The Review Of
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Assessing The Effectiveness Of Joint Interventions By Social Services, Nursing, And Pharmacy In Enhancing Treatment Adherence

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Abstract

Background: Treatment adherence is a recurring problem in healthcare delivery, and rates of non-adherence of 20-50% have been found in various chronic diseases. Multidisciplinary interventions such as social services, nursing, and pharmacy interventions have been demonstrated to overcome multiple barriers to adherence effectively.

Objective: the effectiveness of multidisciplinary collaborative interventions by social services, nursing, and pharmacy in enhancing treatment adherence in chronic patients.

Methods: Prospective 12-month questionnaire survey was performed among 450 chronic disease patients. Patients were randomly divided into intervention (n=225) and control (n=225) groups. Intervention group underwent coordinated pharmacy care, nursing, and social services. Morisky Medication Adherence Scale-8 (MMAS-8) and self-reported questionnaires were used to assess treatment adherence at baseline, 6 months, and 12 months.

Results: There was better adherence score in the intervention group (5.2 ± 1.8) at baseline to 12 months (7.1 ± 1.2) than in controls (5.3 ± 1.7 to 5.8 ± 1.9; $p<0.001$). The secondary outcomes like quality of life, medication knowledge, and healthcare use were significantly improved in the intervention group.

Conclusion: Nursing, social services, and pharmacy teams' multi-disciplinary interventions synergistically work together to enhance patient outcomes and treatment adherence. The multi-disciplinary intervention proves to be effective in overcoming a variety of adherence barriers simultaneously and must be included as a standard part of providing care.

Keywords: adherence, pharmacy, nursing, social services, chronic disease management.

1. Introduction

Treatment compliance remains among the biggest challenges facing modern healthcare systems globally. Compliance with long-term therapy of chronic diseases is set at just 50% by the World Health Organization in high-income countries and lower in low-income countries (Thompson et

al., 2023). Compliance means more morbidity, mortality, and cost to the healthcare system, and this cost alone in the United States exceeds $100 billion annually (Martinez & Rodriguez, 2022).

Previous efforts to improve adherence have been one-discipline, typically clinician- or pharmacist-led. Existing evidence suggests that multifaceted interventions are more likely to cater to the complex, multi-determined nature of non-adherence (Chen et al., 2023). All of the social determinants of health, medication complexity, patient education needs, and psychosocial determinants of adherence impact, and are optimally addressed by multifaceted professional input.

The trio of pharmacists, nurses, and social workers is a developing approach that addresses multiple domains simultaneously. Social workers address the socioeconomic aspects and refer the patients to community resources (Williams & Davis, 2022). Nurses provide ongoing monitoring, teaching, and motivational counseling (Kumar et al., 2023). Pharmacists contribute medication expertise, simplification strategies, and therapeutic monitoring (Anderson et al., 2023). All these professionals are able to develop a multi-dimensional support system to address adherence from all sides.

Despite theoretical advantages, few empirical studies have objectively ascertained the effectiveness of combined interventions across all three professions. Dyadic collaborations or single-discipline intervention have been the focus of most research (Lopez et al., 2022). The paucity of such evidence limits the delivery of potentially advantageous multidisciplinary interventions and is a valuable area for healthcare improvement.

The current research tried to bridge this evidence gap through a rigorous assessment of joint multidisciplinary treatment by pharmacy, nursing, and social services teams. Following a prospective, controlled design with validated adherence measures, the current research strives to provide definitive evidence for the effects of this multidisciplinary intervention.

2. Literature Review

2.1 Adherence to Treatment by Patients Barriers

Adherence to treatment is a multi-determination issue that involves patient, drug, healthcare system, and socioeconomic determinants (Johnson et al., 2023). Forgetting, lack of motivation, side effect fear, and insufficient information regarding their condition are the patient barriers (Smith & Thompson, 2022). Dosage complexity, multidose medications, and side effects are the drug barriers (Brown et al., 2023).

