

Medication safety issues in Four Lower Middle-Income Countries of Northern and Eastern Africa: Challenges and Recommendations

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ABSTRACT

Background: Literature on medication safety issues such as medication errors, adverse drug events and medication safety practices in African countries are scarce compared to western countries.

Objective: This review was carried out to explore medication safety challenges in four Lower Middle-Income Countries (LMIC) of Africa and recommend strategies to improve medication safety.

Methods: Electronic databases such as PubMed, Science Direct, and Google Scholar were searched to locate studies related to medication safety in LMIC of Africa.

Results: The results of this review suggest that a very few numbers of existing studies have investigated medication safety issues in the four LMIC. The medication safety issues reported were in the areas of prescribing, monitoring, administration, and transcribing stages. Medication-related challenges during prescribing were incorrect dose, incorrect frequency, and drug-drug interactions. In the monitoring stage, the most commonly seen errors were drug interactions and inappropriate monitoring process. During the administration stage, the most commonly observed errors were in incorrect dose and medications omission. The Incorrect dose problem was also identified during the dispensing stage. Incidences of adverse drug reactions were reported. Among the reported contributing factors to these medication safety issues were lack of training and limited resources.

Conclusion: one of the challenges faced by the healthcare systems in LMIC is the medication safety issue. Most of the challenges identified can be resolved with the utilization of some available resources in these countries. This paper suggests several recommendations through which these challenges can be addressed.

Keywords: Lower Middle-Income Countries, LMIC, "Egypt, Morocco, Tunisia, Djibouti", medication safety, medication errors (s), adverse drug event (s), adverse drug reaction.

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INTRODUCTION

Patients safety is considered as a human right issue as well as public health concern (1). There are many indicators of patient safety including the rate of medication errors, adverse drug events (ADEs), and medication safety practices in general. Medication errors are defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) as any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer (2). ADEs are injuries caused by medical intervention associated with a drug (3). Many ADEs are preventable (4-6), however hardly cause death (7). Several organizations such as the World Health Organization (WHO) (8) and the Institute of Safe

Medication Practices (ISMP) had made several recommendations to improve medication safety and prevent patient harm (9).

Medication errors and ADEs are relatively common in African countries (10). A systematic review reported that the median ADE was 8.4%, and 2.8% of ADEs caused admission to hospital (10). Dosing errors were the most commonly reported type of medication errors (10). Human factors were commonly the cause of medication errors (10).

The literature on medication-related challenges in African countries such as medication errors, ADEs, and medication safety practices are scarce compared to western countries (11-14). This review aims to explore medication safety challenges in four LMIC of Africa and recommend strategies to improve medication safety.

METHODOLOGY

Search strategy:

We reviewed studies performed in four LMIC of Africa. The countries were classified by income level using the World Bank list of economies (June 2020) (15).

Search terms:

The following words were used "Lower and Middle-Income Countries" "LMIC" and country names " Egypt, Morocco, Tunisia, Djibouti ". Boolean terms such as ("AND" "OR") were used. Keywords were medication safety, medication errors (s), adverse drug event (s), adverse drug reaction (s), prescribing error (s), dispensing error (s), administration error(s).

Inclusion/exclusion criteria

No restrictions were made for the publication year. Letters to the editor, case reports, commentary reviews, and conference proceedings were excepted.

RESULTS AND DISCUSSION

Egypt (Population 102,837,562) (16)

Country Profile

The Arab Republic of Egypt is a LMIC (15) located in Northeast Africa. It is the largest and most populous country in the Middle East. The country's gross national income per capita was 10,000 US dollars in 2013 and the total expenditure on health was 5.6% of GDP in 2014. The under-five mortality rate is 22/1,000 live births (2013) and the maternal mortality ratio (MMR) is 45/100,000 live births (2013).

Healthcare system

The healthcare service in Egypt is divided into private and public services. Public hospitals are managed by the Ministry of Health, Ministry of Education, and the General Authority of Health Insurance under the supervision of the Ministry of Health. The private sector is categorized into hospitals and medical centers. Egypt has more private hospitals than governmental ones. The safety and quality of pharmaceutical products is monitored by the Egyptian Drug Authority. In June 2014, the National Office for the Handling and Reduction of Medication Errors (NO HARMe) launched a voluntary national online medication errors reporting system. Reporting medication errors to the NO HARMe is voluntary and reporters have the option to be anonymous and both potential and actual medication errors can be reported. The NO HARMe receives reports only from healthcare professionals and patients cannot report medication errors to the system. A survey study reported that only 6.67% of the hospitals in Egypt had adopted the process of Electronic Health Records (EHR) and the majority of the hospitals did not adopt this process due to high cost. Those who had implemented the HER process claimed that the system had improved the quality of healthcare services (17).

