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Original Research Article **Pharmacy**

Impact of Pharmacist Led Tele Medication Management Clinic in Ambulatory Care Settings: A Retrospective Analysis

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Abstract

Background**:* Telehealth or telemedicine primarily focuses on patient benefits and safety including improved accessibility, enhanced patient satisfaction, and establishing and maintaining continuity of care. The John Hopkins Aramco Healthcare (JHAH) pharmacy aimed at establishing the pharmacist-led medication management clinics (MMC) clinics as a model of medication management and patient counseling. ***Objectives: To describe and compare the outcome of implementing telehealth services managed via a pharmacist-led medication management clinic (MMC) to confer person-centered patient care services at JHAH. ***Methodology:*** The retrospective observational study was conducted in a single-centered tertiary care institution, John Hopkins Aramco Healthcare, Saudi Arabia for a duration of six months from June 2021 to December 2021 among ambulatory care patients. ***Results:*** There were few significant differences between the gender distribution between patients of tele MMC and MMC that TELEMMC were more preferable choice for the age group 61-70 years compared to MMC, where as in MMC age group 51-60 years were more preferable. Both TELEMMC and MMC demonstrated a high level of satisfaction with general medicine department with 63% of patients. ***Conclusion:*** The present study demonstrates the impact of TELEMMC on clinics, indicating a substantial increase in the number of individuals, particularly geriatric patients, opting for telemedicine consultations. The widespread acceptance of this new method reflects the positive impact it has had on healthcare delivery and patient outcomes

Keywords: Medication management clinic, pharmacist interventions, pharmaceutical care, tele MMC, John Hopkins Aramco Healthcare.

INTRODUCTION

Healthcare systems have witnessed massive progress over the past decades in view of the expeditious implementation of technological advancement, particularly, the use of telecommunication services in clinical practice. The impact of telecommunication has been remarkable during the pandemic and telehealth has transformed to be an indispensable part of the healthcare workflow. The covid-19 outbreak has resulted in significant disruptions in the healthcare systems globally, forcing organizations to embrace innovative approaches to healthcare services, and thus increasing the demand for telehealth services [1-3].

Telehealth or telemedicine primarily focuses on patient benefits and safety including improved accessibility, enhanced patient satisfaction, and establishing and maintaining continuity of care.[1,3] The Ministry of Health (MOH), in Saudi Arabia, has already put forward a telehealth framework that had been successfully implemented during Covid-19 although faced a few challenges.[1,4] Several telehealth tools have been found advantageous to patients including video conferences and mobile applications that conferred online consultations. Amidst the Covid-19 juncture, the implementation of the pharmacist-initiated medication management clinic services integrated using telehealth services in the John Hopkins Aramco Healthcare (JHAH) is highly appreciable. The JHAH pharmacy aimed at establishing the pharmacist-led medication management clinics (MMC) clinics as a model of medication management and patient counseling. The incorporation of telehealth services improved patient engagement and treatment compliance, reduced economic burden, and refined the concept of patient-

centered care, especially for geriatric patients and those patients with chronic conditions [1,3,5].

Research has found that telehealth facilities have achieved better patient satisfaction with the added advantage of convenience and rapid accessibility to healthcare services. It is often comparable to conventional face-to-face consultations and therefore, is a suitable alternative in appropriate settings for delivering individualized quality care.[5–7]

Despite the plethora of futuristic opportunities offered by the telehealth tools, patients as well as the service providers deal with several barriers throughout and post implementation in ambulatory healthcare. Notable challenges within the tele-pharmacy system include technological glitches such as poor internet facilities impairing videoconferencing, lack of experience among pharmacists, and inadequate staff. In addition, lack of proper awareness to use telecommunication services at home or stigma among female patients to reveal their faces are to be managed with patient education and training to facilitate these tools [1,3].