System barriers to compliance within the health system are inadequate patient-provider communication, restricted access to care, and disjointed services (Garcia & Martinez, 2022). Socioeconomic determinants of drug expenses, transportation, and other elements of life play a critical role in influencing compliance, particularly within vulnerable groups (Wilson et al., 2023).

Recent systematic reviews have confirmed the multi-dimensional interaction of the above categories of factors and posited that interventions will need to address more than one domain to be effective (Taylor et al., 2023). The complexity is powerful motivation toward multi-disciplinary interventions which can operate on more than one aspect of the problem of adherence.

2.2 Multidisciplinary Interventions

Cumulative evidence supports the benefits of multidisciplinary care in improving compliance with most chronic conditions. Patel et al. (2023) demonstrated physician-pharmacist-nurse team-based care strategies improved compliance by 35% compared to usual care for patients with diabetes. Lee and Kim (2022) also demonstrated social work-pharmacy intervention combined reduced hospital readmissions for medications by 28%.

Nonetheless, the bulk of research that has been conducted is on two-discipline groups, and not much evidence is found for three-way arrangements (Robinson et al., 2023). The research that has been done on widespread-based multidisciplinary treatments has shown encouraging results but has been marred by small samples and brief follow-up (Miller & Jones, 2022).

2.3 Role-Specific Contributions

These roles all have a given set of skills that they contribute to the interventions for adherence. Social workers perform roles of social determinants of health work, case management, and referral of patients to community resources (Davis et al., 2023). They have psychosocial assessment and intervention training most applicable for addressing challenging adherence issues.

Nurse practitioners offer clinical skill, patient education capacity, and ongoing monitoring capacity (Kumar et al., 2023). Their role to deliver ongoing care and patient advocacy puts them in the ideal position for the attainment of compliance.

Pharmacists offer medication skill, therapeutic monitoring skill, and availability of cost-containment programs (Anderson et al., 2023). Drug interaction knowledge, adverse effect knowledge, and dosing optimization knowledge are most important in solving medicine-based requirements to compliance.

3. Methodology

3.1 Study Design

This research was a 12-month prospective controlled clinical trial from Jan 2023 to Dec 2023 at three metropolitan area health clinics. The protocol was approved by Institutional Review Board (IRB-2022-145) and registered with ClinicalTrials.gov (NCT04892456).

3.2 Participants

Adult patients (≥18 years) with one or more chronic diseases necessitating daily treatment were included. The included chronic diseases were diabetes mellitus, hypertension, cardiovascular disease, chronic kidney disease, and chronic obstructive pulmonary disease. Exclusion criteria were cognitive impairment, terminal illness with an expected life of <6 months, and inability to give informed consent.

450 patients were randomized to intervention (n=225) or control groups (n=225) using computer-generated randomization sequences. A 20% difference in adherence scores with 80% power and α=0.05.was determined to detect sample size .

3.3 Description of Intervention

Integrated multidisciplinary team care was provided to the intervention arm:

Social Services Component: First psychosocial assessment, Identification and resolution of social determinants, Referral to community services,Enrollment into the financial assistance program ,Arrangement for transport

Nursing Component: Systematic and educational review of medication, Telephonic follow-up every two weeks and then monthly,Side effect management,Motivational interviewing, Care coordination by primary clinicians

Pharmacy Component: Medication therapy management, Dosing optimization and simplification, Cost reduction, Monitoring for adverse events, Drug interaction monitoring

3.4 Data Collection Instruments

3.4.1 Primary Outcome Measure

Adherence Treatment was assessed by 0-8 scores on Morisky Medication Adherence Scale-8 (MMAS-8). Adherence with ≥6 scores adherent showed more Higher score .

3.4.2 Secondary Outcomes

Questionnaire: 12-item patient survey of patient knowledge about his/her medications, dosing, and side effects.

SF-12 Health Survey physical and mental health composite scores.

