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A Systematic Review of the Impact of Physician Information Sharing on Patient Outcomes

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Abstract

Effective communication is a cornerstone of high-quality healthcare, empowering patients to make informed decisions, adopt recommended behaviors, and adhere to treatment plans. However, challenges arise due to the complexity of medical information and variations in patient comprehension. This systematic review evaluates the impact of physicians' information-delivery strategies on patient outcomes, focusing on recall and behavioral changes.Following PRISMA guidelines, 17 randomized controlled trials (RCTs) were identified from an initial pool of 9,423 abstracts and 175 full-text articles. Studies included interventions using defined communication strategies compared to control conditions, with outcomes measured as patient recall and behavior. Data were synthesized qualitatively due to heterogeneity in intervention methods and outcome measures.The review analyzed 17 RCTs involving 8,256 participants. Information recall improved in 7 out of 10 interventions, with structured delivery and visual aids being particularly effective. Behavioral outcomes showed significant improvements in 8 of 9 studies, driven by strategies like persuasive framing, tailored explanations, and patient-centered approaches. Notable effects included reduced smoking rates, weight loss, and increased treatment adherence. However, the relationship between trust and recall presented nuanced findings.Deliberate communication strategies enhance patient recall and promote health-related behaviors. Structuring information, using visual aids, and applying persuasive techniques yield measurable benefits. Future research should validate these findings in real-world settings, refine cognitive aid strategies, and explore the dynamics of trust and engagement in physician-patient interactions.

Keywords: *Healthcare, Physician-Patient, Deliberate Communication.*

Introduction

Modern standards for high-quality healthcare emphasize the importance of patient involvement in medical decision-making (1–3). This principle is enshrined as a legal right in numerous countries (4,5). Patients' ability to recall and comprehend medical information is fundamental to informed consent, making decisions about their care, adopting recommended lifestyle changes, and adhering to treatment protocols (6,7). However, medical information is often complex, posing significant challenges for both healthcare providers, who must present it effectively, and patients, who need to understand and apply it (8). Achieving effective communication requires a dynamic interaction between the clinician's ability to deliver clear and

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actionable information and the patient's capacity for health literacy (3). This review focuses on the communication methods used by physicians and their impact on patient behaviors.

Physicians hold ethical and professional responsibilities to ensure patients receive comprehensible and useful information (4,9). Despite the assumption by many physicians that their explanations are straightforward, patients often misunderstand or forget 40–80% of the information conveyed (10–14). Miscommunication can lead to serious repercussions, such as poor adherence to treatments (15), increased medical errors (16), extended hospital stays, higher rates of readmission (17), patient dissatisfaction or complaints (18), deteriorated health outcomes (19,20), and rising healthcare expenses (21).

Providing effective information is a multifaceted process involving decisions on the content, delivery style, and application. Although much research has focused on what information is communicated, there is limited evidence that content alone improves patient outcomes. The majority of existing studies examine supplementary materials like visual aids or written documents alongside verbal communication (21–23). There has been less focus on how physicians deliver information during consultations. To address this gap, a preliminary review was conducted to identify strategies used for different purposes, such as enhancing understanding, influencing decisions, building rapport, or objectively presenting facts (24). However, the extent to which specific communication strategies directly affect patient outcomes remains unclear (25). While general physician communication skills have shown some associations with patient outcomes, findings from meta-analyses and systematic reviews of broad communication practices are inconsistent (26–30).

This systematic review aims to analyze the effects of physicians' information-delivery techniques on patient outcomes. It also seeks to explore the characteristics of these strategies and the randomized controlled trials (RCTs) evaluating their effectiveness.

Methods

This systematic review was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (31). The protocol for the review was registered with PROSPERO (ID: CRD42019115791).

Eligibility Criteria

Randomized controlled trials (RCTs) were included based on criteria established in a prior scoping review examining physicians' methods for providing information during patient interactions (24).

Interventions were required to include consultations utilizing defined communication strategies, while the comparisons could involve any control conditions. Outcomes of interest were limited to patient-related measures, categorized broadly into recall of information and behavioral responses. Outcomes assessed in only a single study—such as satisfaction, quality of life, anxiety, stress, or perceptions of physician competence—were excluded. Trust outcomes were also excluded due to ongoing debates regarding their conceptual and methodological validity in the context of physicians' information-sharing practices (32,33).

