Efficacy of communication-based interventions on physicians and patients' outcome: A meta-analysis of randomised controlled trials

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ABSTRACT

Communication-based intervention on physicians are strongly linked to patient health improvement. We proceeded examine the efficiency of these programs interventions for relevant outcomes in patients life, along with study quality, publication bias and potential moderators.

For this meta-analysis, we searched 2 databases, including: Web of Science and PubMed, using a comprehensive search strategy to identify the efficacy of the physician interventions on patient's outcome studies in the literature, published from inception of 1965. Studies reporting means of health-related outcome in patients were included in the analyses. Studies quality was assessed with risk of bias tool. Meta-regression was used to explore heterogeneity of the year of published studies moderator and subgroup analysis was used to explore the medical specialty moderator.

Of the 3,470 studies initially identified, 14 were eligible for inclusion. These studies had a large diversity of program interventions. The mean effect size representing the impact of communication intervention on patients physical and psychological health was not significant. The only significant mean effect was represented by psychological outcome. Significant associations were found between year of studies and general medicine specialization.

In conclusion the impact of physicians' intervention in not efficient on patients' communication and medical outcome but it improves psychological health.

Keywords: communication-based intervention, physician-patient relationship, patient outcome, patient health

INTRODUCTION

The relationship between a doctor and patient is considered to be one of the most significant aspects of a good medical care. Within interactions in the mentioned dyad information is easily shared, choices more comfortable to be taken and reassurances are provided. In the medical relationship, trust is an essential emotional and behavioral element of effective treatment and is conceptually distinct from satisfaction with treatment (1) and physician-patient working alliance

might be related to patients' beliefs about the usefulness of treatment. The patient satisfaction as an outcome of multiple factors, such number of patients a doctor sees within a day, accessibility to doctors, patients' use of alcohol and drugs, friendliness, and patient level of education (2) and it is also been linked with adherence to therapy, patients changing doctors, and outcome (3).

The increased interest in communication between physicians and patients is motivated by the aim to provide the best possible health care for patients and their

families. In addition, studies indicate that effective and empathic communication skills may decrease the probability of patients filing malpractice claims against their physicians (4). Patients feeling rushed and ignored and physicians providing inadequate explanations and advice proved to be the most significant predictors of dissatisfaction and low outcomes in healthcare. The ability to communicate honestly and empathically with patients has a powerful effect on the success of a medical practice (5,6).

AIM

The aim of the present meta-analysis is to examine whether there is robust empirical evidence for the efficacy of communication skills program interventions for physicians in the patients' health status.

METHOD

Search strategy

Studies were collected through searches of electronic databases Web of Science and PubMed, from the inception of 1965 to May 2020. A search strategy was developed for each database with a combination of free text and MeSH terms for controlling vocabulary. The following comprehensive search string was entered into the databases: "doctor psychological training" or "physician psychological training" or "doctor psychological intervention" or "physician psychological intervention" and "doctor-patient relationship" or "physician-patient relationship". Also, it was manually searching for citations in reference lists of the relevant articles and additional web-based search on Google Scholar for grey literature. The search was limited to those published in English language and human science, and each study from the final results was screened by title and abstract.

Selection and eligibility criteria

The selected studies were screened in two stages: screening of titles and abstracts followed by the retrieval and screening of full-text articles using the eligibility criteria recommended by the preferred reporting items for systematic reviews and meta-analyses (PRISMA) (7) in Figure 1.

Studies were included if they were applying the following conditions: the studies had a randomized controlled trial (RCT) design; studies that clearly delimited the population of interest from others (i.e. nurses or auxiliary personnel); an existing outcome from patients; patients evaluated the physicians (peer-report); an existing control group for both physicians and patients.

Risk of bias

The methodological quality of the included studies was assessed with risk of bias assessment tool, developed by the Cochrane Collaboration (8). The five criteria of sources of bias in RCTs assessment are: (a) adequate generation of allocation sequence; (b) concealment of allocation to conditions; (c) prevention of knowledge of the allocated intervention to assessors of outcome; (d) prevention of knowledge of the allocated intervention to participants and (e) dealing with incomplete data.

