

# Studying the Medication Prescribing Errors in the Egyptian Community Pharmacies

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## Abstract

**Aim:** Prescribing medication errors rates and consequences are not well studied in the Egyptian community pharmacies. These errors may have clinically significant consequences and associated with serious adverse events. Errors determination is difficult because prescriptions may not be available for review and patients often refill the medications from different pharmacies. **The Primary Objectives:** (i) To assess and identify the rates and categories of drug prescribing errors in the Egyptian community pharmacies and (ii) to detect the specialties associated with high incidences of prescribing errors in the Egyptian community. By the end of this study, a secondary objective was achieved as the students became able to implement the clinical pharmacy concepts in the Egyptian community pharmacies. **Materials and Methods:** This was a retrospective study conducted on different Egyptian community pharmacies over a period of 3 months. The prescriptions from different pharmacies were collected and analyzed to detect the presence of any medication prescribing error. **Results:** This study was conducted on a total of 810 prescriptions with a total number of 3262 medications. The total detected medication prescribing errors were 19,405. Inappropriate medication use errors accounted for 9% of these errors. Drug interactions (39%) were the most frequently identified error type in these errors followed by errors in dosing frequency of administration (29%). **Conclusion:** Strategies should be developed to detect and limit these errors in the Egyptian community. Training courses should be conducted to improve the prescribing skills of the physicians and the pharmacists' skills in medication prescribing errors detection.

**Key words:** Clinical pharmacy concepts, Egyptian community pharmacies, errors in medical specialties, prescribing errors

## INTRODUCTION

Medication error may cause inappropriate medication use and patient's harm<sup>[1]</sup> it may occur during the prescribing stage and considered as a prescribing error. It is considered as a major problem that resulting in treatment's failure, antimicrobial's resistance, adverse events, and economic load on society and patients.<sup>[2]</sup> The process of medication prescribing contains more than one component that includes a cognitive component, decision component, and writing of the drug's prescription.<sup>[3]</sup> Prescribing error includes inappropriate drug selection, incorrect doses, incorrect frequency of administration, inaccurate intravenous drugs "concentrations, incorrect administration" rate, and wrong instructions for proper drug administration.<sup>[4]</sup> The most common types of

prescribing errors detected in the Middle East countries were incorrect doses, frequency of drug administration, and strength.<sup>[5]</sup> There are many causes for medication errors; physicians may be one of these causes. The normal physician workflow starts from collecting, checking, documenting patient information with high performance, and ending up with discussing treatment options and giving patient instructions about proper medication use.<sup>[6]</sup> Many medical institutions and societies have contributed prescribing errors

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to inadvertence, ignorance, tiredness, passiveness, and lack of experience of some physicians in addition to their desire of not confessing these errors.<sup>[7]</sup> Poor performance may play a role in medication prescribing errors; however, they are not the only thing, and poor actions also can play a role. Poor history taking, poor patient information collection, illegible handwriting, and incomplete diagnoses are all poor actions disturbing the normal workflow with increasing incidence of medication error.<sup>[8]</sup> Patients having low health literacy and older adults are the most susceptible kind of people that actually have high rates of misunderstanding medication instructions, poor adherence, and memory issues. They cannot remember the other comedications and the physicians' instructions about medications and this leading to serious adverse events.<sup>[9]</sup> Errors of prescribing occur as a result of the high gap between the pharmacist and the physician and the miscommunication between them resulting in the appearance of the common prescribing errors such as inappropriate drug, incorrect dose, allergies, and drug interactions.<sup>[10]</sup> Lack of adequate resources access to patient's medical files and additional staff for supporting the prescribing process are all contributions to errors in medication patient prescribing, and they are threatening the patient safety.<sup>[11]</sup> Drug-drug interactions are considered as a major cause of medication errors. It results from a combination of unawareness of drug-drug interactions and the inappropriate use of reference resources, in addition to polypharmacy and expanding indications for drug therapy with lack of patient monitoring.<sup>[12]</sup> All of these factors and due to lack of centralized patients' files, if prescriptions are given to a consumer, it is impossible to know whether or not a prescription was dispensed, whether the proper drug was supplied or administered. Hence, monitoring the drug's safety and efficacy will depend on the assumption that the prescription was properly transcribed.<sup>[13]</sup> Many studies aimed to report the rates of prescribing errors concluded that at least one prescribing error was detected in 15–21% of prescriptions.<sup>[14,15]</sup> Pharmacists were participated in the clarification the physicians' orders for patients and this was documented by many other studies.<sup>[16,17]</sup> Another survey aimed to report the quality of health care that provided to patients concluded that 16% of patients recorded one error and 2/3 of these patients were in outpatients setting.<sup>[18]</sup> The majority of studies described the percentages of errors and error categories but did not clarify the drugs presented or the impact and severity of the errors, and the proportion of asymptomatic errors with the potential for causing harm was not reported. The incidence and importance of prescribing medication errors in the Egyptian community pharmacies are not well studied. These errors may have clinically significant consequences and associated with serious adverse events so the primary objectives of our study were (i) to assess and identify the rates and types of medication prescribing errors in the Egyptian community pharmacies and (ii) to detect the specialties associated with high incidences of medication prescribing errors in the Egyptian community. By the end of this study, a secondary objective was achieved as the

