Changes in Prognostic Beliefs of Patients With Metastatic Cancer and Their Association With Changing Health Status

Isabella Gupta, BSc[1]; Eric Andrew Finkelstein, PhD, MHA[1,2,3,4]; Semra Ozdemir, PhD[1,2,3]; and Chetna Malhotra, MD[1,2]

ABSTRACT

Background: Patients' prognostic beliefs are known to influence treatment decisions. However, the evolution of these beliefs over an extended period in patients with metastatic cancer is understudied. We assessed longitudinal changes in prognostic beliefs and investigated their association with patients' changing health status. **Methods:** We surveyed a cohort of 600 patients with solid metastatic cancer every 9 months, up to 54 months. At each time point, we assessed whether patients believed their current treatments would cure them (responses classified as accurate, inaccurate, or uncertain belief) and tested the association of their response with symptom burden and recent unplanned hospital admission. **Results:** Only 29% of patients had accurate prognostic belief at baseline, and 24% of patients changed from having accurate to uncertain/inaccurate belief at some point during follow-up. Patients who experienced greater symptom burden were *less* likely to report inaccurate (relative risk ratio [RRR], 0.87; 95% CI, 0.84–0.90) or uncertain prognostic belief (RRR, 0.90; 95% CI, 0.87–0.92), whereas those with a recent unplanned hospital admission were *more* likely to report inaccurate (RRR, 2.71; 95% CI, 1.48–4.94) or uncertain belief (RRR, 2.34; 95% CI, 1.34–4.07) compared with accurate belief. An increase in symptom burden was associated with change toward accurate belief (RRR, 1.75; 95% CI, 1.33–2.31) as opposed to no change. **Conclusions:** In our study of long-term changes in prognostic beliefs among patients with metastatic cancer, reported prognostic beliefs were unstable, changed from accurate to inaccurate/uncertain and vice versa, and were associated with their changing health status. Our findings imply that conversations about goals of care must occur regularly to factor in these changes.

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[1]Lien Centre for Palliative Care, Duke-NUS Medical School, Singapore; [2]Health Services and Systems Research, Duke-NUS Medical School, Singapore; [3]Saw Swee Hock School of Public Health, National University of Singapore, Singapore; and [4]Duke Global Health Institute, Duke University, Durham, North Carolina.

Background

Prognostic beliefs of patients with advanced cancer have been examined extensively.[1–5] Existing research consistently notes the high prevalence of inaccurate prognostic beliefs,[4] revealing a misalignment between patients' expressed desires to understand their prognosis and the prognostic beliefs they hold.[6–9] Previous work has also shown that patients reporting inaccurate prognostic beliefs receive more aggressive treatments and incur greater healthcare costs at the end of life.[10–15] Resultantly, these patients may not receive goal-concordant care at the end of life.

Gaps in patient–physician communication, particularly physicians' reluctance to discuss prognosis, have been cited frequently as a cause of inaccurate beliefs.[8,16] However, patients' beliefs can also be shaped by their own illness experience; if it does not align with the prognostic information they receive, the resultant dissonance may affect how they process and internalize prognostic information. This dissonance, alongside its related coping mechanisms and cognitive biases,[16,17] may cause patients to confound their health status with their prognosis. A previous study showed that patients with poorer health were more likely to accept their prognosis and vice versa.[18] As patients' life expectancy increases with advanced therapies and their health status fluctuates over this longer period, it is possible that their prognostic beliefs also change over time. However, most research on prognostic beliefs has been cross-sectional. Although some longitudinal explorations of changes in prognostic beliefs have emerged recently,[19–24] they assessed beliefs during the end-of-life-period; changes over a longer duration have not been studied.[21,25]

We aimed to assess the extent to which prognostic beliefs change and the direction of these changes in patients with metastatic cancer over a period of up to 54 months. We focused on patients' perceptions about disease curability, henceforth referred to as "prognostic belief." We hypothesized that patients' prognostic belief will be unstable


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over time and will change not only toward accurate belief but also toward inaccurate and uncertain belief. We also hypothesized that patients with better health (lower symptom burden, greater physical and functional well-being) will be more likely to have an inaccurate belief, whereas those with recent experience of a sudden deterioration in health or unplanned hospital admission (UHA) will be more likely to have an accurate prognostic belief. Last, we posited that patients' prognostic belief will be more likely to change toward accuracy as their health deteriorates.

Methods

Study Setting, Design, and Participants

We analyzed data from the Cost of Medical Care of Patients with Advanced Serious Illness in Singapore (COMPASS) study; study details are reported in the previously published study protocol.[26] COMPASS is a prospective cohort of patients with advanced cancer in Singapore, a developed and rapidly aging Southeast Asian country. The study recruited 600 adult patients with stage IV solid metastatic cancer from July 2016 through March 2018, who were then surveyed every 3 months until death or dropout. Additional eligibility criteria are presented in supplemental eFigure 1 (available with this article at JNCCN.org). Surveys were conducted by trained interviewers in person, over the phone, or online in the patients' preferred language (English, Mandarin, or Malay). Patients were asked about their prognostic beliefs every 9 months.

We merged survey data with administrative data from the 2 recruiting hospitals, which treat approximately 70% of all public sector oncology cases,[26] and 6 community hospices out of 9 that provide home or inpatient hospice care in the country.[27]

All patients provided signed consent and the study was approved by the SingHealth Centralised Institutional Review Board (2015/2781).

