Can Patient–Provider Interpersonal Interventions Achieve the Quadruple Aim of Healthcare? A Systematic Review

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BACKGROUND: Human connection is at the heart of medical care, but questions remain as to the effectiveness of interpersonal interventions. The purpose of this review was to characterize the associations between patient–provider interpersonal interventions and the quadruple aim outcomes (population health, patient experience, cost, and provider experience).

METHODS: We sourced data from PubMed, EMBASE, and PsycInfo (January 1997–August 2017). Selected studies included randomized controlled trials and controlled observational studies that examined the association between patient–provider interpersonal interventions and at least one outcome measure of the quadruple aim. Two abstractors independently extracted information about study design, methods, and quality. We characterized evidence related to the objective of the intervention, type and duration of intervention training, target recipient (provider-only vs. provider–patient dyad), and quadruple aim outcomes.

RESULTS: Seventy-three out of 21,835 studies met the design and outcome inclusion criteria. The methodological quality of research was moderate to high for most included studies; 67% of interventions targeted the provider. Most studies measured impact on patient experience; improvements in experience (e.g., satisfaction, patient-centeredness, reduced unmet needs) often corresponded with a positive impact on other patient health outcomes (e.g., quality of life, depression, adherence). Enhanced interpersonal interactions improved provider well-being, burnout, stress, and confidence in communicating with difficult patients. Roughly a quarter of studies evaluated cost, but the majority reported no significant differences between intervention and control groups. Among studies that measured time in the clinical encounter, intervention effects varied. Interventions with lower demands on provider time and effort were often as effective as those with higher demands.

DISCUSSION: Simple, low-demand patient–provider interpersonal interventions may have the potential to improve patient health and patient and provider experience, but there is limited evidence that these interventions influence cost-related outcomes.

KEY WORDS: interpersonal interventions; quadruple aim; systematic review; patient–provider communication.

J Gen Intern Med 35(7):2107–17
DOI: 10.1007/s11606-019-05525-2

Electronic supplementary material *The online version of this article (https://doi.org/10.1007/s11606-019-05525-2) contains supplementary material, which is available to authorized users.*

Prior presentations*: Academy Health Annual Research Meeting, June 2019*

Received October 16, 2019
Revised October 16, 2019
Accepted October 25, 2019
Published online January 9, 2020

"You treat a disease, you win, you lose. You treat a person, I guarantee you, you'll win, no matter what the outcome." —*Patch Adams.*

INTRODUCTION

Humanism is central to clinical care, yet the demands of modern medicine and technology can interfere with meaningful interpersonal interactions between patients and providers.[1, 2] Beyond their inherent value, better connections between patients and providers can improve symptoms, increase adherence to medical recommendations, and reduce medical errors.[3–5] Moreover, routinely failing to connect contributes to physician burnout, which may initiate a downward spiral in patient–provider relationships.[6]

Efforts to improve interpersonal patient–provider interactions have often used patient-centered approaches (e.g., shared decision-making) to enhance communication.[7–10] Previous reviews have explored the effectiveness of

resulting interventions,[11, 12] mostly focusing on how they might improve patient morbidity and satisfaction with care.[13, 14] Fewer studies have looked at the larger range of health-related outcomes including cost and the provider experience, or at which attributes effective interventions might have in common.

To fill this gap, we designed a systematic review to examine the association between patient–provider interpersonal interventions and the quadruple aim of improving population health, patient experience, cost of care, and provider experience.[15] The first three outcome domains were originally proposed by Berwick and the Institute for Healthcare Improvement as the triple aim (improving the care of individuals, improving health of populations, and reducing per capita costs) and have become widely accepted as the pillars of optimizing healthcare performance.[16] The addition of the fourth aim—provider experience—by Bodenheimer and Sinsky in 2014 recognizes that "the care of the patient requires care of the provider."[15] We sought to identify promising interventions—and characteristics across interventions—that have the greatest potential to enhance interpersonal interactions and meaningful outcomes.

METHODS

Data Sources and Searches

To ensure comprehensiveness, we searched PubMed, EMBASE, and PsycInfo in August 2017, published between January 1, 1997, and August 31, 2017.