students became able to implement the clinical pharmacy concepts in the Egyptian community pharmacies.

## MATERIALS AND METHODS

### Study design

Retrospective observational evaluation with descriptive cross sectional design.

### Setting

Egyptian community pharmacies.

### Inclusion criteria

Any prescription for adults or elderly patients includes at least three oral or intravenous medications from any medical specialty.

### Exclusion criteria

Any refill insurance prescription was excluded during data analysis if the original records which include the patients' demographic data were not available in the pharmacy.

### Data collection and analysis

Prescriptions were collected from different Egyptian community pharmacies in different cities; Cairo, Ismailia, and Suez. The investigators were working in these pharmacies and collected the prescriptions over a period of 3 months from February 1 to April 30, 2017. All prescriptions were analyzed to detect the presence of any medication prescribing error.

### Classification of errors: The detected errors were classified into

1. Errors related to inappropriate medication use  
Errors resulted from overdose, underdoses, increased frequency of administration, decreased frequency of administration, increased treatment duration, decreased treatment duration, therapeutic duplication, and drug interactions.
2. Errors related to missing information  
Errors resulted from missing diagnosis, dose unit, dose value, generic name of the drug, instructions for drug use, route of drug administration, frequency of drug administration, patient's age, patient's gender, or date of prescription.
3. Illegible handwriting prescriptions  
Medication error assessment methodology: All prescriptions were evaluated to assess the

correlation between the written diagnosis and the prescribed medications based on the most updated treatment guidelines. All doses, dosing frequencies, route of administrations, treatment durations, and therapeutic duplications were assessed using Medscape drug information database and a double check was done by the master on therapeutic drugs which is an Egyptian drug information reference.

### Study tool

Different drug information databases were used during the study to detect any error related to inappropriate medication use. A drug-drug interaction checker database was used to detect the drug-drug interactions and classify them according to their clinical significance.

### Drug-drug interactions classification

A drug-drug interaction checker database of Medscape was used to detect any drug-drug interaction. This database classifies drug-drug interactions according to severity into serious or life-threatening which requires specific intervention, significant; because these interactions may aggravate the patient's medical status and necessitate changing of one of the interacting drugs, minor which associated with any change in the patient's clinical condition but did not necessitate changing of one of the interacting drugs and contraindicated when both the interacting drugs should not be given concurrently.

1. Serious drug interactions: Life-threatening drug interactions and require medical intervention or change.
2. Significant drug interactions: That may harm the patients and require drug therapy monitoring.

### Medication errors classification according to medical specialties

All detected errors were classified according to their medical specialty into cardiovascular, endocrine, central nervous system, gastrointestinal tract, urology, antimicrobial, rheumatology, analgesics, and miscellaneous to detect the incidence of medication errors in each medical specialty.