Outcome Variables

Prognostic Belief/Change in Prognostic Belief

At each time point, patients were asked whether they were currently undergoing treatment for their illness. Patients who responded affirmatively were then asked about their beliefs about disease curability. Based on their response to the question, "Do you think your current treatment will cure your disease?" we classified patients' prognostic beliefs as accurate ("No"), inaccurate ("Yes"), or uncertain ("Unsure"). This question, adapted from the Cancer Care Outcomes Research and Surveillance study,[28] is commonly used to assess patients' understanding of prognosis.[1] Because metastatic cancers remain largely incurable despite advancements in therapies and variability in prognosis based on the cancer type, we considered acknowledgment of disease incurability by patients undergoing treatment as reporting an accurate prognostic belief.

Change in prognostic belief was assessed between 2 consecutive responses and classified into 1 of 4 categories, based on the category to which patients changed: no change, change to accurate belief, change to inaccurate belief, and change to uncertain belief. In a sensitivity analysis, we further disaggregated the "no change" category (supplemental eTable 1).

Independent Variables

We used 4 variables to assess health status: symptom burden, physical and functional well-being scores, and recent UHA.

Symptom Burden Score

We calculated the symptom burden score based on patients' rating of the severity of 10 symptoms commonly experienced toward the end of life, adapted from the Functional Assessment of Chronic Illness Therapy – Palliative Care (FACIT-Pal) measure.[29] Patients were asked to rate their experience of symptoms such as pain, shortness of breath, and weight loss in the past week on a Likert scale of 0 (not at all) to 4 (very much). The score is a sum of the ratings for patients who rated at least 5 symptoms, adjusted by the number of responses. It ranges from 0 to 40, with a higher score indicating greater symptom burden.

Physical/Functional Well-Being Score

We used the physical and functional well-being subscales of the Functional Assessment of Cancer Therapy – General (FACT-G V4)[30] tool, which is commonly used to assess quality of life for patients with cancer. Both subscales range from 0 to 28, with a higher score indicating greater well-being.

Change in Health Status

We assessed change in health status in 3 ways: change in symptom burden, change in physical well-being, and change in functional well-being scores. For each variable, the change was calculated as the difference in scores between 2 consecutive responses, adjusted for the number of months in the intervening period.

Recent UHA

We defined a recent UHA as an accident and emergency visit that progressed to an inpatient admission, with the admission date occurring in the 3 months preceding each survey. We identified these using administrative inpatient and emergency department data from participating hospitals.

Covariates

We controlled for age, education (primary and below; secondary; and tertiary and above), type of cancer (breast,

gastrointestinal, genitourinary, respiratory, and other), survey response number, and palliative care visits. Palliative care visit is a binary variable defined as the use of palliative care services (hospital outpatient palliative care or inpatient/home/day care at a community hospice) in the 3 months preceding each survey, identified using administrative records. Such visits may not only have mitigated patients' symptom burden but also may have exposed them to new information, explicit or implicit, about their prognosis.[31,32] Similarly, because we expected that patients would both get sicker and learn more about their disease over time, we also controlled for the survey response number.

Statistical Analysis

We limited the analytical sample to patients who reported their prognostic beliefs at least once during the survey period (n=587). We first described the distribution of prognostic beliefs and changes in prognostic beliefs at each time point. Then, we estimated the association between the 2 outcome variables, prognostic belief and change in prognostic belief, and health status. To accommodate these nominal categorical outcome variables, we used a set of multinomial logistic regression models for each outcome. In the second set of models examining change in prognostic belief, we limited the sample to patients who reported their prognostic beliefs at least twice (n=338).

The main independent variables in the first set of models (outcome: prognostic belief) were symptom burden, physical well-being, and functional well-being scores—which were included in separate models due to high correlation—and recent UHA. We controlled for patients' survey response number, palliative care visits, age, education, and type of cancer in all models.

The main independent variables in the second set of models (outcome: change in prognostic belief) included changes in symptom burden, physical well-being, and functional well-being scores, which were tested in separate models. We controlled for all aforementioned covariates except UHA and palliative care visits because they only accounted for the 3 months preceding the survey, which did not correspond to the 9 months or longer between consecutive surveys.

Hausman tests confirmed the validity of using random effects to model individual heterogeneity ($P<.05$) for all but 2 models; we used random effects models in the main results and tested the sensitivity of coefficients to fixed effects (supplemental eTable 2A, B).

Missing responses comprised <5% of the sample (supplemental eFigure 2), and nonresponse was not significantly associated with any indicator of health status. Nonetheless, we conducted complete case analysis to check the sensitivity of our results to missing responses (supplemental eTable 3A [n=482]; eTable 3B [n=233]). Stata, version 17.0 (StataCorp LLC) was used to conduct all analysis.

Results

Demographic details of the sample are described in Table 1. The mean age of patients at baseline was 61 years. The sample was composed largely of patients with respiratory (27.9%) and gastrointestinal (25.7%) cancers. In the 3 months preceding the baseline survey, 13.5% of patients

Table 1. Sample Characteristics at Baseline

Characteristic	n (%)
Age, mean [SD], y	61.0 [10.6]
Gender	
Male	269 (45.8)
Female	318 (54.2)
Education	
Primary and below	224 (38.2)
Secondary	177 (30.2)
Tertiary and above	186 (31.7)
Ethnicity	
Chinese	463 (78.9)
Indian	80 (13.6)
Malay	25 (4.3)
Other	19 (3.2)
Cancer type	
Breast	96 (16.4)
Gastrointestinal	151 (25.7)
Genitourinary	129 (22.0)
Respiratory	164 (27.9)
Other	47 (8.0)
Prognostic belief	
Accurate	167 (28.4)
Inaccurate	165 (28.1)
Uncertain	246 (41.9)
Missing	9 (1.5)
Recent UHA (last 3 months)	
No	508 (86.5)
Yes	79 (13.5)
Palliative care visit (last 3 months)	
No	562 (95.7)
Yes	25 (4.3)
Symptom burden score (range, 0–40), mean [SD]	5.3 [5.2]
Physical well-being score (range, 0–28), mean [SD]	23.5 [4.8]
Functional well-being score (range, 0–28), mean [SD]	21.4 [5.5]

Abbreviation: UHA, unplanned hospital admission.