Study Selection

We searched for studies of interpersonal interventions, defined as those that address the relationship between patients and their providers (e.g., doctor, nurse) and that incorporate or encourage "a selective, systemic process that allows people to reflect and build personal knowledge of one another and create shared meanings."[17] To capture all such interventions, our search included a broad array of MeSH and keywords encompassing domains including trust, empathy, humanism, nonverbal communication, social skills, and interpersonal relations (see Table 4 in the Appendix for complete search strategies).

We defined the following a priori inclusion criteria: (1) the study was a randomized controlled trial (RCT), controlled observational study (i.e., an experimental study with a non-randomized control group), or systematic review; (2) the study evaluated an interpersonal intervention (concept 1 search terms); and (3) the study included at least one quadruple aim outcome (i.e., an outcome pertaining to population health [operationalized as outcomes related to health or healthcare], patient experience, provider experience, or direct or indirect measures of cost) (concept 2 search terms, Table 4 in the Appendix).[15] We excluded non-English studies, animal research, and research with participants younger than 18 years of age.

To conduct the review, we utilized the online systematic review tool Covidence (Veritas Health Innovation Ltd., Melbourne, 2018). Throughout the review process, team members checked each article for eligibility based on study design (i.e., RCT, controlled observational study, systematic review), interpersonal intervention, and presence of at least one quadruple aim-related outcome reported (e.g., frequency of return visits, blood pressure, patient satisfaction, provider burnout). One reviewer (A.T.) examined all systematic reviews to capture additional eligible RCTs and controlled observational studies.

Data Extraction and Quality Assessment

Two or more authors independently reviewed each title/abstract and the selected full-text articles (I.R., A.T., G.P., S.B., R.S.). Two reviewers independently abstracted (I.R., A.T., G.P., S.B.) and assessed the methodological quality of each study (A.T., S.B.) using the Cochrane criteria for grading randomized controlled trials and Effective Practice and Organisation of Care (EPOC) criteria for assessing risk of bias in observational studies.[18] In addition, two reviewers independently graded the level of evidence for each study based on the Oxford Centre for Evidence-Based Medicine levels of evidence (A.T., M.H.).[19] Disagreements were resolved through discussion and consensus with a third reviewer (M.H., R.S.).

Data Synthesis and Analysis

Given the heterogeneity of outcomes across studies, we were unable to conduct a meta-analysis and instead systematically organized the data in an effort to synthesize findings across studies. For each study, we characterized the intervention content focus, structure, demand on participants, and target (or recipient) of the intervention (i.e., provider, or provider and patient). For content focus, we categorized interventions into one of nine focus areas based on the concept most closely related to the intervention objective (e.g., motivational interviewing, communication skills, shared decision-making). For intervention structure, we determined whether the intervention involved any of four structures: (1) educational component (e.g., workshop or presentation), (2) practice (e.g., dyadic exercises such as role-playing and teach-back), (3) general instruction (i.e., recipient receives explicit instructions about the intervention with or without additional training), and/or (4) a tool (e.g., pocket guide, handout that encourages perspective-taking). Because interventions often combined components, we developed nine mutually exclusive categories to encompass the observed combinations of these four structures. To assess the intervention demand on participants, we adapted the intensity rating of Rao et al. by examining the time spent in training based on actual training time and

Table 1 Characteristics of Interventions Included in the Review

	n	%
Content focus		
Motivational interviewing	6	8
Health literacy	3	4
Patient–provider relationship	3	4
Patient-centered care	14	19
Communication skills	21	29
Shared decision-making	5	7
Specific communication technique	16	22
Psychological/therapeutic interview	2	3
Mindfulness	3	4
Structure*		
Education	65	89
Practice	60	82
Instructions	6	8
Tool	29	40
Demand on provider time/effort		
Low	24	33
Moderate	29	40
High	12	16
Not reported	8	11
Target recipient		
Provider-only	51	67
Provider and patient	22	30

**Interventions could include more than one structural component*

duration of training period.[20] We categorized each intervention as low, moderate, or high demand. The target (or recipient) of the intervention was categorized as provider-only or provider–patient dyad (Table 1).

