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Review

Does improving patient–practitioner communication improve clinical outcomes in patients with cardiovascular diseases? A systematic review of the evidence☆

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ABSTRACT

Objective: To conduct a systematic literature review appraising the effects of interventions to improve patient–practitioner communication on cardiovascular-related clinical outcomes.
Methods: Databases were searched up to March 27, 2013 to identify eligible studies that included interventions to improve patient and/or practitioner communication skills and assessment of a cardiovascular-related clinical outcome in adults ≥18 years of age.
Results: Fifteen papers were reviewed: the primary focus in seven studies was the patient; seven included a practitioner-focused intervention and one targeted both. Two patient-focused and two practitioner-focused studies demonstrated a beneficial effect of the intervention compared to a control group. Patient-focused studies were designed to improve patients' information-seeking and question-asking skills with their practitioner. Practitioner-focused studies were designed to either improve practitioner's general patient-centered communication or risk communication skills.
Conclusion: Few interventions targeting patient–practitioner communication have assessed the impact on cardiovascular-related clinical outcomes, limiting the ability to determine effectiveness. Additional rigorous research supported by theoretical frameworks and validated measurement is needed to understand the potential of patient–practitioner communication to improve cardiovascular-related clinical outcomes.
Practice implications: Investments in communication skills trainings in medical education and practice are needed in order to attain the full potential of patient-centered care on cardiovascular-related clinical outcomes.

Contents

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1. Introduction

Despite advances in cardiovascular-related treatments (e.g., hypertension [HTN], type II diabetes mellitus [DM], lipid control) over the past three decades [1], CVD remains the leading cause of death in adults and accounts for approximately 17% of all United States national health expenditures [2]. Costs of CVD are estimated to exceed $1 trillion by 2030 [2]. To address the clinical and economic burden of CVD-related diseases, solutions must target the multilevel barriers to the effective treatment and management. At the forefront is improving the quality of communication within the patient–practitioner relationship, where most health care negotiations occur. Practitioners' communication skills contribute to as much as 50% of the quality of care patients' receive [3].

Many studies have documented the beneficial effects of collaborative patient–practitioner communication that includes qualities of shared-decision making [4], patient-centeredness [5], and adequate information-giving [6] on improvements in patient satisfaction, disease-specific knowledge, self-reported health status, adherence to self-management behaviors, emotional health, recovery from discomfort, and reduction in referrals for diagnostic testing [7–10]. Alternatively, poor communication has been shown to erode patient trust leading to disenrollment in health plans and clinics, and malpractice litigation as well as reduced utilization of preventive services, non-adherence to medical advice, and less health-seeking behaviors among patients [11].

Despite evidence of the importance of patient–practitioner communication on processes of care such as patient satisfaction, trust, and utilization of health services [9,12,13] few studies have linked its affects to clinical outcomes in patients with CVD [8,10]. Perhaps the most pervasive explanation for the non-significant association is the relative lack of theoretical models that support linking communication processes to specific clinical outcomes as well as the absence of psychosocial, behavioral, health care system, and socio-environmental-level factors that may serve as mechanisms through which the quality of patient–provider communication affects outcomes [14,15]. In this review we appraise the existing literature examining interventions to improve patients and/or practitioners verbal communication skills on cardiovascular clinical outcomes.

2. Methods

2.1. Search strategy

To identify relevant articles, a medical librarian trained in systematic review methodology searched the MEDLINE, Embase,

