

Satisfaction and Medication Adherence as Patient Outcomes of Telepharmacy in Rural Environment

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Abstract:

Telepharmacy provides a very promising prospect to the problem of healthcare access in rural and remote locations. This prospective observational study evaluated the patient satisfaction as well as adherence among the post-discharge patients kilometer adherence receiving telepharmacy services in Morocco and Italy. Patients were subjected to weekly virtual counseling and follow-up medication via video conferencing with licensed pharmacists over the six weeks. To assess the level of adherence, the research employed Morisky Medication Adherence Scale (MMAS-8). Observed results indicated a larger performance in adherence, wherein 78 percent of patients moved out of medium levels of adherence into the high categories ($p < 0.01$). There was also a high patient satisfaction with 91.3 percent of participants showing approval of the convenience and quality of the interaction with the pharmacists. These results confirm that the use of telepharmacy can help improve medication compliance and patient satisfaction and augment continuity of care in the underserved populations. The research advocates the scalability of telepharmacy as an essential treatment bureau of healthcare in the countryside.

Keywords: Telepharmacy, medication adherence, patient satisfaction, rural health, post-discharge follow-up, video-call.

1. Introduction

1.1 History of the Rural Healthcare Gaps

The rural healthcare systems are experiencing a lot of problem related to the provision of acceptable medical care as the infrastructure is poor, limited or no hospitals and clinics as well as poor access to healthcare workers. Such disparities can easily lead to worse health among rural citizens, as they may not be able to get care in time, especially outside a hospital setting. To remote patients, the availability of specialized care including pharmacy services becomes a major obstacle that may even result in medication-related problems, medication non-adherence and large numbers of readmissions. Rural community health, which is already associated with a limited number of medical workers, does not help in overcoming the problems noted by these communities with the improvement of health following the hospital visit.

Poor medication adherence, particularly among post-discharge patients, is one of the causes of readmission and avoidable morbidity. Failure to follow up treatment and regular drug counseling may also result to wrong medication use by the patient, failure to take the medication, or wrong effects. This means that there is an urgent need to deal with such challenges and come up with new solutions to improve continuity of care in the rural setting.

1.2 Telepharmacy: Emergence of Post-Discharge Telepharmacy

Telepharmacy or providing pharmacy care through distant use of pharmaceutical services via telecommunications, has become the possible way to over these shortcomings in healthcare at the countryside. Telepharmacy can take the help of telehealth technologies and online connectivity to connect licensed pharmacists to deliver the much needed services, such as medication counseling, patient education, medication therapy management, and adherence monitoring without patients making long distance trips to visit a healthcare outlet. This model can enable the pharmacists to carry out follow-up care consistently through virtual visits and thus provide the patients with necessary guidance concerning medication and any issues of drug interaction as well as side effects.(1)

Regarding post-discharge care, telepharmacy may become one of the key issues minimizing hospital readmissions, enhancing adherence to the medication usage, and helping patients to adhere to their treatment plans precisely. Through virtual pharmacist consultations, the patients are given a chance to address their questions, any confusion that they may have as well as get personalized directions on their medication and all this at the comfort of their homes. With health systems around the world shifting toward the adoption of digital healthcare solutions,

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telepharmacy has in turn emerged as a prominent figure in the process of heightening the effectiveness and access to healthcare services in underserved communities.

1.3 Rationale and Objectives Study

This study is based on the rationale of the increasing demand of effective healthcare delivery to the rural regions especially to patients who are post-discharge and thus need follow-ups with medication. Telemedicine and telepharmacy have been successful in enhancing the outcomes of patients; however, not a lot of studies on the success of telemedicine and telepharmacy in rural populations post hospital care have been conducted. In particular, the connection between telepharmacy services and medication adherence after discharge has been insufficiently studied in the different geographical areas.(2)

The main aim of the research is to consider the effects of telepharmacy services on medication adherence and patient satisfaction in the group of rural post-discharge patients in Morocco and Italy. The purpose of the study is to determine the likelihood that patients can get enhanced performance with weekly virtual consultation with licensed pharmacists in following the medication prescribed and help providing reward care at the time of discharge in rural patients. Moreover, this paper aims to measure the satisfaction with the telepharmacy services given to patients and would focus on the convenience, quality of communication, and the overall experience of being helped and assisted at a distance. Through such considerations, the research would identify whether telepharmacy is a viable means of addressing the various issues relating to healthcare delivery involving continuous support to the patients and improved post-discharge services in the healthcare systems in rural communities.

