Strong Healthcare Provider-Patient Relationship Improves Patient Adherence and Lowers Healthcare Costs: A Meta-Analysis.

Kevin Cheung, PharmD, Jacob Hicks, PharmD, Brian McEwen, and Gregory Cianfarani, RPh
2012

Abstract

Background: Healthcare outcomes on an outpatient basis are influenced by patient adherence. The likelihood of adherence is dictated by the nature of the patient-practitioner relationship. Factors such as trust and strength of relationship are primary gauges of the relationship and thus, predictors of adherence. Further, non-adherence has been linked to increased healthcare costs. These concepts have been extensively described in clinical studies. It is the object of this study, then, to evaluate the correlation between patient-practitioner relationship and adherence and subsequently how that impacts various healthcare costs.

Methods: Secondary resource searches yielded 20 studies and news articles. Eleven of those studies were used to analyze any correlation between practitioner-patient relationships and patient adherence.

Results: Patients who express greater trust tend to enjoy a stronger relationship with their healthcare providers. Consequently, patients are more likely to be adherent to medication regimens and medical advice. Medication adherence, in turn, leads to elevated prescription drug costs, but the lower non-drug healthcare expenditure yields a net savings in terms of dollars spent on healthcare.

Conclusion: Strengthening the patient-provider relationship may result in improved adherence, which can ultimately reduce healthcare dollar spending.

Background

The relationship cultivated between a patient and a healthcare provider plays a role in determining patient-oriented healthcare outcomes. A patient's relationship to their healthcare provider is considered to be stronger when they develop greater trust with their healthcare practitioner. This relationship becomes a critical factor in determining a patient's likelihood of adhering to recommendations. Specifically, the level of trust is particularly important in shaping medication adherence in the face of high out-of-pocket medication costs. This is becoming an even greater obstacle to successful healthcare as it is estimated that upwards of 50-70% of patients are non-adherent. This lack of appropriate participation in the healthcare process costs the United States $290 billion annually.[1] Further, it is estimated that as many as 125,000 lives are lost annually due to medication non-adherence.[2] Given the cost of non-adherence in terms of dollars, human lives lost and the overlooked degradation of quality of life for an immense number of people, the problem of non-adherence provides opportunity for novel approaches to patient care.

Of the many factors considered when evaluating adherence to recommendations and overall satisfaction of healthcare, physician trust has been found to exceed even that of treatment satisfaction.[3] This is a commonly assumed concept in the medical community and this, by extension, leads some healthcare providers to assume that building trust is essential to leadership. Intuitively, without a trusting relationship a patient is less likely to

adhere to a practitioner's recommendations. According to businessman Stephen Covey, "when trust is low it places a hidden tax on every transaction: every communication, every interaction, every strategy, every decision is taxed, bringing speed down and sending costs up".[4] Thus the tenets of trust include competence, agency, and respect for confidentiality.

Methods

Secondary resource searches included EMBASE, PubMED and Google Scholar. When seeking articles that explored the relationship between patient-provider trust and adherence, search terms used were "patient trust" and "medication adherence". When seeking articles that explored the relationship between adherence and cost, search terms used were "medication adherence" and "healthcare costs." These searches yielded 23 studies and news articles. 12 total studies were selected based on the strength of evidence provided by the author. The investigators selected 14 total studies and news articles by evaluating their quality and strength of evidence.

Literature Analysis

Dr. John D. Piette, et al. conducted a 2005-published study in which 912 diabetes patients were enrolled from various Veterans Affairs health centers for a cross-sectional survey to measure trust in healthcare providers. Based on responses to the Primary Care Assessment Survey, patients were stratified into high-trust (n=557) and low-trust (n=355) groups. In the context of physician trust the study evaluated the likelihood of cost-related medication underuse. In this way, the study posed a question in which any correlation between patient-provider relationship and a willingness to use inconvenient (i.e. cost-pressured) medications would be explored and to what extent adherence would occur.[3]

Dr. Alex Molassiotis, et al. conducted a 2007-published study in which patient-clinician relationship (in this case a nurse or pharmacist) was analyzed in relation to adherence in the context of antiretroviral therapy in adult HIV patients. Thirty-eight patients from two HIV units in the United Kingdom were enrolled in a correlational, cross-sectional evaluation of particular facets of the patient-clinician relationship that affect adherence. Surveys including the Patient-Provider Relationship scale, Treatment-related Empowerment Scale (TES), Simplified Medication Adherence Scale (SMAQ), and subscales taken from the HIV Cost & Service Utilization and Adult AIDS Clinical Trials Group scale (AACTG) evaluated aspects such as patients' perception of being valued and respected by the clinician, the patients' ability to initiate conversation about their treatment, empowerment and level of trust placed in the nurse.[5]