We characterized study outcomes and mapped them to each of the quadruple aim domains (population health outcomes, patient experience, cost of care, and provider experience). Because RCTs rarely examine changes in population health, we examined health outcomes (e.g., physical health, mental health, treatment adherence, healthcare utilization, pain, and patient prescription rate) based on the assumption that changes in these outcomes have the potential to influence population health over time. Patient experience outcomes included satisfaction, provider communication quality, patient perception of partnership, extent of patient participatory decision-making, patient motivation to adhere, quality of health information provided, and perceived visit length. Cost outcomes included direct measures of cost and outcomes that could potentially generate savings (e.g., utilization efficiency, prescription rates). To examine reports of visit duration, we gathered all studies that account for visit length ($n = 11$) and abstracted information on the control/baseline visit length as well as identified reduction, extension, or no change in time. Provider experience outcomes included provider communication (perceived and observed), provider perception of relationship with patient, satisfaction, burnout/stress, and patient-centeredness (perceived and observed).

Role of the Funding Source

The funding sources had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication. The review is registered at Prospero: CRD42019120160.

RESULTS

Selected Articles and Study Characteristics

Our initial search, title/abstract and full-text screening, and culling of studies from systematic reviews resulted in a total of 73 articles (see Table 2).[21–93] Two articles reported data from the same trial, but the outcomes and timeframes were unique and are therefore referred to as separate studies.[43, 44] Sixty-seven studies were randomized controlled trials and six were controlled observational studies. Studies predominantly took place in the outpatient setting (86%), with some occurring in the inpatient setting (8%), or both (6%). Most studies took place outside of the USA (60%). Approximately two thirds of the studies (45/73) described a framework that guided the intervention. Study outcomes were assessed over a wide range of follow-up times (i.e., 2 days to 3.5 years, with an average of 258 days after the intervention). No studies reported outcomes beyond 3.5 years. Study characteristics are presented in Table 5 in the Appendix.

Quality Assessment and Levels of Evidence. The methodological quality of research was moderate to high for most studies.[18] Most studies ($n = 71/73$) had a quality score above 2.0, which indicates moderate to high quality, with an average score of 2.57 (SD = 0.21). The primary reason for lower quality scores was incomplete outcome data. Consistent with the combined Cochrane and EPOC ratings, 92% of studies were level 1 according to the levels of evidence, reflecting the highest-quality research (Table 6 in the Appendix).

Synthesis of Interpersonal Interventions

Interventions most commonly focused on general communication skills (29%; e.g., verbal and nonverbal skills), a specific communication technique (22%; e.g., instruction to ask a patient "Is there something else?" rather than "Is there anything else?" at the end of the visit),[66] or a patient-centered care strategy (19%; e.g., training based on a patient-centered care framework). Fewer interventions focused on motivational interviewing (8%), shared decision-making (7%), the patient–provider relationship (4%), mindfulness (4%), health literacy (4%), or a psychological/therapeutic technique (3%). In terms of demand on participants' time and effort, 24 (33%) of the interventions were low demand, 29 (40%) were moderate demand, and 12 (16%) were high demand (Table 7 and 8 in the Appendix). Eight (11%) studies did not report intervention time and effort demands. Most interventions incorporated more than one structural component, most commonly an educational activity (e.g., workshop) and a practice element (e.g., role-play) ($n = 34$, 47%). Three interventions (4%) were limited to a practice, three (4%) were limited to instruction