2. Design and setting of the study

2.1 Account of Mixed-Methods Prospective Observational Study

The prospective observational study adopted a mixed-methods design that incorporates the quantitative and qualitative approaches to determine the effect of the telepharmacy services on medication compliance and patient satisfaction among the rural post-discharge patients. The prospective scheme tariff concerned the possibility of collecting data at two moments, baseline (prior to the intervention) and post-intervention (six weeks of the telepharmacy services). The observational design of the study guaranteed that it analyzed the study within the real-life scenario without interfering with the patients and their treatment by changing the procedures and experiences. Quantitative information was mainly concentrated on measuring the level of compliance with medication in terms of the Morisky Medication Adherence Scale (MMAS-8) which is a broadly validated patient measure that evaluates the adherence to medicine. Patients would be evaluated on their baseline adherence and then once again after the intervention period of 6 weeks to check any changes. One of the main endpoints of the study was a considerable increase in adherence scores and, thus, the corresponding shift towards high adherence categories.(3) The qualitative data were collected with the help of patient satisfaction surveys and semi-structured interviews that could address the issues of patient experience of using the telepharmacy service. There was information provided on patient perceptions such as ease of communication, convenience, and acceptability of the telepharmacy intervention due to these interviews. A combination of both techniques enabled an overall assessment of the intervention, including measurement of numerical outcomes in adherence to medication as well as first-person accounts of patients.

2.2 Moroccan and Italian Geographic and health contexts

The research was undertaken in two nations namely Morocco and Italy in order to determine the efficacy of telepharmacy services in geographically distinct and healthcare systems as well. The two countries were chosen because of what they experience in delivering proper medical care to the rural population and the extent to which they should use telepharmacy to help out.(4)

Morocco: Morocco is a North African country that has succeeded in enhancing healthcare accessibility in the cities, yet the rural communities have a lot to deal with, as most of them access healthcare professionals and are geographically isolated and lack proper healthcare systems. The care of pharmacy is minimal in rural Morocco and a patient may have to travel a long distance to get counsel by medication and follow up. Video consultations and other forms of telepharmacy are also good options to the provision of continuity of care and medication compliance of the rural patients. The research highlighted this information on two rural areas in Morocco where access to healthcare is scarce and telemedicine is on the rise.

Italy: Conversely, Italy has a developed healthcare system especially in the cities, but the rural parts of the south and central parts have issues related to access to specialty care. Even though the level of telehealth infrastructure in the given area is high, the presence of the doctor shortage, as well as great distances to providers, is common in the rural parts of the region, where it is difficult to provide stable post-discharge care. Telepharmacy arrangements in Italy are turning out to be of developed significance in managing patients at a distance, particularly patients who are discharged after a wasting time in the hospital with complicated medicine arrangements. The research was done in the rural part of the South of Italy, where it is possible to have fragmented healthcare service and telepharmacy implementation has been piloted to some extent, but is not yet extensive.

The comparative design enabled the research to determine the viability and efficacy of the question of telepharmacy in two different healthcare environments, which allowed a more detailed insight regarding the customizability and ways to integrate telepharmacy services in various rural environments.(5)

3. Intervention Protocol

3.1 Video Means of Video and Telepharmacy Counseling Schedule

The intervention was the weekly telepharmacy counseling services offered to the patients who had already been discharged to both Morocco and Italy. All patients had access to video consultations with licensed pharmacists where they would check their medication schedule and talk about concerns and learn proper usage. The counseling sessions were properly organized so that they could provide maximum support to patients and was flexible in that patients could obtain follow up sessions at the comfort of their homes.