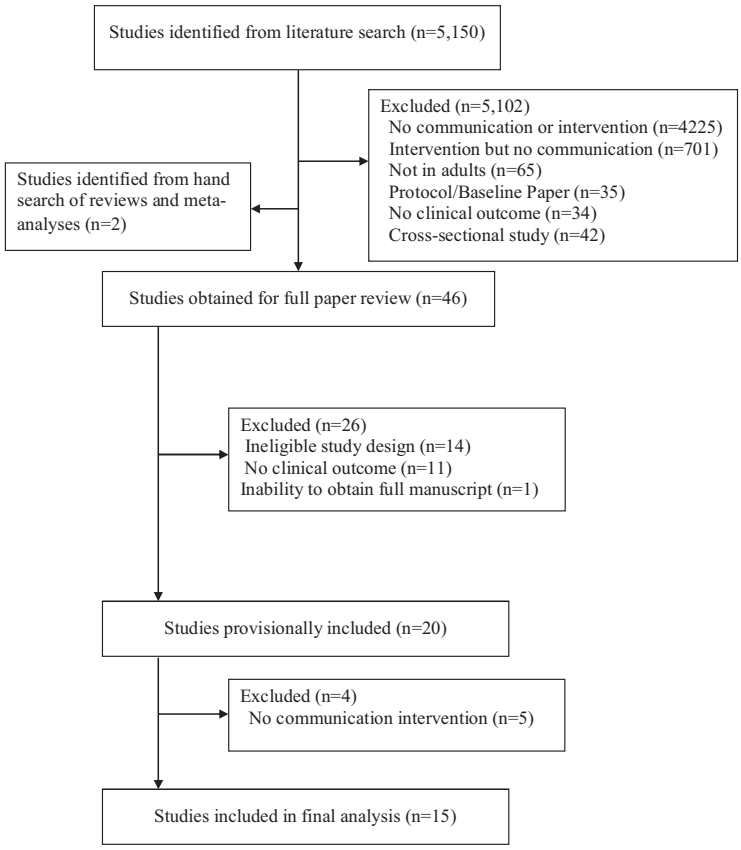

Fig. 1. Review flow chart.

CINAHL, Scopus, and Web of Knowledge databases from 1946 to March 27, 2013 for our concepts. Both the patient–practitioner communication concept and the cardiovascular diseases concept included several keyword synonyms and the subject headings for practitioner–patient relations and cardiovascular diseases. For a full search strategy in PubMed, see the online supplement. Backward searching references from retrieved articles and other relevant systematic reviews, meta-analyses, and "grey" literature (e.g., abstracts from scientific proceedings) was conducted to identify additional publications. Articles were limited to studies conducted in adults (e.g., age $\geq$ 18 years). To ensure comprehensive coverage of the current literature, the search strategy allowed for randomized controlled trials (RCTs) and quasi-experimental study (e.g., case control, single group pre-post, time series) designs.

2.2. Eligibility criteria

Studies were eligible if the intervention included approaches (e.g., motivational interviewing, shared decision-making) to improve patient and/or practitioner *verbal* communication skills (e.g., patient questioning skills; practitioner ability to elicit patient concern) there was assessment of a cardiovascular-related clinical outcome (e.g., blood pressure (BP), lipids, glycated hemoglobin [HbA1c], cardiovascular-related hospitalizations). Studies were excluded if they focused solely on using a decision aid or tool to visually communicate concepts to patients in the absence of intervention approaches to improve practitioner/patient verbal communication skills to discuss the tool (e.g., see Chapin et al. [16]). We assessed both between intervention and control group differences and within-group change in cardiovascular-related outcomes from baseline to end of follow-up.

Data extraction and quality assessment: Fig. 1 summarizes the process used to identify eligible studies for inclusion in this review. All titles and abstracts from the search were independently reviewed by the primary author and a trained research assistant. Each retrieved citation was categorized as; potentially relevant, not relevant, or as having insufficient information to make a judgment. Three of the authors independently reviewed the included articles. Any disagreements about inclusion in the review were discussed by the authors, with all differences resolved by consensus. Percent agreement among the authors was high (93%) across all reviewed citations. Data on study design, methods, participant characteristics, study groups, and outcomes were independently extracted from the selected articles by the primary author and a trained research assistant using a structured data collection form and summarized in tables. Two of the authors independently reviewed the extracted data for completeness before summarizing the included studies. Data on the communications skills targeted by the interventions were also abstracted to help elucidate the pathways through which changes in patient–practitioner communication effect clinical outcomes. Due to the high heterogeneity of the interventions and measures employed meta-analysis could not be used to calculate study effect sizes. Risk of bias for each study was assessed using the guidelines outlined in *The Cochrane Collaboration Handbook for Systematic Review of Interventions* [17].

3. Results

A total of 5150 articles were identified; 46 potentially relevant articles were extracted for review. Twenty-nine of the retrieved articles were excluded because cardiovascular clinical outcomes were not assessed (n = 11); study design was unable to distinguish effects (e.g., observational study, case report, single group pre-post design) (n = 14); interventions were not communication-based (n = 5); and inability to obtain a full copy of the article (n = 1). Fifteen studies were reviewed [18–32].

3.1. Characteristics of the included studies

The study characteristics are in Table 1. The time-frame of the studies ranged from 1991 to 2011. About half (46%) of the studies were conducted within the past 5 years of the review (2008–2013). Fourteen were RCTs [17–28,30,31], one was a case–control study [30]. Among the RCTs, the comparison group was usual care in four studies [24,26,31,32]. An attention control (sessions peripheral to the intervention topics to control for additional time and attention) or a minimal intervention was used in ten studies [18–23,25,27–29]. The majority of the studies were conducted in clinics: seven outpatient [21,24,25,28,29,31,32], three community-based [18,22,27], and three university-affiliated [19,20,23]. Two studies were in inpatient settings [26,30]. Seven studies were conducted in the United States [18,19,22,23,26,27,30]. Of the remaining eight studies, 1 was conducted in Asia (Israel) [24] and 7 were conducted in Europe (England, Germany, Austria) [20,21,25,28,29,31,32].