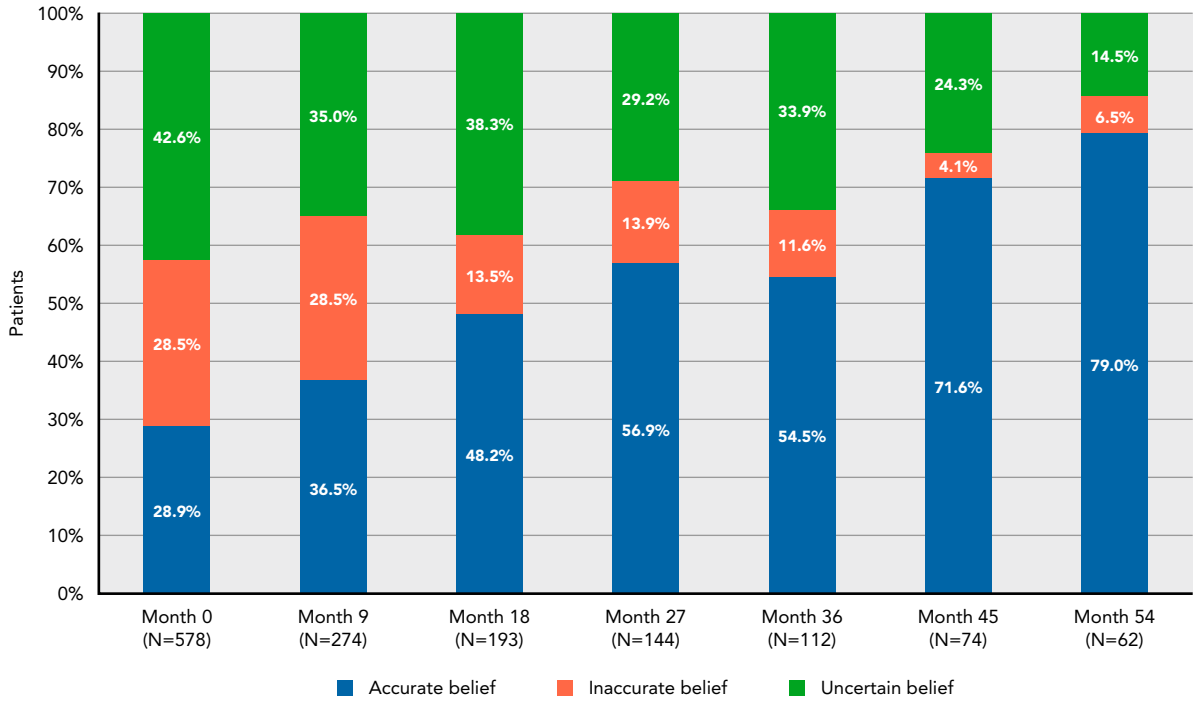

Figure 1. Prognostic beliefs at each time point.

experienced UHA, and 4.3% had a palliative care visit. At baseline, 28.9% of patients reported accurate belief, an equivalent proportion reported inaccurate belief, and the remaining 42.6% reported uncertain belief. Over time, the proportion of patients with an accurate belief increased: nearly 80% reported an accurate belief in month 54 (Figure 1). That said, patients' prognostic beliefs changed at each time point, both toward and away from an accurate belief (supplemental eFigure 3), as summarized in Figure 2. On average, at each time point, 21% of patients changed to an uncertain or inaccurate belief, and 20% changed to an accurate belief (Figure 2). Of the patients who answered the survey at least twice during the study period, 24% changed from having an accurate belief to an uncertain or inaccurate belief at some point during the follow-up. Notably, patients' prognostic beliefs changed up to 6 times, and on average, 28% of each patients' total responses constituted a change in belief from the previous time point.

Consistent with our hypotheses, patients who experienced greater symptom burden were less likely to report an inaccurate (relative risk ratio [RRR], 0.87; 95% CI, 0.84–0.90) or uncertain belief (RRR, 0.90; 95% CI, 0.87–0.92) compared with an accurate prognostic belief (Table 2). Analogously, patients with greater physical and functional well-being were more likely to report an inaccurate (RRR, 1.10; 95% CI, 1.06–1.15 [model 2] and RRR, 1.10; 95% CI, 1.06–1.14 [model 3], respectively) or an uncertain belief (RRR, 1.08; 95% CI, 1.05–1.12 [model 2]) compared with an accurate prognostic belief. Contrary to our hypothesis, patients who experienced a recent UHA were also more likely to have an inaccurate (RRR, 2.71 [model 1]; 2.40 [model 2]; 2.24 [model 3]) or uncertain belief (RRR, 2.34 [model 1]; 2.09 [model 2]; 1.81 [model 3]) than an accurate belief.

Table 3 shows that, in line with our hypothesis, an increase in symptom burden was associated with a greater risk of patients changing toward accurate belief (RRR, 1.75; 95% CI, 1.33–2.31) compared with reporting no change. Improvements in physical and functional well-being were also negatively associated with change to an accurate prognostic belief, albeit at a 10% significance level. Patients were also significantly less likely to change to an inaccurate belief the longer they remained in the study (ie, the greater their response number [RRR, 0.74; 95% CI, 0.59–0.92]).

