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Risk Communication Can Produce the Nonadherence It Seeks to Prevent Through Nocebo Effects, Numerical Framing, Unresolved Uncertainty, and Loss of Patient Control

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ABSTRACT

Risk communication is usually treated as a prerequisite for informed medication use, yet the act of communicating risk can itself alter treatment experience. Side-effect warnings, numerical presentations, expressions of uncertainty, and the structure of treatment choice may influence expectations, symptom interpretation, perceived control, trust, and subsequent medication behavior. The relevant ethical problem is not whether material risks should be disclosed; they should. The problem is how accurate information can be communicated without unnecessarily transforming possibility into expectation, uncertainty into helplessness, or vigilance into premature treatment withdrawal. Evidence from nocebo research shows that adverse expectations can be learned through clinical and social information and can influence symptom experience, although effects are heterogeneous and should not be confused with pharmacological toxicity. Framing studies similarly suggest that informationally equivalent descriptions may produce different responses, while research on uncertainty shows that consequences depend on what is uncertain, how uncertainty is expressed, and whether the patient receives an actionable management plan. Patient agency is also more complex than maximizing choice: insufficient control can be harmful, but excessive choice may increase cognitive and emotional burden. These processes become clinically important when they influence information seeking, medication initiation, implementation, persistence, or discontinuation. A mechanism-sensitive interpretation therefore requires distinguishing communication-induced nonadherence from informed refusal and from nonadherence driven by genuine treatment burden, access problems, or pharmacological harm. Risk communication should be judged not only by factual accuracy but also by comprehensibility, interpretive effects, preservation of agency, and capacity to support appropriate follow-up.

Keywords: Risk communication, Nocebo effect, Numerical framing, Uncertainty communication, Patient autonomy, Medication adherence

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Introduction

The disclosure of medication risk occurs within a treatment context capable of shaping the experiences that patients subsequently report. Nocebo effects provide one mechanism through which expectations, prior learning, contextual cues, and interpretation of bodily sensations may contribute to adverse experiences that are not fully explained by a treatment's specific pharmacological action[1]. This does not make reported symptoms unreal or clinically unimportant. It instead means that the experience attributed to a medicine may contain both pharmacological and context-responsive components. Risk communication therefore has an unusual dual role: it

conveys information necessary for informed decision making while also becoming part of the context through which the treatment is anticipated and experienced.

Information capable of shaping expectations is not confined to formal counseling. Social observation, media narratives, peer reports, family experiences, and other sources can contribute to learned nocebo responses. A systematic review and meta-analysis found a measurable overall effect of social learning on nocebo responding across experimental studies, demonstrating that adverse expectations can be acquired through observation and communication rather than through direct prior exposure alone[2]. Medication counseling consequently occurs within an information environment that clinicians only partly control. A patient may arrive with expectations already formed, and subsequent clinical wording may reinforce, contextualize, or counter those expectations.

Recognition of these processes has already moved beyond laboratory placebo research. Expert consensus has argued that placebo and nocebo mechanisms have implications for routine clinical practice and that communication is one component of the therapeutic context through which expectations can be modified[3]. The implication is not that adverse-effect disclosure should be weakened. It is that clinical communication should recognize that the same factual content can be cognitively and affectively processed in different ways.

Ethical recommendations on nocebo communication similarly emphasize that efforts to reduce harmful expectations must remain compatible with truthful disclosure and informed consent[4]. This distinction is fundamental. A communication strategy that improves adherence by obscuring material risk would be ethically unacceptable even if it reduced symptom expectation. The clinically defensible objective is accurate, comprehensible, proportionate, and autonomy-supportive risk communication.

Patients themselves reinforce that boundary. In a study of teenagers and parents, most participants continued to want information about medication side effects even after receiving education about nocebo effects[5]. The finding challenges any assumption that patients would generally prefer clinicians to suppress adverse-effect information once its potential expectancy effects are explained. Protecting patients from unnecessary nocebo responses and protecting their right to know are therefore simultaneous obligations.

The broader risk-communication literature also indicates that communication is not a single intervention with a uniform outcome. A systematic scoping review in cardiovascular disease and diabetes identified heterogeneous approaches affecting knowledge, perception, decision making, and behavioral outcomes[6]. The unresolved problem is narrower than whether risk communication matters. It is determining when particular properties of safety information increase negative expectation, unresolved uncertainty, loss of agency, or distrust strongly enough to alter medication behavior. Addressing that problem requires separating mechanisms that are often collapsed under the single label of "nonadherence."