Seven studies were patient-focused interventions [19,20,22–24,26,27], seven included a practitioner-focused intervention [21,25,28,30–32], and one targeted both patient and practitioner [18]. The practitioner-focused studies targeted physicians and nurses. The sample size of the interventions ranged from 61 to 1132 patients (median: 279) and 15–107 practitioners (median: 40). Fifty-two percent of the patients were female with a mean age of 56.3 years. In the six studies that reported patients' race 49% were white [18,20,22,23,27]. Four studies reported practitioner demographics [18,22,28,29]. While all of the studies aimed to improve patient and/or practitioner communication skills, three studies included additional intervention components. Two studies targeted patient self-management behaviors through health education and goal setting [22,27] and one provided feedback to practitioners on diabetes quality performance indicators [24]. It is of note that the latter study did not seek to improve the practitioners' communication skills and thus, was classified as a patient-focused study.

Nine studies targeted change in HbA1c among DM patients [19–21,23,25,26]; three of these also targeted changes in BP and/or lipids [22,24,27]. Two studies targeted change in BP among patients with HTN [18,32]. One targeted incident post-surgery tachyarrhythmia among patients that underwent cardiac surgery [30] and three targeted cardiovascular risk reduction [28,29,31]. The mean duration of the studies was 9 months (range: 2–18 months). Communication quality was objectively assessed in six papers [18–20,23,25,26], of which four used a validated measure [18,19,23,25]. Six studies used a self-report of patients' rating of the practitioners' communication skills [21,22,27,29,30,32]. Three studies did not measure patient–practitioner communication [24,28,31]. A majority (80%) of the studies used validated procedures to measure cardiovascular-related outcomes. One study did not indicate how the primary outcome was measured [20], one study indicated that participating practitioners provided the outcome data [29], and another used patient self-measured BP [32]. The effects of the interventions are summarized below and in Table 2.

3.2. Risk of bias

Only six of the 14 reviewed RCTs specified their procedures to randomize or included clear description of their allocation concealment procedures [18,20,22,26,28,31]. Eleven of the RCTs included information on blinding of the data collection procedures and/or whether the interaction partner was blinded to the study objectives [18–20,22–26,28,29,31]. Five of the six studies

Table 1
Characteristics of the included studies.

Study reference	Study design	Study duration (month)	Study setting	Number of patients	Number of practitioners	Completed follow-up		Communication measure	Clinical outcome	Statistical improvement in outcome between groups
						Intervention (%)	Control (%)			
Benner et al. [31]	RCT	6	Primary care practices	1103	[a]	93	86	None	CVD Risk	Yes
Cooper et al. [18]	RCT	12	Community-based clinics	279	41	55[b]		Observational	BP	No
Deinzer et al. [32]	RCT	12	Primary care practice	86	15	98	98	Patient self-report	BP	No
Greenfield et al. [19]	RCT	6	University-affiliated clinics	73	[a]	82	79	Observational	HbA1c	Yes
Kidd et al. [20]	RCT	3	University-affiliated diabetes clinics	202	[a]	[a]	[a]	Observational	HbA1c	No
Kinmonth et al. [21]	RCT	12	Primary care practice	360	107	71	67	Patient self-report	HbA1c	No
Koelewijn-van Loon et al. [28]	RCT	12	Primary care practice	615	24	83	87	None	CVD Risk	No
Krones et al. [29]	RCT	6	Primary care practice	1132	91	84	80	Patient self-report	CVD risk	No
Pill et al. [25]	RCT	18	Primary care practice	252	[a]	81	93	Observational	HbA1c	No
Rost et al. [26]	RCT	4	Inpatient diabetes treatment program	61	22	77	94	Observational	HbA1c	No
Schillinger et al. [27]	RCT	12	Community-based clinic	339	[a]	$\geq$ 85	$\geq$90	Patient self-report	HbA1c; BP	No
Trummer et al. [30]	Case–control study	2	Cardiac inpatient unit	199	38	98	98	Patient self-report	Post-surgery tachyarrhythmia	Yes
Weitzman et al. [24]	RCT	12	Primary care practice	417	15	97[b]		None	HbA1c; BP; LDL	Yes (LDL)
Williams et al. [23]	RCT	12	University-affiliated community hospital	232	[a]	85[b]		Observational	HbA1c	No
Williams et al. [22]	RCT	12	Community-based clinics	886	52	81	85	Patient self-report	HbA1c; lipid ratio	No

[a] Value not reported.
[b] Lost to follow-up not differentiated among conditions.