Dr. Deborah E. Jones, et al. conducted a 2012-published study in which 200 patients from a randomized controlled trial of interventions were followed longitudinally to evaluate any correlation between patients' trust in physicians and self-reported adoption of lifestyle modifications as suggested by their physician. Lifestyle modifications were categorized into the following: adherence to anti-hypertensive medication, weight loss, salt reduction, and increased exercise. The study sample was populated by hypertensive adults as defined by ICD-9 code 401 (or essential hypertension) within the preceding year, gathered from 14 urban primary care practices. Patient trust was measured at baseline and at a one-year follow-up via the Trust in Physician Scale. The question of weight loss was adapted from the 2003-04 NHANES survey while questions regarding salt

reduction and exercise were constructed from the JNC VII recommendations, although they are not validated. Lastly, medication adherence was assessed using the Morisky Medication Adherence Scale.[6]

Dr. Oni Blackstock, et al. conducted a 2012-published, cross-sectional study in which 175 HIV-positive adults, predominantly African American, populated the sample. The level of the patients' trust was examined in relation to adherence to antiretroviral therapy via primary care providers. Trust in primary care provider was assessed using the Wake Forest University Interpersonal Physician Trust Scale (IPTS). Anti-retroviral adherence was measured using the Community Programs for Clinical Research on AIDS (CPCRA) Antiretroviral Medication Self-Report questionnaire. The CPCRA questionnaire has been validated to predict HIV RNA levels and CD4+ cell counts as it assesses antiretroviral adherence over the previous seven days.[7]

Dr. Thomas H. Wroth, et al. conducted a 2006-published, telephone-survey-based study. Between November 2002 and July 2003 Professional Research Consultants, Inc. used a random digit dialing survey method modeled after the Centers for Disease Control Behavioral Risk Factor Surveillance System (BRFSS) survey. 3926 English or Spanish-speaking adults, one per household, were asked to participate in a 25-minute phone interview. Respondents must have visited a health care provider and received a prescription within the previous year.[8]

Dr. Michael C. Sokol, et al. conducted a 2005-published, 12-month, retrospective, cohort study which enrolled 137,277 patients under age 65 via employer-provided medical and drug benefit plans. The plans consisted of HMOs, PPOs, and FFSs. A study sample isolated patients with diabetes mellitus, hypertension, hypercholesterolemia, and congestive heart failure (CHF) provided they used medical services for the condition and received prescription drugs for the diagnosis. Primary endpoints were adherence, total medical costs and prescription drug costs with "healthcare costs" being defined as the sum of both.[9]

Dr. Todd P. Gilmer, et al. conducted a 2004-published study in which individual-level data from the San Diego County Adult Mental Health Services and three years of Medi-Cal eligibility and claims (1998-2000) were analyzed for any correlation between adherence to treatment with antipsychotic medication(s) and health expenditures. Adherence was measured using the cumulative possession ratio (number of days medications were available divided by number of days of Medi-Cal eligibility). The study reviewed data from 2801 patients defined as diagnosed with schizophrenia by a mental health provider and living in the community during the years 1999-2000 and being a beneficiary of Medi-Cal (which is California's state Medicaid).[10]

Drs. Denys T. Lau and David P. Nau conducted a 2004-published study based on administrative claims data from 2000-01. The study was populated by 900 adults aged 18 years and over with type 2 diabetes that were taking oral anti-hyperglycemic agents but not insulin. These adults had medication benefits and an ICD-9-CM (code 250.xx) diagnosis of diabetes 2. The objective was to determine any association between oral anti-hyperglycemic medication non-adherence with hospitalization among this particular population. Non-adherence was measured by medication possession ratio (MPR), which is essentially the amount of time that a patient has access to prescription services.[11]

N. Muszbek, et al. conducted a review article published in 2008 to evaluate existing literature regarding

cost consequences of prescription adherence published since 1995. Their literature search yielded 23 such papers. Further, the authors studied the effects of non-compliance on healthcare expenditure and the cost-effectiveness of pharmaceutical interventions.[12]

Dr. P.D.R. Higgins, et al. conducted a meta-analysis in a 2009 publication to consider the impact of non-adherence to 5-aminosalicylic acid (5-ASA) products on the frequency and cost of ulcerative colitis flares. Inclusion criteria for publications consisted of prospective ulcerative colitis treatment, adult patients, reproducibility/objectivity in measurement of disease activity/flare, costs, adherence and a minimum of 90 days follow-up. After two independent researchers put limits on the search, three full manuscripts were selected with 95% agreement.[13]

Dr. R. Edward Faught, et al. conducted a retrospective, cohort study using state Medicaid claims from Florida, Iowa and New Jersey during the period of January 1997 to June 2006 in a paper published in 2008. The goal was to study the relationship between non-adherence to anti-epileptic drugs (AEDs) on healthcare utilization and direct medical costs. Non-adherence was measured as a function of medication possession ratio (MPR) with non-adherence defined as MPR < 0.80.[14]