Table 2 Study and Intervention Characteristics

Study	Study design*	Quality assessment	Content focus	Intervention structure	Demand	Recipient	Framework (yes/no)
Aboumatar 2013[21]	RCT*	2.45	Health literacy	Education and tool	Low	Provider and patient	No
Aiarzaguena 2007[22]	RCT	3.00	Specific communication technique	Education, practice, and tool	Moderate	Provider	Yes
Ajam 2017(97)	RCT	3.00	Communication skills	Education and practice	High	Provider	Yes
Akturan 2017(98)	RCT	2.82	Psychological/ therapeutic interview	Education and tool	Low	Provider	Yes
Alder 2007[25]	RCT*	2.64	Communication skills	Education, practice, and tool	Moderate	Provider	No
Altiner 2007(99)	RCT	2.67	Health literacy	Practice	Not reported	Provider and patient	Yes
Au 2012[27]	RCT	2.45	Specific communication technique	Tool	Low	Provider and patient	Yes
Aubin-Auger 2016[28]	RCT*	2.36	Patient-centered care	Education and practice	Low	Provider	Yes
Bakker 2007[29]	RCT	2.64	Specific communication technique	Education	High	Provider	No
Bashour 2013[30]	RCT*	2.91	Communication skills	Education and practice	Moderate	Provider	No
Bellón 2008[31]	RCT	2.55	Specific communication technique	Education, practice, and tool	Moderate	Provider	Yes
Bernhard 2012[32]	RCT*	2.42	Specific communication technique	Education and practice	Low	Provider and patient	No
Bieber 2008[33]	RCT*	2.55	Shared decision-making	Education and practice	Moderate	Provider and patient	Yes
Bieber 2006[34]	RCT*	2.82	Shared decision-making	Education and practice	Moderate	Provider and patient	Yes
Bittner 2016[35]	Controlled observational*	2.73	Specific communication technique	Practice	Low	Provider	No
Blatt 2010[36]	RCT*	2.73	Specific communication technique	Instructions	Not reported	Provider	No
Blödt 2016[37]	RCT*	2.55	Communication skills	Education and practice	Moderate	Provider	Yes
Boissy 2016[38]	Controlled observational	2.33	Relationship	Education and practice	Low	Provider	Yes
Briel 2006(100)	RCT	2.73	Patient-centered care	Education and practice	Low	Provider	Yes
Brock 2011[40]	RCT*	2.45	Specific communication technique	Education, practice, and tool	Low	Provider	No
Brown 1999[41]	RCT*	2.67	Patient-centered care	Education and practice	Moderate	Provider	No
Brown 2000[42]	Controlled observational*	2.00	Communication skills	Education and tool	Moderate	Provider	No
Cals 2011(101)	RCT	2.64	Communication skills	Education, practice, and tool	Low	Provider	Yes
Cals 2013(102)	RCT	2.82	Communication skills	Education, practice, and tool	Low	Provider	Yes
Cooper 2013[45]	RCT*	2.55	Patient-centered care	Education and practice	Low	Provider and patient	No
Cooper, 2011[46]	RCT*	2.36	Patient-centered care	Education and practice	Not reported	Provider and patient	Yes
Curtis 2013[47]	RCT	2.64	Specific communication technique	Education, practice, and tool	Moderate	Provider	No
Daly 2010[48]	Controlled observational*	2.56	Specific communication technique	Education and practice	Not reported	Provider and patient	No
Delvaux 2004[49]	RCT*	2.82	Specific communication technique	Education and practice	High	Provider	No
DeMaria 2011[50]	RCT	2.45	Psychological/ therapeutic interview	Education, practice, and tool	Low	Provider	Yes
Dunn 2013[51]	RCT	2.36	Mindfulness	Education, practice, and tool	High	Provider	No

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Table 2. (continued)

