

Living With Medical Uncertainty: A Psychological Model of Fear, Hope, Decision Conflict, and Adaptive Meaning-Making

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Abstract

Medical uncertainty is often treated as a deficit of information that should be progressively reduced through diagnosis, prognostication, testing, or communication. Yet uncertainty is also a lived psychological condition in which incomplete knowledge acquires emotional, behavioral, relational, and existential significance. This article develops a non-empirical psychological model of living with medical uncertainty by distinguishing uncertainty itself from the responses it evokes. Fear arises when unresolved possibilities are appraised as threatening, consequential, and difficult to control. Hope preserves valued future possibilities without necessarily denying uncertainty. Decision conflict emerges when uncertain evidence must be translated into action despite incomplete prediction, competing values, or disagreement about what problem is being decided. Information seeking, avoidance, and reassurance are conceptualized as regulatory strategies rather than simple indicators of engagement. Meaning-making provides a further adaptive pathway by reorganizing illness experience into a sufficiently coherent narrative without requiring uncertainty to disappear. The proposed model therefore treats fear, hope, conflict, information behavior, and meaning as dynamically interacting states rather than sequential stages. Their configuration is expected to vary with illness trajectory, communication, social resources, literacy, cultural expectations, perceived control, power, and access to credible support. The model is intended as a bounded theoretical synthesis requiring longitudinal, comparative, and intervention-based validation.

Keywords: Medical uncertainty, Fear, Hope, Decision conflict, Meaning-making, Uncertainty tolerance

Introduction

Medical uncertainty is not a marginal complication of healthcare. It can arise because available evidence is incomplete, probabilities are unstable, diagnoses remain provisional, treatment response cannot be predicted precisely, or clinicians and patients interpret the same evidence differently. Research on uncertainty has consequently expanded across decision science,

communication, psychology, and clinical practice, yet these traditions often study different fragments of the phenomenon rather than a common psychological architecture [1]. This fragmentation matters because uncertainty is not psychologically equivalent to risk, lack of information, ambiguity, anxiety, or indecision. Communication further complicates the picture. Clinicians do not disclose diagnostic uncertainty in a uniform manner; experimental-vignette and interview evidence indicates substantial variation in whether uncertainty is communicated explicitly, implicitly, or not at all, partly because clinicians balance accuracy, anxiety management, trust, autonomy, and safety-netting [2]. What patients encounter is therefore not simply an objective degree of uncertainty but an uncertainty environment shaped by interpretation and communication.

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This article argues that living with medical uncertainty is best understood as a dynamic psychological condition in which several processes can coexist: threat appraisal can generate fear; unresolved possibilities can preserve hope; action demands can create decision conflict; uncertainty can drive information seeking, avoidance, or reassurance; and illness experience can be reorganized through meaning-making. These processes are not assumed to occur in a fixed sequence, nor is one response inherently adaptive. The article therefore proposes a fear–hope–meaning model in which uncertainty is continually interpreted through personal goals, relational conditions, informational resources, perceived control, and illness context.

Defining medical uncertainty

A useful definition must distinguish uncertainty from the person's response to it. Tolerance of uncertainty has been conceptualized as a cognitive, emotional, and behavioral response to consciously perceived ignorance rather than as uncertainty itself [3]. This distinction prevents a common conceptual error: a patient may face substantial medical uncertainty while remaining relatively regulated, whereas another may experience comparatively limited uncertainty as intolerable because the unresolved issue threatens a highly valued goal.

Uncertainty also has different objects and locations. Work in clinical genomics demonstrated the usefulness of distinguishing uncertainty by source, issue, and locus, including uncertainties arising from scientific knowledge, technical evidence, clinical interpretation, and the perspectives of different actors [4]. That taxonomy should not be generalized mechanically beyond genomics, but it illustrates why “uncertainty” cannot be treated as one homogeneous exposure.

For the present model, medical uncertainty is defined as a state in which clinically or personally consequential aspects of illness, prognosis, treatment, outcome, or future functioning cannot be known with sufficient confidence for the person confronting them. This definition separates three layers: the unresolved condition itself; the individual's awareness and interpretation of that condition; and the psychological or behavioral response that follows.

The distinction is theoretically important. Fear belongs to appraisal, not to uncertainty itself. Hope concerns the preservation of valued possibilities. Decision conflict concerns action under incomplete knowledge. Information behavior concerns attempts to regulate what

is known, attended to, or emotionally manageable. Meaning-making concerns the reconstruction of coherence when certainty cannot be restored. The model developed here therefore treats these as related but noninterchangeable processes.