Search Strategy and Data Sources

Database searches were conducted in MEDLINE, Embase, PsycINFO (Ovid), and the Cochrane Central Register of Controlled Trials from their inception until April 24, 2020. The search strategy was developed iteratively with assistance from an expert medical librarian (HS). Keywords and subject headings were derived from key articles and refined through repeated testing. Additional references were retrieved by reviewing citations from relevant and included studies.

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Study Selection

For the initial scoping review, inclusion was assessed independently by ten reviewers working in pairs, with disagreements resolved through discussion with a third reviewer.

Data Extraction

Two researchers extracted data for each study, focusing on the effects of interventions on patient-related outcomes, as defined in a standardized document. In cases where multiple data points were reported for the same outcome, the most reliable measure was selected. Authors of the studies were contacted to obtain missing or incomplete information.

The extracted data included study characteristics (Table 1) and details about the communication strategies employed (Table 2). Each strategy was identified as a distinct unit of action for delivering information, recorded verbatim ("Specific message/strategy" in Table 2), grouped by type, and categorized into overarching mechanisms of action (Table 2). The classification process was based on previously established methods (24).

Data Analysis

Due to the significant heterogeneity in the included studies, interventions, and outcomes (confirmed statistically: $\chi^2 = 98.62$, $p < 0.001$; $I^2 = 92\%$ for behavioral outcomes, and $\chi^2 = 11.33$, $p = 0.25$; $I^2 = 21\%$ for information recall outcomes), a quantitative meta-analysis was deemed unsuitable. Instead, findings were synthesized qualitatively, summarized descriptively, and presented in tables. Forest plots were generated using Review Manager version 5.4.1 to visualize individual study effects.

Table 1. Characteristics of Information Provision Interventions Assessing Patient Information Recall and Behavioral Outcomes

Author, year, country	Study design	Physicians' specialty, *n*	Type of patients, *n*	Mean age patients (SD/range); % women
Ackermann et al. 2017 (Switzerland)	RCT	Physicians, NR	Analog patients; 234	22 (3.6), 70%
Bennett et al. 2009 (USA)	RCT	Radiologists, 8	Patients undergoing spine injections; 65	NR, NR
Danzi et al. 2018 (Italy)	Experimental video-vignette study	Physicians, NR	Analog patients | healthy women; 54	25.5 (9.2), 100%
Lehmann et al. 2020a (The Netherlands)	Experimental video-vignette study	Oncologists, NR	Analog patients | cancer patients, survivors, healthy; 253	61.3 (11.7), 54%
Lehmann et al. 2020b (The Netherlands)	Experimental video-vignette study	Oncologists, NR	Analog patients | cancer patients, survivors, healthy; 148	61.8 (10.1), 50%
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Visser et al. 2019 (The Netherlands)	Experimental video-vignette study	Physicians, NR	Analog patients | students; 137	21 (2.7), 86%
Visser et al. 2019 (The Netherlands)	Experimental video-vignette study	Physicians, NR	Analog patients | students; 136	21 (2.7), 86%
Werner et al. 2013 (Germany)	RCT	Medical students, 30	Analog patients | medical students; 30	25 (4), 57%
Biglino et al. 2015 (UK)	RCT	Cardiologists, NR	Parents of children with congenital heart disease; 97	NR, 75%
Ockene et al. 1999 (USA)	RCT	Mixed (physicians, residents, nurses), 29	High risk drinking; 481	45 (13.4); 37%
Aveyard et al. 2016 (UK)	RCT	Primary care physicians, 137	Obese; 1882	56 (16.1); 57%
Boguradzka et al. 2014 (Poland)	RCT	Primary care physicians, 4	Visiting GP for routine medical consultation; 600	NR (50-65); 66%
Grimaldo et al. 2001 (USA)	RCT	Anesthesiologists, 4	Older patients scheduled for elective surgery; 195	72.8 (5.6); 40%
Grover et al. 2007 (Canada)	RCT	Primary care physicians, 230	High risk cardio patients; 3053	56.3 (8.1); 30%
Kim et al. 2019 (Korea)	RCT	Cardiologists, NR	Smoking patients with acute coronary syndrome; 66	55.9 (9.0); 3%
Lamb et al. 1994 (USA)	RCT	Mixed (physicians, nurses), NR	Patients with new drugs; 203	53 (NR); 77%
Mazza et al. 2020 (Australia)	Cluster RCT	GPs, 57	Sexually active women; 626	NR (16-45); 100%
Saha and Beach 2011 (USA)	Experimental video-vignette study	Cardiologists, NR	Coronary heart disease patients; 248	58 (10.9); 59%