Moderator variables

We conducted categorical moderator analyses testing the one variable, the medical specialization of the physicians: general medicine, including specialties as: family medicine, surgery, military medicine; respectively oncology specialization, including any domain of the specialization. A second moderator, represent the year of studies publication, used as continuous moderator variable.

Meta-analytic procedures

We conducted a random effects meta-analysis with comprehensive meta-analysis software (CMA) version 3. The meta-analysis was conducted in the following sequence: First, we calculated the comparison between physician intervention group and a comparison group, the effect size, indicating the differences between the two groups at post-test. It was calculated using variance for Hedges'g. The effect size was calculated by means, standard deviation and number of participants (patients), at post-test with a control group. Outcome is the standardized mean difference for the patients from the trained physicians' group vs. the control group. Each study reports three outcomes at once or separately: medical, communication and/or psychological. Next, we conducted subgroup analyses for patient's outcome across all the studies included. In the subgroup analysis we consider each outcome as an independent study and a meta-regression analysis for publication year.

If means and standard deviations were not reported for the symptom outcomes in a study, we calculate the standardized mean difference from dichotomous data or from other statistics such as t-values or p-values. If the effect size could possibly be calculated, the study was excluded. For the studies that had more than one intervention group or control group it was used the most relevant intervention group and only one control group, the less biased of intervention, to calculate effect size. From one study (9) was included with three point times outcomes (after intervention and follow up at 3 and 6 months). At the follow up the

study has an additional outcome (medical outcome) for patients and different size of sample. For the rest of the studies we reported effect sizes for the time point available (e.g. post-test after intervention, 4 weeks later, 6 months or 12 months).

RESULTS

Characteristics of the included studies

Of the 3,470 studies, 2,510 potentially relevant full-text articles were screened by title and abstract. From these, we identified 144 that have had the potential to provide data on interventions on physicians and patients outcome were full text assessed. Among these, 26 examined intervention on physician in correlation with other variables, 14 provided communication intervention on nurses or patients, 26 had a different outcome (e.g. physician productivity or efficacy, physician wellbeing or mental health), 12 studies had lack outcome data, other than mean and standard de-

viation (e.g. odd ratio or median) and could not be calculated by the author from the available data, in one study has not reported the patient outcome, five studies had the intervention on both physicians and nurses or other auxiliary personnel, two studies had no control group and other 4 had no intervention program. In 9 studies was no intervention and finally, 31 studies were qualitative studies, explaining a series of interventions by methodological and applying procedure. After excluding ineligible studies, 14 studies that provided the inclusion criteria data were included in the qualitative and quantitative processes as shows Figure 1.

Risk of bias of the included studies

Overall, the quality of the included RCTs was not optimal. Four studies met two high risk criteria out of the five considered. The highest risk of bias is targeting the random selection bias, followed allocation bias four studies out of 14 as seen in Figure 3. The percentage of

FIGURE 1. Flow chart of selection and inclusion process

FIGURE 2. Risk of bias graph. Judgment about each risk of bias as per percentages

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Douglas et al. 2016	+	+	+	+			+
Epstein et al. 2017	+	+	+			+	+
Jenkins 1998	+				+	+	+
Jerant et al. 2016	+	+	+		+		+
King et al. 2002	+	+	+	+	+	+	+
Merckaert et al. 2008	+		+	+	+	+	+
Mjaaland&Finset 2009	+	+			+	+	+
Morasso et al. 2015	+	+		+	+	+	+
Morriss et al. 2007	+	+		+	+	+	
Penner et al. 2013	+	+	+		+	+	+
Rutter et al. 1996	+	+		+	+	+	
Scott et al. 1999	+		+		+	+	+
Shilling et al. 2003	+	+		+	+	+	+
Stewart et al. 2007	+	+	+		+	+	+

FIGURE 3. Sumarry of each study risk of bias

each studies with a low, unclear and high risk of bias, for each of the quality criteria is presented in Figure 2. Low risk of bias was observed to outcome data criteria (85%), the rest of 15% being considered as unclear.

Characteristics of the individual studies are reported in Table 1. The k = 14 studies, with program interventions based on physician communication and assessed with psychometric assessment tools.

