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Polypharmacy: An Overview

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ABSTRACT

Polypharmacy is a growing public health problem which is affecting multitudes worldwide. This emerging public health problem is defined as the routine use of five or more medicines by an individual patient. Many researchers believe that the prevalence of polypharmacy is going to keep increasing since more people are being diagnosed with chronic diseases. Polypharmacy is known to cause many problems such as adverse drug reactions, drug to drug interactions, wastage of resources and increased treatment costs. Countries should raise awareness of polypharmacy and find solutions to this problem. Healthcare professionals should be educated on the dangers of polypharmacy, medication safety and polypharmacy management. Polypharmacy management means a whole systems approach which avoids the use of unnecessary medication for multimorbid patients while maximizing pharmaceutical care. There is ongoing research to investigate polypharmacy because very little is known in the existing literature. This article describes polypharmacy in detail, including the prevalence of polypharmacy, the economic impact of polypharmacy, medication safety and polypharmacy management. This article aims to give a much deeper insight into polypharmacy.

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Introduction

Polypharmacy is an emerging public health problem worldwide which is associated with dangers such as adverse drug reactions, drug to drug interactions, wastage of resources and increased treatment costs (1). Numerous researchers have been trying to give a standard definition of polypharmacy for many years now (1). A systematic review was done in order, to determine the definition of polypharmacy, and to distinguish between appropriate and inappropriate polypharmacy (1). A total of 1156 articles were identified and only 110 articles met the inclusion criteria (1). The articles did not only define polypharmacy but also, associated terms such as minor and major polypharmacy. As a result, a total of 138 definitions of polypharmacy and associated terms were discovered1 About 80.4% of all definitions were numerical, and 10.9% of these numerical definitions incorporated a duration of therapy or healthcare setting. Approximately 8.7% of all definitions were descriptive. The most reported definition of polypharmacy was the numerical definition of five or more medicines daily (n = 51, 46.4% of articles), with definitions ranging from two or more to 11 or more medicines. Only 6.4% of articles used descriptive definitions to distinguish between appropriate and inappropriate polypharmacy.

The most acceptable definition of polypharmacy is the intake of five or more medicines by one patient. This definition of polypharmacy includes all the medicines that are being taken by an individual patient such as complementary medicines, over-the-counter (OTC) medicines and prescribed medicines (1,2). Even though polypharmacy is defined as taking five or more medicines per patient, healthcare professionals should not focus on the number of medicines but rather evidence-based practice (1,2). Polypharmacy is categorised either as appropriate polypharmacy or inappropriate polypharmacy. Appropriate polypharmacy means the rational dispensing or prescribing of multiple medicines to an individual patient based on the best available scientific evidence and

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bearing in mind the individual patient factors. Inappropriate polypharmacy is defined as the irrational dispensing or prescribing of unnecessary or too many medicines for a patient (1,2).

There are numerous conditions where it is advantageous and suitable to combine the usage of three or more medicines. Appropriate polypharmacy can be practised when treating tuberculosis in order, to stop the emergence of resistant mycobacteria (3). In addition, three medicines are used to treat Helicobacter pylori infections, and about four or five medicines are used to treat HIV/AIDS effectively (4). The "Polypill," which has six suggested constituents, including aspirin, a statin, folic acid, and three antihypertensive medicines, is a notable example of appropriate polypharmacy. The antihypertensive medicines in the polypill are added in half the usual doses, thus reducing the risk of adverse effects, and adding the therapeutic benefit of lowering blood pressure effectively (5). Several studies indicate that adults aged 55 years and above can reduce the risk of heart attacks and strokes by over 80% after taking the polypill. The risk of any adverse effect is estimated to be 17%, and the probability of an adverse effect severe enough to require discontinuation is usually 1-2%. Aspirin is a major contributor to these adverse effects, and people who cannot handle it may benefit from taking the other five ingredients with little risk (5).

Inappropriate polypharmacy, on the other hand, is frequent and is linked to a higher risk of adverse effects, as well as drug to drug interactions (2,3). For instance, if a patient takes eight medicines, each of which carries a separate 5% risk of an adverse drug reaction, the overall probability of an adverse drug reaction is 34%, and there are 28 possible drug-drug interactions, if only pairs of medicines are taken into consideration.18 In a survey of 102 elderly patients conducted in Dutch primary care, i.e., in the Netherlands, 60% of the medicines prescribed were inappropriate.18 There was omission of drug therapy that is indicated for the treatment of a common adverse effect, for example, lack of prescribing a laxative to a patient using an opioid which has a high risk of causing constipation.18 In addition, the patients with ischaemic heart disease were not given aspirin and those with cardiac failure were not given an Angiotensin Converting Enzyme (ACE) inhibitor (6).