When warnings become symptoms: Expectation, learning, and attribution

Explaining the nocebo effect is itself a communication intervention, and its consequences are not uniformly protective. Two preregistered experiments found that nocebo education could alter global side-effect expectations and beliefs related to personal control, yet it did not simply reduce every expectation associated with specifically warned symptoms[7]. Educational material can therefore change how patients conceptualize treatment effects without producing a predictable reduction in every adverse expectation. It may also influence how much additional side-effect information some people subsequently wish to receive. Nocebo education should consequently be treated as an intervention with potential benefits and trade-offs rather than as a standard corrective script.

Expectation is only one component of the pathway. Psychobiological accounts distinguish explicit expectation from associative learning, previous treatment experience, contextual interpretation, and physiological processes through which placebo and nocebo responses can emerge[8]. This distinction matters clinically because two patients who report the same symptom after reading the same warning may have reached that experience through different routes. One may have developed a strong explicit expectation; another may recognize a familiar sensation from prior treatment; a third may reinterpret a common background symptom as medication related. A mechanism-sensitive approach therefore avoids treating the warning itself as the sole causal event.

Prospective evidence illustrates how communication and expectation can precede later symptom experience. Before COVID-19 vaccination, exposure to side-effect information from social sources was associated with expectations about adverse reactions, which in turn were related to subsequently reported side effects[9]. Such findings do not prove that communicated expectations fully caused the symptoms, because biological reactogenicity and residual confounding remain plausible. They nevertheless demonstrate why the temporal

ordering of information, expectation, and experience matters. Studies that assess only symptoms after treatment cannot determine whether patients anticipated those symptoms before exposure.

The clinical importance of attribution is especially visible when symptoms affect persistence. In the SAMSON multiple-crossover trial, symptom intensity during statin periods was closely reproduced during placebo periods, while symptom burden was lower during no-tablet periods[10]. The result does not imply that statins lack pharmacological adverse effects. It demonstrates that, among patients who had previously stopped statins because of symptoms, a large component of symptom experience could not be distinguished by participants according to whether the tablet contained atorvastatin or placebo. After participants reviewed their individualized trial results, a substantial proportion restarted statin treatment. The behaviorally consequential event was therefore not merely the presence of symptoms; it was what those symptoms were understood to mean.

For risk communication, this creates an important distinction between symptom generation and symptom attribution. Communication may contribute to an expectation that affects experience, but it may also influence the interpretation of symptoms that would have occurred anyway. The downstream medication decision can therefore be altered even when the communication did not biologically generate the symptom. A warning that converts every subsequent headache, fatigue episode, or gastrointestinal sensation into evidence of drug intolerance may change persistence through attribution. Conversely, communication that dismisses plausible adverse effects would undermine trust and safety. The clinically relevant target is calibrated interpretation.

Risk magnitude is not message meaning: Numerical framing, side-effect lists, and information format

The probability assigned to an adverse effect does not determine the meaning a patient receives from that probability. In an experimental cybersickness study, positive attribute framing reduced reported symptoms compared with less favorable warning formats[11]. Although the setting was not medication treatment, the study demonstrates an important communication principle: information can remain factually related to the same underlying risk while its linguistic representation changes expectation and experience. Framing therefore cannot be dismissed as cosmetic wording.

The evidence base is nevertheless too limited to support a universal instruction to present every adverse effect positively. A review of positive framing studies found encouraging effects in several experiments but also substantial heterogeneity across outcomes and study designs[12]. Framing can influence salience, affective interpretation, and expectation, yet its clinical consequences depend on the population, the event being described, the credibility of the wording, and the underlying risk. Selective reporting that makes a serious adverse event appear trivial would not constitute ethical framing. The relevant distinction is between altering the risk estimate and changing the interpretive context in which the same accurate estimate is understood.

Numerical information adds another layer. Risk estimates that are technically correct may still be cognitively difficult to interpret when patients must compare small probabilities, distinguish relative from absolute change, or infer what a frequency means for themselves[13]. Numerical communication therefore requires more than the transmission of a number. Denominators should be interpretable, comparisons should not exaggerate proportional differences, and verbal explanation should clarify the clinical meaning of the estimate. Otherwise, numerical precision can coexist with decisional ambiguity.