Table 2
Effects of improving patient–practitioner communication on cardiovascular clinical outcomes.

Study reference	Condition	Sample size	Mean change in clinical outcome	Statistical significance	
				Change in clinical outcome	
				Between group	Within group
Benner et al. [31]	**Practitioner intervention**: 2-day training on risk communication and motivational interviewing	Not provided	−0.5 points in 10-year CVD mortality risk	No	Yes
	Practitioner control: 2-h training in risk assessment	Not provided	−0.6 points in 10-year CVD mortality risk	Ref	Yes
	Patient intervention/control: none	1103			
Cooper et al. [18]	**Practitioner control (minimal)**: HTN guidelines, study newsletter, and journal summaries	19	−6.5/−0.9 mm Hg (+patient intensive)	No	–
			−0.1/+0.2 mm Hg (+patient minimal)	Ref	–
	Practitioner intervention (intensive): minimal + personalized communication skills program	22	−2.8/+0.2 mm Hg (+patient intensive)	No	–
			−2.3/−1.4 mm Hg (+patient minimal)	No	–
	Patient control (minimal): monthly newsletter; appointment reminders	139			
	Patient intervention (intensive): minimal + coaching and follow-up with CHW; photonovella	140			
Deinzer et al. [32]	**Practitioner intervention**: SDM communication skills training with regular supervision	40	−9.26/−5.33 mm Hg	No	Yes
	Practitioner control: UC	46	−6.00/−3.0 mm Hg	–	Yes
	Patient intervention/control: HTN self-management modules	–	–	–	–
Greenfield et al. [19]	**Practitioner intervention**: none				
	Patient intervention: 2 20-min sessions to improve question-asking and information-seeking skills	39	−1.53%	Yes	Yes
	Patient control: standardized education materials	34	+0.35%	Yes	No
[2,0]Kidd et al. [20] [b]	**Practitioner intervention**: none				
	Patient intervention:				
	Group 1: physician letter encouraging question-asking	38	7.8%		
	Group 2: single session to identify questions	42	8.2%	No	–
	Group 3: single session to identify/ rehearse questions	35	8.3%		
	Patient control:				
	Group 1: discussion about hospital layout	40	7.9%	No	No
	Group 2: UC	47	8.3%		
Kinmonth et al. [21] [b]	**Practitioner intervention**: (nurses and physicians) 0.5-day session on patient-centered care and behavior change. Nurses: 3 additional skills trainings	22	7.07%	No	–
	Practitioner control: 2–0.5 day sessions on evidence-based guidelines and materials (nurses only)	21	7.17%	No	–
	Patient intervention: none	360			
Koelewijn-van Loon et al. [28]	**Practitioner intervention**: 1-day training on CHD risk assessment tools and communication skills		−6.3 absolute 10 year risk of CHD	Yes	Yes
			−115% change in modifiable risk	Yes	Yes
	Practitioner control: UC		−4.9 absolute 10 year risk of CHD	Ref	Yes
			−96% change in modifiable risk	Ref	Yes
	Patient intervention/control: none				
Krones et al. [29]	**Practitioner intervention**: 2-two hour sessions on CVD risk calculation and SDM communication	44	−3.00% CVD risk	No	–
	Practitioner control: seminars unrelated to CVD	47	−3.33% CVD risk	Ref	–
	Patient intervention: none	1132			

Table 2 (*Continued*)