The JHAH pharmacy services were found to be crucial in establishing face-to-face outcome-oriented pharmacist-led medication management services for patients requiring chronic ambulatory care.[1] Apart from offering medication delivery, and online consultations for patients with long-standing disease states, the JHAH telehealth services widened its outcome to ensure the continuity of care, to maintain, report, and document up-to-date laboratory investigations, management of polypharmacy, prompt reporting of therapeutic duplication, minimization of the use of unwanted medications and medication synchronization. The current study describes and compares the outcomes of implementing telehealth services managed via a pharmacist-led medication management clinic (MMC) to confer person-centered patient care services at JHAH.

METHODOLOGY

The retrospective observational study was conducted in a single-centered tertiary care institution, John Hopkins Aramco Healthcare, Saudi Arabia. The study aimed at evaluating the acceptance as well as the utilization of newly implemented tele-medication management services among patients for a duration of six months from June 2021 to December 2021. The eligible study participants were those patients with chronic conditions receiving ambulatory care services and refilling prescriptions, excluding inpatients.

During the study, data were collected on the number of prescriptions processed and visited for face-to-face MMC visits, as well as for the tele-mediated MMC visit using electronic health care records. Following data collection on participant selection, the process of modern tele-medication management services was explained in detail to randomly select 20 patients using interactive voice response (IVR) service for managing chronic conditions at their convenience. Selected questionnaires are used for interviewing and understanding the utilization of tele medications management services. The primary outcome is to establish the patient preference for tele-medication management services compared to conventional face-to-face medication management services amidst global outbreaks such as COVID-19. The established tele-MMC services assessed the patient acceptance and treatment compliance, the integration process and associated challenges.

RESULTS

This study demonstrated that the TELEMMC group had patient satisfaction levels similar to face-to-face MMC. Both groups showed similar results in overall satisfaction with compared modalities. A quantitative comparison made up through this study, overwhelmingly suggested that MMC and TELEMMC were comparable. There were four criteria made for the comparison of modalities. Firstly, there was consistent evidence suggested that TELEMMC were more preferable choice for the age group 61-70 compared to MMC, where as in MMC age group 51-60 were more preferable. It was also observed that average proportion difference identified in gender wise, female were more prone to TELEMMC compared to males, whereas males were more likely to favour MMC over TELEMMC. From the department wise distribution, general medicine department were highly demanding for both MMC and TELEMMC. Last modality were the comparison on the types of disease, from both the MMC and TELEMMC, diabetes and hypertension were highly recognized.

Out of 208 samples, from TELEMMC 3.12% of the respondents were from the age group 30-40 years where as 2.12% the respondents from this age group belonged to MMC, followed by 10.4% from TELEMMC, followed by 13.22% MMC respondents from the age group 41-50, 29.12% from TELEMMC and 31.8% from MMC respondents from the age group 51-60 years, 36.4% from TELEMMC and 29.68% from MMC respondents from the age group 61-70, 9.36% from TELEMMC and 24.96% from MMC respondents from the age group 71-80,7.28% from TELEMMC and 8.32% from MMC respondent from the age group 81-90,11.44% from TELEMMC and none of the respondent from MMC from the age group 91-100,only 1.04 % from TELEMMC respondent and none of them respondent from MMC from the age group >100 years.

Table 1: Age group distribution of patients in Tele MMC and MM

Age group (years)	Proportion of patients in Tele MMC (%)	Proportion of patients in MMC (%)
41-50	10.4	13.22
51-60	29.12	31.8
61-70	36.4	29.68
71-80	9.36	24.96
81-90	7.2	8.32
91-100	11.44	0.00
>100	1.64	0.00