The problem is especially apparent after new prescriptions. Patient knowledge about newly prescribed medicines can remain incomplete, with information about adverse effects particularly vulnerable to poor recall or incomplete understanding[14]. This finding separates two questions that are often treated as equivalent: whether information was disclosed and whether usable understanding was achieved. Listing ten adverse effects does not establish that a patient can distinguish common from rare events, transient symptoms from urgent warning signs, or manageable effects from reasons to stop treatment immediately.

Communication format may therefore need to reduce interpretive workload rather than merely increase informational volume. Co-produced illustrated resources for high-risk medicines show how patients and professionals can restructure complex information into patient-facing forms intended to support discussion and shared decisions[15]. Such resources should not be assumed to improve adherence without evaluation. Their relevance lies in demonstrating that safety information can be organized around patient questions, visual relationships, and decision needs instead of reproduced as an undifferentiated list.

The evidence across framing, numerical communication, medication knowledge, and visual presentation suggests that risk-message design can be separated into features with different cognitive and affective consequences.

Table 1. Risk-message properties that can alter how medication safety information is interpreted

Risk-message property	Communication problem being addressed	Likely cognitive or affective response supported by the evidence base	Evidence character	Ethical safeguard
Negative versus positive attribute framing	Equivalent probabilities may acquire different emotional meaning	Differences in symptom expectation, salience, or reported symptom experience	Primarily experimental, with heterogeneous effects	Preserve the same material facts and denominator; do not make serious risk appear trivial
Relative versus absolute numerical emphasis	Relative differences may appear larger or more alarming than their absolute clinical meaning	Distorted magnitude perception or disproportionate concern	Risk-communication and numeracy evidence	Prefer interpretable absolute meaning when possible and explain the comparison explicitly
Dense side-effect enumeration	Long lists can obscure distinctions among frequency, severity, urgency, and manageability	Information overload, poor recall, generalized vigilance	Patient-knowledge and communication evidence	Do not omit material events; organize them by clinically meaningful distinctions
Uncontextualized probability	A precise percentage may not tell the patient what the risk means for the decision	Residual ambiguity despite nominal numerical precision	Risk-communication evidence	Provide denominator, comparison, time frame, and clinical interpretation where relevant
Visual or structured presentation	Complex risk relationships may be difficult to retain in continuous text	Improved organization and potentially easier discussion of options	Co-production and implementation evidence; outcome evidence remains limited	Preserve factual equivalence and make uncertainty visible
Explicit nocebo education	Patients may otherwise interpret all symptoms as direct drug effects	Reattribution, altered expectations, increased perceived control in some settings	Controlled experimental evidence with mixed outcomes	Do not use nocebo explanations to invalidate genuine symptoms or discourage reporting
Patient-preference-sensitive information depth	Some patients want comprehensive detail while others prefer less emphasis on low-probability effects	Greater perceived control and fit with informational preference	Survey and experimental evidence	Preference must be elicited; clinicians should not infer permission to conceal material information

The table also exposes a central limit on communication design: a message can be more interpretable without becoming less truthful. The task is to control avoidable distortion introduced by presentation while preserving the information required for informed decision making.

Uncertainty can inform or destabilize: Expression, ambiguity, and interpretive load

Risk estimates often contain uncertainty because evidence is incomplete, treatment response varies, or the probability for an individual patient cannot be known precisely. Communicating that uncertainty is ethically preferable to false certainty, but its effects depend on how uncertainty is represented. In an experiment examining highly uncertain predictions of pain, different ways of expressing uncertainty produced different responses in pain-related outcomes and trust[16]. Direct emphasis on profound uncertainty could be disadvantageous, whereas

communicating variability across people could be interpreted differently. The relevant exposure is therefore not simply "uncertainty disclosure."

The health-communication literature reinforces this distinction. A scoping review identified probability, scientific uncertainty, ambiguity, and complexity as related but nonidentical forms of uncertainty[17]. Probability may describe a known distribution of possible outcomes; scientific uncertainty concerns limitations in available knowledge; ambiguity may arise from conflicting or insufficient evidence; and complexity can make existing information difficult to interpret. Combining these into one category obscures which communication problem a patient is actually facing.