Study reference	Condition	Sample size	Mean change in clinical outcome	Statistical significance	
				Change in clinical outcome	
				Between group	Within group
Pill et al. [25]	**Practitioner intervention (nurses and physicians)**: behavior change counseling packet; patient leaflets; bimonthly newsletter; continuing support (Nurses)	[a]	+0.693%	No	–
	Practitioner control: distribution of patient leaflets	[a]	+1.153%	No	–
	Patient intervention: none	252			
Rost et al. [26]	**Practitioner intervention**: none	22			
	Patient intervention: single nurse-led session on SDM and active participation; identify list of questions	30	−1.2%	No	Yes
	Patient control: UC	31	−1.1%	No	No
Schillinger et al. [27]	**Practitioner intervention**: none				
	Patient interventions: randomized to either: weekly automated telephone self-management support with nurse follow-up	112	−0.1% (vs. UC) −3.2/−1.6 mm Hg (vs. UC) −0.3% (vs. GMV) 0.7/1.5 mm Hg (vs. GMV)	 No No	 – –
	Monthly 90-min group medical visits (GMV)	113	0.2% −3.9/−3.1 mm Hg	No No	– –
	Patient control: UC	114	Ref		
Trummer et al. [30]	**Practitioner intervention**: 2-h didactic session on communication; 3-h interactive training; supervision of at least 9 patient encounters	38	4% (incidence of post surgery tachyarrhythmia) 8.1 days (adjusted days on ward)	Yes Yes	– –
	Patient intervention: none	97			
	Patient control: pre-intervention comparaison	98	18% 9.3 days	Ref Ref	– –
[2,0]Weitzman et al. [24]	**Practitioner intervention only**: comparison of DM quality performance indicators with other study clinics	175	Ref		
	Patient intervention (dual): letter from clinic director encouraging DM-related discussion with the practitioner	275	−0.3% −6.0 mg/dl −4.2 mm Hg (SBP)	No Yes No	
	Patient control: UC				
Williams et al. [23]	**Practitioner intervention**: none				
	Patient intervention: 3–20 min sessions to identify and clarify patients' questions	120	Not reported	No	–
	Patient control: 3–20 min videos on DM care	112	Not reported	No	–
Williams et al. [22]	**Practitioner intervention**: none	52			
	Patient intervention: computerized DM care assessment, action planning, and brief nurse counseling	469	Not reported	No	
	Patient control: computerized assessment of general health risks and DM care	417	Not reported	Ref	

Ref = reference group; HTN = hypertension; SDM = shared decision-making; UC = usual care; % [HbA1c]; mm Hg [BP]; mg/dl [LDL]

[a] All analyses adjusted for covariates.

[b] No baseline data provided, data represents mean value at final follow-up.

that included audiotape analysis indicated whether the coders were blind to group assignment and used a standardized rating tool [18–20,23,25]. Five of these studies also reported inter-rater reliability calculations [18,19,23,25,26]. Nine studies used completers analysis [19–23,25–27,32], with few reporting clearly how they handled incomplete outcome data (e.g., using an intent-to-treat analysis) [18,21,23,24,28,29,31].

3.3. Patient-focused interventions

Patients were the primary focus in seven of the studies [19,20,22–24,26,27]. All of the studies included an intervention strategy to improve patients' active participation in the medical visit, most frequently, increasing question-asking. However, the method of intervention delivery and dose varied across studies. In three of the studies, trained staff delivered the intervention prior to an audio-taped visit with the patient's physician (average of two intervention sessions) [19,20,23]. One of the studies demonstrated a significant benefit from the intervention [19]. In this RCT, two 20-min coaching sessions, designed to improve patients' information-seeking and question-asking skills prior to an audio-taped clinic visit, was associated with a significant decrease in mean HbA1c among 73 patients with DM as compared to control sessions that reviewed standardized DM

education materials (−1.53% vs. 0.35%, respectively). Lower HbA1c was also associated with more active patient participation and more effective question-asking without affecting the length of the clinic visit [19].

Nurses and physicians delivered the interventions in two studies targeting HbA1c levels in patients with DM [26,27]. One study included nurse-led coaching to improve patients' information-seeking and decision-making. The second study encouraged active patient participation in a multi-component self-management intervention. Neither study demonstrated significant between group differences in HbA1c. However, the former study demonstrated a significant decrease in HbA1c within the intervention group (−1.2% vs. −1.1% in the control group) [26]. Both studies reported significant improvements in patient–practitioner communication assessed by either self-report (e.g., ratings of practitioner interpersonal communication, explanations and elicitation of patient problems) [27] or interactional analysis of audio-taped sessions (e.g., increase in patient question-asking) [26].

In two studies, the intervention was delivered via print or computer-based modalities [22,24]. In one, patients who received a letter encouraging him/her to discuss important DM-related issues with their physician exhibited significantly lower low density lipoprotein (LDL) compared to usual care (104.7 mg/dl vs. 110 mg/dl, respectively) [24]. A higher proportion of patients in the intervention group also met all three target (HbA1c < 9%, LDL < 130 mg/dl and systolic BP < 140 mm Hg) outcomes (38.8% versus 24.2%, respectively). In a secondary analysis of a computer-assisted intervention, which included goal setting and a patient generated list of issues to discuss with the physician, the second study found no significant between-group differences in HbA1c level or lipid ratio [22]. However, patients' ratings of his/her physician's autonomy supportive behaviors (e.g., provides patients with choices, encourages question-asking) significantly increased in the intervention group compared to a computer-assisted attention control group that did not focus on goal setting.