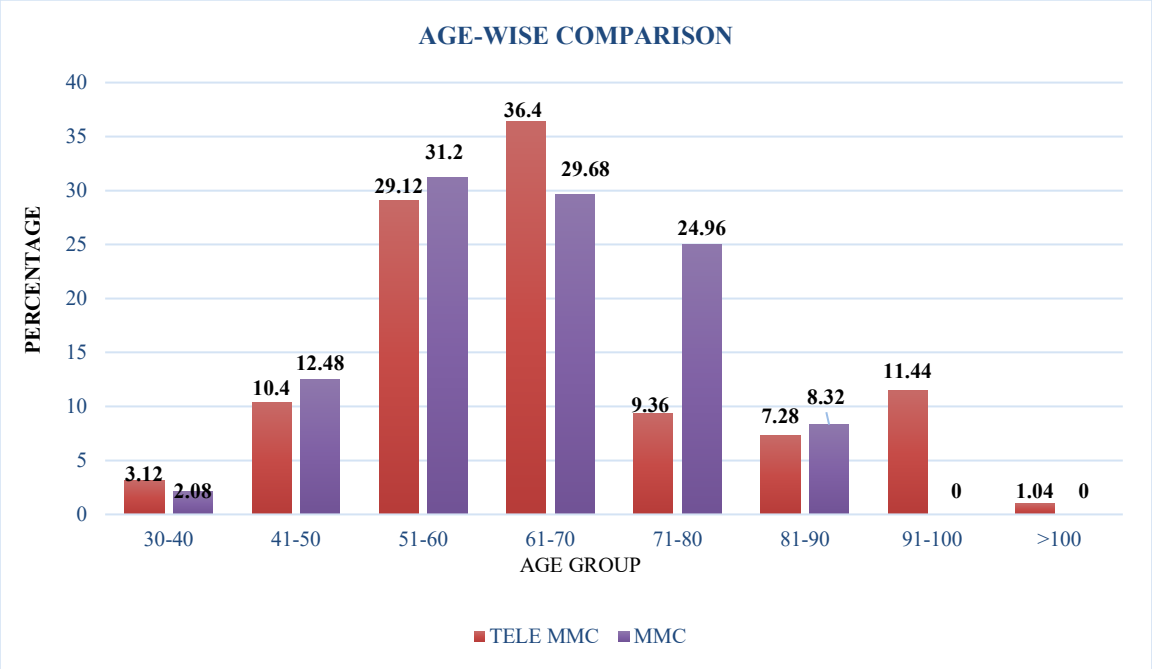

Fig. 1: Age-wise comparison of TELEMMC and MMC

Although comparisons across the gender suggested that there were few significant differences between the gender distribution.62.5% of the respondents were females and 45.76 % were male in TELEMMC and 49.92% of the respondents were females and 58.24 % were males in MMC suggestive of female patients preferring TELEMMC compared to males, while male patients were more likely to favour MMC over TELEMMC.