Importantly, uncertainty can sometimes improve decisions. Two online experiments found that communicating diagnostic uncertainty reduced expectations for receiving antibiotics[18]. The same work also showed that uncertainty could affect trust, with the effect depending on whether the clinician provided a clear treatment recommendation or management direction. This dual result is especially relevant to medication counseling. A statement such as "we cannot know exactly whether you will experience this effect" may support realistic expectations when paired with an explanation of what to monitor and what will happen next. The same statement may instead leave a patient feeling abandoned when no interpretive or action pathway follows it.

For this discussion, unresolved uncertainty therefore refers to uncertainty that remains clinically salient to the medication decision but is communicated without enough interpretive or follow-up guidance for the patient to understand how to act on it. The term does not imply that clinicians should eliminate legitimate scientific uncertainty. Some uncertainty is irreducible. What is modifiable is whether the patient knows which outcomes are possible, which signals require attention, what can be managed without stopping treatment, and when reassessment is available.

This distinction also prevents an important ethical error. Certainty should not be simulated merely to preserve trust or adherence. If treatment benefit, adverse-effect probability, or diagnosis is uncertain, accurate communication may appropriately lower confidence in one option. The desired outcome is not maximal treatment acceptance. It is a decision in which uncertainty is proportionate to the evidence and does not become unnecessarily amplified by ambiguity, unsupported numerical precision, or the absence of a management plan.

Agency is dose-sensitive: Choice, control, and trust

Loss of control is frequently invoked as a reason that medical communication becomes threatening, yet "more choice" is not automatically the solution. Experimental work manipulating the number of treatment choices found a nonmonotonic association with nocebo responding: having no choice was disadvantageous, a limited degree of choice could attenuate nocebo responding, but extensive choice did not produce progressively greater protection[19]. The implication is that perceived agency and decision burden can coexist. A patient may feel constrained when no meaningful choice is available and overwhelmed when responsibility is transferred through a large menu of poorly differentiated options.

Autonomy can also include control over the preferred depth of adverse-effect information. Survey research on authorized concealment suggests that some patients consider it acceptable to decide in advance that selected side-effect information should not be emphasized or disclosed to them[20]. Such an approach is ethically different from unilateral nondisclosure because the authority originates with the informed patient's preference. It should therefore be viewed as an autonomy question rather than as a general nocebo-management technique.

Acceptance of authorized concealment is itself heterogeneous. Individual-difference research found that trust and the desire to avoid side-effect information were among factors associated with whether people would accept or use different authorized-concealment approaches[21]. These findings argue against assuming that a patient's informational preference can be inferred from demographic appearance, anxiety, education, or clinician judgment. Preference must be elicited if it is to justify a different communication approach.

Control also depends on the relational context in which information is delivered. In a factorial vignette experiment, information portraying a physician as more competent or empathic affected trust and treatment-outcome expectations before the hypothetical consultation occurred[22]. Risk information therefore enters an interaction in which judgments about the communicator already influence how the message is interpreted. Identical uncertainty or adverse-effect information may be experienced differently when the source is regarded as attentive and competent than when the patient doubts whether concerns will be heard or managed.

Trust becomes especially important when risk information must be converted into ongoing medication behavior. In a Dutch medication-using population, trust in medication and specific beliefs about necessity, concerns, overuse, and harm were associated with self-reported adherence[23]. These cross-sectional associations do not demonstrate that a particular communication event caused adherence or nonadherence. They do show why trust cannot be treated as a decorative interpersonal outcome. A message that unnecessarily damages confidence in the medicine, the prescriber, or the follow-up process may influence behavior through a pathway that is distinct from numerical misunderstanding.

At the same time, trust must not be operationalized as willingness to comply. A large population survey across Europe and North America found strong support for patient autonomy and substantial preference for disclosure of side-effect information, alongside broad acceptance of positive framing[24]. These positions are compatible: patients can want complete material information while also preferring that it be presented in a way that does not needlessly magnify threat. Trustworthy communication is therefore characterized by truthful risk disclosure, interpretability, responsiveness to information preference, and credible management of concerns—not by maximizing medication acceptance.

