SUBMITTED 3 JAN 24
REVISIONS REQ. 1 & 25 FEB 24; REVISIONS RECD. 12 & 25 FEB 24
ACCEPTED 29 FEB 24
ONLINE-FIRST: MARCH 2024
DOI: https://doi.org/10.18295/squmj.3.2024.014

Inappropriate Polypharmacy and the Need for Comprehensive Medication Management Service

Juhaina S. Al-Maqbali and *Ibrahim Al-Zakwani

Department of Pharmacology & Clinical Pharmacy, College of Medicine and Health Science, Sultan Qaboos University, Muscat, Oman; Department of Pharmacy, Sultan Qaboos University Hospital, University Medical City, Muscat, Oman
**Corresponding Author's e-mail: ial_zakwani@yahoo.com*

Polypharmacy is commonly defined as taking five or more medications at once by a patient.[1,2] Even though polypharmacy is observed in the majority of age groups, at a prevalence rate of around 37%, it is, however, more prevalent (54%) in the elderly (>65 years). Polypharmacy is linked to negative outcomes including increasing morbidities and mortality, especially in the elderly[3], and at Sultan Qaboos University (SQUH), it was reported to be an independent risk factor for delirium development during hospitalization.[4] Polypharmacy is also known to be a major risk factor for adverse drug reactions (ADRs), drug-drug interactions, and hospital re-admissions.

A report of polypharmacy interventions has been published that is associated with improvements in patients' health outcomes including quality of life, disease control as well as a reduction in hospital costs.[5] This includes the availability of clinical pharmacy service, where clinical pharmacists in multidisciplinary care teams of various models, play a fundamental role in enhancing patient health outcomes and reducing economic burden.[6,7] At SQUH, clinical pharmacy services have been provided to most but not all specialties since the inception of the hospital, and the pharmaceutical interventions are intended to care for patients from admission

until discharge.[6-9] The pharmaceutical interventions were able to prevent a wide range of medication errors and inappropriate polypharmacy which led to a reported annual cost avoidance of approximately US$ 440,000.[8] Deleting or omitting a medication from a patient list, especially if it's contributing to inappropriate polypharmacy is considered a fundamental category of pharmaceutical interventions provided by the clinical pharmacists at SQUH, and its highly acknowledged by the healthcare providers.[9] Furthermore, the clinical pharmacy service provided at SQUH was further developed to an emerging concept called 'bundle care service' that provides a whole bundle of care to the patients on admission, which includes medication history/ reconciliation on admission, pharmaceutical interventions, discharge medication review, and counseling during the hospital stay or upon discharge to ensure a proper transition of care.[7,10] It has been reported that the full bundle of care is prioritized to patients with more than one comorbidity and to those on polypharmacy, and to not all admitted patients, mainly because of the insufficient number of clinical pharmacists available at SQUH.

The need for a sustained pharmacy practice model that contributes to the institutional and governmental strategic plans for reducing healthcare costs and improving clinical outcomes is frequently recommended[11], which ensures an early follow-up review post-hospitalization. An example is the new concept of comprehensive medication management (CMM) service that guarantees each patient's medications are reviewed to determine their appropriateness, effectiveness, and safety given their complex comorbidities and other prescribed medications. The medications should be taken by the patient as intended during a continuous follow-up plan that starts at the primary care or post-hospitalization.[12] Unlike other pharmaceutical models, CMM service is delivered in the form of a continuous patient-centered model with a holistic approach, by clinical pharmacists working with the patient, physicians, and other members of the healthcare team[13], which leads in return to continuous prevention of inappropriate polypharmacy and other pharmaceutical care issues. However, the insufficient number of clinical pharmacists available at SQUH hospital still remain to be the main limitation to those services to be optimally implemented, although the concept of return of investment (ROI) and consequently cost-benefit of the new services to SQUH should guide this decision of introducing a new service. This concept was first recommended by the American College of Clinical Pharmacy (ACCP) and its

clinical and economic impact on primary care was widely and positively supported by evidence-based literature.[14]