Results from the sensitivity analyses were consistent with the main results. An increase in symptom burden was associated with a change to accurate belief even after disaggregating the "no change" category (supplemental eTable 1). In the fixed effects models, symptom burden and physical well-being continued to be significantly associated with prognostic beliefs, although coefficients were expectedly less precise (eTable 2A, B). The complete case analysis yielded qualitatively similar results as well, other than functional well-being score, because the model failed to converge (eTable 3A, B).

Discussion

We used data from a prospective cohort of patients with stage IV solid metastatic cancer to examine changes in

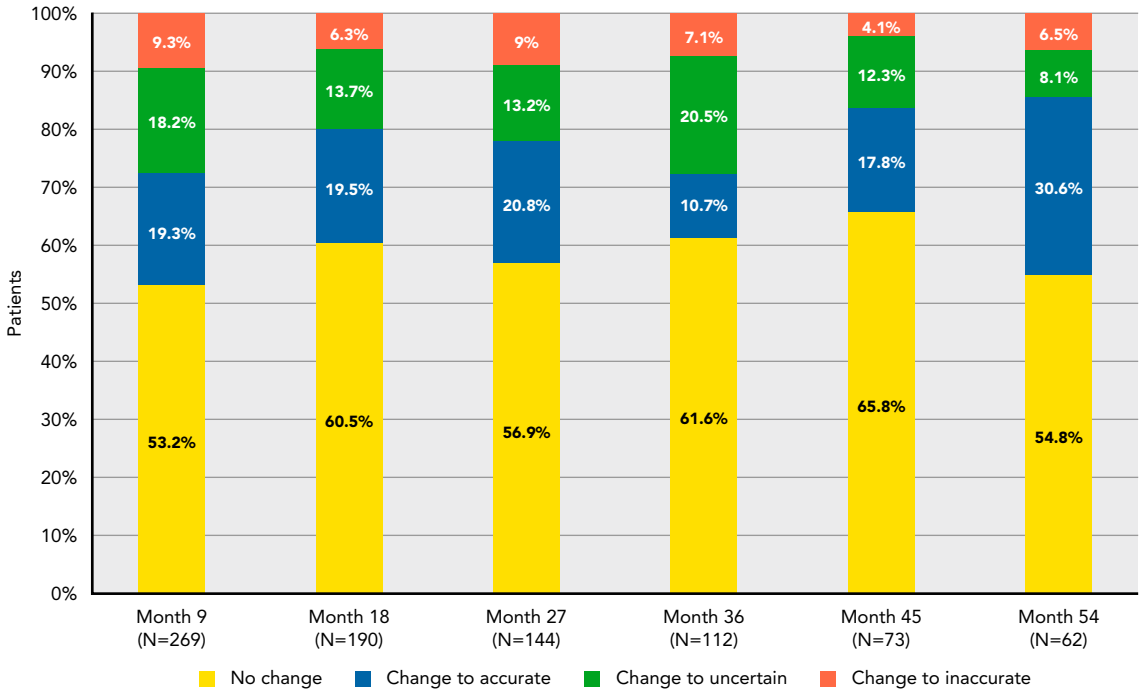

Figure 2. Changes in prognostic belief from previous time point.

patients' prognostic beliefs, up to 54 months. Given that many patients are seeing improvements in life expectancy despite the incurable nature of their illness while also receiving treatments to effectively palliate their symptoms, our study provides a fuller picture of the evolution of patients' prognostic beliefs. We found that beliefs about disease curability changed often, both toward and away from an accurate belief, and were consistently associated with patients' changing health status as captured by their symptom burden, physical well-being, and recent UHA. We found that 24% of patients who reported their prognostic beliefs at least twice changed from having an accurate belief to an inaccurate or uncertain belief at some point during the follow-up. This proportion of change from accurate to less accurate beliefs is similar to that reported in recent longitudinal examinations of prognostic beliefs.[25,33,34] We found that on average, 7.1% of patients changed to inaccurate belief and 14.3% changed to uncertain belief at each time point. Previous studies have reported that between 8% and 20% of patients change from an accurate to an inaccurate belief between surveys.[25,33,34] The slightly lower proportion of change to inaccurate beliefs in our sample may be explained by the longer time period under analysis, as the sample evolves to a majority of accurate beliefs over time. Alternately, it may be that these changes are captured as "change to uncertain" observations instead, allowing us to discern that even when patients change to less accurate beliefs, they appear to do so hesitantly. Such changes further demonstrate the limitation of understanding prognostic belief as a static or stable construct, or one that will only change toward accuracy.

We showed that patients' prognostic belief evolves dynamically with their health status. We found that patients were consistently less likely to report an accurate belief when they experienced better health (lower symptom burden and greater physical well-being). Correspondingly, patients were more likely to report a change to accurate belief if they experienced an increase in symptom burden or decrease in physical well-being. This suggests the possibility of cognitive dissonance when the patient's illness experience contradicted the prognostic information provided to them.[35] To resolve the tension between their positive self-image or experience of health and poor prognosis, they may have avoided "cognitively integrating" their prognosis, and thereby reported inaccurate beliefs. Existing literature also suggests that emotional numbness[36] and cognitive biases such as hope and denial may influence how patients metabolize prognostic information.[37–39] Contrary to our hypothesis, we found that patients were less likely to report an accurate belief if they had experienced a recent UHA. This is somewhat surprising because patients may or may not feel physically better after an UHA, but the experience of having survived and overcome an unexpected deterioration in health possibly created a self-deception or misattribution bias that made them more optimistic about disease curability.[40] In this case, the prognostic information provided to patients may be at odds with their improved health