This produces a more precise understanding of loss of control. It is not synonymous with refusal, disagreement, anxiety, or asking for further information. It refers to reduced perceived agency over the treatment decision or over the management of possible adverse effects. Communication may contribute to that state when risks are presented as inevitable, when uncertainty is acknowledged without a follow-up plan, when options are offered without meaningful distinctions, or when the patient's preferences are treated as obstacles to adherence. Conversely, control can be supported by bounded choices, explicit contingency plans, opportunities to revisit the decision, and clear acknowledgment that accepting or declining treatment remains the patient's decision.

From concern to medication behavior: Information seeking, treatment burden, and adherence

Concern after risk disclosure should not be equated immediately with nonadherence. Medication behavior lies downstream from several distinct processes, including symptom experience, interpretation of those symptoms, practical treatment workload, uncertainty about benefit, access to further information, and the patient's judgment that treatment remains worthwhile. This distinction is important because treatment burden itself is associated with poorer adherence among older adults managing multiple chronic conditions[25]. Where medication schedules, monitoring, appointments, adverse effects, costs, or competing illness demands become difficult to sustain, nonadherence may reflect genuine workload rather than a communication-generated response. A risk-message pathway should therefore never be used to reclassify structurally or clinically burdensome treatment as a psychological communication problem.

Seeking more information also requires careful interpretation. Patients do not necessarily move directly from receiving a recommendation to either accepting or rejecting it. Scenario-based evidence indicates that some people condition adherence on obtaining additional information, while shared decision-making experiences can influence whether they seek further formal sources[26]. Verification can therefore represent an attempt to resolve uncertainty rather than resistance to treatment. A patient who delays initiation while checking an unfamiliar adverse-effect claim is behaviorally different from a patient who discontinues treatment because an expected symptom has been interpreted as intolerable toxicity.

The same distinction applies to participation in treatment decisions. A systematic review of randomized trials in asthma, chronic obstructive pulmonary disease, and cystic fibrosis found that three of four included trials reported significant improvements in inhaled-medication adherence following shared decision-making interventions[27]. The evidence base is small and disease specific, so it does not justify the claim that shared decision making universally improves adherence. It nevertheless demonstrates that autonomy-supportive communication and adherence are not opposing objectives. Supporting agency can improve implementation when patients understand why treatment is recommended, how it fits their priorities, and what options exist if problems arise.

The resulting medication-behavior pathway is therefore conditional rather than linear. Risk information may increase vigilance without changing treatment, encourage appropriate information seeking, prompt clinically justified reassessment, contribute to premature discontinuation, or support informed refusal. Whether concern becomes harmful depends partly on what the patient expects, what symptoms occur, how those symptoms are attributed, whether uncertainty remains actionable, whether treatment feels manageable, and whether the patient believes concerns can be discussed without losing control of the decision.

These relationships are summarized in **Figure 1**, which separates message properties from intermediate psychological and relational responses, symptom attribution, treatment burden, and subsequent medication behavior.