Healthcare Utilization Questionnaire: Tracking emergency department use, hospitalization, and unplanned clinic visits.

Socioeconomic Barrier Questionnaire: 15-item self-report questionnaire that measures financial, transportation, and social barriers to adherence.

3.5 Timeline of Data Collection

The data were collected at three time points:

•Basline (recruitment)

•6 months after recruitment

•12 months after recruitment

3.6 Statistical Analysis

Descriptive statistics for all variables were calculated. Continuous between-group variables were compared using t-tests, and categorical variables were compared using chi-square tests. Repeated measures analysis of variance was utilized to compare across time differences. Effect sizes were calculated using Cohen's d. Statistical significance of $p<0.05$ was utilized.

4. Results

4.1 Participant characteristics

450 patients were recruited, 423 (94%) of which had 12-month follow-up. Baseline characteristics were well matched between groups (Table 1).

Table 1: Baseline Study Participants' Characteristics

Characteristic	Intervention Group (n=225)	Control Group (n=225)	p-value
Age (years), mean ± SD	62.4 ± 12.8	63.1 ± 13.2	0.52
Female, n (%)	132 (58.7)	128 (56.9)	0.68
Race/Ethnicity, n (%)	0.43		
White	98 (43.6)	105 (46.7)	
Hispanic	67 (29.8)	62 (27.6)	
African American	45 (20.0)	42 (18.7)	
Other	15 (6.7)	16 (7.1)	
Education Level, n (%)	0.39		
< High School	45 (20.0)	52 (23.1)	

High School Graduate	89 (39.6)	87 (38.7)	
Some College	67 (29.8)	63 (28.0)	
College Graduate	24 (10.7)	23 (10.2)	
Annual Income, n (%)	0.56		
< $25,000	78 (34.7)	82 (36.4)	
$25,000 - $50,000	89 (39.6)	86 (38.2)	
> $50,000	58 (25.8)	57 (25.3)	
Chronic Conditions, n (%)			
Diabetes	156 (69.3)	161 (71.6)	0.58
Hypertension	189 (84.0)	192 (85.3)	0.70
Cardiovascular Disease	98 (43.6)	94 (41.8)	0.69
CKD	67 (29.8)	71 (31.6)	0.67
COPD	45 (20.0)	48 (21.3)	0.72
Number of Medications, mean ± SD	6.8 ± 2.4	6.9 ± 2.6	0.67
Baseline MMAS-8 Score, mean ± SD	5.2 ± 1.8	5.3 ± 1.7	0.51

4.2 Primary outcome: Treatment adherence

Intervention group showed better MMAS-8 scores compared to the control group at all time points (Table 2).

Table 2: Adherence Scores at Follow-up (MMAS-8)

Time Point	Intervention Group	Control Group	Between-Group Difference	p-value	Effect Size (Cohen's d)
Baseline	5.2 ± 1.8	5.3 ± 1.7	-0.1	0.51	0.06
6 Months	6.4 ± 1.5	5.6 ± 1.8	0.8	<0.001	0.48
12 Months	7.1 ± 1.2	5.8 ± 1.9	1.3	<0.001	0.81
Change from Baseline					
6 Months	1.2 ± 1.4	0.3 ± 1.2	0.9	<0.001	0.69
12 Months	1.9 ± 1.6	0.5 ± 1.4	1.4	<0.001	0.92

The proportion of adherent patients (MMAS-8 ≥6) increased significantly in the intervention group: 34.2% at baseline to 78.7% at 12 months, compared to 36.0% to 42.2% in the control group ($p<0.001$).

Repeated measures ANOVA revealed significant time × group interaction ($F(2,844) = 45.3$, $p<0.001$), indicating that the improvement in adherence scores over time was significantly greater in the intervention group.

4.3 Secondary Outcomes

Adherent patients (MMAS-8 ≥6) were more significantly represented in the intervention group: 34.2% at baseline compared with 78.7% at 12 months, and 36.0% vs. 42.2% in the control group ($p<0.001$).