Table 1. Differences between Appropriate and Inappropriate polypharmacy

Type	Description
1. Appropriate polypharmacy	It is present when: (a) all medicines are given for the purpose of achieving specific therapeutic objectives that have been agreed with the patient (b) therapeutic objectives are achieved or there is a reasonable chance they will be achieved in the future (c) medication therapy has been optimized to minimize the risk of adverse drug reactions (ADRs) (d) the patient is motivated and able to take all medicines as intended
1. Inappropriate polypharmacy	It is present when one or more medicines are given which are not or no longer needed, either because: (a) there is no evidence-based indication, the indication has expired or the dose is unnecessarily high (b) one or more medicines cannot achieve the intended therapeutic objectives (c) one, or the combination of several medicines cause ADRs, or put the patient at a high risk of getting ADRs (d) the patient is not willing or able to take one or more medicines as intended

Healthcare professionals should implement polypharmacy management strategies that will prevent the use of unnecessary medication for multimorbid patients while maximizing pharmaceutical care. The goal of healthcare professionals should be to promote appropriate polypharmacy and to reduce inappropriate polypharmacy. Appropriate polypharmacy can be highly beneficial for the secondary prevention of a myocardial infarction which includes medicines such as beta blockers, statins, antiplatelet agents and ACE inhibitors (2,3).

Prevalence of polypharmacy

Although the prevalence of polypharmacy is not well understood, it is expected to continue rising worldwide due to many factors. Most patients associated with polypharmacy are those having multiple chronic conditions such as the elderly above the age of 65 years old (4). These elderly patients are referred to as vulnerable patient groups and they should be protected from the risks of polypharmacy (4). The proportion of older population groups is increasing worldwide and it is estimated that by the year 2050 population groups aged over 65 years will account for 16% of the total population (5). Several researchers report that multimorbidity increases remarkably with age and it is most prevalent in the elderly (6).

Hypertension, hyperlipidaemia and depression are among the most prevalent comorbidities for patients especially in primary care (7). When a patient has multimorbidity, this may negatively affect both the physical and mental health (8). In addition, multimorbidity can negatively affect the patient's quality of life and cause restrictions on normal activities (8). Even though there are many new technological advancements in healthcare, there are very few evidence-based clinical practice guidelines for treating the elderly with multiple morbidities (8). Consequently, inappropriate polypharmacy will occur when medicines are selected based on guidelines for single diseases and without taking into consideration multimorbidity(8).

Economic impact

The rational use of medicines can help to reduce healthcare costs (9). Numerous studies have shown that inappropriate polypharmacy contributes to about 4% of the world's total avoidable healthcare costs (9). About US$ 18 billion, which is approximately 0.3% of the total health expenditure worldwide could be avoided if the right polypharmacy management strategies are implemented. There are many strategies which can be used to avoid unnecessary healthcare costs caused by inappropriate polypharmacy (9). Firstly, medical audits should be done on multimorbid patients receiving multiple medicines in order, to identify any inappropriate polypharmacy.9 Secondly, healthcare professionals should use a targeted approach when developing a treatment plan for a patient or they should use individualised therapy approaches.

A monitoring system for polypharmacy should be established which will ensure that all cases of inappropriate polypharmacy will be identified and rectified. In addition, healthcare professionals should work in a multidisciplinary team when establishing a treatment plan for a patient and the role of the pharmacist should be promoted in medication management. In one study where clinical pharmacists performed comprehensive medication reviews for older multimorbid patients, the total hospital-based healthcare costs per patient were reduced by US$ 230. This study gave the conclusion that polypharmacy strategies can help to reduce morbidity and healthcare costs (9,10).

Patient safety

Patient safety can be improved when adverse drug reactions (ADRs), drug to drug interactions and medication errors associated with polypharmacy are reported (2). Caregivers, patients and healthcare professionals all play a critical role in reporting any harm caused by medication such as adverse drug reactions (ADRs). The World Health Organization (WHO) developed a Global Patient Safety Challenge in 2017, with the goal of reducing medication related harm by 50% over the next five years (2). This Global Patient Safety Challenge comprises of strategies such as medication reviews that can be used to optimize the rational use of medication, improve health outcomes, and prevent harm. Statistics suggest that adverse drug reactions (ADRs) are the 14th leading cause of morbidity and mortality worldwide (11). Several studies have shown that inappropriate polypharmacy is causing harm to patients which can be prevented (12).

Many patients use over-the-counter (OTC) medication for conditions such as pain, allergies or coughs which may interact with their prescribed medication (13). Consequently, it is important to ask the patient about any medication that he or she is currently taking before giving any medication (13). Since many patients often use conventional medicines together with complementary medicines, it is crucial for healthcare providers to ask patients these complementary medicines (14). Healthcare providers should consider the possibility of drug to drug interactions between complementary medicines and conventional medicines.

Polypharmacy management

The major aim for the development of polypharmacy management strategies is to ensure medication safety. The first step in ensuring medication safety is to prescribe the appropriate medication for a patient and do a thorough risk assessment (2). A good example is that a patient who once had a myocardial infarction cannot be given aspirin as a prophylactic agent because it can increase the risk of cardiovascular events. The second step in ensuring

medication safety is to do a comprehensive medication review. A medication review is an activity in which a multidisciplinary team of healthcare professionals assess the risks and benefits of each medicine for a patient and make evidence-based healthcare decisions (2).