Results

Piette et al., in stratifying their population by level of trust, demonstrated a statistically significant correlation to cost-associated underuse (p= 0.01 in High-Trust Group, p= <0.001 in Low-Trust Group). Further, strong correlation was found regarding non-cost-related underuse (p= 0.001 in High-Trust Group, p= <0.001 in Low-Trust Group). Of interesting note, depressive symptoms significantly affected cost-related underuse in both groups. See table below.[3]

Table 2. Bivariate Relationships Between Patient Characteristics and Cost-Related Medication Underuse, Within Strata Defined by Physician Trust*

	High-Trust Group		Low-Trust Group	
Variable	% With Cost-Related Underuse	*P* Value	% With Cost-Related Underuse	*P* Value
Monthly prescription cost, $				
<51	3.6	.01	4.2	<.001
51-100	6.6		12.1	
>100	11.0		29.6	
Household income, $ (in thousands)				
≥25	5.9	.63	8.2	.04
15 to <25	7.7		7.1	
10 to <15	4.3		17.7	
<10	4.2		18.2	
Non–cost-related underuse				
No	4.7	.001	7.9	<.001
Yes	14.7		24.0	
Depressive symptoms				
No	4.3	.01	6.7	.003
Yes	9.8		16.8	
Race				
White	5.7	.70	9.9	.11
Nonwhite	6.7		16.4	

Molassiotis et al. found that a patient's adherence behavior may be a function of the level of

trust placed in the attending nurse in addition to the patient's perception of being valued by the aforementioned healthcare provider. Further, the research team posited that in order to develop communication and improve these relationships, trust and respect are the avenues to focus on.[5]

Jones et al. found that patients are twice as likely (unadjusted odds ratio = 2.00, adjusted odds ratio = 2.07) to lose weight at a 12-month follow-up when they express complete trust in their physician. These results were significant in both the unadjusted and adjusted models as p-values were 0.01 and 0.007, respectively. Regarding the other endpoints, such as dietary salt reduction, exercise and medication adherence, no correlation between trust and healthcare outcome was demonstrated as significant ($p > .05$). See table below.[6]

Table 4
Odds ratios of reporting medication adherence and healthy lifestyle modifications at 12-month follow-up. Results compare patients with complete trust in their physician to the reference group of patients with less than complete trust.

Outcome variable	Unadjusted model[a]			Adjusted model[a]		
	Odds ratio	95% CI	*P* value	Odds ratio	95% CI	*P* value
Attempts to						
Lose weight	2.00	1.16, 3.45	0.01	2.07	1.22, 3.52	0.007
Cut back on salt	1.13	0.66, 1.94	0.65	1.58	0.85, 2.95	0.15
Exercise more	1.34	0.70, 2.55	0.38	1.63	0.85, 3.12	0.14
Adherent to medication	1.36	0.78, 2.39	0.28	1.04	0.55, 1.97	0.90

Blackstock et al. demonstrated that high levels of trust in primary care providers results in a statistically significant increase in adherence ($p = <0.001$, unadjusted OR = 3.93, adjusted OR = 2.67). Of tangential interest is that employment shared a significant correlation with adherence ($p = 0.03$, unadjusted OR = 2.58, adjusted OR = 2.84). See table below.[7]

Table 2.

DESCRIPTION OF THE SAMPLE BY LEVEL OF ADHERENCE AND UNADJUSTED AND ADJUSTED ASSOCIATIONS BETWEEN TRUST IN PCP (ALONG WITH SELECTED COVARIATES) AND ARV ADHERENCE (N=175)

	Adherent[ab]			Unadjusted OR	Adjusted OR
Characteristic	Yes (N=119)	No (N=56)	p-value	(95% CI)	(95% CI)
Level of trust in PCP[c]					
High	92 (77.3%)	26 (46.4%)	<.001	3.93 (2.00–7.75)*	2.67 (1.24–5.76)*
Low	27 (22.7%)	30 (53.6%)		ref	ref
Age, years (SD)	49.6 (9.9)	49.0 (8.8)	.68	1.01 (0.97–1.04)	1.00 (0.97–1.04)
Gender			.31		
Male (%)	56 (47.1%)	31 (55.4%)		ref	ref
Female (%)	63 (52.9%)	25 (44.6%)		1.40 (0.74–2.64)	1.08 (0.51–2.30)
Race/ethnicity			.76		
African American/Black (%)	106 (89.1%)	49 (87.5%)		2.16 (0.30–15.80)	3.00 (0.24–37.9)
Hispanic (%)	11 (9.2%)	5 (8.9%)		2.20 (0.24–20.40)	2.71 (0.17–42.9)
White (%)	2 (3.6%)	2 (1.7%)		ref	ref
Employed			.03		
Yes (%)	32 (26.9%)	7 (12.5%)		2.58 (1.06–6.23)*	2.84 (0.91–7.34)
No (%)	87 (73.1%)	49 (87.5%)		ref	ref
History of psychiatric illness			.22		
Yes (%)	52 (43.7%)	30 (53.6%)		0.67 (0.36–1.27)	0.84 (0.40–1.77)
No (%)	67 (56.3%)	26 (46.4%)		ref	ref