Sources and forms of uncertainty

Medical uncertainty can originate at several levels simultaneously. Qualitative work with hospital physicians has identified strategies directed toward ignorance, uncertainty itself, emotional responses, and the clinician–patient relationship, demonstrating that uncertainty management is not solely an informational problem [5]. A clinician may therefore reduce one uncertainty while inadvertently amplifying another—for example, by providing a technically accurate explanation that increases awareness of prognostic unpredictability. Patients also encounter uncertainty through illness trajectories in which possibilities remain open for prolonged periods. Among patients and caregivers dealing with advanced cancer and immunotherapy, prognostic uncertainty coexisted with hope, distress, disappointment, and heterogeneous preferences for information [6]. Such findings challenge the assumption that greater informational clarity automatically produces psychological stability.

Uncertainty can also leave the clinical encounter and become socially reconstructed. Analysis of online health communities shows that patients and caregivers interpret, reformulate, and negotiate uncertain professional information through peer interaction [7]. Digital environments can consequently provide support and interpretive resources, but they can also introduce additional ambiguity, conflicting testimony, or unequal access to credible information.

The proposed model therefore distinguishes at least four analytically different uncertainty sources: epistemic uncertainty, concerning what is known; predictive uncertainty, concerning what will happen; relational uncertainty, concerning whose interpretation can be trusted and how information should be communicated; and existential uncertainty, concerning what illness means for identity, roles, plans, and future life. These categories are proposed organizing constructs rather than an empirically validated taxonomy. Their value lies in showing that the psychological consequences of uncertainty depend not only on its magnitude but also on what is uncertain and why that uncertainty matters.

Threat appraisal and fear

Fear becomes especially important when unresolved possibilities are appraised as threatening and personally consequential. Evidence from breast-cancer consultations suggests that anxiety may already be elevated before communication occurs and is associated with greater pre-consultation illness uncertainty [8]. Uncertainty should therefore not always be modeled as the first event in a causal chain; emotional state can shape how uncertainty is noticed, interpreted, and carried into clinical encounters.

Intolerance of uncertainty provides one plausible vulnerability process. In breast-cancer survivors, intolerance of uncertainty was strongly associated with fear of cancer recurrence, although not every hypothesized coping pathway was supported [9]. This negative evidence is important because it argues against a simple mechanism in which intolerance automatically produces fear through one uniform coping style.

A broader preregistered meta-analytic structural model likewise indicates that associations between intolerance of uncertainty and anxiety differ across anxiety presentations rather than operating with identical strength in all groups [10]. Evidence from psychiatric populations cannot be transferred directly to medical uncertainty, but it supports a bounded proposition: sensitivity to unresolved possibilities may amplify threat appraisal without determining its content or consequence.

The model proposed here therefore treats fear as the product of an interaction among uncertainty, perceived threat, anticipated consequences, controllability, and personal significance. Fear may motivate protective information seeking or timely action, but it may also narrow attention, intensify reassurance needs, increase avoidance, or make probabilistic information difficult to use. Its adaptiveness depends on whether it improves orientation to the problem or traps the person in repeated attempts to obtain certainty that medicine cannot provide.

Hope, possibility, and future orientation

Hope should not be defined as the disappearance of uncertainty or as the psychological opposite of fear. In advanced cancer, qualitative synthesis shows that patients confront emotional, social, financial, informational, and communication uncertainties while simultaneously trying to preserve realistic expectations and reasons for hope [11]. Hope can therefore coexist

with fear because the two processes evaluate different aspects of the same uncertain future.

Cross-sectional evidence among patients receiving haemodialysis found that greater illness uncertainty was modestly associated with lower agency and pathways components of hope [12]. A separate haemodialysis study reported statistical mediation by hope between uncertainty, social support, and self-management [13]. Because these data are cross-sectional, they do not demonstrate that uncertainty temporally reduces hope or that hope causally restores self-management. They nevertheless support the proposition that future orientation is intertwined with how uncertain illness is psychologically organized.