## RESULTS AND DISCUSSION

The incidence and importance of medication prescribing errors in the Egyptian community pharmacies are not well studied. These errors may be serious associated with significant adverse events. The number of the medication prescribing errors detected in this current study was 19,405. A total of 810 prescriptions were included in the analysis with a total number of 3262 medications collected from different Egyptian community pharmacies. Prescribing

**Table 1: Types of prescribing errors**

Types	n (%)
Errors related to missing information	17319 (89%)
Errors related to inappropriate medication use	1625 (9%)
Illegible handwriting	461 (2%)

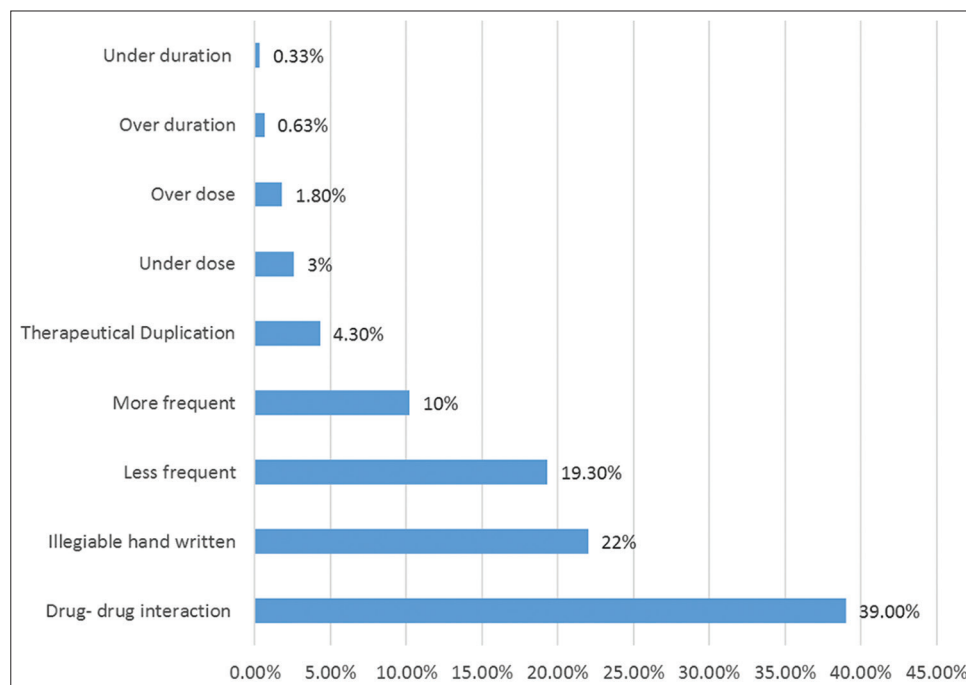
error types are shown in Table 1. About 9% from the detected prescribing errors had clinical significant. These errors were reached to the patients and they may cause harm or subtherapeutic effect on the treatment plans. Errors related to inappropriate medication use and illegible handwriting was 2086. About 11% of the total detected errors. Comparison of our results with those obtained by another three studies in different countries<sup>[19-21]</sup> shows that this current study reported the highest average error rate as their average error rates were 1.5, 3.5, and 7.6%, respectively. This finding is most probably because this current study included 20 errors-related parameters during analysis, while the other studies examined less number of prescribing errors-related parameters. Figure 1 shows the different types of errors related to inappropriate medication use and illegible handwriting. Dosing errors; overdoses and drug administration with increased frequency or duration may subject the patients to drugs' toxicities while underdoes and drug administration with decreased frequency or duration may subject the patients to subtherapeutic drug effects. The outcomes of these errors could not be detected during this current study. Therapeutic duplication may also lead to increase in the incidence or adverse drug reactions or toxicities. The most frequently identified error type was drug interactions (39%) of all the errors related to inappropriate medication use, 4% of these interactions were serious, and 35% were significant. Examples of serious drug interactions detected in this study are sertraline and buspirone, carbamazepine and clopidogrel, daclatasvir and sofosbuvir, aspirin and perindopril, aspirin and lisinopril, aspirin and captopril, carbamazepine and duloxetine, and amlodipine and simvastatin. The ratio of serious to significant drug interactions in this current study was 1:9 which was comparable to the results of another study<sup>[22]</sup> which reported that the serious (8.5%) to significant drug interactions (69%) ratio was 1:8. The rates of dosing and frequency of administration errors were 3.4% and 29%, respectively. About 1.8% of the dosing errors were overdoses and 2.6% were underdoses. A higher rate of dosing errors (53%) was detected by Al-Khani *et al.* (2014),<sup>[10]</sup> in another retrospective study conducted to determine the factors contributing to drug prescribing errors, this higher rate of dosing errors occurred because they examined the types of prescribing errors rates in very limited prescribing errors-related parameters. The second most commonly identified error was detected in the frequency of dose administration (29% of the total errors). About 19.5% of these errors were due to the administration of drugs with less frequency and

