical condition
		Duplicate therapy
		Non-drug therapy indicated
		Treating avoidable ADR
		Addictive or Recreational drugs
	Needs additional drug therapy	Untreated indication
		Preventive or prophylactic
		Synergistic or potentiating
Effectiveness	Needs different drug product	More effective drug available
		Condition refractory to drugs
		Dosage form inappropriate
		Not effective for condition
	Dosage too low	Wrong dose
		Frequency inappropriate
		Drug interaction
		Duration inappropriate
Safety	Adverse drug reaction	Undesirable effect
		Unsafe drug for patient
		Drug interaction
		Dosage administered or changed too rapidly
		Allergic reactions
		Contraindication present
	Dosage too high	Wrong dose
		Frequency inappropriate
		Duration inappropriate
		Drug interaction
		Incorrect administration
Compliance (Morisky scale)	Non-compliance	Not remember to take the medication
		Not take the medication during recovery
		No caution is considered for medication
		Not take the medication during exacerbation

There were 11 (14.47%) numbers of DTPs among effectiveness related issues; of which more effective drug available (4, 5.4%) from need different drug product and inappropriate frequency (4, 5.4%) from dosage too low were the common DTP. A total of 5 (6.8%) and 6 (7.1%) number of patients had need different drug product and dosage too low problem respectively.

24 (31.6%) number of patients experienced safety related DTPs, of which 20 (26.8%) and 10(13.4%) number of patients had adverse drug reaction and undesirable effects respectively. The most common undesirable effects are hypotension (8, 10.8 %) and nasal bleeding (2, 2.6%).

Digoxin (1, 1.3 %) was wrongly indicated for stage B heart failure patients. Aspirin and clopidogrel together is also indicated for one patient. Frusemide was used as wrong dose (dose too high), while dexamethasone and digoxin were used as inappropriate frequency for some patients.

Among 76 patients, 7 (9.2%) of them showed different forms of allergy like vomiting (2, 2.6%), gastro-intestinal irritation (2, 2.6%) and constipation (2, 2.6%) before they were admitted for their cardiac case.

A total of 20 (25%), 19 (25.9%) and 21(26.1%) number of patients with functional heart failure and cor pulmonalae, rheumatic heart disease and hypertensive heart disease respectively had DTP.

Most patients had co morbidity and used more than one drugs. 58 (76.3%) and 60 (78.9%) number of patients used poly pharmacy and had co morbidity respectively of which 30(39.5%) and 65 (85.5%) number of patients with poly pharmacy and co morbidity respectively had DTP. Most of the patients (18, 23.7%) with multi co morbidity had DTP cases.

All patients with CKD, DM, and UTI had DTP while anemia (9, 11.8%) and urinary tract infection (9, 11.8%) were the common co morbidity.

No correlation was observed between age (p=0.8), number of addictive drug use (p=0.1), length of hospital stay (p=0.4), number of co morbidity (p=0.2), education status (p=0.5) and number of drugs (p=0.2) with the presence of drug therapy problems while age (p=0.2), sex (0.007), length of hospital stay (0.1), diabetes mellitus (p=0.8), chronic kidney disease (p=0.054), rheumatic heart disease (p=0.15), hypertensive heart diseases (p=0.18), presence of co morbidity (p=0.23), education status (p=0.48), and addictive drug use (p=0.003) didn't also correlate with number of DTP except sex and addictive drug use.

Discussion

The most common CVD encountered were hypertensive heart disease (26, 32%), rheumatic heart diseases (24, 31.6%) and functional heart failure and cor pulmonalae (14, 18.4%) where the study in Jordan showed, systemic hypertension (38.47%) was the major diagnosis (19). Heart failure (70, 78.9%) was the common syndrome that caused higher number of patient admission.

Urinary tract infection (11, 13.75%), anemia (10, 12.5%) and pneumonia (9, 11.25%) were the common co morbidities, while in Jordan diabetes mellitus (37, 46.25%) and chronic renal failure (15, 18.75%) were the most common ones. Since infection is prevalent in most developing countries (29).

There were a total of 230 drugs with a mean of 3±1.4 number of drugs per patient, which is smaller than the study in Jordan which had 13.14 per patient (1051 drugs) (22).

Diuretics (76.3%), ACEi (52.6%), antibiotics (27.6%), and, statin and anti coagulant (19.7%) were the commonly used drugs while in Jordan the most commonly prescribed drugs were antihypertensive (21.05%), anticoagulants and antiplatelets drugs (11.13%) and antiulcer (8.84%). This could be due to there were higher number of heart failure and rheumatic heart disease patients in this study (24).

Most of the admitted patients (73, 96.1%) had DTP, which is similar to the study by Blix et'al and Andreazza et'al (25, 46).

A total of 105 numbers of DTPs were identified with the mean number of 1.38 ± 0.8 DTP per patient. The study in JUSH in internal medicine ward showed, there were 149 DTP with 3.014 DTP per patient, this variation can be due to the involvement of clinical pharmacy service since then. On the other hand in Jordan, 394 DRPs were identified, which correspond to 4.9 DRPs per patient (19, 49). In this study use of addictive drugs and compliance is not considered. This can cause the above variation.

The major DTP type was indication (73, 96.1%), from which need additional drug therapy was the common, while in Jordan efficacy and safety DTP types were the common; such difference can be explained with higher number of drug use in Jordan and can be due to there is no specific and comprehensive national CVD treatment guide line in Ethiopia. Mekonnen AB found unnecessary drug therapy was the common DTP ,of which no medical condition was the common while in this study unnecessary drug constituted lesser number of DTP since addictive drug use is not grouped as DTP(48).