Table 2. Association of Prognostic Belief With Health Status

	Model 1 RRR (95% CI)	Model 2 RRR (95% CI)	Model 3 RRR (95% CI)
Inaccurate prognostic belief (n=309 observations)[a]			
Symptom burden score	0.87** (0.84–0.90)		
Physical well-being score		1.10** (1.06–1.15)	
Functional well-being score			1.10** (1.06–1.14)
Recent UHA	2.71** (1.48–4.94)	2.40** (1.33–4.32)	2.24** (1.25–3.99)
Number of responses	0.60** (0.52–0.69)	0.54** (0.47–0.63)	0.56** (0.49–0.65)
Palliative care visits	0.72 (0.30–1.70)	0.63 (0.27–1.47)	0.64 (0.27–1.50)
Uncertain prognostic belief (n=523 observations)[a]			
Symptom burden score	0.90** (0.87–0.92)		
Physical well-being score		1.08** (1.05–1.12)	
Functional well-being score			1.04* (1.00–1.07)
Recent UHA	2.34** (1.34–4.07)	2.09** (1.21–3.59)	1.81* (1.07–3.08)
Number of responses	0.73** (0.65–0.82)	0.67** (0.60–0.75)	0.66** (0.59–0.74)
Palliative care visits	0.78 (0.38–1.63)	0.71 (0.35–1.48)	0.66 (0.32–1.36)
Observations	1,437	1,437	1,437

Age, level of education (primary and below; secondary; tertiary and above), and type of cancer (breast, gastrointestinal, genitourinary, respiratory, other) are controlled for in all models.
Abbreviations: RRR, relative risk ratio; UHA, unplanned hospital admission.
[a]Reference category is "accurate prognostic belief."
*$P<.05$; **$P<.01$.

status, prompting them to resolve this dissonance by rationalizing that their treatment may cure them.[41]

Our results have clinical implications. Physicians' reluctance to discuss prognosis is recognized as a significant barrier to effective patient–physician communication, but the flip side—patients' reluctance to accept prognosis—arguably deserves closer attention.[42,43] Although improvements in patient–physician communication must focus on meeting patients' information needs, clear delivery of prognostic information, and supporting patients in internalizing this information, physicians must balance these considerations with the psychological benefits offered by coping strategies that may manifest as inaccurate beliefs.[17] Given the cognitive dissonance patients appear to be experiencing, the insistence that patients *report* correct understanding of their prognosis should be revisited. Physicians must also consider that patients' prognostic beliefs can change as their illness evolves and health status changes, even years after they have been living with an incurable illness.[17,28,41] Keeping in mind that patients may experience "backsliding" to less accurate beliefs even after reporting an accurate belief, conversations about goals of care must occur regularly to address and account for these changes.

On the methodological front, our results underscore the need to understand prognostic belief as a dynamically evolving construct, and call into question the framing of accurate belief about disease curability as prognostic awareness.[44] In addition to its lack of conceptually consistent definition,[3,45] the term "prognostic awareness" implies that patients' responses are a function of the information provided to them. Our results show otherwise.

This study, however, is not without limitations. First, the study design prevents us from drawing causal inferences. Because patients' prognostic beliefs possibly influenced their experience and reporting of health status, further research into the determinants of prognostic belief is warranted. Second, we witnessed sizeable numbers of deaths along with some dropouts and nonresponses over the 54 months. This sample evolution is unsurprising given patients' diagnosis of metastatic cancer. We were unable to control for mortality as we studied prognostic belief prospectively from baseline survey. Upon examining the sensitivity of results to missingness, we found that the main results remained broadly unchanged. Third, our findings were based on responses to one question that focused on patients' belief about disease curability; the word "cure" has been previously noted as potentially limiting.[44] However, previous studies with composite prognostic awareness measures report low correspondence between different questions, indicating that using multiple measures of a poorly understood construct might produce noisy results.[18] Hence, we chose not to include subjective life expectancy or knowledge of cancer stage in our analysis and framed responses as "beliefs" instead of "awareness."

Table 3. Association of Change in Prognostic Belief With Changes in Health Status

	Model 1 RRR (95% CI)	Model 2 RRR (95% CI)	Model 3 RRR (95% CI)
Change to inaccurate (n=65 observations)[a]			
Change in symptom burden score	0.80 (0.51–1.24)		
Change in physical well-being score		1.25 (0.76–2.07)	
Change in functional well-being score			0.84 (0.53–1.34)
Number of responses	0.74** (0.59–0.92)	0.74** (0.59–0.92)	0.75* (0.60–0.94)
Change to uncertain (n=131 observations)[a]			
Change in symptom burden score	1.09 (0.80–1.50)		
Change in physical well-being score		0.76 (0.52–1.10)	
Change in functional well-being score			0.77 (0.54–1.10)
Number of responses	0.89 (0.76–1.04)	0.89 (0.77–1.04)	0.90 (0.77–1.06)
Change to accurate (n=163 observations)[a]			
Change in symptom burden score	1.75** (1.33–2.31)		
Change in physical well-being score		0.75 (0.53–1.06)	
Change in functional well-being score			0.73 (0.52–1.01)
Number of responses	0.89 (0.77–1.03)	0.89 (0.77–1.03)	0.91 (0.78–1.05)
Observations	850	850	850

Age, level of education (primary and below; secondary; tertiary and above), and type of cancer (breast, gastrointestinal, genitourinary, respiratory, other) are controlled for in all models.
Abbreviation: RRR, relative risk ratio.
[a]Reference category is "no change."
*$P<.05$; **$P<.01$.

Fourth, our study would have benefitted from more data on prognostic information received by patients apart from the palliative care consults and visits they experienced. Last, we did not assess additional possible confounding factors, including use of advanced anticancer therapies, alternative/complementary treatments, or enrollment in clinical trials.