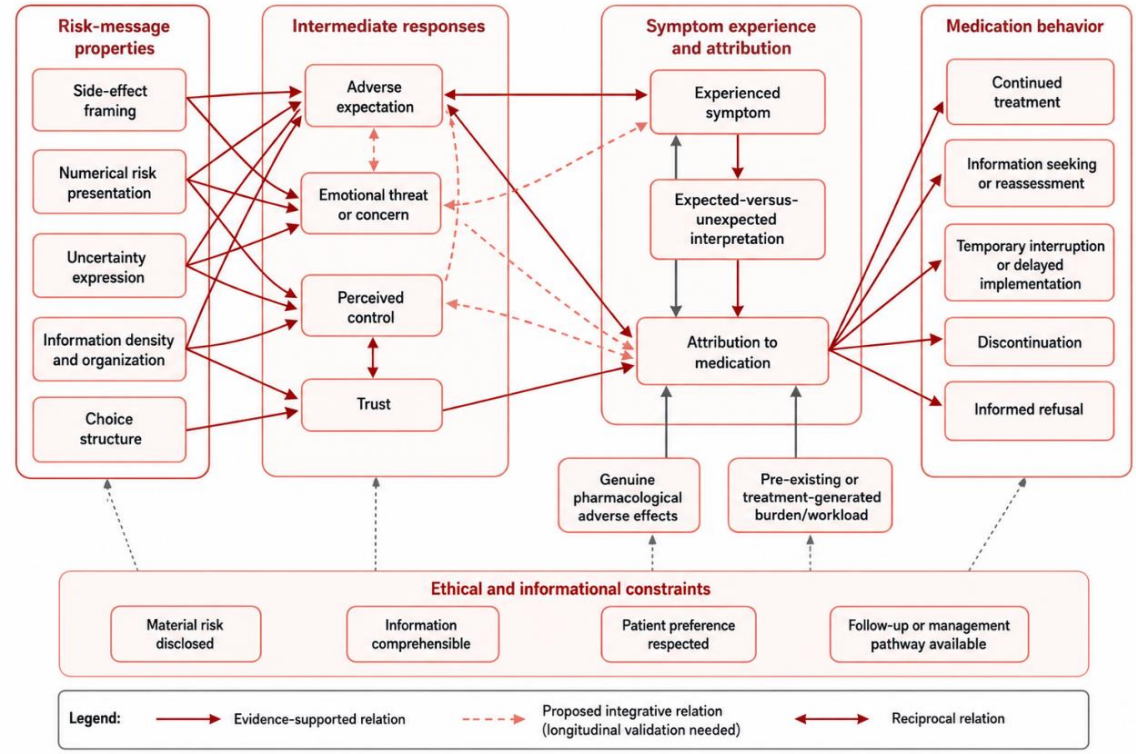

Figure 1. Risk-message conditions that can redirect medication behavior through expectation, uncertainty, attribution, and agency

The ethical boundary: Informed refusal versus communication-induced nonadherence

Because communication can affect behavior, the term *communication-induced nonadherence* requires a narrow definition. It should refer only to noninitiation, postponement, interruption, or discontinuation to which a modifiable communication process plausibly contributed through expectation, unresolved uncertainty, loss of control, distrust, or symptom attribution. The category should not include decisions explained adequately by pharmacological harm, treatment burden, access barriers, changing patient priorities, or a well-informed preference not to receive treatment.

Experimental evidence reinforces the need for caution. Nocebo information and clinician empathy can alter selected treatment-related expectations and experiences, but their effects are not uniform and proposed psychological mediators have not always been supported[28]. Empathy should therefore not be presented as a reliable antidote to nocebo effects, nor should nocebo education become a technique for persuading patients to reinterpret legitimate adverse effects as psychologically generated.

The wider intervention literature reaches a similarly restrained conclusion. A systematic review of controlled experiments found that interventions explaining nocebo effects frequently changed at least one psychological or symptom-related outcome, but substantial heterogeneity remained and direct patient evidence was limited[29]. Nocebo education is therefore promising as an explanatory tool, particularly when it helps patients understand that expectations and context can influence experience. It has not been established as a universal adherence intervention.

This boundary is clearest when contrasted with informed refusal. A patient may understand the expected benefit, material harms, uncertainty, alternatives, and management options and still decide that treatment is not acceptable. That decision may reduce conventional adherence measures without representing communication failure. Conversely, a patient who stops a potentially valuable medicine because an undifferentiated side-effect list has

made every ordinary bodily sensation appear dangerous may have experienced a modifiable communication effect. The observable behavior can be identical while the decision process is fundamentally different.

The practical objective is therefore neither maximum adherence nor minimum disclosure. It is to reduce avoidable communication-generated harm while preserving the patient's authority to make an informed treatment decision.

Practice and research implications

Clinical risk communication should preserve factual completeness while improving interpretability. Material adverse effects should remain disclosed, but clinicians can distinguish common from rare events, transient from urgent symptoms, and expected monitoring from reasons for immediate review. Positive framing may sometimes reduce unnecessary negative expectancy, yet it should be used only when the underlying probability and clinical seriousness remain unchanged[12]. Numerical information should likewise be accompanied by enough context for patients to understand what the estimate means for the decision rather than being treated as self-explanatory[13].

Uncertainty should be communicated explicitly when it matters clinically, but an actionable next step should accompany it whenever possible. Experimental evidence indicates that the consequences of uncertainty depend on its formulation and on whether patients receive a meaningful recommendation or management direction[18]. A useful research proposition is that uncertainty paired with a concrete follow-up, monitoring, or reassessment plan will produce less trust erosion and less premature treatment abandonment than uncertainty communicated without an action pathway. That proposition requires direct longitudinal testing in medication decisions.