Study	Study design*	Quality assessment	Content focus	Intervention structure	Demand	Recipient	Framework (yes/no)
Edgoose 2014[52]	RCT	2.36	Patient-centered care	Instructions	Low	Provider	Yes
Edwards 2004[53]	RCT*	2.45	Shared decision-making	Education and practice	Low	Provider	No
Epstein 2017[54]	RCT*	2.64	Patient-centered care	Education and practice	Moderate	Provider and patient	Yes
Finnema 2005[55]	RCT	2.64	Specific communication technique	Education and practice	High	Provider	Yes
Fujimori 2014[56]	RCT*	2.64	Communication skills	Education and practice	Moderate	Provider	Yes
Fukui 2011[57]	RCT*	2.64	Communication skills	Education, practice, and tool	Moderate	Provider	Yes
Fukui 2009[58]	RCT*	3.00	Communication skills	Education, practice, and tool	High	Provider	Yes
Grepmair 2007[59]	RCT	2.82	Mindfulness	Practice	High	Provider	No
Griffey 2015[60]	RCT	1.82	Health literacy	Education and practice	Not reported	Provider	No
Harmsen 2005[61]	RCT	2.45	Specific communication technique	Education and practice	Moderate	Provider and patient	Yes
Haskard 2008[62]	RCT*	2.55	Communication skills	Education, practice, and tool	Moderate	Provider and patient	No
Heritage 2007[63]	Controlled observational*	2.64	Specific communication technique	Education, instruction, and tool	Low	Provider	No
Hietanen 2007[64]	RCT	2.73	Communication skills	Education and practice	Moderate	Provider	No
Jaffray 2014[65]	RCT	2.45	Motivational interviewing	Education and practice	Moderate	Provider	No
Johnson 2008[66]	RCT*	2.64	Communication skills	Instructions	Low	Provider	No
Jones 2016[67]	RCT	2.55	Motivational interviewing	Education	Moderate	Provider and patient	Yes
Kim 2012[68]	RCT*	2.45	Motivational interviewing	Education, instruction, and tool	Not reported	Provider	Yes
Kinmonth 1998[69]	RCT	2.36	Patient-centered care	Education, practice, and tool	Moderate	Provider and patient	No
Langewitz 1998[70]	RCT*	2.64	Patient-centered care	Education, practice, and tool	Moderate	Provider	Yes
Little 2015[71]	RCT	2.45	Communication skills	Education and practice	Low	Provider	Yes
Loh 2007[72]	RCT	2.73	Shared decision-making	Education, practice, and tool	High	Provider and patient	Yes
Lonsdale 2017[73]	RCT	3.00	Communication skills	Education	Moderate	Provider	Yes
Luo 2007[74]	RCT*	2.73	Relationship	Education and practice	Not reported	Provider	Yes
Maatouk-Bürmann 2016[75]	RCT*	2.50	Communication skills	Education and practice	High	Provider	Yes
Manze 2015[76]	RCT	2.82	Communication skills	Education, practice, and tool	Low	Provider and patient	Yes
Mercer 2016[77]	RCT	2.64	Mindfulness	Education, practice, and tool	High	Provider and patient	Yes
Merckaert 2015[78]	RCT	2.55	Communication skills	Education and practice	High	Provider	No
Middleton 2006[79]	RCT	2.64	Specific communication technique	Education, practice, and tool	Low	Provider and patient	Yes
Moral 2015[80]	RCT	2.42	Motivational interviewing	Education and practice	Moderate	Provider	Yes
Muñoz Alamo 2002[81]	RCT	2.45	Patient-centered care	Education and practice	Moderate	Provider	Yes
Penner 2013[82]	RCT	2.36	Patient-centered care	Instructions and tools	Low	Provider and patient	Yes
Pill 1998[83]	RCT*	2.55	Patient-centered care	Education, practice, and tool	Moderate	Provider	Yes
Rakel 2011[84]	RCT	2.73	Specific communication technique	Education, practice, and tool	Not reported	Provider and patient	Yes
Rask 2009[85]	RCT	2.45			High	Provider	No

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Table 3 Impact on the Quadruple Aim by Focus of the Intervention

Content focus	Studies with at least one positive outcome relevant to the quadruple aim				
	Health outcomes	Patient experience	Provider experience	Cost-related outcomes	No significant improvement in outcomes for all investigated domains
Motivational interviewing	67, 80, 90	67, 68	87		65
Health literacy	26	21, 60	21		
Relationship	74	38			91
Patient-centered care	28, 69, 81, 82	45, 46, 54, 69, 82, 83, 93	46, 52, 70		39, 41, 92
Communication skills	44, 56–58, 73	42, 56, 57, 62, 64, 66, 71, 73, 78, 86, 89	42, 56, 58, 62, 75, 78, 86, 89	23	25, 30, 37, 43, 76, 85
Shared decision-making		33, 34, 53, 72, 88			
Specific communication technique	22, 31, 55	27, 35, 36, 49, 63, 79, 84	34, 40, 49, 55, 79		29, 32, 47, 48, 61
Psychological/ therapeutic interview		24, 50			
Mindfulness	59, 77	51	51	77	

**Detailed outcomes for each quadruple aim domain (including nonsignificant findings) are presented in Tables 15 and 16 in the Appendix*

(e.g., instruction to sit vs. stand during the visit), two interventions (3%) encompassed only education, and one was limited to a tool (Table 9 in the Appendix). (i.e., a one-page feedback form to aid in stimulating conversation with patients). Only 22 (30%) interventions had a dyadic (e.g., patient–provider) approach; the others were provider-focused only (Table 10 in the Appendix). Thirty-four studies (47%) used methods to directly observe communication; 28 of these found a positive association between intervention efforts and a quadruple aim outcome. Table 2 presents intervention characteristics for each study, and Table 5 in the Appendix presents intervention setting and participant demographic information for each study.

Impact on the Quadruple Aim Outcomes

Table 3 presents the studies that had at least one positive outcome relevant to the quadruple aim, by content focus. Below, we describe an overview of findings for each quadruple aim domain. Refer to Tables 15 and 16 in the Appendix for the list of health and cost outcomes and patient and provider experience outcomes, respectively.