3.4. Practitioner-focused interventions

In the seven studies targeting practitioners only, all of the interventions were workshops designed to improve practitioners' communication skills with 71% of studies including subsequent booster trainings throughout the course of the study to practice the skills [21,25,29,30,32]. One case–control study reported a significantly lower incidence of post-surgery tachyarrhythmia in the intervention group than in a historical control group (4% vs. 18%) [26]. Perceived emotional quality of communication with the practitioners (e.g., degree of friendliness, sensitivity, supportiveness) was also higher in the intervention group. In this study, practitioners received supervision by psychotherapists trained in communication techniques, in addition to the workshop and booster trainings, during nine of their patient encounters. Using a similar intervention approach, Deinzer et al. [32] did not demonstrate a beneficial effect of practitioner communication training coupled with ongoing supervision on changes in patients' BP. However, intervention patients reported significantly higher levels of shared decision-making than the control group at one year.

Two of the practitioner-focused studies that included additional booster trainings only offered such opportunities to participating nurses (approximately 8 additional hours) resulting in a higher percentage of nurses discussing the intervention materials (i.e. diabetes education booklet, agenda setting chart, readiness ruler) with patients as compared to participating physicians [21,25]. Despite additional support, a majority of nurses stopped using the intervention materials over time feeling it was too difficult to integrate them into time constrained visits and not congruent with their professional role [33]. In both studies, application of the skills by physicians also declined over time. In one study, 19% of practitioners reported regular use 30 months post-baseline [25].

Three of the reviewed studies were designed to improve practitioner's risk assessment and communication skills among patients with high cardiovascular risk [28,29,31]. In the REACH OUT study, intervention practitioners participated in a one-day training that included discussions about coronary heart disease (CHD) risk, the Framingham risk assessment process, and effective risk communication skills. Intervention materials and scripts were reviewed through role plays [31]. At the 6-month follow-up, there was a significant between-group difference in absolute 10-year risk of CHD in the intervention group compared to usual care (−1.4, 95% confidence interval [CI]: −2.1, −0.8; $p < .0001$). Patients in the intervention group also exhibited significantly greater reductions in modifiable risk of CHD (−18.5%, 95%CI: −35.5, −1.4; $p = .03$) [31]. The remaining two studies failed to show an effect of a shared decision-making and decision aid intervention on mean change in cardiovascular risk [28,29]. However, one reported higher levels of shared decision-making among intervention patients immediately following a clinical encounter as well as less decisional regret 6 months later [29].

3.5. Patient and practitioner-targeted intervention

One study targeted both patient and practitioner communication skills [18]. In this study, 279 patients and 41 physicians were randomized to either a minimal or intensive patient-centered intervention to improve BP and medication adherence [18]. The physician intensive intervention used an interactive CD-ROM-based, communication skills training program that included a medical encounter, coded with the Roter Interaction Analysis System (RIAS) [34] between the participating physician and a standardized patient (SP). Physicians were asked to review the coded encounter that included individualized feedback of their communication skills based on RIAS scores and complete case-based exercises. Physicians in the minimal intervention group received a copy of the JNC-7 guidelines, summaries of studies related to care for CVD patients and health disparities, and a monthly study newsletter. Intensive intervention physicians also received these materials. Patients randomized to the minimal intervention group received a monthly newsletter with health tips, a question and answer column, recipes, and reminders to keep clinic appointments. Patients randomized to the intensive intervention group participated in a 20-min coaching session delivered by a trained community health worker (CHW) prior to an audio-taped visit with their physician and a 10-min post-visit debriefing. They also participated in up to 10 check-in phone calls with the CHW and received a series of photo-novellas (e.g., small booklets that use pictures and words to tell a story) that reinforced the intervention's key messages.

At the 12-month follow-up, there were no differences between groups in BP or self-reported medication adherence [18]. Based on RIAS-coded clinic visits, all participating physicians exhibited less verbal dominance with their patients. However, those in the intensive intervention group were less patient-centered compared to their baseline assessment. Patients in the intensive intervention group reported higher levels of participatory-decision making and greater involvement when their physician was in the intensive intervention group.