Conclusions

We studied long-term changes in patients' prognostic beliefs and offered insights into previously unstudied dimensions of prognostic belief, namely the extent to which it evolves over a long period of time, its association with changing health status, and the prevalence of changes from accurate to less accurate beliefs. We found that prognostic beliefs are associated with changing health status: when patients feel better, they are less likely to hold an accurate prognostic belief, which suggests the presence of cognitive dissonance. Our findings have implications for treating physicians who must note that even after patients have reported an accurate understanding of prognosis, their beliefs may change as their health status evolves. Thus, conversations about goals of care must occur regularly to accommodate these changes.

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Correspondence: Chetna Malhotra, MD, Lien Centre for Palliative Care, Duke-NUS Medical School, 8 College Road, Singapore 169857. Email: chetna.malhotra@duke-nus.edu.sg

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Changes in Prognostic Beliefs of Patients With Metastatic Cancer and Their Association With Changing Health Status

Isabella Gupta, BSc; Eric Andrew Finkelstein, PhD, MHA; Semra Ozdemir, PhD; and Chetna Malhotra, MD

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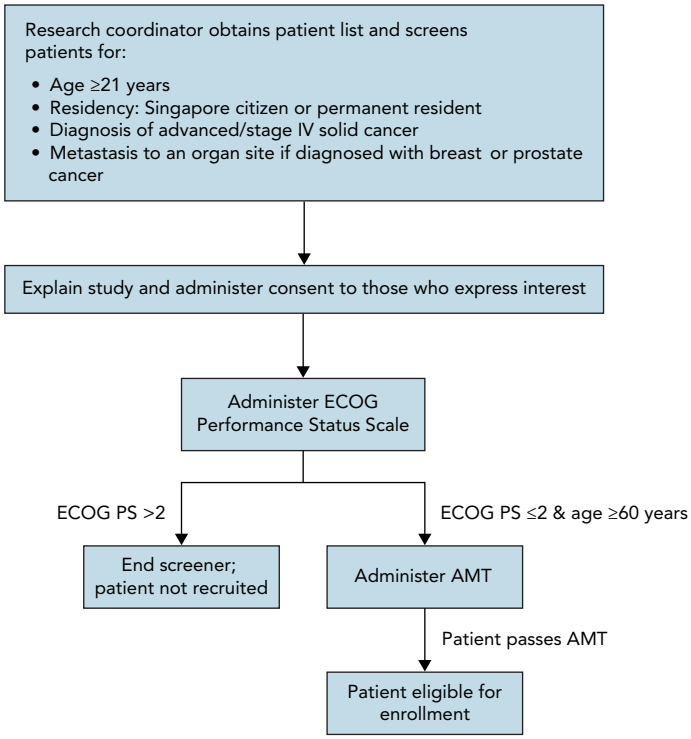
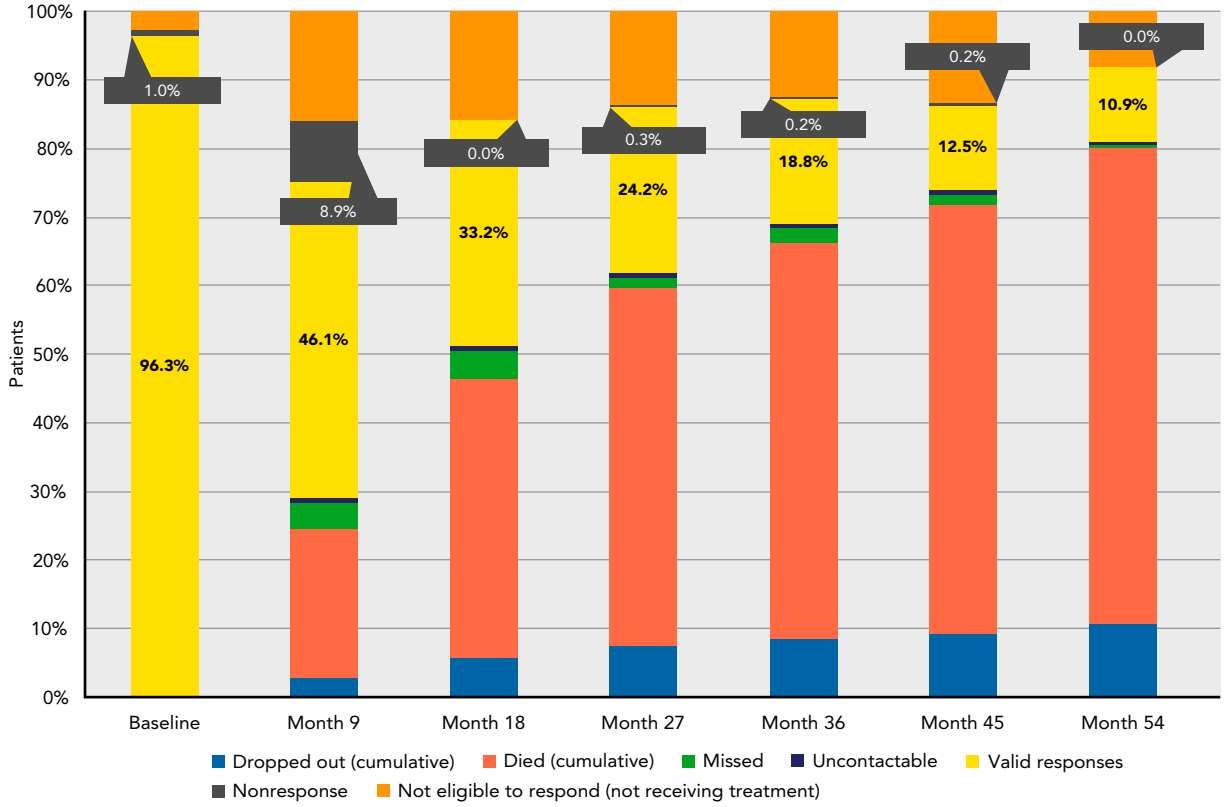
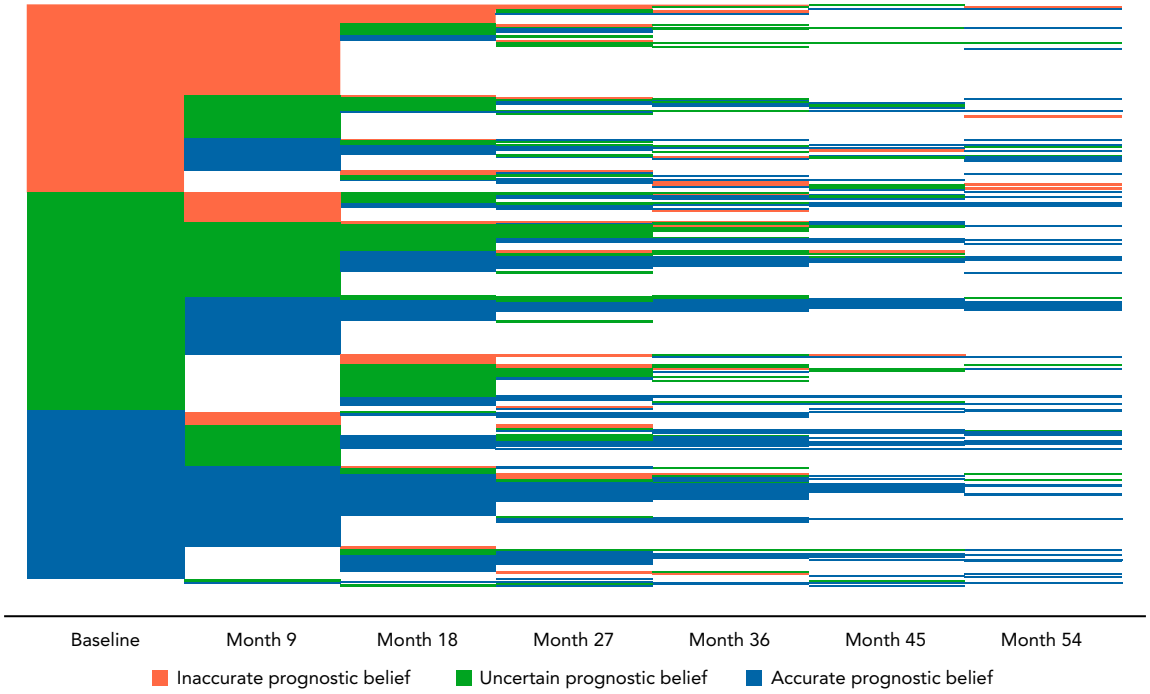