In the proposed model, adaptive hope is the capacity to preserve valued future possibilities while remaining epistemically open to outcomes that cannot yet be known. This differs from certainty-seeking optimism. Hope can be sustained by perceived options, credible support, meaningful goals, and a sense that some form of agency remains available even when outcome control is limited. Conversely, hope becomes fragile when uncertainty is combined with severe resource constraints, contradictory communication, loss of trusted relationships, repeated disappointment, or the belief that no meaningful action remains possible.

The distinction between possibility and prediction is central. Hope does not require the belief that a desired outcome is probable. It requires that the future remains sufficiently open for valued action or meaning to remain conceivable. This permits fear and hope to operate simultaneously: fear represents the anticipated cost of adverse possibilities, whereas hope represents the preserved significance of favorable or still-meaningful possibilities.

Because hope under uncertainty depends on both internal appraisal and external conditions, a purely individual account would be inadequate. The multilevel conditions that preserve or constrain future orientation are therefore synthesized below.

The psychological problem is not whether hope is present or absent, but under what conditions an uncertain future remains experienced as inhabitable, actionable, and meaningful enough to support forward orientation. **Table 1** organizes those conditions without converting them into a score or hierarchy.

Table 1. Conditions That Preserve or Constrict Hopeful Future Orientation Under Medical Uncertainty

What remains psychologically possible	Primary regulatory process	Constraint on future orientation	Boundary or competing interpretation	Consequence within the proposed model
Uncertain condition — Prognosis remains unresolved but credible options remain available				
Continued investment in treatment, relationships, or future goals	Possibility preservation	Repeated deterioration or contradictory prognostic messages	Hope may reflect realistic openness rather than denial	Fear and hope may coexist without immediate conflict
Uncertain condition — Outcome control is limited but some action remains available				
Agency through preparation, symptom management, communication, or value-based choice	Actionable control	Confusing “limited control” with “no agency”	Action does not imply control over clinical outcome	Hope shifts from outcome certainty toward meaningful participation
Uncertain condition — Social and relational support is reliable				
Future possibilities can be discussed without requiring premature certainty	Shared regulation	Isolation, mistrust, fragmented care, or invalidation	Support can also become unrealistic reassurance	Hope becomes relationally sustained rather than individually generated
Uncertain condition — Information is incomplete but intelligible				
Uncertainty can be represented without being experienced as chaos	Cognitive organization	Low health literacy, inaccessible language, conflicting explanations	More information may increase rather than reduce uncertainty	Future orientation depends on interpretability, not information volume alone
Uncertain condition — Desired clinical outcome becomes less attainable				
Alternative goals, identities, or sources of meaning may remain available	Goal revision	Rigid attachment to one outcome as the only meaningful future	Goal revision must not be equated with resignation	Hope can be reorganized around changed but still valued possibilities
Uncertain condition — Uncertainty persists over time				
A tolerable open future may still be maintained	Temporal adaptation	Repeated waiting, recurrence threat, or cumulative disappointment	Persistence of uncertainty can exhaust previously effective strategies	Hope may fluctuate rather than decline linearly
Uncertain condition — Structural resources are constrained				
Limited but meaningful options may still be identified	Context-sensitive agency	Financial, geographic, linguistic, digital, or organizational barriers	Psychological framing cannot compensate for unavailable care	Future orientation is partly determined by opportunity, not mindset alone

The same evidence also implies that future orientation should be represented as an unequal field of opportunity rather than as a uniform psychological resource. **Figure 1** therefore depicts how uncertainty can widen or narrow

perceived pathways toward valued futures without assigning numerical strength to those pathways.

