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Discussion

Toward a basic science of communication in serious illness

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ABSTRACT

High-quality communication can mitigate suffering during serious illness. Innovations in theory and technology present the opportunity to advance serious illness communication research, moving beyond inquiry that links broad communication constructs to health outcomes toward operationalizing and understanding the impact of discrete communication functions on human experience. Given the high stakes of communication during serious illness, we see a critical need to develop a basic science approach to serious illness communication research. Such an approach seeks to link "what actually happens during a conversation" – the lexical and non-lexical communication content elements, as well as contextual factors – with the emotional and cognitive experiences of patients, caregivers, and clinicians. This paper defines and justifies a basic science approach to serious illness communication research and outlines investigative and methodological opportunities in this area. A systematic understanding of the building blocks of serious illness communication can help identify evidence-informed communication strategies that promote positive patient outcomes, shape more targeted communication skills training for clinicians, and lead to more tailored and meaningful serious illness care.

1. Toward a basic science of communication in serious illness

Seriously ill patients suffer from complex, multidimensional threats to their well-being. Amidst burdensome symptoms, complicated treatment decisions, and an uncertain future, many experience anxiety about the life-altering nature of their illness [1–5]. Communication research links high-quality communication with improved quality of life through the end of life, goal-concordant care, and lower bereaved caregiver distress [6–10]. However, these studies have done little to inform underlying mechanisms of communication in this setting. For example, despite finding an association between clinician-expressed empathy and information recall among women with advanced breast cancer, one recent study could not determine an explanation for this relationship [11]. There remain important opportunities, therefore, to research the "processes and fundamental pathways linking communication to outcomes" [12,13], including the effects of discrete verbal and nonverbal communication elements [14] and the context in which they occur.

A basic science approach may advance research into the fundamental mechanisms of communication in the setting of serious illness [14,15]. Increased risk of dying and the need for decision-making related to treatments without uniform benefit, as well as cognitive and emotional strain, heighten the salience of high-quality communication in this setting. Attention to the basic science of communication will catalyze discoveries about the specific elements of "what actually happens during a conversation"– the lexical, non-lexical, and contextual factors – and directly link them with the emotional and cognitive experiences of patients, caregivers, and clinicians. Doing so can help identify communication mechanisms that promote positive patient outcomes, ultimately informing more targeted communication skills training for clinicians. Herein we describe fundamentally important elements of this basic science and point to opportunities for future research in this area.

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2. A basic science of communication

Developing a basic science of serious illness communication requires clarity about relevant independent and dependent variables that relate to this phenomenon, and the testable theories that propose mediating and moderating relationships between them. With these, we can break down and test the most discrete elements of communication. We can see a useful analogue in the practice of basic molecular and cellular scientists (Fig. 1). For example, cancer researchers investigate the role of cellular ligands and receptors and the environments in which they meet. In much the same way, communication researchers might look to understand the inputs, reception, and context of conversations between patients, caregivers, and their clinicians. Understanding how these building blocks of communication relate to each other can inform more sophisticated interventions to re-engineer how we train, incentivize, and support high-quality communication in clinical practice. This basic science approach extends the important theoretical work done in health care communication broadly [12,13,16] through closer scrutiny of discrete elements and their relationships to outcomes.

3. Linking discrete elements of communication with outcomes

Investigating when and how communication functions influence a specific health outcome requires first isolating “what is expressed, how, where, when, and by who” – the lexical and non-lexical communication content elements, as well as contextual factors, present during serious illness conversations. These factors represent the independent variables of serious illness communication. Once investigators have carefully operationalized and measured these discrete communication elements, it is then possible to evaluate their impact on patient experiences and health outcomes – the dependent variables relevant to this phenomenon (Fig. 2). In doing so, we can begin to understand specific pathways through which serious illness communication affects patients’ and caregivers’ cognitive and emotional experiences, and more distal health outcomes, building upon and refining current communication theories and practices [12,13,16].