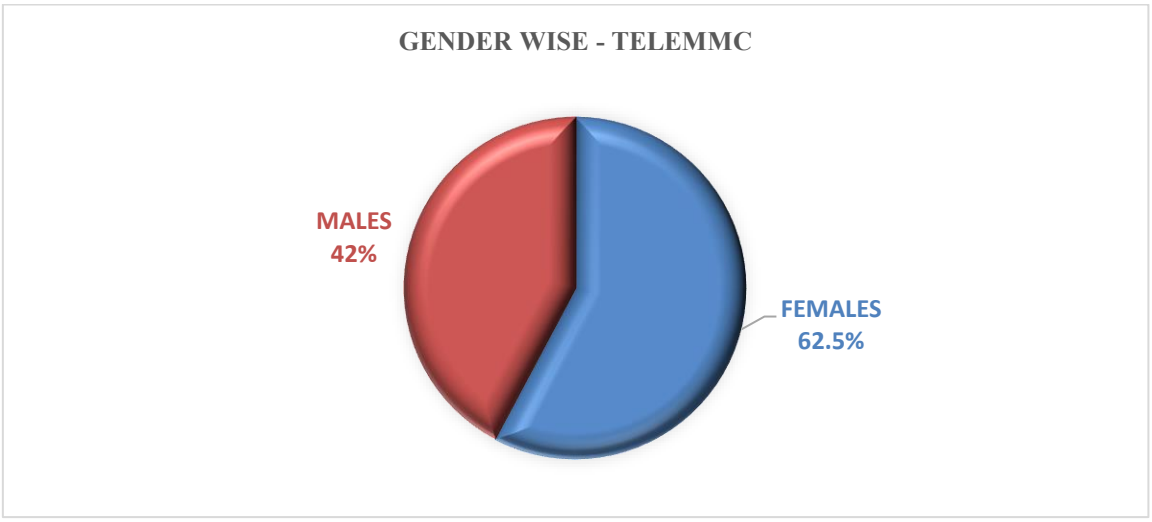

Fig. 2: Gender wise distribution in TELEMMC

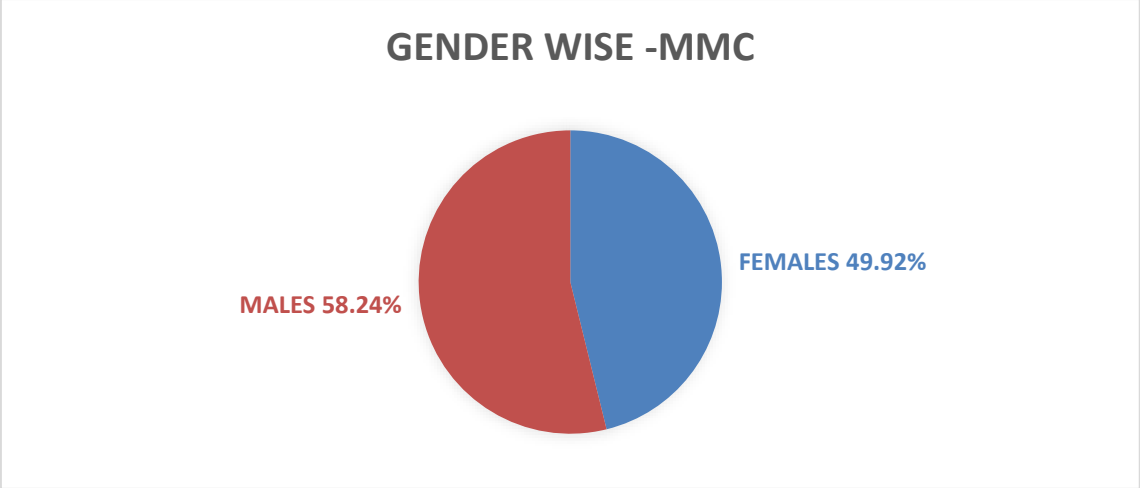

Fig. 3: Gender wise distribution in MMC

The TELEMMC was more efficient and had comparable patient satisfaction which was clearly demonstrated among patients with hypertension and diabetes. In MMC, 18.72% respondents presented with hypertension, followed by 17.9 % with diabetes. Wherein, TELEMMC 27.04% respondents had diabetes followed by 16.04 % presented with hypertension. There is no significant difference observed from both TELEMMC and MMC in dyslipidaemia. Other cases showed 54% in MMC and 43% in TELEMMC, as their clinical manifestations demanded regular follow up consultation and hospital visits.