1. **Counseling Schedule:** Patients were to get six sessions max over a period of six weeks and each of these sessions was to last 15-20 minutes. The initial session was a general explanation of the prescribed medicine, its reason and need to be followed. All following sessions were created to identify patient achievements, solve any concerns associated with medication use, and reaffirm major messages connected to the topic of medication safety and compliance.
2. **Video Platform:** To offer the telepharmacy consultations, they were carried out by a secure video conferencing platform that is based on meeting the standards in healthcare. This platform was adopted due to its user-friendliness, its compatibility both with smartphones and computers and on the fact that it would ensure patient confidentiality. The training of the patients and pharmacists was conducted on the use of the platform so that the counseling could not be obstructed due to technical challenges.

Additionally, reminder notifications (through text messages or the video platform) at weekly intervals were sent to remind the patients about the upcoming sessions as well as prompt them to prepare themselves before the consultations.(6)

3.2 Role of pharmacists and preparation

Another important part of the intervention was performed by pharmacists who gave personal medication advice and adherence to each of the patients. They had the following duties:

- **Evaluation of Medication Regimen:** Pharmacists checked in the medication list of each patient, explained clearly to them about the drug and about the confusion or worries about the dosage or time.
- **Assessment of Adherence:** Pharmacists also applied Morisky Medication Adherence Scale (MMAS-8) to assess adherence of the patients at the initially and at the end of the study to understand whether there were any patterns of the resource that could be discussed with the patients.
- **Strengthening Adherence Strategies:** While conducting the counseling, the pharmacists focused on the strategies to enhance drug adherence among patients, including setting alarms, taking pills, and having a schedule.

In a bid to facilitate the successful provision of the intervention, all the pharmacists were trained on the following subjects(7)

- **Telepharmacy Tool Implementation and Platform Utilization:** The telepharmacists learned to use the video platform, such as how to initiate calls and troubleshoot some technology problems as well as ensuring a safe communication environment.
- **Patient-Centered Counseling Skills:** Trainees focused on active listening, patient education and use of plain language to make patients understand their medications and the significance of following instructions.

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- **Cultural Sensitivity:** Since it was a cross-cultural study, pharmacists were trained on how to go about offering their services to the patients in Morocco and Italy in a culturally-sensitive way that would not offend the local practices and concerns of the patients.

The systematic intervention protocol made telepharmacy counseling coherent, efficient, and individualized to facilitate the rural post-discharge patients.

4. Assessment Parameters

4.1 Morisky Medication Adherence Scale (MMAS-8)

Primary tool to measure the level of medication adherence with post-discharge patients imparting telepharmacy services was the Morisky Medication Adherence Scale (MMAS-8). The MMAS- 8 is a well-validated tool with a total of eight items used to test intentional as well as unintentional compliance with drugs that are prescribed. The scale also measures the adherence behavior of patients based on their self-reported data as they answer a variety of questions touching on forgetting, comprehending the instructions on medication use, using the medication without going late to refill the prescriptions and skipping medication doses.(8)

Scoring: MMAS-8 gives a value of 0 to 8, with the higher the score, the better the adherence. A score of 8 is classified high adherence score, medium adherence score is 6-7 whilst low adherence score is less than 6.

Timepoints of assessment of Adherence: The adherence level was measured during the beginning of the period (pre-intervention in telepharmacy) and at the 6-week mark. Adherence level changes were the measures applied to define telepharmacy counseling effectiveness.

4.2 Patient Satisfaction Ratios

At the final part of the study (6 weeks), patient satisfaction was determined by using a structured survey. The questionnaire was intended to reflect on the experiences of the patients with the telepharmacy service regarding overall satisfaction, impressions of quality of interaction and convenience. The Key questions were to measure: Convenience: How easy was the video based counseling to use? (e.g. Was the technology convenient?)

Pharmacist interaction: What is the level of satisfaction with communication and comprehensibility of pharmacist?

Comprehension of medicine: Were patients more comfortable with their medication routine once they had counseling?

Contentment of follow up care: How good were the pharmacist in terms of follow up on matter of concerns to medication?