At the start of CMM service, the triple aim was broadly agreed upon to optimize health system performance, which enhances patient experience, improves population health and reduces costs. In the past decade, a growing body of evidence has documented the benefits of moving CMM service from double and triple aim to quadruple aim, including patient satisfaction and impact on provider work-life (e.g., pharmacists and physicians) together with the earlier mentioned benefits of healthcare utilization and clinical outcomes, through demonstrating documentation processes and monitoring surveys.[15] This movement from triple aim to quadruple aim was affected by the physicians and other members of the health care workforce reporting a widespread burnout and dissatisfaction, which in turn impact health outcomes, and may increase costs. CMM service is widely provided in primary care and assisted in shaping the CMM service for other types of care, depending on organizational needs, availability of resources, and differences in pharmacy practice models. CMM was later improved to handle secondary and tertiary care level.[16] In addition, measurable criteria to identify patients and areas for practicing CMM services have been developed to help prioritize patients who would benefit most from clinical pharmacist interventions.[17] These include; classifying the patient' medication list into complex, risky or costly medication. As well as innovations to establish physician-pharmacist collaborative relationships to aid pharmacists practicing CMM using various strategies that are mainly around the concept of physicians accepting pharmacist interventions[18]. Although recent studies published on clinical pharmacy services at SQUH have proven that staff shortage in this service can lead to less than optimum expectations, they have also documented a high acceptance rate among other healthcare providers about their interventions that lead to better health outcomes.[7-9] This might be an opportunity for SQUH to evaluate the implementation of CMM services by prioritizing healthcare conditions that are likely to be associated with inappropriate polypharmacy. These could include chronic diseases like heart failure, diabetes mellitus, and hypertension. Additionally, other categories of patients could be added to the referral service and this might prove to be an efficient and cost-effective service.

Authors' Contribution

Both authors contributed equally and approved the final version of the manuscript.

References

1. Delara M, Murray L, Jafari B, Bahji A, Goodarzi Z, Kirkham J, et al. Prevalence and factors associated with polypharmacy: a systematic review and Meta-analysis. BMC Geriatr. 2022; 22:601. doi: 10.1186/s12877-022-03279-x.
2. Alawainati M, Habib F, Ateya E, Dakheel E, Al-Buainain M. Prevalence, Characteristics and Determinants of Polypharmacy Among Elderly Patients Attending Primary Health Care Centers in Bahrain: A cross-sectional study. Sultan Qaboos Univ Med J. 2023; 1. doi: 10.18295/squmj.9.2023.052.
3. Al Sibani M, Al-Maqbali JS, Yusuf Z, Al Alawi AM. Incidence and Risk Factors for 28 Days Hospital Readmission: A Retrospective Study from Oman. Oman Med J. 2022; 37:e423. doi: 10.5001/omj.2022.91.
4. Al Farsi RS, Al Alawi AM, Al Huraizi AR, Al-Saadi T, Al-Hamadani N, Al Zeedy K, et al. Delirium in Medically Hospitalized Patients: Prevalence, Recognition and Risk Factors: A Prospective Cohort Study. J Clin Med. 2023; 12:3897. doi: 10.3390/jcm12123897.
5. Lum MV, Cheung MYS, Harris DR, Sakakibara BM. A scoping review of polypharmacy interventions in patients with stroke, heart disease and diabetes. Int J Clin Pharm. 2020; 42:378-92. doi: 10.1007/s11096-020-01028-x.
6. Al-Hashar A, Al Sinawi H, Al Mahrizi A, Al-Hatrushi M. Prevalence and Covariates of Polypharmacy in Elderly Patients on Discharge from a Tertiary Care Hospital in Oman. Oman Med J. 2016; 31:421-5. doi: 10.5001/omj.2016.85.
7. Al Abd BM, Al-Maqbali JS, Al-Zakwani I. Impact of Clinical Pharmacists-driven Bundled Activities from Admission to Discharge on 90-day Hospital Readmissions and Emergency Department Visits. Oman Med J. 2023; 38:e566. doi: 10.5001/omj.2023.110.
8. Al-Maqbali JS, Taqi A, Al-Ajmi S, Al-Hamadani B, Al-Hamadani F, Bahram F, et al. The Impacts of Clinical Pharmacists' Interventions on Clinical Significance and Cost Avoidance in a Tertiary Care University Hospital in Oman: A Retrospective Analysis. Pharmacy (Basel). 2022; 10:127. doi: 10.3390/pharmacy10050127.