eFigure 1. Eligibility criteria for COMPASS study.
Abbreviations: AMT, Abbreviated Mental Test; PS, performance status.



eFigure 2. Evolution of sample.



eFigure 3. Transitions in prognostic belief over time.
Note: Transitions presented only for patients who report prognostic belief at least twice (n=338 patients).

eTable 1. Association of Change in Prognostic Belief With Changes in Health Status[a]

	Model 1	Model 2	Model 3
	Change in Symptom Burden Score RRR (95% CI)	Change in Physical Well-Being Score RRR (95% CI)	Change in Functional Well-Being Score RRR (95% CI)
Change to inaccurate (n=65 observations)[b]			
Change in symptom burden score	0.69 (0.41–1.16)		
Change in physical well-being score		1.65 (0.88–3.08)	
Change in functional well-being score			0.77 (0.43–1.37)
Number of responses	0.42*** (0.32–0.56)	0.42*** (0.32–0.56)	0.43*** (0.32–0.58)
Change to uncertain (n=131 observations)[b]			
Change in symptom burden score	0.98 (0.65–1.46)		
Change in physical well-being score		0.94 (0.57–1.56)	
Change in functional well-being score			0.70 (0.43–1.15)
Number of responses	0.52*** (0.41–0.65)	0.52*** (0.41–0.65)	0.53*** (0.42–0.67)
Change to accurate (n=163 observations)[b]			
Change in symptom burden score	1.63*** (1.13–2.34)		
Change in physical well-being score		0.93 (0.58–1.50)	
Change in functional well-being score			0.66* (0.41–1.06)
Number of responses	0.52*** (0.41–0.65)	0.52*** (0.41–0.65)	0.53*** (0.43–0.67)
Stay at inaccurate (n=79 observations)[b]			
Change in symptom burden score	0.59** (0.35–0.99)		
Change in physical well-being score		1.74* (0.96–3.15)	
Change in functional well-being score			0.85 (0.49–1.49)
Number of responses	0.23*** (0.16–0.33)	0.23*** (0.16–0.34)	0.24*** (0.17–0.35)
Stay at uncertain (n=140 observations)[b]			
Change in symptom burden score	0.79 (0.52–1.18)		
Change in physical well-being score		1.52 (0.92–2.52)	
Change in functional well-being score			0.90 (0.55–1.47)
Number of responses	0.46*** (0.36–0.59)	0.46*** (0.36–0.59)	0.47*** (0.37–0.59)
Observations	850	850	850