Health Outcomes. Among 38 (52%) studies that included health measures, moderate-demand interventions that focused on a specific communication technique[22, 31, 47] had a positive impact on several health outcomes, including physical function, obesity control, and mental health. Several interventions that comprised a practice alone, or combined education and practice coupled with a tool, also improved health outcomes (Table 11 in the Appendix presents health outcomes by study). These results suggest that moderate- to high-demand interventions focused on a specific communication technique, partnered with an education–practice–tool intervention, may offer an effective mechanism to influence health outcomes. As an example, Bellón et al. evaluated a communication technique

Table 2. (continued)

Study	Study design*	Quality assessment	Content focus	Intervention structure	Demand	Recipient	Framework (yes/no)
			Communication skills	Education and practice			
Roter 1998[86]	Controlled observational*	2.50	Communication skills	Education, practice, and tool	Moderate	Provider	No
Smith 1998[87]	RCT*	2.82	Motivational interviewing	Education and practice	Moderate	Provider	Yes
Song 2015[88]	RCT*	2.64	Shared decision-making	Education and practice	Moderate	Provider	Yes
Stewart 2007[89]	RCT*	2.27	Communication skills	Education and practice	Low	Provider	Yes
Swanson 1999[90]	RCT	2.42	Motivational interviewing	Education, practice, and tool	Low	Provider	Yes
Thom 1999[91]	RCT	2.45	Relationship	Education and practice	Low	Provider	Yes
Wolf 2008 (JNCQ)[92]	RCT	2.27	Patient-centered care	Education and practice	Moderate	Provider and patient	No
Wolf 2008 (JONA)[93]	RCT	2.36	Patient-centered care	Education and practice	Moderate	Provider and patient	Yes

**Indicates that direct observation was used to evaluate effects of the intervention*

intervention that encourages general practitioners to select from a list of seven possible hypotheses for why a patient is a frequent attender (i.e., biological, psychological, social, family, cultural, administrative–organizational, or related to doctor–patient relationship), and then share their selection with colleagues along with a plan to address these issues. The intervention training involved an educational component (3-day workshop) coupled with skills-based practice and a pocket guide tool and was found to reduce the number of consultations among frequent attenders by 61.3% at 1 year.[31]

Patient Experience. Most studies (74%, 49 RCTs and 5 controlled observational studies) evaluated patient experience outcomes; there was marked variation in the intervention focus, structure, and demand associated with positive impact on patient experience (Table 12 in the Appendix presents patient experience outcomes by study). Among the 38 studies that reported a positive patient experience outcome, 61% used provider-focused interventions. This suggests that interventions may improve patient perceptions of their care without requiring active participation by the patient in the intervention (although there are likely bidirectional factors such that changes in the provider's communication behavior affect the patient's communication behavior as well). Among interventions with a positive impact on patient experience (e.g., satisfaction, comprehension), several also demonstrated a positive impact on health outcomes (e.g., depression, adherence). In some cases, interventions that positively influenced patient experience also had a positive impact on provider experience and cost. As an example, Brock et al. evaluated a low-demand specific communication technique that prompted providers to (1) familiarize the patient with the "establishing focus" process; (2) ask the patient to list concerns; (3) make space for pressing patient stories early on; (4) avoid prematurely initiating diagnostic sequences or patient storytelling before a full agenda is set; (5) ask patient to prioritize concerns; (6) negotiate priorities, when necessary; and (7) seek confirmation and commitment from the patient. A brief education (2-h group training session, handbook, videotape demonstration, group discussion) and practice (role-play, coaching) coupled with a tool (video and cue card describing "establishing focus" protocol) reduced the number of concerns raised by patients near the end of the visit (1.14 to 0.83 concerns per patient) without influencing visit length (a proxy for cost of care).[40]