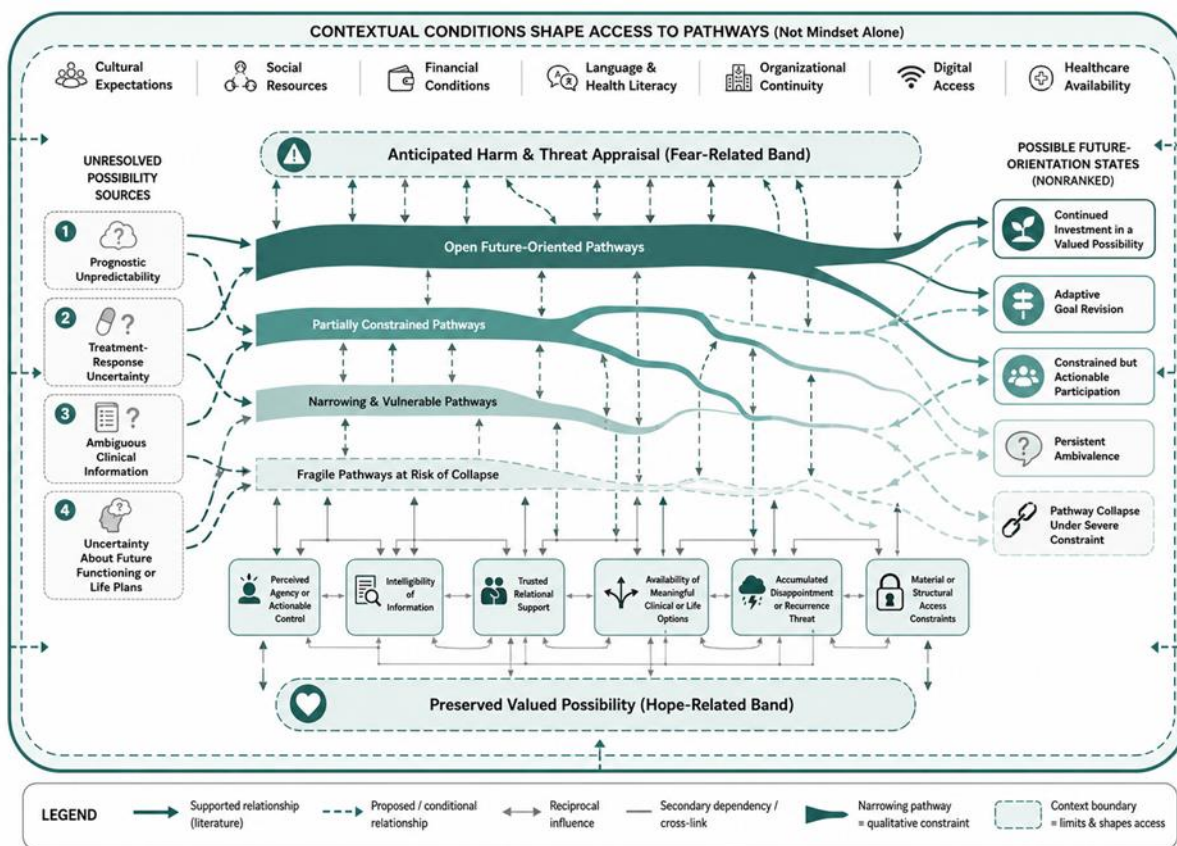


Figure 1. Unequal Pathways to an Inhabitable Future Under Medical Uncertainty

Decision conflict under incomplete knowledge

Uncertainty becomes especially consequential when a choice cannot be postponed. Decision conflict is often interpreted as insufficient information, but the construct also includes uncertainty about values, anticipated consequences, and the adequacy of available options. Validation work using hypothetical future-care decisions demonstrates that decisional conflict is sensitive to scenario construction and that not every decision context functions equivalently as a measurement situation [14]. Thus, apparent conflict can partly reflect how the choice itself is framed.

Observed clinical interactions also show that decisional conflict is shaped by capacities and emotions surrounding participation. Among older adults with multiple chronic conditions, health literacy, education, anxiety, and participation were associated with decisional conflict, with participation statistically mediating one literacy relationship [15]. Such evidence supports a multilevel interpretation: conflict is not always an isolated cognitive deficit inside the patient.

Shared decision making introduces another complexity. Conceptual and interactional analysis suggests that uncertainty can both motivate and remain embedded within shared decision making rather than being removed before deliberation begins [16]. A high-quality decision process may therefore expose uncertainty more clearly instead of eliminating it.

Patients and clinicians may also disagree about what problem is actually being decided. Dyadic qualitative evidence in cancer care indicates that patients and physicians draw on different but overlapping knowledge systems when defining treatment problems [17]. The proposed model therefore defines decision conflict under uncertainty as a state in which action is required while evidence, values, future consequences, or even the definition of the decision problem remain insufficiently settled.

Fear can intensify this state by increasing anticipated loss, whereas hope can complicate it by maintaining attachment to desirable but uncertain outcomes. Conflict is therefore not necessarily evidence of failed decision

making. In some circumstances, it may be an accurate psychological representation of a genuinely difficult choice. The theoretical problem is to distinguish productive conflict that supports value clarification from destabilizing conflict that produces paralysis, compulsive certainty seeking, or disengagement.