(Continued on p. 94)

Wroth et al. demonstrated a statistically significant reduction in medication adherence when extent of confidence in a doctor was reported as “somewhat” or “not” (unadjusted OR = 2.00, adjusted OR = 1.37. See table below.[8]

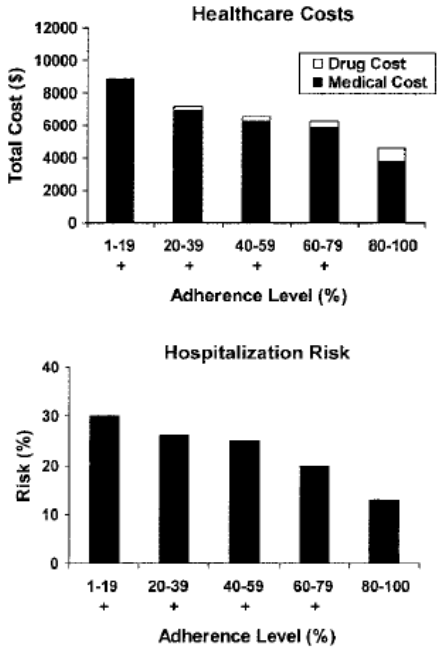
Table 4. Physician-Patient Relationship Factors, Satisfaction With Care, and Primary Medication Non-adherence (N = 3926)

Variable	Unadjusted % Non-Adherence	Primary Non-Adherence, Unadjusted OR (95% CI)	Primary Non-Adherence, Adjusted* OR (95% CI)
Regular Source of Care			
Yes	21.1	0.77 (0.57–1.05)	1.27 (0.88–1.83)
No†	25.8	–	–
Confidence in Dr.'s Ability			
Somewhat/Not	32.3	2.00 (1.64–2.44)‡	1.37 (1.04–1.79)‡
Mostly/Very†	19.2	–	–

Sokol et al. demonstrated that for four chronic diseases (diabetes mellitus, hypertension, hypercholesterolemia, and congestive heart failure), the level of adherence and medical costs are inversely related to each other. Also, the extent of adherence and drug costs are positively related to each other. In each of the four chronic diseases, Sokol et al. revealed an increase in hospitalization with a decrease in medication adherence. See tables below.[9]

TABLE 2. Disease-Related Healthcare Costs and Hospitalization Risk at Varying Levels of Medication Adherence

Condition	Adherence Level	N	Medical Cost ($)	Drug Cost ($)	Total Cost ($)	Hospitalization Risk (%)
Diabetes	1–19	182	8812*	55	8867	30*
	20–39	259	6959*	165	7124	26*
	40–59	419	6237*	285	6522	25*
	60–79	599	5887*	404	6291	20*
	80–100	1801	3808	763	4570	13
			$F = 36.62^{\dagger}$	$F = 88.57^{\dagger}$		χ^2 (25 df) = 543.6†
			Adj. $r^2 = 0.18$	Adj. $r^2 = 0.36$		
Hypertension	1–19	350	4847	31	4878	28*
	20–39	344	5973*	89	6062	24*
	40–59	562	5113	184	5297	24*
	60–79	921	4977	285	5262	20
	80–100	5804	4383	489	4871	19
			$F = 46.44^{\dagger}$	$F = 171.98^{\dagger}$		χ^2 (31 df) = 1256.3†
			Adj. $r^2 = 0.13$	Adj. $r^2 = 0.37$		
Hypercholesterolemia	1–19	167	6810*	78	6888	15*
	20–39	216	4786*	213	4999	13
	40–59	324	3452	373	3825	15*
	60–79	520	4938*	603	5541	14*
	80–100	1754	3124	801	3924	12
			$F = 18.99^{\dagger}$	$F = 320.08^{\dagger}$		χ^2 (25 df) = 474.7†
			Adj. $r^2 = 0.10$	Adj. $r^2 = 0.65$		
CHF	1–19	86	9826	15	9841	58
	20–39	70	7643	90	7733	63*
	40–59	82	11,244	134	11,378	65*
	60–79	107	13,766	158	13,924	64*
	80–100	518	12,261	437	12,698	57
			$F = 5.33^{\dagger}$	$F = 25.73^{\dagger}$		χ^2 (24 df) = 169.7†
			Adj. $r^2 = 0.08$	Adj. $r^2 = 0.34$		



Estimated diabetes-related healthcare costs and hospitalization risk based on regression analyses. A plus sign (+) under a column denotes a value that is significantly higher than the outcome for the 80-100% adherence group ($P < 0.05$).

FIGURE 1. Diabetes: impact of medication adherence on disease-related healthcare costs and hospitalization risk.