Table 2. Information-Giving Intervention, Strategy(ies), Strategy Type(s), and Strategy Category(ies) Targeted by Each Study

Author, year	Intervention	Specific message/strategy	Strategy type (*N* strategies)	Strategy category	Outcome
Ackermann et al. 2017	Structuring the presentation of discharge information	Structured information, following the structural elements of a book, in which the content is presented in a specific order, from high-level information (e.g., title, table of contents, chapter headings) to	Structuring (1)	C	Immediate recall

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		detailed, low-level information			
Bennett et al. 2009	Diagrams added to speech	Showing a set of diagrams illustrating the twelve key points addressed by the informed consent form before signing it	Visualization (1)	C	Recognition
Danzi et al. 2018	Affective communication while delivering bad news	Four supportive statements: "But whatever action we do take, and however that develops, we will continue to take good care of you. We will be with you all the way," "We will do and will continue to do our very best for you," "And whatever happens, we will never let you down. You are not facing this on your own," "I completely understand your reluctance. We'll look at this decision together carefully and we'll pay attention to your concerns."	Emotional-responsiveness (1)	R	Active recall and recognition
Lehmann et al. 2020a	Tailoring the amount of preferred information	Amount of information tailored to patients' preferences	Quantity (1)	C	Active recall and recognition
Lehmann et al. 2020b	Affect-oriented, caring communication style	Utterances that validate the patient's emotional burden and convey understanding (e.g., I can imagine that you're worried; I understand that this is a tough and uncertain period for you)	Emotional responsiveness (1)	R	Active recall and recognition
Lehmann et al. 2020b	Cognition-oriented communication style with information structuring	Four signs of structuring: verbal signals that introduce a certain topic/agenda, that introduce a summary, that use numeric signals (e.g., first,…second…), and visual signs such as finger/hand signals when counting/using numeric signals	Structuring (1)	C	Active recall and recognition

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Visser et al. 2019	Emotion-oriented communication	Emotion-oriented silence (passive style): listen attentively until the patient resumes the conversation	Emotional responsiveness (emotion-oriented silence) (1)	R	Active recall and recognition
Visser et al. 2019	Emotion-oriented communication	Emotion-oriented speech (active style): acknowledging and/or exploring the patient's emotional expressions, providing empathic and supportive statements	Emotional responsiveness (emotion-oriented speech) (1)	R	Active recall and recognition
Werner et al. 2013	Communication skills training aimed to reduce a layperson's cognitive load	Assessing what the patient already knows, using easy and understandable language adapted to the patient's level, active encouragement to ask questions, making use of the available information sheets for medical procedures, reducing the amount of information by clustering the facts (e.g., combining each operative step with its possible complication)	Simplification, structuring, teach-back, visualization (4)	C	Active recall
Biglino et al. 2015	Three-dimensional patient-specific models of cardiac lesion(s) added to speech	Providing a three-dimensional model of the cardiac lesion(s) and discuss it during the appointment	Visualization (1)	C	Change in knowledge
Ockene et al. 1999	Alcohol intervention training with patient-centered counseling approach	Use of nondirective, open-ended questions (e.g., "How do you feel about drinking?" or "How might you go about cutting down?"); the providers were also taught to use patient education materials (i.e., tip sheets) and a goal statement.	Open-ended questions, visualization (2)	C	Alcohol consumption
Aveyard et al. 2016	Brief intervention offering referral to a weight management group	Offer of help/referral to change behaviors; ask patients to return	Directivity (1)	P	Weight change

