The Effect of Pharmacist-Led Interventions on Medication Adherence **Compared With Usual Care: A Systematic Review and Meta-Analysis**

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INTRODUCTION AND OBJECTIVES

- Poor adherence of patients may contribute to the excessive • utilization of limited medical facilities, thereby causing substantial escalations in healthcare expenditures¹.
- However, limited data based on quantitative estimates, such as • the proportion of days covered (PDC), are required to substantiate the impact of pharmacist assistance on enhancing patients' medication adherence.

RESULTS SUMMARY

Table 1 Characters of included studies

Schnoor 2022

Author Year	Study design	Diseases & Treatments	Sample size	Oute	Evaluation	
				Intervention group	Standard group	time frames
Bacci 2023	Randomized controlled trial	Type 2 diabetes treated with statins	555	Adherent: 45.4%	Adherent: 44,1%	1 year
Schnoor 2022	Observational study	Asthma and chronic obstructive pulmonary disease treated with inhalation medication	9452	PDC mean (SD): 0.7726(0.25)	PDC mean (SD): 0.7053(0.298)	2 years
Zongo 2021	Observational study	Hypertension treated with lipid- lowering drugs	27318	Baseline non-adherent patients: Adherent: 44.9% Baseline adherent patients: Adherent: 83.0%	Baseline non-adherent patients: Adherent: 38.5% Baseline adherent patients: Adherent: 82.4%	2 years
Rinehart 2021	Observational study	Diabetes, hypertension, or cardiovascular disease treated with at least one prescription for medication related to these	881	PDC mean (SD): 0.844 (0.186) Adherent: 71.0%	PDC mean (SD): 0.799 (0.223) Adherent: 62.3%	9 months
Bingham 2020	Observational study	Diabetes with mental health conditions treated with psychotropics	8167	PDC mean (SD): 0.79 (0.19)	PDC mean (SD): 0.66 (0.12)	6 months
Samir Abdin 2020	Observational study	No disease restricted	60	PDC mean (SD): 0.90 (0.12)	PDC mean (SD): 0.844 (0.14)	6 months
Mikuls 2019	Randomized controlled trials	Gout treated with allopurinol	1463	PDC mean (SD): 0.68(0.29) PDC≥0.8: 50%	PDC mean (SD): 0.61 (0.29) PDC≥0.8: 37%	1 year
Yeung 2017	Randomized controlled trials	Heart failure, hypertension, and diabetes	68	Adherent: 35.3%	Adherent:14.7%	6 months
Taitel 2017	Randomized controlled trial	No disease restricted	735218	PDC mean (SD): 0.558 (0.003) Adherent: 34.5%	PDC mean (SD): 0.567 (0.003) Adherent: 33.5%	1 year
Park 2016	Randomized controlled trials	Hypertension treated with antihypertensive medication	1126	PDC mean (SD): 0.805 (0.22) Adherent: 64.8%	PDC mean (SD): 0.761 (0.259) Adherent: 59.5%	6 months
Abughosh 2017	Observational study	Diabetes with hypertension treated with ACEIs(angiotensin-converting enzyme inhibitor) or ARBs(angiotensin II receptor blockers)	743	PDC mean (SD): 0.6606 (0.3376)	PDC mean (SD): 0.5650 (0.3822)	6 months
Abughosh 2016	Observational study	Diabetes with hypertension treated with ACEIs(angiotensin-converting enzyme inhibitor) or ARBs(angiotensin II receptor blockers)	186	PDC mean (SD): 0.58 (0.26)	PDC mean (SD): 0.29(0.17)	6 months
Pawloski 2016	Randomized controlled trial	Hypertension treated with antihypertensive medication	240	Adherent: 90%	Adherent: 77%	1 year
Blackburn 2016	Randomized controlled trial	Patients treated with statins	1906	PDC mean (SD): 0.716 (0.33) Adherent: 57.3%	PDC mean (SD): 0.709 (0.33) Adherent: 55.9%	1 year
	Randomized	Acute coronary syndrome treated	2/1	PDC mean (SD): 0.94 (0.11)	PDC mean (SD): 0.87 (0.15)	1 year

This study aims to thoroughly review the available data on • pharmacist intervention measured by PDC and pool the included results using meta-analysis.

METHODS

- PubMed, Web of Science, Cochrane Library, ScienceDirect, and • Embase were systematically searched from inception to March 2024.
- The protocol was registered in the international Prospective • Register of Systematic Reviews database (PROSPERO: CRD42024558571). The revised Cochrane Risk of Bias Tool and the Newcastle-Ottawa Scale were used to assess the quality of the studies.
- The revised Cochrane Risk of Bias Tool and the Newcastle-Ottawa \bullet Scale were used to assess the quality of the studies.
- The weighted mean difference (MD) and the risk ratio (RR) for the • PDC and the percentage of adherent patients (defined as PDC≥80%) were estimated to conduct Meta-analysis. Heterogeneity was assessed using the I² statistic, and a random-

effects model was used when I² exceeded 40%.