Repeated measures ANOVA showed significant time × group interaction ($F(2,844) = 45.3$, $p<0.001$), revealing that the rise in adherence scores over time was significantly greater in the intervention group.

Medication knowledge scores were much higher in the intervention group than in controls (Table 3).

Table 3: Medication Knowledge Scores Over Time

Time Point	Intervention Group	Control Group	Between-Group Difference	p-value
Baseline	7.2 ± 2.1	7.4 ± 2.0	-0.2	0.31
6 Months	9.8 ± 1.6	7.8 ± 2.2	2.0	<0.001
12 Months	10.3 ± 1.4	8.1 ± 2.1	2.2	<0.001

4.3.2 Quality of Life

Physical and mental component SF-12 scores were higher in the intervention group (Table 4).

Table 4: Quality of Life Scores (SF-12) at 12 Months

Component	Intervention Group	Control Group	Difference	p-value
Physical Health	48.2 ± 8.4	43.6 ± 9.2	4.6	<0.001
Mental Health	51.3 ± 7.8	47.9 ± 8.6	3.4	<0.001

4.3.3 Healthcare Utilization

The intervention group demonstrated reduced healthcare utilization compared to controls over the 12-month period (Table 5).

Table 5: Healthcare Utilization Outcomes

Outcome	Intervention Group	Control Group	Rate Ratio	p-value
ED Visits per Patient	0.42 ± 0.78	0.89 ± 1.24	0.47	<0.001
Hospitalizations per Patient	0.18 ± 0.52	0.34 ± 0.71	0.53	0.003
Unscheduled Clinic Visits	1.23 ± 1.45	2.01 ± 2.12	0.61	<0.001

4.3.3 Healthcare Utilization4.4 Subgroup Analyses

Effect of intervention varied by patient characteristics. Patients with more chronic conditions (≥3) improved more (MMAS-8 change: 2.3 compared to 1.6 in patients with 1-2 conditions; p=0.02). Similarly, less affluent patients with lower baseline income (<$25,000) improved compared with wealthier participants (2.1 vs. 1.7; p=0.04).

4.5 Utilization of Intervention Components

Intervention group participants utilized the following components at the following rates:

- 98.2% were called back by nurses
- 94.7% were pharmacy medication review
- 78.2% were given access to social services support
- 65.3% were given contact with community resources
- 52.4% were given financial support

All the patients who received all the three professional services had much greater adherence than those with one or two services (2.4 vs. 1.3 MMAS-8 point improvement; p<0.001).

5. Discussion

5.1 Main Findings

This study is strong evidence that inter-professional interventions by nursing, pharmacy, and social services teams impact medication adherence among chronic disease patients. The intervention group achieved clinically significant change in adherence measures with effect sizes demonstrating large practical significance. The 1.9-point improvement in MMAS-8 scores reflecting change towards non-adherence to adherence among numerous participants has practice implications for clinical outcomes as well as health costs.

Findings are consistent with and extend earlier studies of multidisciplinary interventions. Although earlier studies have reported benefits of two-discipline teams (Patel et al., 2023; Lee & Kim, 2022), the current study demonstrates the value added by extensive three-discipline collaboration. The dose-response gradient observed, in the sense that patients receiving all three services had greater improvement, represents synergistic effect of the multidisciplinary treatment.

The intervention group had reduced healthcare utilization compared to controls over the 12-month intervention period (Table 5).

Table 5: Healthcare Utilization Outcomes

5.2 Mechanisms of Effect

The success of the combined intervention is probably a result of that multiple adherence barriers were tackled at once. Social services addressed socioeconomic barriers through resource linkage and funding support initiatives. Nursing provided intensive support, teaching, and monitoring that activated patients. Pharmacy services optimized medication regimens and were addressed clinical issues that would otherwise lead to discontinuation.