Information seeking, avoidance, and reassurance

Information behavior is frequently treated as a simple response to uncertainty: people who know less seek more information until uncertainty declines. Evidence does not support such a uniform sequence. Multinational survey research indicates that patient-centered communication is associated with different uncertainty-management strategies and with use of different online health-information channels [18]. Seeking can therefore reduce, maintain, or even increase uncertainty depending on what the person is trying to accomplish.

Avoidance is similarly heterogeneous. Patient-centered communication has been associated with lower cancer-information avoidance, with trust and healthcare literacy statistically mediating parts of that relationship [19]. Avoidance should therefore not automatically be interpreted as denial or lack of motivation. It may reflect low trust, difficulty evaluating conflicting information, emotional overload, inaccessible communication, or the attempt to preserve functioning when additional information has little immediate decision value.

Within the proposed model, information seeking, avoidance, and reassurance are regulatory behaviors. Seeking may be adaptive when it improves orientation or identifies actionable options, but maladaptive when it becomes an endless search for impossible certainty. Avoidance may temporarily protect emotional functioning but become harmful when it blocks necessary decisions. Reassurance may stabilize threat appraisal when it restores relational trust, yet repeated reassurance can also become a short-lived response that strengthens dependence on external certainty.

Digital environments amplify both opportunity and burden. Patients can access professional resources, peer experience, and multiple interpretations rapidly, but the ability to benefit from those resources depends on literacy, trust, access, language, and the capacity to judge credibility. Information volume should therefore not be equated with epistemic control.

Meaning-making and narrative coherence

Some uncertainty cannot be solved through further information or better prediction. When diagnosis, prognosis, recurrence risk, chronicity, or functional loss remains unresolved, adaptation may require a different psychological task: constructing enough coherence to continue living without claiming that uncertainty has disappeared.

Qualitative evidence among younger and middle-aged adults with cancer describes meaning in life as dynamic rather than fixed, with illness capable of disrupting prior assumptions while also prompting reconstruction of goals, relationships, and priorities [20]. This supports a process-oriented view of meaning but does not justify assuming that adversity automatically produces growth. Intervention evidence also requires careful interpretation. In a randomized trial among cancer survivors, meaning-centered psychotherapy produced stronger improvement than cognitive behavioral therapy on meaning-related outcomes, while the groups did not differ on every broader psychological endpoint [21]. Meaning can therefore be therapeutically responsive without being a universal pathway to psychological improvement.

The distinction between meaning-making and other forms of adaptation is equally important. In advanced lung and prostate cancer, acceptance—but not the measured meaning-making pathway—statistically accounted for part of the relationship between perceived injustice and psycho-spiritual outcomes [22]. This null result argues against treating “meaning” as a catch-all explanation for adjustment.

The present article therefore defines adaptive meaning-making narrowly: the reorganization of illness experience into a sufficiently coherent account that preserves identity, valued action, or relational continuity while acknowledging unresolved uncertainty. Coherence does not require a positive story. It may involve recognizing loss, abandoning an earlier expectation, revising goals, or accepting that no fully satisfying explanation exists.

Meaning-making also interacts with the earlier components of the model. Fear can destabilize narrative coherence by continually reopening catastrophic possibilities. Hope can protect future-oriented meaning by preserving valued alternatives. Decision conflict can expose incompatible values that require reinterpretation before action is possible. Information seeking can supply narrative material, whereas conflicting or excessive information can fragment coherence further.

The important theoretical boundary is therefore between meaning that accommodates uncertainty and meaning that falsely resolves it. Adaptive meaning-making does not convert unknown outcomes into confident expectations. Instead, it allows uncertainty to remain cognitively unresolved while making life psychologically more organized. This distinction becomes central to the later proposed dynamic model, in which fear, hope, conflict, information regulation, and meaning-making repeatedly influence one another rather than forming a single linear pathway.

Tolerance, control, and adaptive regulation

Tolerance should not be equated with passivity. A systematic review of illness-uncertainty interventions in cancer found substantial heterogeneity in intervention content and populations, limiting any claim that one uncertainty-management strategy is uniformly superior [23]. Regulation therefore concerns fit between strategy, uncertainty source, timing, and available resources.

The distinction between patient and clinician regulation is equally important. Primary-care physicians with

greater uncertainty tolerance reported greater confidence in shared decision making, but this did not translate into higher patient-reported shared decision making [24]. Clinician comfort with ambiguity is therefore not a proxy for patient participation or psychological safety. More broadly, contemporary synthesis of intolerance-of-uncertainty research continues to identify conceptual and measurement disputes despite its transdiagnostic importance [25].