Cost of Care. Nineteen (26%) studies examined cost as an outcome or evaluated outcomes that could potentially generate savings (e.g., imaging efficiency, prescription rates). Among these, only three studies suggested savings could be attributed to the intervention.[23, 43, 77] Among the remaining 16 studies, 10 (53%) found no significant differences in cost or cost-related outcomes, and 6 (32%) reported at least one instance of increased costs or a cost-related outcome. In one cost-effectiveness study, Mercer et al. used a provider- and patient-focused intervention that included education about the CARE Plus program, practice (group-based support and training), and a clinic-based tool to aid providers in identifying patient concerns and priorities, promote patient self-management, and ensure agreement in care plan. Patients also received a mindfulness-based stress management CD, a cognitive behavioral therapy self-help booklet, and written material about the intervention. Although the intervention was high demand in terms of the time investment for clinicians, it resulted in improved patient well-being (as measured by W-BQ12) and improvement in quality-adjusted life years of 0.076 (95% CI 0.028–0.124) over the 12-month trial, resulting in a cost-effectiveness ratio of £12,224 per quality-adjusted life year gained.[77]

Eleven studies (10 RCTs and 1 controlled observational study) measured clinic visit length, which has the potential to influence cost (Table 13 in the Appendix). Only four of those studies found that visits were significantly longer in the intervention group compared to the control group (two studies utilized the same data set, which found longer visits for nurse interviews but not physician interviews).[57, 58, 75, 84] These studies also identified significant improvements in areas of patient health (i.e., quality of life), patient experience (i.e., satisfaction), and provider experience (i.e., communication ability). In five studies, the intervention did not significantly influence visit time, but there was a positive impact on patient satisfaction,[50, 57, 72] perceived patient-centeredness,[40, 72] and number of unmet concerns among patients.[9] These findings suggest that interpersonal interventions can have positive benefits on patient experience with minimal impact on visit length.

Provider Experience. As with patient experience, among studies examining provider experience ($n = 27$), we observed variation across focus, structure, demand, and recipient of the intervention (Table 14 in the Appendix presents provider experience outcomes by study). One of the most common types of interventions that positively influenced provider experience was clinician training using a general communication content focus ($n = 11$), which was associated with improvements in communication, satisfaction, and perceived provider friendliness. Many of the studies examining provider experience did not describe training time or duration. Collectively, results suggest that interpersonal interventions may improve provider communication practices, increase their self-efficacy in connecting with the patient, and reduce burnout. For example, Delvaux et al. evaluated a high-demand, provider-focused intervention that involved education (105-h psychological training program) and practice to implement a specific communication skill in the

oncology setting. The intervention reduced stress among nurses (by an average of 0.2 on a 4-point Nursing Stress Scale), improved nurses' attitudes by 0.2 on the 7-point semantic differential questionnaire, and increased nurse communication skills (Nurses Satisfaction with the Interview Assessment Questionnaire and Patient Satisfaction with the Interview Assessment Questionnaire; 8-item four-point scale) with an average effect size of 0.7.[49]

DISCUSSION

This systematic review of 73 studies of interpersonal interventions identified several intervention features that may positively influence patient health and patient and provider experience; fewer studies found significant positive effects on cost outcomes. Our review updates and extends previous work by synthesizing interventions according to the widely accepted goals of the quadruple aim (population health, patient experience, cost, and provider experience). The following discussion considers the implications of these findings for clinical practice and health system redesign.

A common misperception is that interpersonal skills are innate or cannot be taught.[94] Our review confirms the opposite, that quite a number of interventions can be employed to improve patient–provider interactions and downstream outcomes. Encouragingly, some of these effective interventions are also relatively efficient. Several low- to moderate-demand interventions had positive impacts on a range of quadruple aim-related outcomes, including health outcomes (e.g., physical function and adherence), patient experience (e.g., satisfaction, involvement in care, and comprehension), and provider experience (e.g., reduced depersonalization and emotional exhaustion) (Table 7 in the Appendix).

What are key components of interpersonal interventions that may foster human connection in medical care? The reviewed studies provide some possible clues. Several of the studies with a positive impact on patient or provider experience focused on communication skills (18%) or a specific communication technique (14%), such as eliciting patient priorities or teaching a specific phrase to elicit unaddressed concerns.[66] However, interventions focusing on content areas ranging from mindfulness techniques to shared decision-making also showed promise Table 2. Many interventions employed multiple modalities that commonly included education and practice (48%) or education and practice accompanied by a tool (33%); results regarding the effectiveness of using a combination of training modalities are mixed (Table 9 in the Appendix). Finally, connection is bidirectional, yet in most of the reviewed studies, the intervention focused solely on changing provider behavior and many of these were effective (Table 10 in the Appendix). At present, there is insufficient evidence to conclusively compare the merits of provider-only versus provider–patient dyad interventions. This may be a useful focus for future research.