Medication safety issues

Generally, there is a lack of literature about medication safety in Egypt. An analysis of six months' medication error reports submitted to the Egyptian national online system revealed that medication errors were most common in the prescribing (54%), monitoring (25%), and administration (16%) stages of the medication use process. Medication errors during prescribing were incorrect dose (32.5%), incorrect frequency (13%), and drug-drug interactions (category x) (9.5%) (18). In the monitoring stage most commonly, seen errors were drug

interactions (52%), monitoring not ordered (24%) and monitoring ordered but not performed (12%). The most commonly observed errors in the administration stage were extra dose (16.5%), medications omission (13.5%), and incorrect dose (10.5%) (18). In the dispensing stage, the most frequent errors were dispensing of the incorrect drug (64%) and expired medications (19.5%). In the transcribing stage, incorrect patient (37%), incorrect dose (29%) and incorrect frequency (17%) were the leading errors (18). Lack of knowledge and experience, environmental factors, incomplete prescribing instructions, lack of drug information resources, lack of documentation, lack of patient information, and illegible handwriting were the causes of medication errors (18). The top common medication classes associated with the reported medication errors were antibiotics, Central Nervous System (CNS) drugs, cardiovascular drugs, antacids, and chemotherapy (18). In an ICU of a large teaching hospital in Egypt, 97% of the patients had one or more drug-related problems (19). The most commonly identified medication errors were dosing errors followed by therapeutic duplication, unnecessary medications, and antibiotics misuse. In the adult oncology unit in one of the main hospitals in Alexandria, wrong dose and missed information were the most common drug-related problems (20). Factors influencing head nurse's appropriate management of high alert medications were time constraints, limited resources, lack of training in management and leadership, and lack of support from hospitals' management (21). Although clinical pharmacy services are not widely implemented in Egypt, one study reported that clinical pharmacists' interventions have resolved prescribing and administration errors, however 21% of the interventions were not accepted (22). Recommendations to prevent medication errors in Egypt included staff education and training, establishing a local reporting system in each hospital, environment modification, improving communication, designing a standard prescription form, drug formulary spreading to physicians, auditing an administration sheet, and adopting clinical practice guidelines (18).

Morocco (Population 36,910,560) (16)

Country Profile:

Morocco is a LMIC (15) with an area of 710,850 km². The gross national income per capita was 7000 US dollars in 2013. The total expenditure on health was 5.9% of GDP in 2014. The under-five mortality rate is 30/1,000 live births (2013) and the maternal mortality ratio (MMR) is 120/100,000 live births (2013).

Healthcare system

The healthcare system in Morocco consists of public and private sectors. The public healthcare sector includes 2,626 Basic Healthcare Centers (BHCs), general hospitals, specialized hospitals, and teaching hospitals. The public health sector has a capacity of more than 27,350 beds and more than 38,000 healthcare professionals. The private sector consists of clinics, dialysis centers, and radiologist offices with a capacity of about 6,156 beds and more than 10,800 healthcare professionals.

Medication safety issues

There is a lack of literature about the challenges of medication safety in Morocco. A study conducted in a Moroccan ICU reported medication error incidence of 10 per 100 medication orders, potential ADEs of 2.28 per 100 medication orders, and ADEs incidence of 0.16 per 100 medication orders (23). The majority of the medication errors occurred in the transcribing stage, and

Medication safety issues in Four Lower Middle-Income Countries of Northern and Eastern Africa: Challenges and Recommendations

antibiotics were the most common medication class associated with errors (23). Two of the ADEs resulted in death (23).

Tunisia (Population 11,852,183) (16)

Country Profile

Tunisia is a LMIC (15) with a gross national income per capita of 10000 US dollars in 2013. The total expenditure on health was 7% of GDP in 2014. The under-five mortality rate is 15/1,000 live births (2013) and the maternal mortality ratio (MMR) is 46/100,000 live births (2013).

Healthcare system

In Tunisia, public facilities provide free-of-charge medical care to all residence (24). There are 23 university hospitals, 33 regional hospitals, 109 district hospitals, and 2085 primary care centers throughout the country. There are 2.2 pharmacists per 10,000 population (24).