The proposed model defines adaptive regulation as flexible movement among information seeking, temporary postponement, acceptance, controllable action, reassurance, and meaning reconstruction. Control is adaptive when directed toward genuinely controllable elements; it becomes destabilizing when converted into an unlimited search for certainty. Acceptance is not resignation, and tolerance is not indifference.

Table 2 is needed because superficially similar responses to uncertainty can have different psychological functions and should not be collapsed into a single “coping” category.

Table 2. Discriminating Regulatory Responses to Persistent Medical Uncertainty

Response pattern	Immediate psychological function	When it may support adaptation	When it may become destabilizing	Distinction required by the model
Targeted information seeking	Improve orientation	Information can change action or interpretation	Search continues after useful uncertainty is exhausted	Seeking is not synonymous with uncertainty reduction
Reassurance	Restore temporary relational security	Clarifies plans or corrects misunderstanding	Repeated reassurance substitutes for tolerating unresolved risk	Reassurance differs from information acquisition
Actionable control	Preserve agency	Concrete decisions remain possible	Effort is directed toward uncontrollable outcomes	Agency does not imply outcome control
Acceptance	Reduce struggle with unavoidable indeterminacy	Uncertainty cannot presently be resolved	Acceptance is misread as withdrawal or imposed resignation	Acceptance differs from helplessness
Meaning reconstruction	Restore coherence	Old goals or assumptions require revision	Positive meaning is demanded prematurely	Coherence need not eliminate loss
Strategic postponement	Protect decision quality or functioning	More evidence is genuinely expected	Delay becomes avoidance of necessary action	Waiting can be active rather than passive

A dynamic fear–hope–meaning model

The proposed model treats medical uncertainty as a recurrent appraisal field rather than a linear sequence. Uncertainty may activate threat appraisal and fear, preserve valued possibilities and hope, create decision conflict when action becomes necessary, alter information behavior, and disrupt or reorganize meaning.

These states can occur simultaneously and feed back into one another.

Recent prenatal-care evidence illustrates why uncertainty should not be placed only upstream: pregnancy-related uncertainty moderated associations among patient-centered communication, trust, and informational support [26]. The broader theoretical implication is that

uncertainty can change the functioning of relational processes while those same processes alter how uncertainty is experienced.

The model therefore proposes three forms of transition: amplification, when fear, conflict, repeated searching, and fragmented meaning reinforce one another; accommodation, when uncertainty remains but becomes

sufficiently interpretable and tolerable for action; and reorientation, when changed goals or meanings preserve a viable future despite unresolved outcomes. These transitions are hypotheses, not validated states.

Because the article's central claim depends on reciprocal rather than sequential relationships, **Figure 2** represents the model as an adaptive feedback field.