4. Discussion and conclusions

4.1. Discussion

Thorough review of the literature yielded 15 studies that tested the effects of improving the quality of patient–practitioner

communication on cardiovascular-related clinical outcomes. Patient-focused and practitioner-focused studies each comprised 46.7% of the reviewed interventions, one targeted both. Four of the 15 studies (26.7%) reported a statistically significant improvement in a clinical outcome attributed to the intervention [19,24,30,31]. The two effective patient interventions comprised a simple approach to coaching patients to ask more questions in the clinic visit [19,24], sometimes called patient activation [7]. The practitioner interventions combined didactic workshops, interactive role-plays and ongoing supervision to increase practitioners' patient-centered or risk communication skills [30,31]. A majority of studies documented improvements in active patient participation [16,21,22,30], shared decision-making and information exchange [18,25,26,29], emotional quality of practitioner communication [30], perceived autonomy support by the practitioner [22], and practitioner communication rated as excellent [21].

Four limitations in study design in the reviewed papers diminished finding robust causal relationships. Lack of assessment of practitioners' baseline communication skills made it difficult to distinguish if non-significant findings reflect an inability to alter practitioners' skills, ceiling effects, or extraneous confounding variables [20,25]. Three studies did not assess communication, rendering it impossible to determine whether clinical outcomes resulted from the interventions [24,28,31]. For instance, in Weitzman et al. [24] all participating physicians received feedback on quality performance indicators related to their patients' DM care; thus, improvements in the clinical outcomes may have been due to more treatment independent of changes of relationship quality. Most of the interventions were brief. Patient interventions were limited to an average of two sessions, possibly an insufficient dose to translate into changes in clinical outcomes months later. Cooper et al. [18] attempted to address these issues by including patient check-in calls with a CHW to provide ongoing contact and support; however, the structure and content of their calls were not described. Similarly, studies with a practitioner component included few intervention contacts with limited opportunity for practice. Studies have shown that the ability to receive ongoing constructive feedback on newly acquired skills results in more durable and sustained improvements in communication [35]. Such reinforcement did occur in one of the effective practitioner-focused studies that included ongoing supervision and feedback of actual patient encounters [30]. Not including reinforcement may lead to a decay of knowledge and skills [36]. This was seen in the reviewed studies where physicians were rated as less patient-centered and less likely to use the intervention approach at the follow-up visit compared to their pre-intervention ratings [18,25]. Although, this apparent degradation in clinical communication skills is worrisome it may also reflect "expertise reversal," when experienced practitioners who are automatic in their skills appear less skilled when they become consciously aware of these skills in order to improve them [37].

Finally, the negative studies may have failed to find effects by utilizing a 'one size fits all' intervention that did not incorporate patients' and practitioners' preferred communication style [38]. For example, Deinzer et al. [32] reported an association between higher levels of shared decision-making and lower BP in the patient subgroup that preferred shared-decision making at baseline. Williams et al. [22,23] found that reductions in HbA1c were a function of level of active patient participation and perceived competence, irrespective of group assignment.

The methodological limitations of the studies reviewed also highlight prevalent shortcomings of the patient–practitioner communication outcomes literature. For example, the reported communication measures varied so widely that communication constructs and behaviors could not be directly compared. Results between the two types of measures sometimes conflicted; for example, the coding system rated the physician as less patient-centered but patients perceived physicians to facilitate more information exchange and shared decision-making, or vice versa [18]. It remains to be determined whether patient's perception of the visit or what measurements say happened is more directly linked to changes in clinical outcomes.

Regardless of the intervention focus (patient, practitioner, or both); the quality of communication was measured from the perspective of only one partner of the dyad. Yet patients and practitioners can and do disagree on the quality of communication [39]. Such lack of agreement has been shown to increase practitioner frustration, and lower patient trust, satisfaction and adherence behaviors [40]. Failure to consider the reciprocal nature of the relationship may have limited researchers' ability to demonstrate the impact of patient–practitioner communication on outcomes. Finally, these studies lacked a conceptual model connecting changes in communication processes that occur *within* the clinic visit to patient behaviors that would facilitate improvements in clinical outcomes *outside* of that environment.

There are limitations of this review. We may have missed some studies and by limiting our review to cardiovascular outcomes we may have excluded relevant work in different patient populations. However, we did include a search of the gray literature as well as studies reporting non-significant findings to minimize publication bias. We may have also excluded a potentially relevant article published in non-English language due to an inability to obtain the full article limiting the generalizability of this review. Finally, we decided against limiting our search to a particular setting (e.g., primary care) or study design (e.g., RCT) as we felt it would have been too restrictive and might not have accurately captured the current state of the literature.