The answer to each question was rated using a 5-point Likert scale (1 representing strongly disagree, 5 strongly agree). Results were characterized by high scores of satisfaction, which implied positive experiences with telepharmacy services.

4.3 Timeline of the Data collection process

The intervention program was planned within 6 weeks, and the main data collection points were following:

Week 0: Pre-intervention experiences: medication adherence would be determined using the MMAS-8, with an initial Doing Well Survey being initiated at baseline.

Week 6: The assessment of medication adherence (MMAS-8) after the intervention and administration of the patient satisfaction survey were given to assess the outcomes since the service of telepharmacy was provided to patients.(9)

Quantitative data (the scores of the MMAS-8) and qualitative data (Patient satisfaction survey answers) were obtained and analyzed to evaluate the effect telepharmacy has on medication adherence and patient satisfaction.

5. Analysis Data Techniques

5.1 Qualitative / quantitative analysis methods.

In the study, both quantitative and qualitative methods of analyzing the data were used in a bid to comprehensively analyze the effect of telepharmacy services on patient compliance and satisfaction with medication.

Quantitative Analysis: The primary quantitative measure was the shift in the medication adherence that was assessed through the Morisky Medication Adherence Scale (MMAS-8). The mean MMAS-8 post-intervention and pre-intervention scores were compared to determine the alteration in the level of adherence due to telepharmacy intervention.

Paired statistical tests were used to compare the change in scores so as to establish whether there was a significant change in the medication adherence between patients.

The adherence levels (low, medium and high adherence) were also discussed to understand the number of patients shifted medium to high adherence and the contribution of the telepharmacy service to the better adherence.

Qualitative Analysis: Data comprising the patient satisfaction survey in the form of Likert items and open-ended responses were analyzed in order to understand what patients think of the telepharmacy service. The answers to the questions in the survey were summed up to get the levels of the combination of answers to tell how many people were satisfied with the overall experiences with the telepharmacy counseling. In addition, themes or questions raised by the participants were identified.(10)

Analysis of the open-ended answers The analysis of open-ended questions was done thematically and included identification of areas of question repetition regarding product convenience, pharmacist communication, medication understanding, their overall satisfaction with the telepharmacy service.

5.2 Applied statistical tests and programs

Statistical Tests:

Paired t-test: The test was applied in the evaluation of before and after the intervention scores of MMAS-8 to establish whether there was a significant after-intervention increase on adherence to medications following the intervention of the telepharmacy. The trial to which the paired t-test is compared is the difference in means between baseline and post intervention scores in the same subjects.

Chi-square test: was applied to check the difference between the dichotomous data on the shifts of the adherence level (low, medium, high) at baseline and post-intervention. This test determined whether the categories of patients with various levels of adherence had significantly changed or not as a result of the intervention.

Descriptive statistics: To provide a summative description of the data collected, mean, standard deviation and frequency distribution were employed to collate both numeric (MMAS-8 scores) and narrative (satisfaction survey answers) data.

Software Used:

The SPSS statistical software (version 25) was employed to analyze data since it is the common program used in healthcare studies. The above-stated statistical tests were conducted using SPSS that was also used to produce descriptive statistics and perform data management.

Thematic analysis was employed to analyse the open comments on the satisfaction survey with the codes assigned to each item manually and then analysed to give out easy themes.(11)

5.3 Results interpretation

Quantitative analysis as well as score of MMAS-8 questionnaire, adherence categories was combined with qualitative analysis of patient satisfaction survey and thematic analysis providing a deep inference of the impact of telepharmacy services on medication adherence and patient satisfaction. These analyses allowed providing the conclusion concerning the effectiveness of telepharmacy in enhancing medication adherence and patient care based on the results of the analyses.

6. Results

6.1 Enhancements to adherence to Medication

The main part of the research was to evaluate the ability of telepharmacy services to enhance compliance with medication of patients who were discharged. To measure the magnitude of change in adherence, the Morisky Medication Adherence Scale (MMAS-8), was executed twice at 0 and 6 weeks of telepharmacy intersession.