The number and presentation of choices should support agency without imposing excessive decision burden. Limited meaningful choice can support control, whereas extensive poorly differentiated choice may increase burden[19]. Preferences regarding information depth should be elicited rather than presumed, and any authorized limitation of side-effect information must originate with the patient rather than the clinician[21]. Shared decision making offers a constructive model because participation can coexist with improved adherence in some clinical contexts[27].

Future studies should move beyond immediate expectation ratings. Stronger designs would measure the risk message actually received, pre-existing expectations, trust, perceived control, symptom experience, symptom attribution, treatment burden, information seeking, and medication implementation across time. Such designs could test whether communication effects are mediated by expectation, uncertainty, trust, attribution, or combinations of these processes and could identify cases in which discontinuation reflects informed preference instead.

The practical distinctions arising from the evidence are consolidated in **Table 2**.

Table 2. Communication conditions that support informed medication use without suppressing legitimate concern

Communication condition	What it should support	Avoidable failure mode	Appropriate clinical response	Evidence-status caution
Accurate risk disclosure with interpretable framing	Comprehension without unnecessary threat amplification	Alarm generated by technically correct but context-poor presentation	Explain magnitude, seriousness, time frame, and manageability	Framing effects are heterogeneous and context dependent
Clear numerical context	Calibrated perception of likelihood	Relative-risk inflation, denominator confusion, false precision	Prefer understandable absolute meaning and consistent denominators where appropriate	Improved comprehension does not guarantee adherence
Structured side-effect information	Distinction between ordinary, manageable, and urgent events	Undifferentiated vigilance toward every possible symptom	Group effects by frequency, severity, urgency, and required action	Material risks must not be omitted for convenience
Explicit uncertainty plus next-step guidance	Realistic expectations and preserved trust	Ambiguity without a plan, or false certainty	State what is unknown and what monitoring, review, or contingency follows	Direct adherence effects require further testing
Bounded meaningful choice	Agency without excessive decision burden	Coercion at one extreme or choice overload at the other	Offer clinically relevant options with interpretable differences	Choice effects are not uniformly monotonic

Preference-sensitive information depth	Patient control over how information is received	Clinician-imposed concealment or unwanted information saturation	Elicit preferences while maintaining informed-consent requirements	Preferences differ substantially among individuals
Nocebo explanation when clinically appropriate	Reattribution and understanding of contextual effects	Dismissal of genuine adverse effects or implication that symptoms are imaginary	Explain that pharmacological and contextual influences can coexist	Intervention evidence remains preliminary and heterogeneous
Empathic follow-up and reassessment	Trust, symptom reporting, and safe treatment adjustment	Patient feels that raising concerns threatens access to care or autonomy	Invite reporting, verify symptoms, and revisit the treatment decision	Empathy is beneficial relationally but is not a guaranteed nocebo antidote
Distinction between verification and refusal	Appropriate information seeking	Labeling questions or second opinions as nonadherence	Support clarification and reassessment before classifying behavior	Information-seeking intentions do not equal observed persistence
Respect for informed refusal	Autonomy after adequate information and deliberation	Treating every treatment decline as communication failure	Document understanding, alternatives, preferences, and follow-up	Adherence is not the sole criterion of successful communication

Conclusion

Risk communication can contribute to the nonadherence it is intended to prevent, but only under identifiable and context-dependent conditions. Negative expectations can be learned, framing can change the meaning attached to equivalent risk information, uncertainty can become destabilizing when it lacks interpretive or action guidance, and loss of control or trust can influence how symptoms and treatment choices are understood. None of these processes establishes that adverse effects are imaginary, that disclosure is harmful in itself, or that adherence should override autonomy.

The ethically relevant objective is better communication rather than less information. Material risks should remain accurate and visible, numerical information should be interpretable, uncertainty should be paired with appropriate management guidance, and patients should retain meaningful control over treatment decisions. Medication discontinuation must then be interpreted according to its mechanism. A decision arising from genuine toxicity, unsustainable treatment burden, or informed refusal is different from one shaped unnecessarily by avoidable expectancy, ambiguity, distrust, or misattribution.

The strongest current evidence supports this thesis conditionally rather than universally. Future longitudinal studies should test the complete sequence from message properties through expectations, trust, symptom attribution, treatment burden, and actual medication behavior. Until then, risk communication should be judged by whether it enables patients to understand uncertainty and harm without converting possibility into inevitability or autonomy into pressure to comply.

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