10% of these errors were due to administration of drugs with more frequency. This rate of wrong frequency errors was higher than the rate (5%) reported by Sada *et al.*<sup>[23]</sup>, because they included lower number of prescriptions (220) compared to the prescriptions included in this current study (810). The third most common medication error detected was illegible handwriting (22%), Nanji *et al.* detected a lower rate (1.2%).<sup>[24]</sup> Errors in treatment durations were about 1% of the detected errors and this rate was comparable to the results of Dibbi *et al.* who conducted a retrospective study at the Hera General Hospital, Saudi Arabia (2006), and detected a wrong duration rate of 0.7%.<sup>[19]</sup> The fourth most common type of error was errors due to therapeutic duplication which resulted in 4.3% of the total errors. This finding is consistent with the results of de Las Mercedes who studied the types, rates, and main reasons of errors in one pharmacy in Spain and reported a therapeutic duplication rate of 3.6%.<sup>[25]</sup> Figure 2 shows the errors related to missing information, all of the following parameters were missed in some prescriptions: Diagnosis, dose unit, dose value, generic name of the drug, instructions for drug use, route of drug administration, frequency of drug administration, patient's age, patient's gender, and date of prescription. A total of 17,319 errors were related to missing information, the most common prescription error type was missing diagnosis (17%) followed by 13% and 8% resulted from missing treatment durations and dose values, respectively. These rates were comparable to the missing information rates detected by Murray *et al.*<sup>[26]</sup> The "Missing instructions for drug use" errors rate was 9% which was lower than the rate (18.7%) detected by Murray *et al.*<sup>[26]</sup> Figure 3 shows the rates of medication

errors in each medical specialty. All drugs were categorized according to their medical specialty and the errors rates were calculated. The following medical specialties were associated with many prescribing errors: Cardiovascular, endocrine, central nervous system, gastrointestinal (GIT), urology, antimicrobial, rheumatology, and analgesics. About 18% of the detected medication errors were due to errors in prescribing cardiovascular medications followed by 13% and 8% in GIT and antimicrobial medications, respectively. These results were comparable with the results of Samsiah *et al.*, who concluded that the most frequently recorded pharmacological classes associated with medication errors are cardiovascular drugs (25.54%) and antimicrobial drugs (17.2%).<sup>[27]</sup>

## CONCLUSION

The findings of this current study concluded that medication prescribing errors are very common and frequent within the Egyptian community pharmacies. To achieve culture of careful prescribing and minimize prescribing errors, some changes in the work environment must take place. Strategies and plans should be developed to detect and limit these errors because they can increase the patients' morbidities and mortalities in the Egyptian community. Training courses should be conducted to improve the prescribing skills of the physicians and the pharmacists' skills about medication prescribing errors detection. In addition, the patient awareness campaigns should be organized for patients to educate them about the most common errors detected in the study.