3.1. Lexical content

Lexical (i.e., verbal) communication features can be considered the “what” of communication. Though the content of serious illness communication has received increasing attention [17–28], research linking discrete lexical elements of communication to outcomes is limited. To date, some research has utilized direct observation of real-life conversations to accomplish this aim. Direct observation avoids limitations of relying on patient and clinician report of the conversation, as these parties often disagree regarding what has been conveyed [10,29]. For example, Robinson and colleagues [30] analyzed consultations between newly diagnosed breast cancer patients and their surgeons for observed patient-centered communication behaviors [6,31]. They found that two patient-centered communication behaviors – frequency of patients asserting their treatment preferences and surgeons providing good or hopeful news – reduced patient levels of hopelessness indirectly through their effects on patient satisfaction. Gramling and colleagues [32] analyzed initial palliative care consultations for patients with advanced cancer for observed talk about length-of-life. They found that such talk was associated with increased enrollment in hospice in the six months following these conversations, a relationship that was even stronger among patients who endorsed end-of-life treatment preferences favoring comfort over longevity [33].

Though less common, experimental studies also lend insight into the influence of discrete verbal communication elements. One study [34] randomized healthy women and those with breast cancer to scripted video vignettes of conversations about transitioning to palliative treatment, manipulating explicitness of prognostic information and reassurance about non-abandonment. They found that explicit, reassuring communication resulted in decreased anxiety, uncertainty, and physiological arousal, while increasing recall, self-efficacy, and satisfaction [34–36].

3.2. Non-lexical content

Paraverbal (e.g., tone of voice and cadence) and nonverbal (e.g., body language and eye contact) communication may be seen as comprising the “how” of communication. Though much of communication research focuses on lexical elements, researchers have used diverse approaches to begin to uncover non-lexical aspects of communication. Hillen et al. [37] experimentally manipulated oncologist eye contact, posture, and facial cues in otherwise identically-scripted video vignettes to assess their effects on healthy female participants and those with breast cancer diagnoses. They found that oncologist eye contact enhanced trust, but that posture and smiling did not. Hamel and colleagues [38] analyzed nonverbal communication in observed conversations between Black Americans with cancer and their oncologists. They focused on nonverbal (e.g., eye gaze, body orientation) and paraverbal (e.g., interruptions, laughter) communication behaviors of the

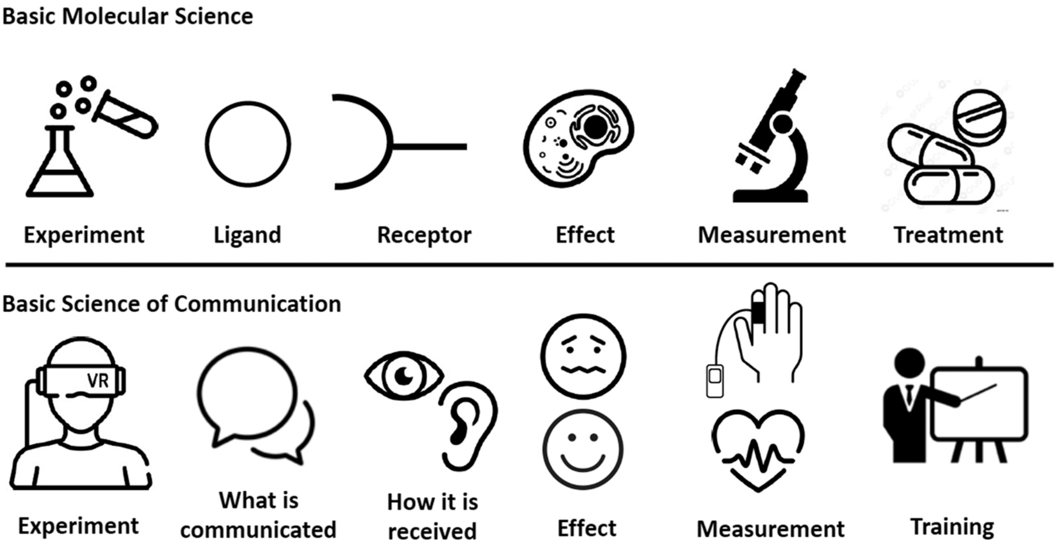

Fig. 1. Basic molecular science vs. basic science of communication.