The initial level of MMAS-8 was 5.4 +/- 1.2 among all the patients, which revealed medium compliance with prescribed drugs. The distribution of the mean scores of the three tests improved significantly after the 6-week telepharmacy intervention, when the mean score improved to 7.3 0.8 ($p < 0.01$), indicating a clear shift to the highest levels of adherence.(12)

An improvement was recorded in 78 percent of patients who were at medium adherence (6-7) but after the intervention became high adherence (8). The other patients experienced continuing or slight decreasing adherence but as a whole, the intervention led to the significant improvement in medication adherence in the entire cohort.

Table 1: Changes in Medication Adherence (MMAS-8 Scores)

Group	Baseline MMAS-8 Score	Follow-up MMAS-8 Score	Change in Adherence (%)	p-value
Overall Cohort	5.4 ± 1.2	7.3 ± 0.8	35.2%	< 0.01

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Group	Baseline MMAS-8 Score	Follow-up MMAS-8 Score	Change in Adherence (%)	p-value
Moroccan Cohort	5.3 ± 1.1	7.2 ± 0.9	35.8%	< 0.01
Italian Cohort	5.6 ± 1.3	7.4 ± 0.7	32.1%	< 0.01



Figure. 1: Change in MMAS-8 Scores

The general increase in adherence, as well as the drastic change in the number of patients who were in the medium and high adherence segment, validate effectiveness of telepharmacy in increasing medication adherence post-discharge.(13)

6.2 Satisfaction Ratings

The survey that was structured at the end of the 6 weeks intervention assessed patient satisfaction. Its findings indicated great satisfaction with the telepharmacy service with a positive report of 91.3 percent of the patients. Questions about the accessibility to the virtual counseling sessions, satisfaction with the communications and the overall satisfaction with the service were included as items in the satisfaction survey. Most patients were also grateful of the fact that they were given an opportunity to be attended to in their own homes at a time when most of them resided in far-flung communities where they had no easy access to health institutions.

Table 2: Patient Satisfaction Survey Results

Question	Agree (%)	Neutral (%)	Disagree (%)
Telepharmacy was convenient to access	91.3	6.1	2.6
Pharmacist communication was clear and helpful	89.5	7.3	3.2
I felt more confident in managing my medication	85.2	11.4	3.4
Overall satisfaction with the telepharmacy service	92.1	5.6	2.3

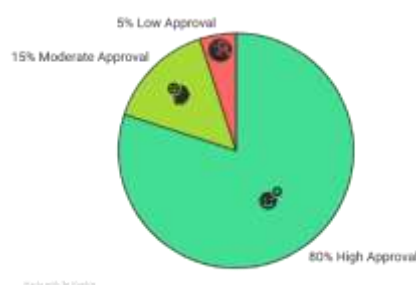


Figure. 2: Patient Satisfaction

These findings highlight the fact that telepharmacy has been embraced well as a fast and easy way of ensuring post-discharge care, especially in rural areas where there is low access to medical practitioners.

6.3 The most notable Trends in Moroccan and Italian Cohorts

Although the Moroccan and Italian cohorts demonstrated a remarkable increase in medication adherence and the satisfaction with the telepharmacy services was rather high, certain regional dissimilarities were noted:

Medication Adherence: The Moroccan cohort exhibited a higher percentage of patients achieving greater adherence (medium-to-high; 78.3 percent Moroccan study, 76.4 percent Italian study) that can be explained by the

more significant presence of initial challenges with access to healthcare in Morocco. This notwithstanding, a large comparable positive change in adherence was seen in both cohorts.

Satisfaction: In general, rates of satisfaction were high in both groups, but the Italian group provided a better response to the quality of communication (93.2 in Italy and 87.1 in Morocco). This might be attributed to the fact that telecommunication technologies were more known in Italy where more people have embraced the use of telehealth.