TABLE 3. All-Cause Healthcare Costs and Hospitalization Risk at Varying Levels of Medication Adherence

Condition	Adherence Level	N	Medical Cost ($)	Drug Cost ($)	Total Cost ($)	Hospitalization Risk (%)
Diabetes	1–19	182	15,186*	1312	16,498	55*
	20–39	259	11,200*	1877	13,077	47*
	40–59	419	11,008*	1970	12,978	42*
	60–79	599	9363*	2121	11,484	39*
	80–100	1801	6377	2510	8886	30
			$F = 51.33^{\dagger}$	**$F = 51.38^{\dagger}$**		**χ^2 (25 df) = 695.3†**
			Adj. $r^2 = 0.24$	**Adj. $r^2 = 0.24$**		
Hypertension	1–19	350	8831*	916	9747	44*
	20–39	344	10,286*	952	11,238	39*
	40–59	562	8368*	1123	9491	36*
	60–79	921	7658	1271	8929	30*
	80–100	5804	6570	1817	8386	27
			$F = 66.51^{\dagger}$	**$F = 50.94^{\dagger}$**		**χ^2 (31 df) = 1573.2†**
			Adj. $r^2 = 0.18$	**Adj. $r^2 = 0.14$**		
Hypercholesterolemia	1–19	167	9849*	1067	10,916	26*
	20–39	216	6830*	1152	7982	18*
	40–59	324	5509*	1247	6756	20*
	60–79	520	6676*	1736	8412	21*
	80–100	1754	4780	1972	6752	16
			$F = 22.37^{\dagger}$	**$F = 101.14^{\dagger}$**		**χ^2 (25 df) = 500.7†**
			Adj. $r^2 = 0.11$	**Adj. $r^2 = 0.37$**		
CHF	1–19	86	22,003	1961	23,964	83*
	20–39	70	17,133	2055	19,188	81*
	40–59	82	24,103	2208	26,311	85*
	60–79	107	26,373	3412	29,785	84*
	80–100	518	19,056	3107	22,164	75
			$F = 7.69^{\dagger}$	**$F = 11.71^{\dagger}$**		**χ^2 (24 df) = 108.7†**
			Adj. $r^2 = 0.12$	**Adj. $r^2 = 0.18$**		

Gilmer et al. demonstrated that more adherent patients tend to incur higher pharmacy costs. However, there is less spending on non-drug healthcare costs, which effectively offsets medication spending. Overall there is a net savings in healthcare expenditure. Of interesting note, Gilmer et al. included data regarding "excess fillers". These individuals are by definition non-adherent patients in that they amplify their healthcare provider's suggestions and end up with greater pharmacological spending. This, of course, means a narrower window in the offsetting of costs that reduced non-drug spending creates when pharmacy costs are considered. See tables below.[10]

TABLE 2. Standardized Estimates of Annual Hospitalization Rates in Relation to Adherence to Treatment With Antipsychotic Medication Among Medicaid Beneficiaries With Schizophrenia (N=2,801 Person-Years)[a]

Antipsychotic Adherence[b]	Psychiatric Hospitalization		Medical Hospitalization	
	%	SE	%	SE
Nonadherent[c]	34.9	2.0	13.3	1.5
Partially adherent[d]	24.1	2.0	9.4	1.4
Adherent	13.5	1.1	7.0	0.8
Excess filler[e]	24.8	2.0	11.8	1.6

TABLE 3. Standardized Estimates of Annual Cost of Treatment in Relation to Adherence to Treatment With Antipsychotic Medication Among Medicaid Beneficiaries With Schizophrenia (N=2,801 Person-Years)[a]

	Annual Expenditures ($)							
	Hospital		Outpatient		Pharmacy		Total	
Antipsychotic Adherence[b]	Amount	SE	Amount	SE	Amount	SE	Amount	SE
Nonadherent[c]	3,413	368	3,464	175	1,542	107	8,168	433
Partially adherent[d]	2,689	412	3,693	208	3,142	110	9,403	542
Adherent	1,025	95	3,776	151	4,463	161	9,505	289
Excess filler[e]	2,472	272	5,741	312	5,635	188	14,044	561

Lau et al. observed an increased rate of hospitalization with a decreased rate of medication adherence via medication possession ratios (MPRs). The more adherent patients showed better A1C control which may describe the reduction in hospitalization.[11]

Table 2—*Percentage of enrollees hospitalized in 2001 across 2000 antihyperglycemic adherence score increments* (n = 900)

	2000 adherence scores (MPR %)*				
	100	99 to 80	79 to 60	59 to 40	<40
n	220	421	165	67	27
2001 hospitalization†	4.1	5.2	10.3	11.9	14.8

Data are percentages. *Adherence scores are defined by the MPR in percentages; †hospitalization due to diabetes or cardiovascular causes: $\chi^2 = 10.40$; $P = 0.01$.