MISS – Medical Interview Satisfaction Scale; PPSB – Physician Psychosocial Belief; CAT – Communication Assessment Tool; PHDRA – Physician’s Humanistic Behaviors Questionnaire; APPC – Active Patient Participation Coding; Verona VR-CoDES – Responding to patients’ emotions; PTCC – Prognostic and Treatment Choices and Balanced Framing subscales; HBCM – Perceived Medical Condition Self-Management Scale; BDI – Beck depression inventory; STAI – The State-Trait Anxiety Inventory; HADS – Hospital Anxiety and Depression Scale; PEQ – The Patient Experiences Questionnaire; PDI – Psychological Distress Inventory; STAI-S – State-Trait Anxiety Inventory–State; PSB – Patients’ Symptom Beliefs; SF-20 – Self-perceived Racial and Ethnic Discrimination in Social Survey; PPDS – Perceived Past Discrimination Scale; PSCQ – The Patient Satisfaction with Communication Questionnaire; CDIS – Cancer Diagnostic Interview Scale; BSY – Brief Symptom Inventory

Efficacy of communication-based interventions

The main meta-analytical results are displayed in Figure 4, the forest plot of the standardized effect sizes of communication interventions.

The mean effect size representing the impact of communication intervention on patients physical and psychological health is g = 0.113 (95% CI -0.070; 0.098) for all 14 RCTs, (p > 0.05). Heterogeneity was moderate (I²= 32.11) (Table 2). The results show that the efficacy of the interventions is not significant. Next, we calculated the effect sizes for each outcome Figure 5. The statistical analysis for communication outcome (N = 6, g = 0.169, 95%CI = -0.160; 0.497, I² = 21.79; p > 0.05), is not significant. The results point out that intervention

TABLE 1. Characteristics of the sample of studies included in the meta-analysis

Study	Intervention Method	Intervention duration / n sessions	Doctor Speciality	Measurements	Intervention group		Control group		Physicians group		Outcome
					(n)	M (SD)	(n)	M (SD)	Intervention (n)	Control (n)	
Scott et al., 1999 (10)	PBI (problem-based interviewing)	12 months training	General medicine	MISS	144	89.4 (11.1) 38.8 (5.4)	136	86.7 (11.2) 37.4 (5.3)	10	10	Communication Psychological
Jenkins, 1998 (11)	Communication skills course	3-day residential course	Oncology	PPSB	186	75.41 (10.52)	186	83.73 (8.737)	48	45	Communication
Douglas et al., 2016 (12)	Learning strategies for quality communication training	Half-day workshop	General medicine	CAT; PHDRA	719	4.1 (0.9) 3.5 (0.5) 6.3 (2.3)	681	4.0 (0.9) 3.4 (0.5) 5.8 (2.6)	23	28	Communication Medical Psychological
Epstein et al., 2017 (13)	Patient-Centered Communication Intervention	2-session in-office physician training (1.75hours) 1-hour patient and caregiver coaching session, and 3 follow-up phone calls	Oncology	APPC; Verona VR-CoDES; PTCC	130	0.16 (0.81)	135	- 0.01 (0.66)	19	9	Communication
Jerant et al., 2016 (14)	SEE IT training	>3 sessions of 20-min audio-recorded visits	General medicine	HBCM	66	0.18 (0.96)	65	- 0.19 (1.01)	27	23	Psychological
King et al., 2002 (15)	Acquisition of skills in the application of brief cognitive behaviour therapy	Four half day workshops at one week intervals	General medicine	BDI; STAI	137	17.5 (9.6) 48.6 (13.8)	135	16.6 (11.5) 48.2 (14.9)	42	42	Medical Psychological
Mierckaert et al., 2008 (16)	BT (Communication skills basic training)	Two 8h day sessions and one 3h evening session; a 2h plenary session; 17h of small group role-playing sessions	General medicine	HADS	27	12.2 (22.3)	29	2.4 (21.4)	27	29	Psychological
Mjaaland & Finset, 2009 (17)	GRIP (Communication skills training programme)	Forty hours (three full days and five half days) over an 8-week period	General medicine	PEQ	62	54.1 (9.8)	59	56.0 (5.0)	15	10	Communication
Moreoso et al., 2015 (18)	Communication skills training program	Three weekly 3h sessions (9 hours in total) with didactic and experiential learning methodologies	Oncology	PDI; STAI-S	174	45.39 (11.81) 27.67 (9.13)	165	45.51 (10.74) 28.61 (8.91)	17	19	Medical Psychological
Morriss et al., 2007 (19)	Reattribution model training	Three 2h training sessions at the practice work base	General medicine	PSB; HADS	66	3.60 (0.97) 3.06 (0.84)	75	3.40 (0.99) 2.86 (1.02)	8	8	Medical Psychological
Penner et al., 2013 (9)	Common in group intervention	-	General medicine	SF-20; PPDS	42	3.85 (0.42) 5.47 (0.82)	30	3.83 (0.49) 5.39 (0.71)	7	7	Communication Psychological
Penner et al., 2013 (9)	Common in group intervention	-	General medicine	SF-20; PPDS	30	5.41 (0.92) 5.25 (0.66) 4.90 (1.10)	23	4.56 (1.53) 4.02 (1.35) 4.72 (0.97)	7	7	Communication Psychological Medical
Penner et al., 2013 (9)	Common in group intervention	-	General medicine	SF-20; PPDS	20	5.43 (0.52) 5.03 (0.52) 4.63 (1.01)	21	4.55 (1.53) 4.26 (1.50) 4.49 (0.97)	7	7	Communication Psychological Medical
Rutter et al., 1996 (20)	Training in communication	Two meetings, two days apart based on a handbook - discussions and booklets	Oncology	HADS	18	18.4 (5.4) 3.9 (3.7)	18	19.6 (4.9) 6.8 (4.5)	3	-	Medical Psychological
Shilling et al., 2003 (21)	Communication skills training course	Intensive 3 day training	Oncology	PSCQ	439	77.90 (4.28)	422	77.86 (4.07)	425	410	Psychological
Stewart et al., 2007 (22)	The state-of-the-art CME program	Principles of adult education and experiential learning and with 5 key elements	General medicine	12-item questionnaire based on Henbest et al. (2000); CDIS	11	3.28 (0.49) 82.06 (5.80) 0.40 (0.40)	91	3.14 (0.49) 77.78 (8.07) 0.46 (0.38)	25	26	Communication Medical Psychological