Medication reviews in polypharmacy are performed together with the patient or caregiver and they take into consideration the effectiveness of the medication. Medication reviews help to improve the appropriateness of the medication, improve outcomes and reduce harm (15). A systematic review and meta-analysis reported that pharmacist initiated medication reviews caused a reduction in hospital admissions. In one study, medication reviews helped to reduce the number of adverse drug reactions 30 days after patient discharge (16). When medication reviews are done, deprescribing can be considered if there is inappropriate polypharmacy (17).

Deprescribing means a planned or supervised process of dose reduction or the cessation of medication that might be causing harm or is no longer of benefit to the patient. Deprescribing helps to promote the rational use of medication and ensure patient safety (17). The third step for ensuring medication safety involves the correct dispensing, preparation and administration of the medication. If a medicine is deemed unsafe, it should not be dispensed nor administered to the patient. The fourth step for ensuring medication safety involves good communication and patient engagement. Healthcare providers and patients should communicate effectively in order, to ensure medication safety. Effective communication will help the healthcare provider to identify any medication related problems such as adverse drug reactions and solve them (2).

The final step for ensuring medication safety involves medication reconciliation at care transitions. Medication reconciliation is a process in which healthcare providers and patients or caregivers work together to ensure that both parties get the accurate and complete medication information. Medication information can be communicated in the form of a medication list or patient-held medication record and this will help to determine which medicines should be added or discontinued. Figure 1 below shows the key steps for ensuring medication safety in polypharmacy (2,15,16,17).

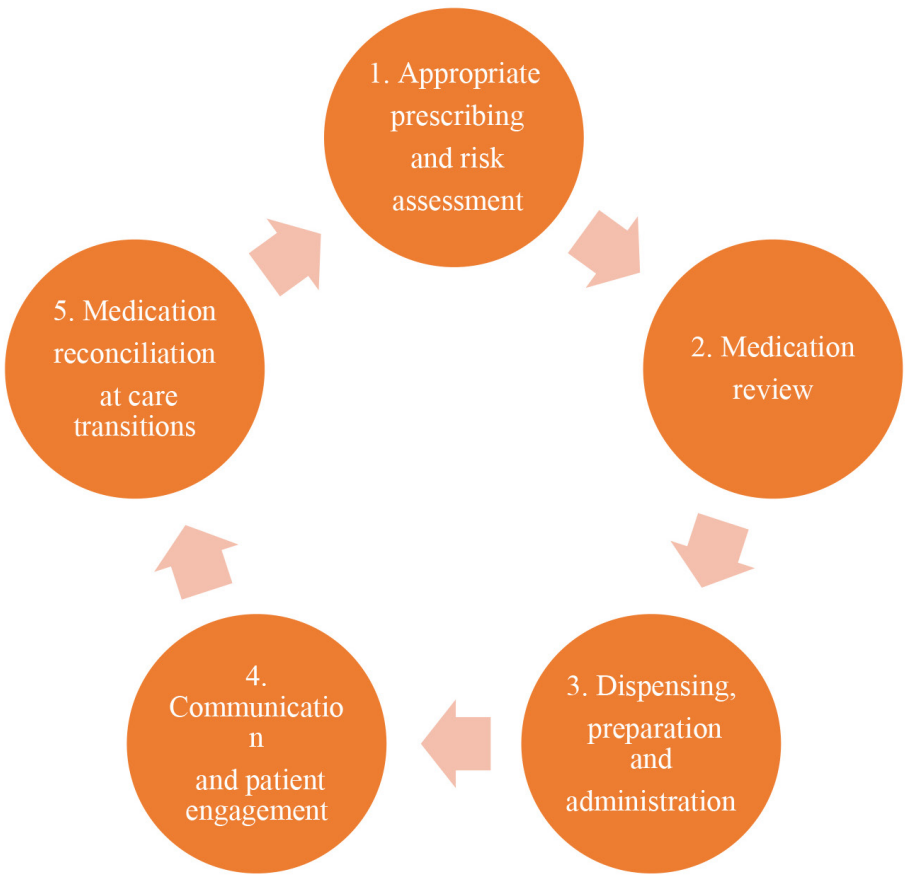

Figure 1. Five key steps in ensuring medication safety in polypharmacy (2,15,16,17).

Conclusion

The healthcare provider plays a critical role in promoting appropriate polypharmacy and reducing inappropriate polypharmacy. It is important for inappropriate polypharmacy to be reduced so that medication related problems such as adverse drug reactions can be prevented, and unnecessary healthcare costs can be avoided. The healthcare provider must take into consideration the safety aspects, concurrent medication, and pre-existing conditions before giving any medicine to any patient. Patient safety can be improved when drug to drug interactions, adverse drug reactions and medication errors associated with polypharmacy are reported. There should be a monitoring system which will ensure that all medication problems related to polypharmacy are identified and solved. Healthcare professionals should implement polypharmacy management strategies such as medication reviews which will ensure the rational use of medication and ensure optimal patient care.

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