9. Al-Maqbali JS, Taqi A, Al-Hamadani B, Gamal S, Al-Lawati E, Himali NA, et al.. Levels of agreement among clinical pharmacists on the impact of pharmaceutical interventions in Oman: A retrospective analysis. Pharm Pract (Granada). 2022; 20:2708. doi: 10.18549/PharmPract.2022.3.2708..
10. Al-Hashar A, Al-Zakwani I, Eriksson T, Sarakbi A, Al-Zadjali B, Al Mubaihsi S, et al. Impact of medication reconciliation and review and counselling, on adverse drug events and healthcare resource use. Int J Clin Pharm. 2018; 40:1154-64. doi: 10.1007/s11096-018-0650-8.
11. Pestka DL, Blanchard CM, Sorensen TD. What is needed to sustain comprehensive medication management? One health plan's perspectives. J Manag Care Spec Pharm. 2022; 28:674-9. doi: 10.18553/jmcp.2022.28.6.674.
12. Nace DK, Grundy P, Nielsen M. Patient-Centered Medical Home. Integrating Comprehensive Medication Management to Optimize Patient Outcomes. 2nd Edition, June 2012. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://thepcc.org/sites/default/files/media/medmanagement.pdf. Accessed on February 7, 2024.
13. American College of Clinical Pharmacy, American College of Clinical Pharmacy Research Institute, UNC Eshelman Institute for Innovation. The patient care process for delivering comprehensive medication management (CMM). Optimizing medication use in patient-centered, team-based care settings. **2020**. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.accp.com/docs/positions/misc/CMM_Care_Process.pdf. Accessed on February 7, 2024.
14. Brajković A, Bosnar L, Nascimento MMGD, Prkačin I, Balenović A, Ramalho de Oliveira D, at al. Healthcare Utilisation and Clinical Outcomes in Older Cardiovascular Patients Receiving Comprehensive Medication Management Services: A Nonrandomised Clinical Study. Int J Environ Res Public Health. 2022; 19:2781. doi: 10.3390/ijerph19052781.
15. McFarland MS, Buck ML, Crannage E, Armistead LT, Ourth H, Finks SW, et al; writing on behalf of the Get the Medications Right Institute. Assessing the Impact of Comprehensive Medication Management on Achievement of the Quadruple Aim. Am J Med. 2021; 134:456-61. doi: 10.1016/j.amjmed.2020.12.008.

16. Mulrooney M, Smith M. Primary Care Pharmacist Practice Models Shape the Comprehensive Medication Management Process. Ann Pharmacother. 2022; 56:620-5. doi: 10.1177/10600280211042031.
17. Bishop MA, Chang HY, Kitchen C, Weiner JP, Kharrazi H, Shermock KM. Development of measurable criteria to identify and prioritize patients for inclusion in comprehensive medication management programs within primary care settings. J Manag Care Spec Pharm. 2021; 27:1009-18. doi: 10.18553/jmcp.2021.27.8.1009.
18. Yoo A, Fennelly JE, Renauer MM, Coe AB, Choe HM, Marshall VD, et al. Comprehensive medication review service by embedded pharmacists in primary care: Innovations and impact. J Am Pharm Assoc (2003). 2022; 62:580-7.e1. doi: 10.1016/j.japh.2021.09.015.