FIGURE 4. Statistics for studies included

FIGURE 5. Statistics for each outcome

programs do not improve the communication between physician and patient. The effect size for medical outcome ($N = 8$, $g = 0.088$, $95\%CI = -0.043; 0.219$, $I^2 = 4.134$; $p > 0.05$) is not significant. Finally, for psychological outcome ($N = 13$, $g = 0.161$, $95\%CI = 0.003; 0.048$, $I^2 = 12.75$; $p < 0.05$) is significant, therefore intervention programs applied on physicians support a high-

er level of psychological state improvement in patients. Figure 6 represents the funnel plots as follows: (a) mixed outcomes; (b) communication outcome; (c) medical outcome and (d) psychological outcome. These effects were not symmetrical, and the trim and fill analysis suggested adjustment to these mean effect sizes (23).

TABLE 2. Standardized effect sizing of interventions and of medical specialty moderator

Model	Outcome	N-comp	g (95% CI)	Std. er.	Variance	LL	UL	Z	I ²
Fixed	Mixed	14	0.040	0.030	0.001	-0.019	0.098	1.318	86.612
Random	Mixed	14	0.113	0.093	0.009	-0.070	0.296	1.205	32.110
Fixed	Communication	6	0.027	0.039	0.002	-0.050	0.104	0.491	91.988
Random	Communication	6	0.169	0.168	0.160	-0.160	0.497	0.315	21.787
Fixed	Medical	8	0.137	0.042	0.002	0.055	0.218	3.288*	18.756
Random	Medical	8	0.088	0.067	0.004	-0.043	0.219	1.315	4.134
Fixed	Psychological	13	0.136	0.033	0.001	0.072	0.200	4.147*	50.293
Random	Psychological	13	0.161	0.058	0.003	0.048	0.274	2.801*	12.746
Fixed	General Medicine	10	0.159	0.040	0.002	0.082	0.237	4.024*	62.464
Random	General Medicine	10	0.234	0.082	0.007	0.073	0.395	2.855*	35.340
Fixed	Oncology	6	-0.123	0.046	0.002	0.032	-2.664	0.008*	92.482
Random	Oncology	6	-0.134	0.192	0.037	-0.509	0.242	-0.698	18.308