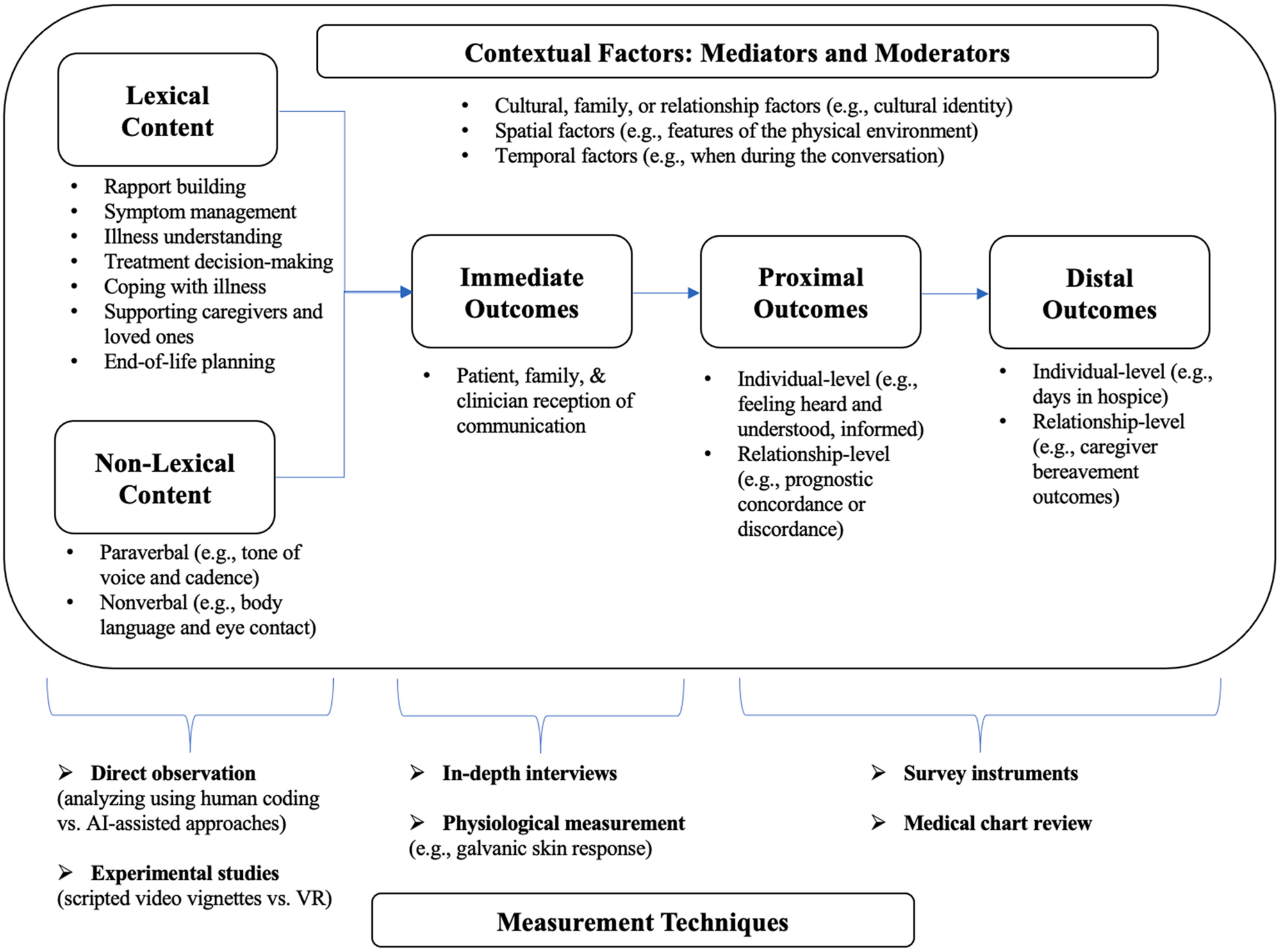

Fig. 2. Linking discrete elements of communication with outcomes and highlighting opportunities for measurement.

dyad, rather than the individual. Using network analysis methods, they examined how these communication behaviors of patients and clinicians mutually influenced one another. New artificial intelligence-assisted approaches to analyzing conversation recordings has enabled study of communication delivery features such as use of silence [39], turn-taking [40], and vocal tone [41,42].

Yet, research linking patients' and clinicians' nonverbal communication during clinical interactions and health outcomes is limited by heterogenous measurement techniques, limiting generalizability [43, 44]. For example, when measuring the effect of smiling in clinical interactions, researchers can choose to ask "overall, how often did the physician smile during the interaction." However, taking a more discrete approach by counting the number of smiles, or even coding the frequency and intensity of facial muscle movements activated by different types of smiles, may shed light on how different smiles are perceived by patients in clinical encounters [45]. Because guidance to "smile more" may be problematic for a host of reasons, stronger evidence of the subtleties and contexts of smiles can guide the appropriate and effective use of this and other body language in practice.