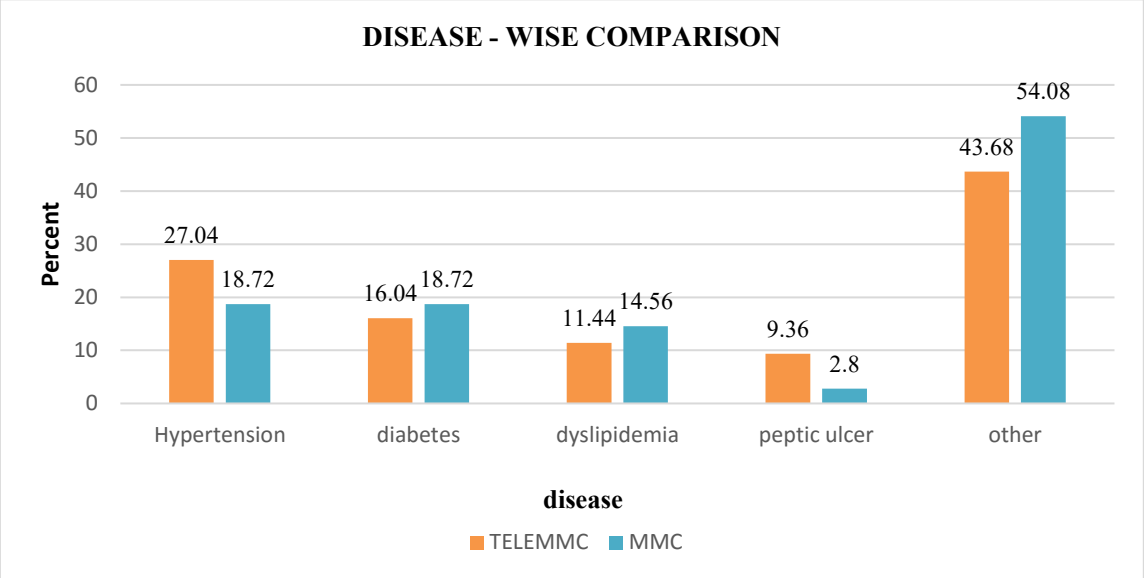

Fig. 4: Diagrammatic representation of disease wise comparison of TELEMMC and MMC

Comparison Based on Department Among Respondents

Both TELEMMC and MMC demonstrated a high level of satisfaction with general medicine department with 63% of patients. Pulmonology department are more preferable through MMC with 12.48 % compared to TELEMMC which shows only 3.12%. Gastroenterology department are more prone to TELEMMC with 11.22 % while MMC showed only 6.24%. Ophthalmology department presented 6.24 % in TELEMMC and MMC shows 4.16%. Cardiology department was more accessed through TELEMMC with 6.24% while MMC was with 4.16%. Other departments such as orthopaedics, nephrology and endocrinology preferred to MMC compared to TELEMMC as they required regular follow up consultation and hospital visit due to their chronic condition.

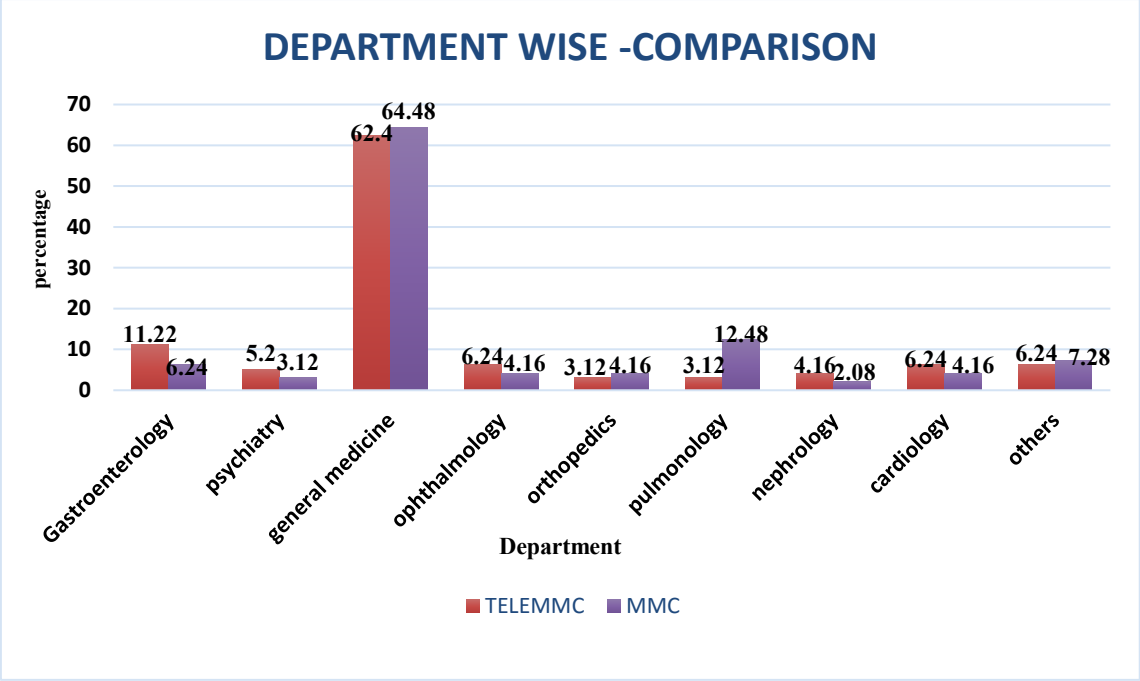

Fig. 5: diagrammatic representation of department wise comparison of TELEMMC and MMC