Need additional drug therapy (78, 90.69%) is one of the most common DTPs. It was also common problem in the Mekonnen AB's (34, 70.83%) study in JUSH internal medicine ward. This can be due to the absence of specific and comprehensive disease management guideline (41).

The common untreated indications were anemia (13), hypertension (5), urinary tract infection (3), atrial fibrillation (2), and rheumatoid arthritis (1) respectively while in Jordan study anemia and dyslipidemia were the common (19).

There were 17 (19.77%) patients with effectiveness related DTP, which is lesser than the study by Roberta SA (67) and Mekonnen AB (22) this might be due to the inclusion of all internal medicine admitted patient in the latter studies (20, 40-41).

Relatively higher number of safety related problems (22, 45.83%) were found by Mekonnen AB than this study (27, 31.39%). This difference can be due to

Mekonnen AB considers all internal medicine admitted patients or can be due to lesser involvement of pharmaceutical care services (41).

Mekonnen AB showed higher number of adverse drug events (16, 33.33%) and dosage too high (12, 8%) than this study (22, 27.5% and 11, 13.75%), because all internal medicine cases were selected (19, 29).

The most common undesirable effects are hypotension (16, 16.5 %) and nasal bleeding (2, 2.1%) respectively, which are similar in Al Salmi study (29). Hypotension is due to the use of high dose of frusemide and enalapril while the nasal bleeding is due to the use of high dose un-fractionated heparin and warfarin (39, 47-48).

Using Morisky as adherence measuring parameter, 45 (46.4%) number of patients was non-compliant. No caution considered while taking the medication was the major non-compliance issue; this can be due to dispensing associated error. Even though different measurement of adherence was used, 29 of the patients were non-compliant in the Mekonnen AB's study (45).

Aspirin (one) was indicated for stage B heart failure patient with out considering risk to benefit ratio because these patients had peptic ulcer disease. Aspirin and clopidogrel is also indicated for one patient even though such combinations are not accepted today due to severity of the combined adverse effect (49, 51). Enalapril is indicated for first trimester pregnant, even though it wasn't taken. It is contraindication to pregnant women (51). Frusemide was also indicated as tablet form for patient with severe peripheral edema.

ACEi, ciprofloxacin, and warfarin were among the most effective drug related DTPs, which should be used for some patients, but they were n't used during that time while some antibiotics, hydrochlothiazide, BB, and digoxin were not also used for some patients as synergistic effect to manage some indication. The most common drug categories which should be used as a preventive therapy were ACEi (23, 23.6%) and BB (20, 20.6%). The benefit of ACEi cardiovascular diseases management are ventricular remodeling, norepinephrine release, vasoconstriction, sodium and water retention, and preventing myocardial fibrosis, myocyte apoptosis and cardiac hypertrophy, while beta blockers decrease ventricular mass, improve the sphericity of the ventricle, and reduce systolic and diastolic volumes (left ventricular end-systolic volume and left ventricular end-diastolic volume) (32,36).

Lower dose of loop diuretics or by adding angiotensinogen II convertase enzyme inhibitors (dual benefit) can be used to prevent hypokalemia rather than using potassium chloride as a preventive therapy. Two out of five of them have taken digoxin (severe interaction is expected)(38).

Beers MH found patients stayed greater than two weeks had significant association with DTP, while in this study no co relation was observed between length of hospital stay (p=0.534) with presence of DTP 36). This can be due to greater than half of the patients in this study stayed less than eight days.

The present study has the following limitations. First, it remains unknown to changes in medication which leads to improvement in the health and wellbeing of the patients because such outcome data was methodologically difficult to obtain. Second, decisions about pharmacotherapy in this area are difficult as current guidelines rarely address the complexity of multiple chronic conditions of patients with cardiovascular diseases.

Conclusion

The most common CVD encountered were hypertensive heart disease, rheumatic heart disease and functional heart failure and cor pulmonalae.

Most of the patients had DTP. There is no mean difference between patients admitted in FHRH and JUSH with the occurrence of drug therapy problems.

The major DTP type was indication, from which need additional drug therapy was the common. No correlation was observed between age, number of drugs, number of co morbidity, numbers of addictive drug use, education and length of hospital stay with the presence of drug therapy problems.

Recommendations

a) Drug therapy problem was high in both hospitals, so following recommendation were forwarded.

b) MOH and FMHACA: To establish drug therapy problem guide line as per the national label to give quality pharmaceutical service for the patient

c) MOH and FMHACA: To establish nationwide specific and comprehensive cardiovascular disease management guide line

d) MOH and FMHACA: To effectively establish and develop pharmaceutical care services

e) Pharmacist: To strengthen pharmaceutical care services

f) Health care professionals: to educate patients to stop the use of social drugs and how to adhere to the prescribed medications

g) Researchers: to investigate the possible reason for indication problem

h) Researchers: to investigate the impact of sex and number of addictive drug use on number of DTPs.

Acknowledgement

We are very grateful to our college staff members for unreserved guidance and constructive suggestions and comments from the stage of proposal development to this end. We would like to thank Jimma University for supporting the budget which required for this research. Finally our deepest gratitude goes to Felege Hiwot referral hospital staff workers who helped and allowed us in collecting and gathering data from the hospital.

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AUTHORS' CONTRIBUTIONS

Authors contributed equally to all aspects of the study.

PEER REVIEW

Not commissioned; externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.