4.2. Conclusions

Despite increasing evidence that the interpersonal dynamics of the patient–practitioner relationship affects the quality of patient care, interventions to alter patient–practitioner communication skills have not yet translated to improvements in clinical outcomes. Of the 15 interventions included in this review, only one-quarter of the studies ($n = 4$) reported a statistically significant improvement in the clinical endpoint. Findings from the positive studies suggest that intervention approaches that seek to enhance patient participation within the medical visit and incorporate ongoing feedback to improve practitioners' clinically critical communication skills may be effective for improving cardiovascular-related clinical outcomes.

We suggest areas for future research based on this review. Theory building is needed to define a program of research to guide policy and practice. Comprehensive conceptual models, such as the evidence-based Macy Initiative in Health Communication [41] offer a start in linking elements of patient–practitioner communication and outcomes by organizing findings from diverse areas of research and guiding hypothesis generation. A model, which combines a refined, empirically derived understanding of critical attributes of communication, the individuals and context, is needed to make sense of the current literature and determine if and how communication affects clinical outcomes. Such a model would suggest iterative refinements of interventions and clarify whether short-term intervention approaches like those identified in this review have the power to produce behavior changes that improve important clinical outcomes.

In the future, scholars should utilize existing, validated communication tools and examine communication longitudinally in order to assess the dynamic nature of communication within the relationship rather than rely on a single assessment at the

baseline visit. This would provide a knowledge base about the evolution of patient–practitioner relationships that may be more likely to explain differences in patient behavior and outcomes.

4.3. Practice implications

The topic of improving patient–practitioner communication is vital as cardiovascular-related clinical outcomes such as blood pressure, lipid, and glycemic control are established quality indicators of practitioner performance and effectiveness in managing CVD. The interaction between the quality of the patient–practitioner relationship and patient outcomes has not gone unnoticed. Government organization and national medical associations alike support the integration of communication skills training into medical education and practice, emphasizing the importance of fostering the relational aspects of the medical interview in addition to the technical information exchange. While these statements are encouraging in principle, the findings from the present review indicate that in reality, there are still many opportunities for improvement.

At the practitioner-level, communication skills training should be systematically incorporated throughout the medical school curricula with ongoing support of a committed and trained faculty. To derive the greatest benefits, training opportunities should extend beyond the pre-clinical years to residency and continuing medical education when communications skills are the focal point of patient care. Evidence shows that practitioners' communication skills change and endure when training models incorporate deliberative practice, individual attention and ongoing feedback, take into account practitioners' level of expertise, utilize role-plays, include the creation of personal learning goals, self-performance assessment, and connection of learning to current practice [35,42,43].

At the patient-level, there is a need for intervention strategies to detect and adapt to patients' preferred communication style, needs, and skills that could easily be delivered in a busy clinic waiting room. Advancements in health information technologies such as virtual health coaches, patient portals, and interactive videos that support patient shared decision-making are providing new opportunities to prepare patients to be informed, activated partners in their care [44–46]. The Video Doctor multimedia tool is an example of one such intervention that has been shown to increase patient participation in the medical visit as well as improve lifestyle behaviors (e.g., reduce smoking, increase exercise and healthy eating) in a variety of patient populations [45].

The need for innovative and sustainable communication training models are more important than ever as policy and law move toward new models of care such as the Patient-Centered Medical Home and the government regulates approaches to care such as shared decision-making [47]. Funding initiatives by organizations such as the Patient-Centered Outcomes Research Institute (PCORI) which are designed to rigorously focus research on patients' preferences and collaborative partnerships provide the impetus to invest in developing approaches that can address some of the limitations highlighted in this review. The advent of new payment models that focus on improving the efficiency and quality of patient care (e.g. accountable care organizations) will also require a fundamental shift in the way health care institutions and payers incentivize practitioners to acquire and refine the skills needed to deliver patient-centered care [48]. The Communication Climate Assessment Toolkit endorsed by the National Quality Forum offers health care institutions one method to assess and track organizational performance in patient-centered communication for quality improvement interventions [49]. Patient surveys such as CAHPS and the Press Ganey satisfaction questionnaire can also be used to identify areas for improvements in communication. The Geisinger Health System serves as an exemplar institution that integrates patient feedback into ratings of practitioner and clinic performance to improve the quality of patient-centered care [50]. When patients and practitioners are able to find common ground through collaborative communication, coordination, negotiation, and understanding of one another's perspectives, we may able to attain the full potential of patient-centered care to impact cardiovascular-related clinical outcomes.

Conflict of interest

All authors declare that there are no competing or financial relationships that may lead to a conflict of interest.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.pec.2014.04.006.

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