Polypharmacy is commonly defined as taking five or more medications at once by a patient.\textsuperscript{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\textsuperscript{3}, and at Sultan Qaboos University (SQUH), it was reported to be an independent risk factor for delirium development during hospitalization.\textsuperscript{4} Polypharmacy is also known to be a major risk factor for adverse drug reactions (ADRs), drug-drug interactions, and hospital readmissions.

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.\textsuperscript{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.\textsuperscript{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
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. 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. 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. 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, 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. 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, 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