**Figure 1:** The different types of errors related to inappropriate medication use and illegible handwriting



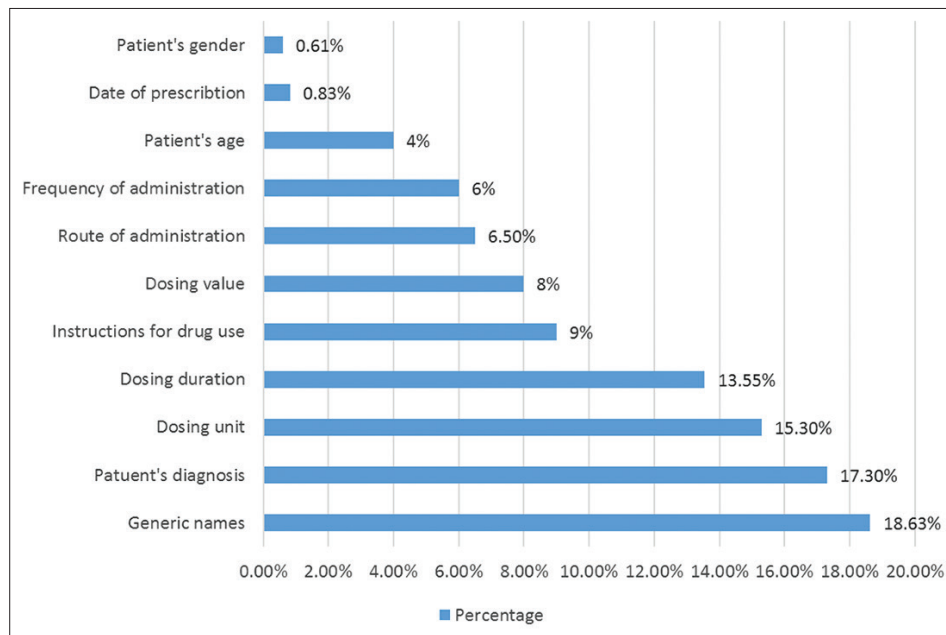


Figure 2: The different types of errors related to missing information

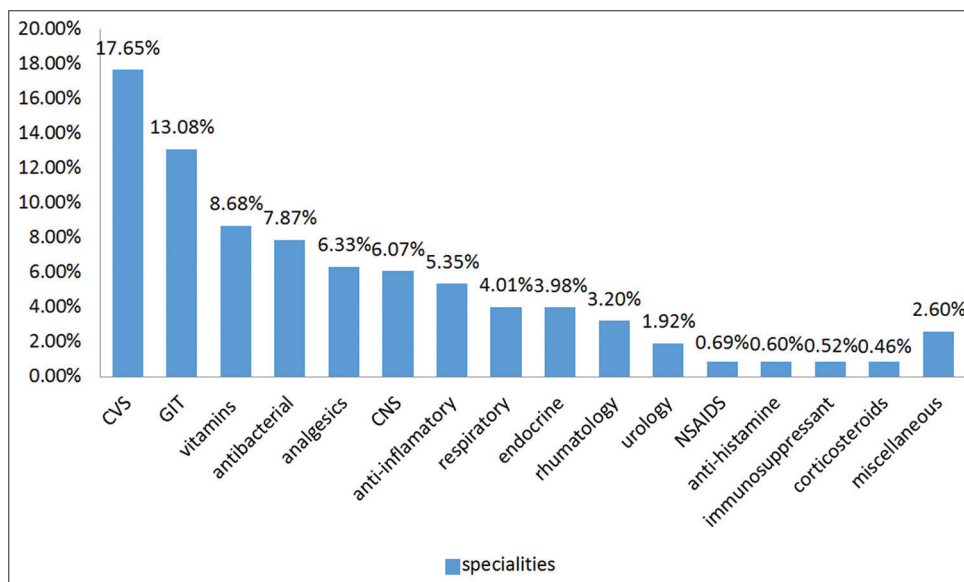


Figure 3: The rates of medication errors in each medical speciality

## REFERENCES

1. The National Coordinating Council for Medication Error and Prevention. The Council: Moving into the Second Decade "Developing Recommendations and Offering Tools"; 2010.
2. Vijayakumar TM, Sathyavati D, Subhashini T, Grandhi S, Dhanaraju MD. Assessment of prescribing trends and rationality of drug prescribing. *Int J Pharmacol* 2011;7:140-3.
3. Leonard MS, Cimino M, Shaha S, McDougal S, Pilliod J, Brodsky L, *et al.* Risk reduction for adverse drug events through sequential implementation of patient safety initiatives in a children's hospital. *Pediatrics* 2006;118:e1124-9.
4. Alagha HZ, Badary OA, Ibrahim HM, Sabri NA. Reducing prescribing errors in the paediatric intensive care unit: An experience from Egypt. *Acta Paediatr* 2011;100:e169-74.
5. Alsulami Z, Conroy S, Choonara I. Medication errors in the middle east countries: A systematic review of the literature. *Eur J Clin Pharmacol* 2013;69:995-1008.
6. Asan O, Chiou E, Montague E. Quantitative ethnographic study of physician workflow and interactions with electronic health record systems. *Int J Ind Ergon* 2015;49:124-30.
7. Hannawa AF. Shedding light on the dark side of doctor-patient interactions: Verbal and nonverbal messages