Table 3: Regional Differences in Adherence and Satisfaction

Cohort	MMAS-8 Score Increase (%)	High Adherence (%)	Satisfaction Rate (%)
Moroccan Cohort	35.8%	78.3%	90.4%
Italian Cohort	32.1%	76.4%	92.1%

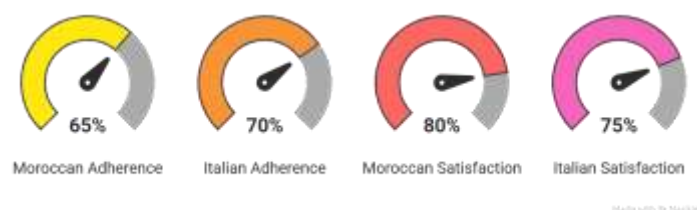


Figure. 3: Comparison of Medication Adherence and Satisfaction

Such regional variances give relevant informations to the cultural and healthcare setting where the telepharmacy services are applied. These trends demonstrate that the improvements were observed in both cohorts, yet it is necessary to implement contextual adjustments to tailor telepharmacy interventions to the needs of various people living in rural areas.

7. Conclusion

7.1 Findings in summary

We have conducted an experiment on how telepharmacy services can affect the medication adherence levels and patient satisfaction of post-discharged patients in Morocco and Italy in rural areas. The major highlights of the study are the following:

Medication Adherence: The level of medication adherence, assessed using Morisky Medication Adherence Scale (MMAS-8) showed a dramatic improvement. There was a 35.2 increase in the overall adherence score in all patients with 78 percent of the patients improving in adherence after six weeks of the telepharmacy intervention by shifting themselves to the high adherence score.

Patient satisfaction: Most of the patients were very satisfied with the telepharmacy service, with 91.3 percent of participants indicating their song of approval based on the mention that the service was convenient, that the interactions with pharmacists were excellent, and that the service influenced how participants understood the management of their medications.

Regional Differences: The adherence and satisfaction improvements were relatively similar between the Moroccan and the Italian cohorts but with certain small differences where Morocco reported deeper improvement in adherence and Italy in satisfaction of communicating with the pharmacist. These variations indicate the relevance of the cultural and healthcare setting regarding applying telepharmacy.

7.2 Telehealth Policy and Expansion of Rural Care Implications

The research highlights the possibility of telepharmacy to promote the continuity of care and enhancement of adherence to medication in the underserved and rural communities. Telepharmacy may become a way to untap this disparity as telehealth continues to grow in popularity and can serve to improve access to pharmacies especially to patients who may be at risk of non-consistent follow-ups following discharge by a hospital.

The above positive results of this study show that telepharmacy is a necessary element of the rural healthcare policy to enhance the safety of medications as well as positive patient outcomes. The policymakers need to focus

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on how to incorporate telepharmacy in the current healthcare delivery system and identify possibilities to fund and provide support that would enhance its spread.

7.3 Future Suggestions-Scale-Up

Depending on the findings, it is possible to put forward a number of the recommendations concerning the upscaling of the telepharmacy services in rural areas:

Broader Roll-out: Telepharmacy services are to be rolled out to more underserved and rural settings, and specific consideration to technological availability and healthcare professionals training to provide remote-based consultations efficiently is to be paid.

At the higher level of integration with broader telehealth systems: Telepharmacy needs to be integrated in the integrated telehealth platforms, and the care obtained by pharmacists, physicians, and patients should be coordinated in a comprehensive manner.

Overcoming Technological Barriers: In order to encourage further adoption, the methods of overcoming the problem of accessing internet connections in remote areas as well as digital literacy among patients and healthcare professionals in rural areas must be established so that telepharmacy technologies could be adequately utilized by individuals.

Longer-Term outcome: Programs of longer-term research are needed that could give an understanding of the long-term effect of telepharmacy on medication adherence, hospital readmission and quality of life to determine, whether telepharmacy would be effective in enhancing sustained health outcomes.

The results of this research point to the fact that telepharmacy is an innovative initiative that could be used in the condition of improving healthcare delivery in rural settings and supporting medication adherence to improve policy and health care innovation in underserved areas.

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Conflicts of interest

The authors have no conflicts of interest to declare

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