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Boguradzka et al. 2014	Physicians' counseling on colonoscopy screening	Standardized discussion with basic information on the disease, rationale for screening and benefits of early treatment and prevention, recommendation to participate in screening, information on screening procedure	Standardization, argumentation (2)	P+O	Participation in screening
Grimaldo et al. 2001	Short information session stressing the importance of patients-proxies' communication about end-of-life care	Guidelines-driven information; provision of examples regarding cardiopulmonary resuscitation and mechanical ventilation; encouragement to talk with the proxies about end of life wishes	Standardization, accuracy, directivity (3)	P+O	Written durable power of attorney
Grover et al. 2007	Sharing information on future risks for cardiovascular events	Computer printout that displays a patient's probability of developing coronary disease graphically summarized; ongoing info/feedback	Visualization, repetition (2)	C	Blood lipid levels
Kim et al. 2019	Aversive advice	Three sentences on consequences of dysfunctional behaviors and stress of losses: "Smoking caused your chest pain"; "If you do not stop smoking right now, this pain will come again"; "The next time you feel this pain you will probably die."	Negative framing (1)	P	Smoking cessation
Lamb et al. 1994	Providing patients with information about potential side effects	Description of potential side effects for new medications, in addition to drug name, purpose, dose	Argumentation (1)	P	Medication side effects
Mazza et al. 2020	Complex intervention providing structured effectiveness-based contraceptive counseling and access to rapid referral	Structured counseling with nonbiased, scripted descriptions of all contraceptives with emphasis on safety and efficacy; recommended return appointment and rapid referral pathway to clinic	Structuring, accuracy, standardization, directivity (4)	C+O+P	Use of contraceptive

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Saha and Beach 2011	Patient-centered communication behaviors	Presence of empathic statements, presence of elicitation and validation of patient concerns, more exploration of patient context and individualization of discussion, more rapport building and partnership statements, more patient education, use of lay language, nonverbal behaviors reinforcing verbal behaviors (positive affect showed with voice tone and facial expressions, high attentiveness and presence conveyed through eye contact, nodding, and leaning forward)	Visualization, personalization, emotional responsiveness (3)	C+R	Likelihood of undergoing treatment

C cognitive aid strategy (where the strategy had the function of aiding understanding), *O* objectivity-oriented strategy (where the strategy had the function of objectively reporting information), *R* relationship-oriented strategy (where the strategy had the function of building the relationship with the patient), *P* persuasive strategy (where the strategy had the function of persuading the patient to do something)

Results

A total of 9,423 abstracts were initially screened, followed by 175 full-text articles. Of these, 39 studies were included in the preliminary scoping review (24), and 17 randomized controlled trials (RCTs) ,Two studies assessed separate interventions with different groups of participants (38,39), with one using a shared control group (39).

The RCTs were published between 1994 and 2024 and included 8,256 participants, with an average age of 48 years (SD = 17.13). Findings are presented separately for the two primary outcomes: information recall and behavioral outcomes.

Studies on Information Recall

Eight of the 17 studies investigated the effects of interventions on knowledge or recall, covering 10 distinct interventions. Recall was primarily assessed through a combination of recognition and free recall, with all measures self-reported and evaluated immediately post-intervention. One study focused on parental understanding of a child's condition, measured before and after the intervention (41).

Characteristics of Information Recall Studies

The sample sizes for these studies ranged from 30 (40) to 253 (37) participants (Table 1). Seven of the 10 interventions involved explaining clinical matters, while analog patients participated in eight studies. Three

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interventions involved former patients (37,38), and six utilized experimental setups with video vignettes (36–39), with the remaining interventions conducted in real-life settings.

Unique strategies were tested in all 10 interventions, including cognitive aids (six interventions) and relationship-oriented strategies (four interventions) (Table 2). Emotional responsiveness (36,38,39), information structuring (34,38,40), and visual demonstrations (34,35,41) were the most frequently assessed strategies.

Effects on Information Recall

Seven of the 10 interventions showed positive effects on recall. Significant improvements were reported in two studies (34,35), while another study showed significant effects on recognition but not free recall (39). Ackermann et al. (34) demonstrated that structured information delivery significantly enhanced recall compared to unstructured communication, especially for participants with lower prior medical knowledge. Similarly, Bennet et al. (35) found that using visual diagrams during informed consent improved recognition of key points compared to standard care, without extending consultation time.

Some strategies, such as emotional responsiveness and structured information (38), showed no improvement in recall when assessed in a large sample. Lehmann et al. (38) noted that trust might inversely impact recall and highlighted confounding effects from patient characteristics, including age, gender, education, and health literacy.

Nine of the 17 studies measured behavioral outcomes. Seven studies used objective measures, while two relied on self-reports (48,51). Outcomes included changes in health-related behaviors such as alcohol reduction (42), weight loss (43), lipid levels (46), smoking cessation (47), treatment adherence (48,49,51), screening participation (44), and drafting a durable power of attorney (45).