The extreme score change on medicines knowledge confirms that education was the principal mechanism of action. The simultaneous quality-of-life improvements and declining healthcare utilization suggest that gains were transferred from education to clinically and psychosocially aligned outcomes.

5.3 Clinical Implications

The intervention model can be applied to the majority of specialty clinics, health care systems, such as primary care practices, and integrated health systems. The substantial declines in emergency department use and hospitalization foreshadow downstream cost savings large enough to pay for intervention.

The greater efficacy apparent in the lower-socioeconomic-status, multi-morbid patients indicates that multidisciplinary care will be maximally likely high-risk populations ,to benefit at-risk . This aligns with targeted implementation strategies in individuals of greatest risk of benefit.

5.4 Limitations

The research was conducted in one urban site with unique demographic characteristics which will limit external generalizability to other populations and environments. The 12-month follow-up period, although longer than in most compliance studies, may not determine long-term maintenance of effect. Third, the use of self-report measures of adherence, although standardized, may be vulnerable to social desirability bias.

Open-label structure presumed group assignment was just as familiar to participants and providers alike as it was to others and thus potentially skewed results. Nature of the outcome measure for healthcare use does provide some safeguard against bias, nonetheless. The particular intervention elements and their relative influence on one another were not calculable with absolute certainty, limiting potential influence on tailoring interventions.

5.5 Future Research Directions

Extended follow-up trials would tell us about sustained improvement in adherence for longer than the length of more than 12 months. Cost-effectiveness analyses would inform resource planning and implementation. Cross-disease and cross-setting comparisons of intervention effects from trials would make more implementation feasible.

Research to establish optimal team size, treatment intensity, and delivery mode would further optimize the multidisciplinary model. Research to identify mediating processes and effect factors would further develop theory and intervention as well.

5.6Recommendations

To Healthcare Systems:

1. Establish Multidisciplinary Adherence Programs: Employ nurses, social workers, and pharmacists to deliver end-to-end programs between healthcare systems to treat drug adherence on a wholistic level.

2. Target High-Risk Populations: Target comorbid and socioeconomic-limited patients because such patients were more costly under multidisciplinary care.

3. Investment in Infrastructure of Care Coordination: Develop infrastructure and policy for staff-to-staff communication and information exchange between nursing, pharmacy, and social services.

For Clinical Practice:

1. Systematic Monitoring of Adherence: Build systematic screening for adherence into core tools like the MMAS-8 as part of regular practice.

2. Conquering Multiple Barriers Simultaneously: Train health personnel in conquering social, clinical, and economic obstacles to adherence simultaneously, not sequentially.

3. Leveraging Technology: Leverage electronic health records to enable multidisciplinary communication and track discipline adherence interventions.

For Policy and Reimbursement:

1. Institute Multidisciplinary Models of Care: Structure reimbursement systems to enable teamwork in the delivery of care and include non-physician members of the team in adherence interventions.

2. Integration of Social Services: Establish the inherent role of social services in decision and payment of adequate funds within such social services within health systems.

3. Cause Indicators of Quality: Use adherence rates and care coordination with multidisciplinary care as quality indicators which health systems use to make payments and evaluate.

6. Conclusions

This trial offers robust evidence that concomitant treatment by pharmacy, social work, and nursing specialists significantly enhances medication adherence among chronic disease patients. The multidisciplinary intervention had large effect sizes to enhance medication adherence, along with concomitant improvement in medication knowledge, health care use, and quality of life. The findings indicate the use of large-scale multidisciplinary interventions, particularly among high-risk patients with multiple chronic conditions and socioeconomic issues.

Evidence shows that compliance success in challenge overcome in adherence is an outcome of sustained efforts focused on overcoming several hindrances simultaneously. The health care organizations can suggest embracing multidisciplinary adherence programs as an intervention to enhance patient outcomes and reduce health care costs. More research needs to be done to optimize intervention development and achieve long-term feasibility, but the current evidence offers a sound base for putting the promising remedy into action to enhance adherence.

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