3.3. *Communication context*

The cultural, spatial, and temporal environment in which conversations takes place represents the "who, where, and when" of communication. As other communication researchers have identified, how contextual factors moderate and mediate the effects of communication elements on specific health outcomes remains underexplored [12,13, 16]. Contexts articulated by sociolinguists and anthropologists that may impact the encounter are numerous and include habituated experiences of interactional etiquette, such as norms of politeness and authority, symbolic actions, and communicative rituals. Here we articulate a few ways context may be considered and measured as most relevant to serious illness communication.

"Where" patients, family members, and clinicians situate themselves spatially in the clinical encounter is a form of communication. Spatial aspects of communication have long been recognized as important in palliative care, as early serious illness communication curricula stressed the importance of the physical setting as the first step of setting-up the conversation [46]. Increasing use of digitally-mediated communication and telemedicine means serious illness communication is also happening outside the traditional in-person clinical setting [47]. Empirically investigating the influence of factors in the physical or digital environment on communication processes presents a research opportunity in serious illness. The growing use of virtual technologies offers a novel way of studying this relationship, allowing investigators to systematically manipulate environmental factors in a variety of clinical settings (e.g., changing virtual backgrounds in telehealth [48]).

The "who" of communication entails considering the impact of cultural, family, or relationship factors. Though much of serious illness communication research emphasizes the clinician-patient relationship, this dyadic view is not a complete representation of the family relationships and myriad social interactions that contribute to the "crowded room" of decision-making in the clinical encounter [49]. Examination of triadic communication in conversations about treatment choices and prognosis in advanced cancer has found that companions often speak on behalf of patients, even when patients are able to speak for themselves [50]. More research is necessary to investigate how the conversational roles of patients and family, or other, caregivers influence the experience of conversations and impact decisional outcomes, such as patients' and caregivers' satisfaction or conflict [51].

Research documents racial disparities in patient-clinician communication [52–56] and stigmatizing and judgmental language in the medical records of Black and Brown patients [57]. However, granular examination of the effect of implicit biases on communication and resulting health outcomes is limited and focuses more on frequency than quality. For example, Ingersoll and colleagues [53] examined whether prognosis communication differed by patients' self-reported race/ethnicity and found that prognosis conversations were less than half as likely to occur with Black or Latino/a/x patients compared to others. Research that helps us understand how to mitigate differences in communication quality and outcomes that arise from racial, cultural, or other forms of clinician-patient discordance and bias can inform communication skills training and address disparities. Patients report a major barrier to meaningful serious illness communication and care is clinician lack of awareness or insensitivity to their cultural needs [58], highlighting the urgent need for research examining the influence of cultural identity on communication as well [59]. As it stands, much of the literature in serious illness communication is derived from or written by White people, leading to the development of "universal communication principles" without critical examination of who these conversation frameworks were built by and for.

Temporal factors may also affect communication interactions. This includes considering "when" communication elements occur in the course of an individual's serious illness trajectory, as well as "when" during a conversation [60,61]. Longitudinal communication research that collects multiple recordings of clinical interactions can help characterize the effects of the disease trajectory on communication [27]. A study examining prognostic disclosure using serial audio-recorded discussions across a child's advancing cancer course found that the majority of prognostic communication occurred at the time of overt disease progression, and that prognostic disclosure followed three distinct patterns (absent, deferred, and seed-planting) [62]. This line of inquiry presents opportunities to determine relationships between for example, prognosis communication patterns, and outcomes, such as prognostic understanding. It may also yield insights about clinically important sub-types of serious illness conversations where certain types may be beneficial for certain scenarios or perceived more favorably by participants.

4. The path forward

Preliminary work in this area lays the groundwork for a basic science of serious illness communication and reveals opportunities for future study. As we outline below, rigorous application of certain theories, methods, and outcomes can advance more systematic research in this area.