- physicians communicate during error disclosures. *Patient Educ Couns* 2011;84:344-51.
8. Krishna MR, Divya G, Lakshmi P, Kannan MM, Ranganayakulu D. Common prescribing errors in Government general hospital. *Int J Res Pharm Sci* 2014;4:27-31.
  9. Serper M, McCarthy DM, Patzer RE, King JP, Bailey SC, Smith SG, *et al.* What patients think doctors know: Beliefs about provider knowledge as barriers to safe medication use. *Patient Educ Couns* 2013;93:306-11.
  10. Al-Khani S, Moharram A, Aljadhey H. Factors contributing to the identification and prevention of incorrect drug prescribing errors in outpatient setting. *Saudi Pharm J* 2014;22:429-32.
  11. Famiyeh IM, McCarthy L. Pharmacist prescribing: A scoping review about the views and experiences of patients and the public. *Res Social Adm Pharm* 2017;13:1-6.
  12. Kennedy C, Brewer L, Williams D. Drug interactions. *Medicine* 2016;44:422-6.
  13. Friedman AL, Geoghegan SR, Sowers NM, Kulkarni S, Formica RN Jr., Medication errors in the outpatient setting: Classification and root cause analysis. *Arch Surg* 2007;142:278-83.
  14. Meyer TA. Improving the quality of the order-writing process for inpatient orders and outpatient prescriptions. *Am J Health Syst Pharm* 2000;57 suppl 4:4-22.
  15. Shaughnessy AF, Nickel RO. Prescription-writing patterns and errors in a family medicine residency program. *J FamPract* 1989;29:290-5.
  16. Hawksworth GM, Corlett AJ, Wright DJ, Chrystyn H. Clinical pharmacy interventions by community pharmacists during the dispensing process. *Br J Clin Pharm* 1999;47:695-700.
  17. Buurma H, De Smet PA, Van Den Hoff OP, Egberts ACG. Nature, frequency, and determinants of prescription modifications in Dutch community pharmacies. *Br J Clin Pharmacol* 2001;52:85-91.
  18. Davis K, Schoenbaum SC, Collins KS, Tenney K, Hughes DL, Audet AJ. Room for improvement: Patients report on the quality of their health care. Available from: <http://www.cmwf.org>. [Last accessed on 2016 Nov 01].
  19. Dibbi HM, ALbrashi HF, Hussein W. Causes and outcome of Medication errors in Hospitalized patient. *Saudi Med J* 2006;27:1489-92.
  20. Azouly L, Zargarzadeh A. In appropriate medication prescribing errors in community dwelling elderly patient in Iran. *Eur J Clin Pharmacol* 2005;61:913-9.
  21. Ganhdi TK, Weingart SN, Seger AC, Borus J, Burdick E, Gpoon E. Outpatient prescribing errors and the impact of computerized prescribing. *J Gen Intern Med* 2005;20:837-41.
  22. Albadr Y, Bohassan AK, Ming LC, Khan TM. An exploratory study investigating the potential drug-drug interactions in internal medicine department, Alahsa, Saudi Arabia. *J Pharm Health Serv Res* 2014;54:237-41.
  23. Sada O, Melkie A, Shibeshi W. Medication prescribing errors in the medical intensive care unit of Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia. *BMC Res Notes* 2015;8:448.
  24. Nanji KC, Rothschild JM, Salzberg C, Keohane CA, Zigmont K, Devita J, *et al.* Errors associated with outpatient computerized prescribing systems. *J Am Med Inform Assoc* 2011;18:767-73.
  25. de Las Mercedes MS. Medication errors in a Spanish community pharmacy: Nature, frequency and potential causes. *Int J Clin Pharm* 2013;35:185-9.
  26. Murray KA, Belanger A, Devine LT, Lane A, Condren ME. Emergency department discharge prescription errors in an academic medical center. *Proc (Bayl Univ Med Cent)* 2017;30:143-6.
  27. Samsiah A, Othman N, Jamshed S, Hassali MA, Wan-Mohaina WA. Medication errors reported to the National Medication Error Reporting System in Malaysia: A 4-year retrospective review (2009 to 2012). *Eur J Clin Pharmacol* 2016;72:1515-24.

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