Medication safety issues

A study carried out in a teaching hospital reported that all prescriptions did not include patient's age, body weight, and allergy information. This information was not transferred to the pharmacy department (25). Nurses did not routinely check the expiration date, package integrity, product appearance, and patient identity (25). Of 180 drugs administration, 8.4% contained medication errors (25). These errors were administration of the wrong dose, the wrong drugs or techniques, and omission errors. In the same study, 61 healthcare professionals (21 physicians, 9 pharmacists, and 31 nurses) were interviewed about their daily clinical practice. About half of the physicians (n=10) had prescribed medications for patients that they have not seen or know, and more than half had made medication orders verbally or through phone calls (25). Half of the nurses reported not requesting the physician name and signature before ordering medication and 40% of them did not ask about treatment duration (25). The incidence of ADEs was 10% in Tunisia. Of which 60% were preventable and 21% caused the death (26).

Djibouti (Population 991,922 people) (16)

Country Profile:

Djibouti is a LMIC (15) located in East Africa and occupies a total area of 23,200 km². The gross national income per capita was 2000 US dollars in 2013. The total expenditure on health was 10.6 % of GDP in 2014. The under-five mortality rate is 70/1,000 live births (2013) and the maternal mortality ratio is 230/100,000 live births (2013).

Healthcare system

The health care system in Djibouti consists of public, private sectors, and service provided by the Office of Social Protection. The public sector provides healthcare to the population free of charge. However, there is a lack of medicines in the hospitals therefore patients need to buy their prescribed medications from the private community pharmacies. The private healthcare sector provides inpatient, outpatient, and dental care. Only a few people can afford the treatment expenses in the private sectors. The Office of Social Protection provides healthcare services to its employees through local medical dispensaries. There is a lack of physicians, pharmacists, and nurses in Djibouti and the ratio of doctors to patients is 18 to 100,000 people. There is a lack of studies about medication-related issues in Djibouti.

Recommendations to improve medication safety in LMIC

Recommendations:

- *Raising the awareness of healthcare professionals, patients, and the public about medication safety. This can be achieved by the following:*
 - Conducting focus group discussions to explore the healthcare professionals' opinions about medication safety challenges and opportunities for improvement.
 - Developing appropriate training modules, and training the healthcare professionals (Physicians, nurses, and pharmacists) on all stages of the medication use process.
 - Conducting medication safety awareness campaigns for the community and patients and providing educational sessions on the importance of prevention of medication-related harm.
 - Building national and local campaigns and activities around the theme of Medication Safety Awareness day.
- *Improve the quality of the medication use process through the following:*
 - Developing and implementing strategies to reduce medication errors, increase awareness and improve medication safety practices.
 - Developing and enforcing a standard prescription format that consists of crucial information for safe prescribing (Age, gender, body weight, diagnosis, medication name, dose, frequency, route of administration, indication, physicians' signature, and allergy status).
 - Double-checking of prescriptions before dispensing of medications to prevent medication errors.
 - Developing patient's medication card that contains current and past prescribed medications to assist healthcare professionals to check patient's medication history on the next follow-up clinic appointment or hospital readmission.
 - Conduct independent verification of high-risk medications (Anti-infective, potassium, and other salts/electrolytes for injection, insulin, narcotics & sedatives, chemotherapeutic agents & immunosuppressive agents, and heparin & anticoagulant) by two nurses before administration.
- *Implement medication safety services as follow:*
 - Developing an action plan for the establishment of drug information units at the hospital level with defined roles, responsibilities, resources, activities, and timescale.

Medication safety issues in Four Lower Middle-Income Countries of Northern and Eastern Africa: Challenges and Recommendations

- Developing patient counseling tools for patients who are at high risk of medication errors.
 - Developing a medication reconciliation tool to ensure medication safety at the transition of care.
 - Informing and engaging patients, family and caregivers in the medication reconciliation process.
 - Developing policies about error-prone abbreviations, high-risk medications, and Look-Alike-Sound-Alike, to increase healthcare professionals' awareness about medication safety.
 - Developing a list of inappropriate medications use in the elderly (STOPP/START criteria).
- *Reducing medication errors and medication-related harm through the following:*
- Implementing medication errors and adverse drug events reporting system.
 - Developing standards, best practices, tools, and materials to implement national guidelines on medication safety.
 - Developing a sustainable strategy to improve medication safety including a medication safety committee.
 - Establishing patients counseling services in diabetes and cardiology clinics.
 - Conduct an audit to measure improvement in medication safety practices

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Medication safety issues in Four Lower Middle-Income Countries of Northern and Eastern Africa: Challenges and Recommendations

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