Muzbek et al. observed an increase in drug costs with an increase in adherence in studies assessing drug costs only. However, this was accompanied by an increased effectiveness of treatment that led to a decrease in medical events and non-drug costs. In the reviewed studies that evaluated any correlation between adherence and cost-effectiveness of pharmacological approaches, increased adherence was observed to reduce cost-effectiveness ratios but the study failed to elucidate a manner or quantification of the extent. See tables below.[12]

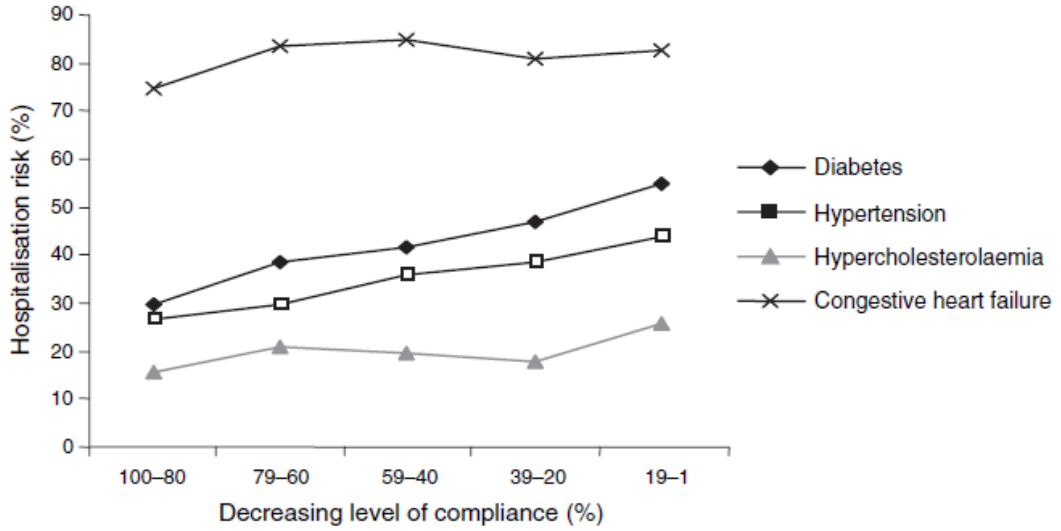


Figure 1 Risk of hospitalisation in relation to the level of compliance for diabetes, hypertension, hypercholesterolaemia and CHF (43)

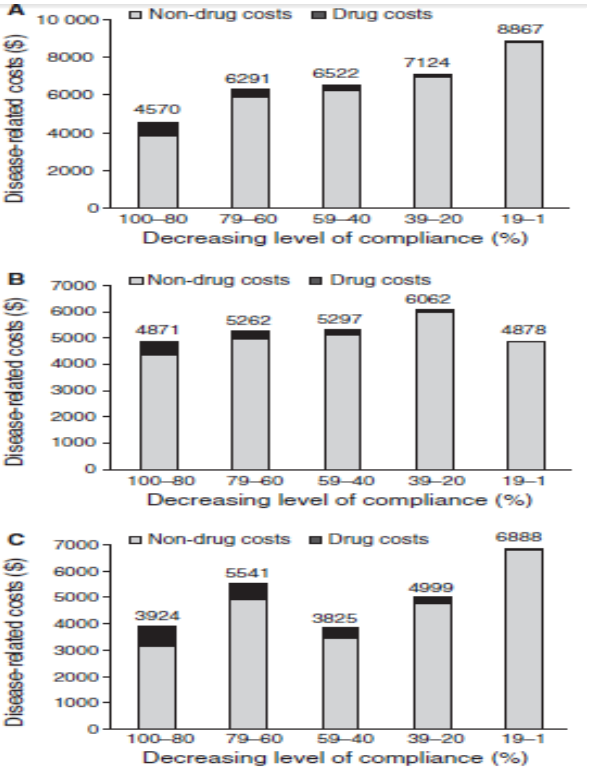


Figure 2 Disease-related healthcare costs in relation to the level of compliance for diabetes (A), hypertension (B) and

Higgins et. al evaluated the relationship between ulcerative colitis (UC) flares and patient adherence. The relative risk of relapse associated with non-adherence ranged from 3.65 to infinity (0% adherence flares vs 33% non-adherence flares). Further, the study considered medication costs as related to adherence. Intuitively, adherence and medication costs are positively correlated. The reduction in remission-associated health-care costs offsets pharmacological spending for a net savings in total healthcare costs. See tables below.[13]