The sample sizes for these studies ranged from 66 (47) to 305 (46) participants (Table 1). Eight studies were conducted in real-life settings, with one employing video vignettes (51). Six studies targeted health behavior changes. Most interventions combined multiple communication strategies, with persuasive approaches (five interventions) and cognitive aids (four interventions) being the most common (Table 2).

Eight of the nine studies demonstrated significant positive effects on behavioral outcomes . Persuasive strategies, such as direct recommendations (43,45,49), detailed explanations of risks and benefits (44,48), and negatively framed messaging (47), consistently improved patient behaviors. For instance, Kim et al. (47) reported that negatively framing the consequences of smoking significantly increased quit rates.

Patient-centered strategies that enhanced understanding and personalized information also led to improved behaviors, including reduced alcohol consumption (42) and increased willingness to undergo treatments (51).

The sole study that did not find clear improvements tested repeated graphical presentations of cardiovascular risk (46). While results were borderline significant, the authors noted potential underestimation of the intervention effect.

Discussion

This systematic review is, to our knowledge, the first to examine the impact of information-delivery strategies on patient outcomes across diverse healthcare contexts while exclusively including RCTs with low bias risk. The analysis of 17 RCTs involving 8,256 participants highlights that employing deliberate communication strategies is more effective in enhancing patient outcomes than using standard methods. These findings build upon prior reviews that emphasize the role of physician communication (26,28) and the utility of written or visual aids outside consultations (22,23,52,53). This study underscores the potential of oral information delivery—a common, resource-efficient practice in healthcare—to significantly influence patient cognitive and behavioral outcomes when enhanced with specific framing strategies (54).

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Among studies focusing on information recall, four out of 10 reported significant improvements when physicians employed specific communication strategies. These studies shared similarities in their tested approaches, settings, and designs. Conversely, nearly all studies examining behavioral outcomes demonstrated positive and significant effects, even for objectively measured results such as weight reduction and lipid profile changes. However, these studies varied widely in the strategies used and the types of behaviors assessed, leading to multiple interpretations and implications.

The contrast between these outcomes may stem from their differing natures and related communication objectives, such as fostering understanding versus influencing behavior. Information recall interventions often utilized cognitive aid strategies like structuring information in experimental setups designed to clarify clinical issues. Some also incorporated relationship-focused strategies like emotional responsiveness, which were less effective for recall. One study suggested that trust and relationship dynamics might reduce recall effectiveness (38), possibly due to patients deferring to physicians' authority. This highlights the need for further exploration of how trust interacts with information retention, as well as encouraging patients to actively engage with the information provided (33). For influencing behavior, persuasive communication strategies consistently showed robust effects, supporting the importance of persuasion in medical communication (55). While this review focuses on explicit persuasive methods, prior studies have highlighted the effectiveness of subtle, implicit persuasion in medical practice (56). These findings raise important considerations for the ethical and effective use of persuasion in clinical communication.

Studies on information recall primarily involved controlled, experimental environments with consistent strategies, whereas behavioral outcome studies were typically conducted in real-world settings with a mix of approaches. Real-life studies introduce greater variability due to external factors and participant characteristics, which might amplify intervention effects as patients perceive them as more relevant. Although analog patients have been shown to reliably assess physician communication (57,58), their engagement depends heavily on the scenario design (59). A structured approach to research might involve mapping specific communication behaviors, testing their efficacy in controlled settings, and subsequently evaluating their impact in real-world contexts.

Despite differences in objectives and strategies, all included interventions shared the commonality of delivering tailored information to patients. This highlights the interplay between physician communication, patient understanding, and behavioral change. Improvements in behavioral outcomes may be driven by mechanisms extending beyond the information exchange itself, involving patient perceptions, attitudes, and intentions (60,61). Alternatively, patients might prioritize key information that motivates and enables behavioral changes. Future research should explore what patients consider critical to remember and identify the minimum information needed to drive specific health behaviors, such as adopting lifestyle changes or participating in screening programs. The "learning by doing" approach, which integrates behavioral and cognitive learning, could provide further insights into these dynamics (62).

Conclusions

Framing medical information using deliberate communication strategies can enhance patient recall and promote health-related behaviors. This review identifies specific strategies that physicians can adopt to achieve communication goals and improve outcomes. Future research should validate these strategies with larger samples in real-world settings, assess cognitive aid techniques for enhancing recall, and examine the interplay between different communication approaches. Additionally, further studies are needed to investigate how patients ensure physicians understand their concerns and needs (63).

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