The decision to employ interpersonal skill interventions will depend greatly on their complexity and cost. Unfortunately, these structural aspects of the interventions were not always described in sufficient detail. For example, several studies failed to report intervention training time and only 11 studies measured visit time as an outcome. Among the studies that did report this information, however, most found that the interventions improved patient and provider experience without significantly increasing visit time (Table 13 in the Appendix).

Downstream cost savings would be another argument for adopting interpersonal interventions, and 19 studies took this into consideration. Only three studies found potential cost savings associated with an interpersonal intervention.[23, 43, 77] These results suggest that it should not be assumed that enhancing interpersonal communication will increase efficiency or reduce costs. Given the relative paucity of evidence, however, continuing to assess cost and cost-related outcomes would elevate the value of future studies of interpersonal interventions.

Our approach has several limitations. Like all systematic reviews, our evidence synthesis is subject to both publication and selection bias. Given the breadth of this topic, we may have missed relevant studies that did not include a required MeSH or "text word" search term from both concept 1 (interpersonal intervention) and concept 2 (quadruple aim outcome) of our search strategy (Table 4 in the Appendix). In addition, by restricting our review to RCTs and controlled observational studies, our findings represent only a portion of relevant research pertaining to interpersonal interventions and their implementation.[94] We narrowed our focus in an effort to synthesize the evidence across studies with similar designs; however, future research could gain valuable insight from adaptive and pragmatic trials, pre–post studies, and qualitative research. Moreover, future research might benefit from taking a more direct approach to examine patient–provider interactions themselves, at varying levels of interpersonal competency, and to evaluate whether better interactions are associated with improved quadruple aim outcomes.[4, 89] Additional research is also needed to synthesize the evidence around interpersonal interactions with caregivers and interactions between patients and allied health professionals. Our review does not account for team or clinical microsystem impacts that may affect interpersonal interactions in the patient–provider encounter.[95]

Another limitation of our research is the inability to conduct a meta-analysis of the data due to the

heterogeneity in study designs and outcomes. Variability among studies further complicates the synthesis of results. The negative findings across studies may be attributed to beta error, due to inadequate sample size, which should be considered when interpreting the results. We found that several studies express overlapping aims that could undermine validity and generalizability of findings. Similarly, because of the breadth of intervention approaches and studies that lacked sufficient and clear descriptions, we are unable to offer a detailed account of each intervention in the synthesis of studies, but instead provide a resource for locating interventions and guiding frameworks that are of interest based on intervention content and impact across a range of outcomes (Table 2). Furthermore, with complex social interventions, it is challenging to assess sustained impact, which presents another consideration in the interpretation of our findings.[96] Finally, our search strategy was limited to English-language studies, which may have excluded relevant interventions (Table 4 in the Appendix).

In summary, this review provides a comprehensive overview of the evidence regarding the impact of patient–provider interpersonal interventions on quadruple aim outcomes. Our review of interpersonal interventions that met inclusion criteria suggests that interventions that require only minimal to moderate demands may have the potential to improve patient experience, provider experience, and features of patient health. Limited evidence suggests that these interventions may achieve these improvements without prolonging visit time. Studies examining downstream cost savings showed minimal benefits, and further exploration of this outcome is needed. Human connection is at the heart of clinical care, and our findings suggest that clinicians, managers, and policymakers should consider interpersonal interventions not only for their inherent value, but because of the potential for impact across the quadruple aim.

Acknowledgments: *We would like to acknowledge Ted Miclau, Laura Jacobson, Shreyas Bharadwaj, and Isabella Romero for their assistance in data analysis and synthesis. We would also like to acknowledge Amrapali Maitra, Sheila Lahijani, and Lars Osterberg for their insightful contributions to this research study.*

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Funding Information *This study was supported by a grant from the Gordon and Betty Moore Foundation (#6382, Zulman & Verghese, PIs) and a grant from the Arthur Vining Davis Foundation. Drs. Haverfield and Schwartz are supported by VA Palo Alto Center for Innovation to Implementation (Ci2i) HSR&D postdoctoral fellowship.*

Compliance with Ethical Standards:

Conflict of Interest: *There are no conflicts to disclose.*

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