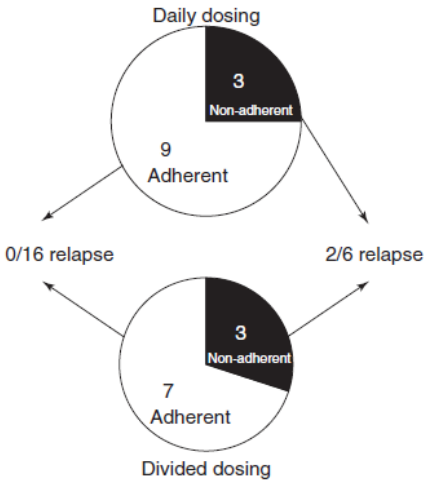
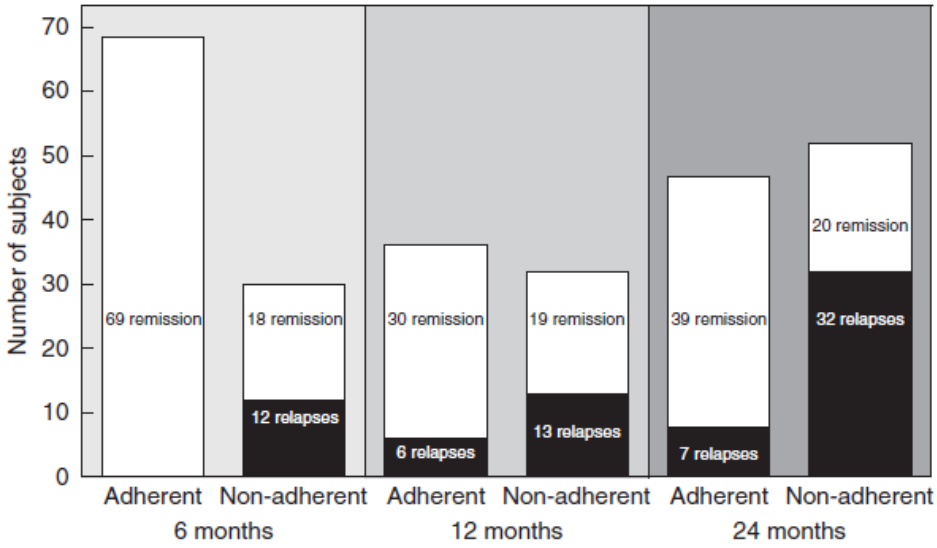


Figure 2. The relapse rate is presented stratified by adherence status and dosing regimen in Kane's pilot study.



Faught et al. evaluated non-adherence to anti-epileptic drug therapy (AED) and its relationship to hospital and emergency department utilization. Stratified as either "adherent" or "nonadherent", the nonadherent demonstrated a 1.86 incidence rate ratio for hospitalization. There was also incidence rate ratios >1 for inpatient days and emergency department visits. Faught et al. further elucidated a correlation between AED nonadherence and increased incremental healthcare costs quarterly and poorer health outcomes. See tables below.[14]

Table 3. Univariate health care utilization results

	Nonadherent (32,265 patient-years)		Adherent (91,876 patient-years)		
	Events	Incidence rate	Events	Incidence rate	Incidence rate ratio (95% CI)
Hospitalizations	43,167	1.34	65,913	0.72	1.86 (1.84–1.88)
Inpatient days	307,904	9.54	346,856	3.78	2.52 (2.51–2.53)
ED visits	47,859	1.48	90,562	0.99	1.50 (1.49–1.52)
Outpatient visits	563,580	17.47	1,748,538	19.07	0.92 (0.91–0.92)

CI, confidence interval; ED, emergency department.
Partial data from this table were previously reported (Faught et al., 2008).

Table 5. Incremental costs associated with nonadherence

	Mean cost for nonadherent quarters (±SD)	Mean cost for adherent quarters (±SD)	Unadjusted incremental cost	95% CI		Adjusted incremental cost	95% CI	
				Lower bound	Upper bound		Lower bound	Upper bound
Inpatient	$1,670.57 ± $8,293	$746.14 ± $5,837	$924.43	$895	$953	$4,320.44	$4,077	$4,564
ED	$101.49 ± $1,819	$68.73 ± $3,366	$32.76	$22	$44	$303.44	$273	$334
Outpatient	$543.10 ± $1,516	$677.49 ± $1,845	−$134.39	−$141	−$128	−$75.96	−$87	−$65
Pharmacy								
AED	$205.60 ± $313	$624.92 ± $809	−$419.32	−$421	−$417	−$187.14	−$191	−$184
Other	$1,083.65 ± $2,158	$1,217.11 ± $2,495	−$133.47	−$143	−$124	−$280.13	−$290	−$270

AED, antiepileptic drug; CI, confidence interval; ED, emergency department; SD, standard deviation; multivariate models controlled for gender, age, race, use of AED polytherapy, or concomitant medication known to increase seizure risk, state of residence, epilepsy-related and psychiatric comorbidities, Charlson comorbidity index, and Medicare eligibility.

Conclusions

A successful patient-practitioner relationship is the foundation of healthcare and a strong rapport with patients is a professional goal amongst the entire healthcare industry. This is due to the intuitive understanding (not to mention the already quantified understanding) that a stronger relationship leads to better health outcomes. Although intuitive, this relationship can become compromised in a world of increasing health costs, overworked healthcare professionals and depressed economic times. The degradation of this relationship can have massive human and financial ramifications.