4.1. Theory

The patient-centered communication in cancer care conceptual framework from the US National Cancer Institute [6,31] outlines six interrelated key functions of communication: fostering healing relationships, exchanging information, managing uncertainty, making decisions, responding to emotions, and enabling patient self-management. This represents a helpful starting point for serious illness communication research. Nonetheless, applying new methods to the study of communication necessitates innovative adoption and articulation of theoretical frameworks [63–65]. For example, Mishel's [66] theory of uncertainty in illness may be appropriate if interested in investigating managing uncertainty. Theories of behavioral convergence and divergence [67] can be considered if interested in studying reciprocity in communication as a means of alleviating communication disparities [38]. Table 1 describes additional relevant theories and their potential value in building a basic science of serious illness communication. A basic science approach to serious illness communication research can test, refine, and discover theoretical models by seeking to explain how, when, and why serious illness communication contributes to improved patient outcomes.

4.2. Methods

Serious illness communication research to date often relies on resource intensive observational or experimental methods that fail to elucidate links between discrete communication elements and patient outcomes. Advances in audiovisual recording and conversation analysis are of great interest, but do not afford opportunities for experimental manipulation or comparison [68]. Human manual coding of conversations limits our ability to study conversational features at scale. And, despite overcoming ethical challenges to manipulating communication variables in real world settings, communication experiments often rely on scripted video vignettes that are costly to produce and therefore inflexible to manipulation of multiple variables [69].

Innovations in artificial intelligence-assisted methods and virtual technologies hold distinct promise for advancing the science to address these barriers. Partially- or fully-automated computational methods, such as natural language processing, present new opportunities to study conversational features at scale [63]. These underutilized tools can accelerate systematic analysis of discrete communication features in large conversation datasets [42,60]. Further, combining new computational methods with traditional qualitative approaches may offer a 'breadth-and-depth method' of communication research, complementing large scale analysis of conversation datasets with nuanced investigation of the complexities of the interaction [70]. Importantly, work in this area must recognize that these new tools can "learn" and perpetuate existing human and structural biases built into collected data, necessitating critical attention to algorithmic fairness [71]. Principles of algorithmic fairness should be incorporated into research designs, building machine-learning systems that proactively advance health equity, not merely protect against harms [72].

Similarly, respective advances and efficiencies in the quality and cost of virtual technologies allows researchers to systematically manipulate communication variables in realistic settings. For example, virtual reality (VR) can immerse participants in a clinical simulation in which environment, race, gender, and communication content and delivery can be randomized to assess the discrete effects of each variable. A recent review highlighted research and opportunities for using virtual technologies, including VR, to study affective outcomes in clinical communication [73]. VR makes it possible to easily and efficiently modify and experiment with these and other communication factors, enabling the testing of multiple hypotheses about the effects of clinician and communication variables on patient outcomes.

4.3. Outcomes

To better understand the relationship between communication variables and clinically relevant outcomes in serious illness, researchers must clearly and consistently operationalize outcomes that happen during conversations (immediate), shortly after (proximal), and further downstream (distal). These outcomes may represent the perspectives and experiences of patients, families, and clinicians, each of whom play a critical role in serious illness communication [14]. We see at least two ways of assessing patient, family, and clinician immediate experience of communication: through in-depth interviews and physiological measurement. First, in-depth interviews with conversation participants can enable a better understanding of how perceptions of communication quality validate or challenge direct measurement of conversational features and other more distal measures of communication quality; "in the end, communication is as effective as the influence it has on patients'

Table 1
Relevant theories for a basic science of serious illness communication.

Theory	Description	Related citations
Attentional narrowing	This theory outlines that processing information under stress impairs memory formation. It provides a framework for measuring strategies to reduce stress during a consultation (e.g., clinician-expressed empathy) and testing the effect on patient's recall of information, with exploration of relevant mediators and moderators (e.g., the therapeutic relationship).	[11,87]
Communication accommodation theory	Speakers modify their communication behavior in an interaction, through behavioral strategies of convergence (matching another's style) or divergence (accentuating differences in style), to create, maintain, or decrease social distance. This theory can be applied to studies analyzing verbal or nonverbal behaviors in patient-clinician conversations, observing behaviors of the dyad, rather than the individual, for evidence of convergence and divergence.	[38,67,88]
Terror management theory	Awareness of death (mortality salience) can provoke intense death anxiety that people manage by embracing cultural worldviews; this adherence forms the basis of one's self-esteem, which buffers death anxiety. This theory can provide an underpinning when studying prognosis communication as a potential mortality salience trigger, and investigating the relationship between prognosis communication and relevant serious illness communication outcomes, like prognostic awareness and quality of life, with potential mediators of self-esteem.	[89–91]
Anxiety/uncertainty management	Explains ways anxiety about communication between individuals and uncertainty about communication outcomes undermine effective communication. This theory may be used to study how anxiety about communication because of cultural difference may influence communication outcomes, such as emotional upset and emotional arousal (e.g., measured via galvanic skin conductance).	[92,93]
Cognitive-Transactional Model	A model of dyadic coping that posits individual processing and coping becomes dyadic when the ownership of an illness or coping with illness is shared, a process that requires communication; dyadic coping affects individual and relational outcomes via self- and dyadic efficacy. This model could be used to investigate communication processes between patients and caregivers in a clinical encounter with outcomes such as caregiver burden and caregiver preparedness.	[94,95]
Broaden-and-Build Theory	Proposes that positive emotions function to broaden an individual's thought-action repertoire, in turn building physical, intellectual, and social resources, and ultimately promoting resilience. This theory can be used to explore expression of positive emotion in conversations between patients, caregivers, and clinicians, and the influence of frequency of expression on measures of patient satisfaction with life or the patient-clinician relationship.	[18,96]