Table 2: Overall comparison of disease and department in TELEMMC and MMC

S. No	Department	Disease	Number of cases	
			MMC	TELEMMC
1.	General medicine	Hypertension Diabetes Dyslipidemia	19 18 14	15 25 11
2.	Pulmonology	Seasonal allergy Asthma Nasal polyps Chronic sinusitis	2 5 3 2	1 2 0 0
3.	Gasteroenterology	Peptic ulcer Gi bleed GERD constipation	2 1 1 2	9 1 1 0
4.	Ophthalmology	Dry eyes Glucoma	2 2	2 4
5.	Cardiology	Coronary artery disease Proximal atrial fibrillation	4 0	5 1
6	Other departments (Orthopaedics, Endocrinology, nephrology)		25	23

DISCUSSION

The present study evaluated the acceptance as well as the utilization of newly implemented tele-medication management services among patients for a duration of six months. The study agreed that TELEMMC has brought out effectiveness in patient care by maintaining continuity of care, enhance health outcomes, reduce healthcare costs, and improve clinical care with the convenience of being in their homes.

A greater proportion of individuals in the age group of 61-70 years responded to TELEMMC, with 36.4% of respondents coming from that age group, whereas 29.68% of individuals in the same age group responded to MMC. The higher access of geriatric individuals to TELEMMC could potentially be attributed to various factors such as polypharmacy, confusion, comorbidities, and age-related difficulties that geriatric individuals may face when taking medications. These factors might make TELEMMC a more convenient and accessible option for them, as it allows for remote monitoring and consultation, potentially reducing the challenges associated with traditional in-person medical care for geriatric patients.

Despite comparing gender distributions, the findings indicate that there were minimal notable distinctions between the genders. In TELEMMC,

majority of the respondents were females (62.5%) than males (45.76%), while in MMC, majority were males (58.24%) than females (49.92%). This suggests that females were more inclined towards TELEMMC than males, whereas males were more likely to prefer MMC over TELEMMC.

When examining the comparison of diseases, it was found that in MMC, 18.72% of the respondents had hypertension, while 17.9% of them had diabetes. On the other hand, in TELEMMC, 27.04% of the respondents had diabetes, followed by 16.04% who had hypertension. The increased accessibility, regular monitoring, education and support, and cost-effectiveness of consultations may contribute to the higher preference of diabetic patients for convenient TELEMMC consultations. The present findings also agrees with the conclusion of the studies done by Richard j santen *et al.,* on Intensive TELEMMC self-management program for rural, underserved patients with diabetes mellitus which shows a practical template to reduce the workforce gap of endocrinologists [8].

Both TELEMMC and MMC showed a significant level of satisfaction with the general medicine department, with 63% of respondents expressing their contentment. Maintaining a high level of satisfaction is crucial for healthcare institutions as it not only reflects the quality of care but also contributes to patient loyalty and positive recommendations. This can be attributed to various factors such as the competence and professionalism of the medical staff, the quality of care provided, the efficiency of service delivery, the communication between healthcare providers and patients, and overall patient experience.

The study, being a comparative study, demonstrates the different levels of prioritization given to MMC and TELEMMC in specific diseases. TELEMMC has made a significant impact on geriatrics and holds great potential for improving patient care in the future due to its convenience. Furthermore, the study reveals the disease class that is most frequently consulted, providing valuable insights for further improvement and knowledge enhancement.

While the results of our study are promising, it is important to acknowledge its limitations, namely the small sample size and short duration. Indeed, improving laboratory handling into TELEMMC can be a valuable enhancement that would improve the utility of this method. A significant challenge in TELMMC was the shortage of staff and the necessity of introducing skilled personnel to effectively deliver information in an empathetic manner.