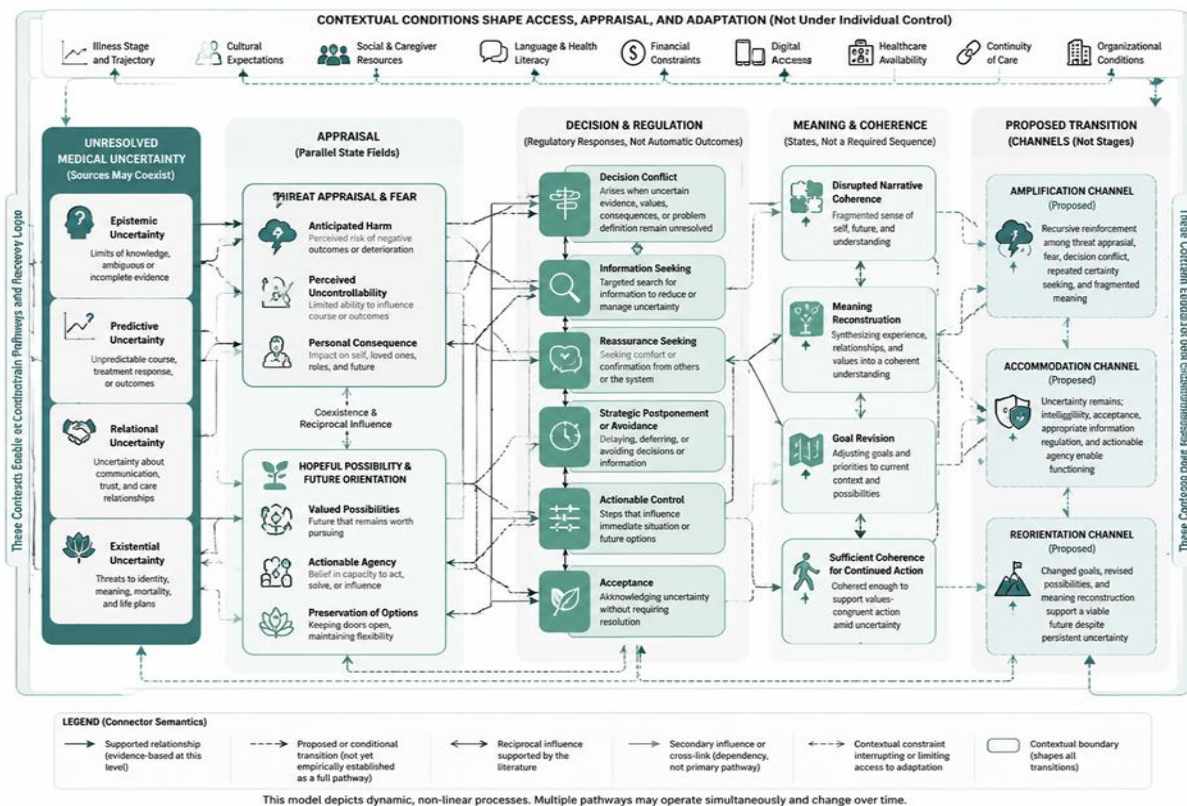


Figure 2. Recursive Transitions Between Threat, Possibility, Conflict, and Coherence Under Medical Uncertainty

Clinical communication under uncertainty

Clinical communication is one of the principal environments in which the model can be altered, but communication should not be treated as a technique for eliminating uncertainty. In breast-cancer care, perceived empathic communication was associated with uncertainty and psychological adjustment, with relationship strengths differing by treatment status [27]. Multimethod evidence from advanced multimorbidity likewise shows that patients, carers, and professionals experience future uncertainty differently and do not share one preferred communication approach [28]. Communication should therefore make uncertainty intelligible without converting probability into promise, explore what the patient wants to know now, identify

what remains actionable, and permit preferences to change over time. It should also recognize when reassurance, additional detail, or postponement serves a useful function and when it maintains distress. The proposed model predicts that communication works partly by changing appraisal, relational security, perceived agency, and narrative coherence rather than simply by increasing information volume.

Results and Discussion

This synthesis reframes medical uncertainty from an informational deficit into a psychologically organized condition. Evidence supports distinctions among uncertainty, intolerance, fear, hope, decision conflict, information behavior, acceptance, and meaning, but the

literature does not validate the exact dynamic architecture proposed here. Much of the direct evidence is cross-sectional, oncology-heavy, and dependent on self-report, while qualitative studies are context-specific. The model's main contribution is therefore explanatory organization rather than causal demonstration. It predicts that adaptation depends less on eliminating uncertainty than on whether threat remains proportionate, valued possibilities remain available, decisions remain workable, information behavior remains functional, and meaning can be reorganized. Longitudinal studies should test transitions among these states, while comparative work should examine illness stage, culture, literacy, socioeconomic resources, digital access, caregiver involvement, and healthcare continuity as moderators. Intervention studies should test individual pathways rather than assuming that reducing uncertainty itself is always the appropriate endpoint.

Measurement development is also necessary because current instruments may capture different mixtures of ignorance, emotional intolerance, decisional difficulty, and illness-specific uncertainty. Validation should therefore examine within-person change rather than relying only on between-person differences. Research should also test whether apparently adaptive responses become maladaptive when sustained beyond their useful context—for example, whether reassurance shifts from relational support to dependence, or whether postponement shifts from prudent waiting to avoidance.

Conclusion

Medical uncertainty is lived through more than not knowing. It is interpreted as threat, possibility, choice, informational demand, and disruption of meaning. The proposed fear–hope–meaning model explains these responses as interacting and context-dependent rather than sequential. Adaptive living with uncertainty does not require fear to disappear, hope to become certainty, or meaning to become positive. It requires sufficient flexibility to remain oriented, agentic, and coherent while important outcomes remain unresolved.

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