perceptions" [16]. Second, opportunities exist to use physiological measurement techniques to examine the impact of communication at the cellular level [73]. For example, researchers can add to subjective assessment of emotion and cognitive experience psychophysiological measures (e.g., galvanic skin resistance [35,74], pupillary response, or neural activity [75–77]) that assess emotional arousal and cognitive load.

Many studies focus on non-specific measures of patient satisfaction as a communication outcome [43]. However, examining the relationship between communication features and proximal and distal outcomes can advance communication theory and further explain the connections between them. Deciding on which outcomes are relevant depends on the specific conversational features under investigation [13]. A recent publication [78] outlined a taxonomy of potential communication measures, including those that are empirically and theoretically supported.

Proximal individual-level measures of particular relevance in serious illness may include measures of patient experience, such as feeling heard and understood [79,80], as well as measures of being informed, such as prognostic awareness [81]. Proximal relationship-level measures might consider the impact of communication elements on the patient-clinician relationship, as well as markers of effective information exchange (i.e., measures of prognostic concordance or discordance [82,83]). New tools to evaluate the influence of communication on patients and their caregivers offer additional avenues to assess other proximal relational outcomes [84]. Distal individual-level outcomes might include days in hospice or location of death, which can be obtained through medical chart review. The more distal outcomes become, the more challenging they are to relate to specific communication functions due to the influence of multiple other factors. However, large, longitudinal studies which assess communication outcomes at multiple time-points show the potential of linking immediate, proximal, and distal outcomes, and also the moderation and mediation processes underlying them [85].

5. Key additional considerations

Advocating a basic science approach to communication research may raise questions about whether the complexities of such a relational and dynamic task as human conversation defy the often reductionist or frequentist approach to hypothesis testing in modern science. Some may resist the idea that the communication can be broken into component parts and argue that focusing on certain communication variables may not capture the full range of factors that influence patient and caregiver experience; or that the interplay of factors is more important than any one component part [6]. Others may critique methods of direct observation, in that knowledge that a conversation is being recorded may distort the authenticity of examining "real-world" interactions [86]. Additionally, direct observation work requires that "what actually happens during a conversation" be observable to people or algorithms (created by people), imbuing the observable features with biases that must be acknowledged and addressed. These are akin to the tradeoffs evident in any research approach, and we can be mindful of them while pushing the science forward.

However, given the urgent need to train the health care workforce in evidence-based communication approaches that mitigate suffering, we propose that a basic science approach to serious illness communication research represents a critically important addition to our current tools for discovery. Through systematically examining the effects of discrete communication functions, a basic science approach can be used to inform tailored serious illness communication strategies to optimize outcomes for particular patients, at particular moments in time, adding to a portfolio of communication approaches that can be taught, practiced, and individualized.

6. Conclusion

This paper defines a basic science approach to serious illness communication research and outlines investigative and methodological opportunities in this area. We encourage researchers in serious illness communication to: 1) clearly operationalize the communication variables they are investigating and/or manipulating in their work, including what happens, how it happens, when and where it happens, and who does it; 2) seek to uncover pathways that link particular conversational elements with specific health outcomes; and 3) use a variety of theories and measures to both test and discover the impact of communication on proximal and distal outcomes as measured by self-report and other means. Such an approach will have implications not only for the health care experiences of those affected by serious illness and the communication skills training that will shape them, but also for clinical practice and health care quality more broadly.

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