Advantages and Disadvantages of Tele Medication Management Clinics (TeleMMC)

Advantages

1. **Enhanced Accessibility and Convenience**: The implementation of TeleMMC significantly improved access to pharmaceutical care, particularly for geriatric and chronically ill patients. By allowing consultations to occur remotely, patients were able to receive ongoing medication management without the need to physically attend healthcare facilities, thereby reducing travel burden and improving continuity of care.
2. **Comparable Patient Satisfaction**: The study demonstrated that TeleMMC achieved patient satisfaction levels comparable to those of conventional face-to-face MMCs. This finding suggests that remote pharmaceutical services can maintain high standards of patient-centered care, despite the absence of in-person interactions.
3. **Improved Management of Chronic Diseases**: TeleMMC proved to be especially effective for patients managing chronic conditions such as diabetes and hypertension. The model enabled regular follow-up, dose adjustments, and adherence monitoring, all of which are critical for optimizing long-term disease outcomes.
4. **Higher Uptake Among Geriatric and Female Populations**: A higher proportion of patients aged 61–70 utilized TeleMMC services, reflecting the model's suitability for populations with mobility limitations or complex medication regimens. Additionally, female patients demonstrated greater preference for telehealth, possibly due to increased convenience, privacy, and cultural considerations.
5. **Operational Efficiency and Cost-Effectiveness**: TeleMMC services contributed to a reduction in unnecessary hospital visits, thereby alleviating healthcare system burden. The model also offered potential cost savings to patients by minimizing transportation and time away from work or caregiving responsibilities.
6. **Resilience During Health System Disruptions**: The adoption of TeleMMC during the COVID-19 pandemic allowed for uninterrupted delivery of pharmaceutical care. The flexibility and scalability of this model enhanced healthcare system resilience during public health emergencies.

Disadvantages and Challenges

1. **Technological Barriers**: The success of TeleMMC is contingent on reliable internet access and a certain level of digital literacy among patients. Technological limitations such as poor connectivity and unfamiliarity with telecommunication platforms may hinder service accessibility, particularly for older adults or patients in underserved areas.
2. **Limited Suitability for Certain Medical Conditions**: While TeleMMC is well-suited for chronic disease management, it may be less effective for conditions that require physical

examination or diagnostic testing. Specialties such as orthopedics, nephrology, and endocrinology often necessitate in-person assessments, thereby limiting the applicability of telehealth models in these areas.

3. **Human Resource Constraints**: A significant challenge identified in the study was the shortage of trained staff capable of delivering empathetic and clinically sound care through virtual platforms. The demand for skilled personnel in telepharmacy is likely to increase as these services expand.
4. **Laboratory and Diagnostic Limitations**: The inability to integrate laboratory testing and diagnostics into the telehealth workflow remains a notable limitation. Patients requiring routine laboratory monitoring were still required to visit healthcare facilities, thereby partially negating the convenience of remote care.
5. **Cultural and Privacy Concerns**: In some cases, patients—particularly women—expressed hesitance in engaging with video consultations due to cultural norms or privacy concerns. Addressing these issues through patient education and culturally sensitive practices is essential for broader adoption.
6. **Study Limitations**: The findings of this study should be interpreted in light of its limitations, including a relatively small sample size and a limited six-month study period within a single tertiary care institution. Further longitudinal studies across diverse healthcare settings are warranted to validate and generalize these results.

CONCLUSION

The present study demonstrates the impact of TELEMMC on clinics, indicating a substantial increase in the number of individuals, particularly geriatric patients, opting for telemedicine consultations. The majority of female participants in the study were found to prefer utilizing TELEMMC, possibly due to the increased convenience it offers in terms of consulting with healthcare providers and engaging in open conversations. The largest group seeking consultations through TELEMMC was comprised of individuals with diabetes. This trend can be attributed to the convenience of assessing laboratory instructions along by making necessary adjustments to medication regimens without the need for regular hospital visits. Overall, there was a significant acceptance and positive reception of the TeleMMC system, indicating a substantial improvement in patient care. The widespread acceptance of this new method reflects the positive impact it has had on healthcare delivery and patient outcomes.

ABBREVIATIONS:

JHAH: John Hopkins Aramco Healthcare; MMC: Medications Management clinic; MOH: Ministry of Health; IVR: Interactive voice response; GERD: Gastroesophageal reflux disorder.

Conflicts of Interest: Authors declare no conflicts of interest during the conduct of the study.

Acknowledgement

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