* $p < 0.05$; N-comp – number of participants; Std. er. – standard error; LL – lower limit; UL – Upper limit; I² – heterogeneity

Intervention moderators

The subgroup analysis of medical specialty revealed no statistically significant differences among oncology specialty (N = 6, $g = -0.134$, 95%CI = -0.509; 0.242, $I^2 = 18.308$; $p > 0.05$) but significant result in general medicine specialty (N = 10, $g = 0.234$, 95%CI = 0.073; 0.395, $I^2 = 35.34$; $p < 0.05$) and medium heterogeneity (Table 2). Therefore, the impact of the communication interventions on physician is higher for oncology patients.

The range of the years studied were published, vary between 1996 and 2017. The results of meta-regression analysis are displayed in Table 3. Statistical analyses are positive assuming that there is a significant impact of year of publication on effect sizes ($Z = 2.48$, 95%CI = 0.0069; 0.059, $p < 0.000$) and the heterogeneity was high ($I^2 = 86.61$), indicating that more recent studies reported higher effects.

DISCUSSIONS

The purpose of this study was to examine the efficacy of communication programs interventions on physicians to improve health behaviors and health-related outcomes in patients. We conducted a meta-analysis including all communication interventions on physicians tested in RCTs for relevant outcomes on patients. Interventions were considered as therapeutic programs to facilitate a better relationship between physician and patient and improvement in patients psychological and medical condition. We examined the intervention effects for clinical patients, subclinical and nonclinical participants. We also analyzed two general moderators, one from the perspective of physician characteristics and one from the studies characteristics, with possible implication for further studies.

From all 3,470 studies 14 were selected. Overall, the meta-analysis included 1,390 physicians, 710 in the

intervention group and 680 in the control group. From all 4,583 patients who rate the physician's changes, 2,271 were in the intervention group and the rest of 2,312 patients in the control group. Patients measured outcomes were diverse and clustered in three main categories: (a) communication outcome (satisfaction with the medical interview, patient centeredness, doctor-centeredness, inter-personal skills, physician trust or satisfaction with the consultation); (b) medical outcome (treatment adherence, clinical anxiety and depression, physical health concerns or shorter duration of symptoms) and (c) psychological outcome (sub-clinical anxiety, affection, mental health concerns, self-management, psychological distress or psychological impact on life).

Our first research question asked whether better communication skills in physicians can improve the relationship between physician-patient and moreover if there are any health outcomes on patient. Results revealed that these interventions are not generally efficacious (24,25). Interventions applied on physicians attempted to improve only the psychological outcomes. On psychological level, a safe physician-patient relationship involves patient participation in decision-making and enhance in patient a higher level of self-determination (26). For the second question, whether medical specialty and year of the studies are significant moderation, results revealed that recent communication-based intervention are more efficient. General practitioners show more communication skills and attention to patient concerns and create an affective atmosphere for patient wellbeing (27).

This meta-analysis has a series of limitations. First, the small number of RCTs studies limited the analysis to 14 included studies. For further research it is recommended to be included RCTs with more than one follow-up time and longitudinal studies. The intervention programs vary from a study to another. Each program had its own methodological and duration of the inter-

FIGURE 6. Funnel plots of standard error for outcomes

TABLE 3. Statistics for the meta-regression model

	Coefficient	Std. error	LL	UL	Z-value	Tau ²	I ²	Q	p
Publication Year	0.033	0.0133	0.0069	0.059	2.48*	0.0966	86.61	87.25	0.000

* $p < 0.05$; Std. error – standard error; LL – lower limit; UL – upper limit; I² – heterogeneity

FIGURE 7. Regression plot of publication year

vention that can contribute to different outcomes in patients' condition. Some potentially important moderators such as severity of patients' symptoms and socioeconomic variables (e.g., ethnicity, education) could be considered. Future research should therefore consider the impact of these important moderators.

CONCLUSIONS

The results points it is necessary to set a goal development of an universal training in communication skills

for physicians and the application of the new communication skills in daily practice to improve the patient's health and satisfaction with the medical care and treatment. Our results somewhat support the assumption that the transfer of communication skills into a real consultation with the patient is hard to apply and it is important to start to research more in this domain.

Conflict of interest: none declared
Financial support: none declared

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