Subgroup analyses were conducted based on various evaluation • time frames and types of pharmacist interventions, and the sensitivity analysis was also performed.



Samir Abdin 2020 0.13 0.13 0.161 0.061 Samir Abdin 2020 0.9 0.12 60 0.84 Mikulus 2019 0.68 0.29 681 0.61 Taitel 2017 0.57 0.003 367631 0.56 Abughosh 2017 0.66 0.34 248 0.57 Park 2016 0.81 0.22 563 0.76 Abughosh 2016 0.58 0.26 87 0.29 Blackburn 2016 0.72 0.33 907 0.71 Ho 2014 0.94 0.11 122 0.87 Total (95% Cl) 381160 Heterogeneity: Tau ² = 0.01 ; Chi ² = 2519.63 , df = 10 (P < 0.000	101),1 = 100%	-1 -0'5	0 05 1					
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Bingham 2020 0.79 0.19 8167 0.66	0.12 8167 9.6%	0.13 [0.13, 0.13] 2020						
Rinehart 2021 0.84 0.19 294 0.8	0.22 587 9.2%	0.04 [0.01, 0.07] 2021	-					

0.25 2400 0.71 0.3 7052 9.5% 0.06 [0.05, 0.07] 2022

Figure 2 Meta-analysis results of weighted mean difference in PDC

0.77

	Pharmacist intervention		Usual care		Risk Ratio			Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% Cl	Year	M-H, Random, 95% Cl
Bacci 2023	84	185	163	370	2.6%	1.03 [0.85, 1.25]	2023	
Rinehart 2021	330	465	574	921	9.8%	1.14 [1.05, 1.23]	2021	-
Zongo 2021 (1)	1629	3629	1783	4633	13.6%	1.17 [1.11, 1.23]	2021	-
Zongo 2021 (2)	7581	9134	8172	9922	19.1%	1.01 [0.99, 1.02]	2021	• •
Mikulus 2019	341	681	289	782	5.8%	1.35 [1.20, 1.53]	2019	
Faitel 2017	126833	367631	123142	367587	19.6%	1.03 [1.02, 1.04]	2017	
reung 2017	12	34	5	34	0.1%	2.40 [0.95, 6.07]	2017	
Park 2016	365	563	335	563	8.2%	1.09 [0.99, 1.19]	2016	
Pawloski 2016	115	128	86	112	5.9%	1.17 [1.04, 1.32]	2016	
Blackburn 2016	520	907	558	999	9.6%	1.03 [0.95, 1.11]	2016	+
Ho 2014	109	122	88	119	5.5%	1.21 [1.07, 1.37]	2014	
Fotal (95% CI)		383479		386042	100.0%	1.09 [1.06, 1.13]		•
Fotal events	137919		135195					
Heterogeneity: Tau ^z =	= 0.00; Chi ^z = 76.8;	5, df = 10 (P	< 0.0000	1); I ^z = 879	%			
Fest for overall effect:	Z = 5.17 (P < 0.00	1001)						Pharmacist intervention Usual care

Figure 3 Meta-analysis results of risk ratio for adherent patients





Studies included in review (n = 15)

Figure 1 PRISMA flow diagram

CONCLUSIONS

Pharmacist interventions can enhance medication adherence by either increasing the mean value of adherence or improving the percentage of high adherent patients compared to usual care.

Based on the Newcastle–Ottawa Scale Quality assessment scale, 6 included studies were of high quality, while only one study was classified as low quality. The average quality score of the 7 studies was 6.86. The result of the Risk of bias assessment showed that three studies were evaluated to be at low risk of bias, two studies to be at high risk of bias, while the remaining two studies were evaluated to have some concern.

- The meta-analysis found that the pharmacist intervention group generated higher PDC with MD of 0.08 (95% CI: 0.03-0.12, p=0.001, I²=100%) and higher percentage of adherent patients with RR of 1.09 (95% CI: 1.06–1.13, p <0.001, $I^2 = 87\%$) compared with the usual-care group.
- Considering different evaluation time frames, pharmacist intervention improved adherence at both 6-month $(MD=0.12(95\% \text{ CI}: 0.06-0.18, p < 0.001, I^2 = 94\%)$ and 12-month $(MD=0.05 95\% \text{ CI}: 0.00-0.10, p=0.05), p=0.02, I^2 = 0.02$ 93%), with greater improvement at 6-month. After excluding the observational studies, sensitivity analysis shows that the result is still robust with MD=0.04 (0.01-0.07), p=0.007, $l^2 = 89\%$), RR=1.12 (1.04-1.21), p=0.002, $l^2 = 81\%$).

(n=14) Not mean PDC or

percentage of adherent patients as

outcomes (n= 17)