The results of this meta-analysis further strengthen the case for improved patient-provider relationships and help establish an overlooked fact that the patient-provider relationship predicts a patient's willingness to adhere to their practitioner's recommendations. The bulk of existing literature considers the physician as the primary surrogate of the healthcare experience but an increasing amount of evidence is beginning to suggest that these implications might fall upon nurses and pharmacists as well. Centers of healthcare, where many different levels of workers interact with patients, are collectively responsible for earnestly developing a trusting and strong relationship with these patients. The importance of this is underscored when cost-related pressures lead to aberrant pharmacological adherence. It is at this point where trusted healthcare professionals can make a case for continuing pharmacological interventions in the face of difficult times. In such circumstances, evidence presented showed that practitioners could be responsible for patients' willingness to fill prescriptions and make lifestyle changes. This, of course, leads to improved outcomes.

An intrinsic notion built into the healthcare industry is that the more a patient cooperates with an established course of action, the better the outcome on many fronts. As this regards lowered healthcare costs, the findings of this study support this notion. To the patient at a pharmacy counter, it may often seem like increased medication adherence raises their healthcare costs. However, various studies presented demonstrate that reduced healthcare costs offset pharmacy costs and result in lower overall healthcare costs and a lower cost-benefit ratio.

The original question posed in this meta-analysis was whether a strong patient-practitioner

relationship leads to improved patient adherence, and whether that will translate to lower healthcare costs. After conducting extensive research, there is enough evidence to support the claim that practitioners can lower total healthcare expenditures by improving their relationship with patients. Based on the results, it is clear that the healthcare community should work to establish a better relationship with their patients.

This meta-analysis has a few limitations. The analysis was not able to provide evidence on *how* a practitioner can increase a patient's trust in them because there is no literature published on the topic. The rationale for this may be that it is already common for leaders to present their credentials when they introduce themselves. Another limitation is that there is no study that directly linked strong patient-practitioner relationship, adherence, and healthcare cost together in a study.

References

1. Piette et al. *The Role of Patient-Physician Trust in Moderating Medication Nonadherence Due to Cost Pressures*. Arch Intern Med. 2005;165:1749-1755.

2. *NEHI Research Shows Patient Medication Nonadherence Costs Health Care System $290 Billion Annually*. http://www.nehi.net/news/press_releases/110/nehi_research_shows_patient_medication_nonadherence_costs_health_care_system_290_billion. Accessed on November 19, 2012.

3. Openshaw, Scott. *Experts Meet to Evaluate the State of Medication Adherence and Provide Real-World Solutions*. http://www.meadwestvaco.com/mwv/groups/content/@corp/@newsevts/documents/document/mwv033230.pdf. Accessed on November 19, 2012.

4. Covey, Stephen. *How the Best Leaders Build Trust*. http://www.businessknowhow.com/growth/leadertrust.htm. Accessed on November 19, 2012.

5. Mollasiotis et al. *The importance of the patient–clinician relationship in adherence to antiretroviral medication*. IJNP 2007; 13: 370–376.

6. Jones et al. *Patient trust in physicians and adoption of lifestyle behaviors to control high blood pressure*. Patient Education and Counseling 89 (2012); 57–62.

7. Blackstock et al. *Trust in Primary Care Providers and Antiretroviral Adherence in an Urban HIV Clinic*. JHCPU 23 (2012): 88–98.

8. Wroth et al. *Primary Medication Adherence in a Rural Population: The Role of the Patient-Physician Relationship and Satisfaction with Care*. J Am Board Fam Med

2006;19:478–86.

9. Sokol et al. *Impact of Medication Adherence on Hospitalization Risk and Healthcare Cost*. Med Care 2005;43: 521–530.

10. Gilmer et al. *Adherence to Treatment With Antipsychotic Medication and Health Care Costs Among Medicaid Beneficiaries With Schizophrenia*. Am J Psychiatry 2004; 161:692–699.

11. Lau et al. *Oral Antihyperglycemic Medication Nonadherence and Subsequent Hospitalization Among Individuals With Type 2 Diabetes*. Diabetes Care 27:2149–2153, 2004.

12. Muzbek et al. *The economic consequences of noncompliance in cardiovascular disease and related conditions: a literature review*. Int J Clin Pract, February 2008, 62, 2, 338–351.

13. Higgins et al. *Systematic review: impact of non-adherence to 5-aminosalicylic acid products on the frequency and cost of ulcerative colitis flares*. Aliment Pharmacol Ther 29, 247–257.

14. Faught et al. *Impact of nonadherence to antiepileptic drugs on health care utilization and costs: Findings from the RANSOM study*. Epilepsia, 50(3):501–509, 2009.