Age, level of education (primary and below; secondary; tertiary and above), and type of cancer (breast, gastrointestinal, genitourinary, respiratory, other) are controlled for in all models.
Abbreviation: RRR, relative risk ratio.
[a]"No change" is disaggregated into "stay at unsure," "stay at inaccurate," and "stay at accurate."
[b]Reference category is "stay at accurate."
*P<.1; **P<.05; ***P<.01.

eTable 2A. Association of Prognostic Belief With Health Status (Fixed Effects Model)

	Model 1	Model 2	Model 3
	Symptom Burden Score RRR (95% CI)	Physical Well-Being Score RRR (95% CI)	Functional Well-Being Score RRR (95% CI)
Inaccurate prognostic belief (n=178 observations)[a]			
Symptom burden score	0.87** (0.81–0.92)		
Physical well-being score		1.11** (1.03–1.19)	
Functional well-being score			1.02 (0.96–1.08)
Recent UHA	1.67 (0.64–4.33)	1.38 (0.58–3.28)	1.24 (0.55–2.79)
Number of responses	0.44** (0.28–0.67)	0.45** (0.30–0.67)	0.48** (0.32–0.71)
Age	1.28 (0.85–1.94)	1.08 (0.75–1.56)	0.98 (0.70–1.38)
Palliative care visits	2.05 (0.34–12.33)	2.05 (0.41–10.17)	1.91 (0.39–9.44)
Uncertain prognostic belief (n=304 observations)[a]			
Symptom burden score	0.91** (0.88–0.95)		
Physical well-being score		1.06* (1.01–1.11)	
Functional well-being score			1.01 (0.97–1.06)
Recent UHA	1.81 (0.84–3.92)	1.58 (0.78–3.21)	1.44 (0.77–2.72)
Number of responses	0.79 (0.57–1.10)	0.78 (0.57–1.07)	0.78 (0.57–1.06)
Age	0.95 (0.66–1.37)	0.86 (0.60–1.22)	0.83 (0.59–1.19)
Palliative care visits	0.77 (0.31–1.88)	0.76 (0.32–1.80)	0.77 (0.33–1.77)
Observations	842	842	842

Standard errors clustered by patient.
Abbreviations: RRR, relative risk ratio; UHA, unplanned hospital admission.
[a]Reference category is "accurate prognostic belief."
*$P<.05$; **$P<.01$.

eTable 2B. Association of Change in Prognostic Belief with Change in Health Status (Fixed Effects Model)

	Model 1	Model 2	Model 3
	Change in Symptom Burden Score RRR (95% CI)	Change in Physical Well-Being Score RRR (95% CI)	Change in Functional Well-Being Score RRR (95% CI)
Change to inaccurate (n=49 observations)[a]			
Change in symptom burden score	0.95 (0.60–1.50)		
Change in physical well-being score		1.02 (0.59–1.77)	
Change in functional well-being score			0.68 (0.36–1.30)
Number of responses	0.72 (0.35–1.47)	0.72 (0.35–1.49)	0.74 (0.36–1.55)
Age	1.16 (0.50–2.71)	1.15 (0.48–2.71)	1.11 (0.48–2.58)
Change to uncertain (n=108 observations)[a]			
Change in symptom burden score	1.16 (0.74–1.81)		
Change in physical well-being score		0.75 (0.45–1.23)	
Change in functional well-being score			0.77 (0.52–1.12)
Number of responses	0.89 (0.55–1.45)	0.90 (0.55–1.47)	0.93 (0.57–1.52)
Age	1.03 (0.59–1.80)	1.01 (0.57–1.77)	0.98 (0.56–1.71)
Change to accurate (n=133 observations)[a]			
Change in symptom burden score	1.62** (1.18–2.23)		
Change in physical well-being score		0.76 (0.53–1.10)	
Change in functional well-being score			0.74 (0.52–1.06)
Number of responses	0.76 (0.50–1.15)	0.75 (0.50–1.13)	0.77 (0.51–1.16)
Age	1.21 (0.76–1.93)	1.25 (0.78–1.98)	1.24 (0.78–1.98)
Observations	554	554	554

Standard errors clustered by patient.
Abbreviation: RRR, relative risk ratio.
[a]Reference category is "no change."
*$P<.05$; **$P<.01$.

eTable 3A. Complete Case Analysis Assessing the Association Between Prognostic Belief and Health Status

	Model 1	Model 2	Model 3
	Symptom Burden Score RRR (95% CI)	Physical Well-Being Score RRR (95% CI)	Functional Well-Being Score RRR (95% CI)
Inaccurate prognostic belief (n=228 observations)[a]			
Symptom burden score	0.89** (0.85–0.92)		
Physical well-being score		1.09** (1.04–1.14)	
Functional well-being score			1.10** (1.05–1.14)
Recent UHA	2.75** (1.43–5.28)	2.43** (1.28–4.63)	2.32** (1.22–4.40)
Number of responses	0.58** (0.49–0.68)	0.53** (0.45–0.63)	0.55** (0.47–0.66)
Palliative care visits	0.45 (0.16–1.23)	0.41 (0.15–1.13)	0.41 (0.15–1.15)
Uncertain prognostic belief (n=34 observations)[a]			
Symptom burden score	0.91** (0.88–0.94)		
Physical well-being score		1.07** (1.03–1.11)	
Functional well-being score			1.03 (0.99–1.07)
Recent UHA	2.09* (1.14–3.84)	1.87* (1.03–3.40)	1.64 (0.91–2.96)
Number of responses	0.71** (0.62–0.81)	0.66** (0.58–0.76)	0.65** (0.57–0.75)
Palliative care visits	0.56 (0.24–1.30)	0.52 (0.23–1.20)	0.48 (0.21–1.10)
Observations	1,053	1,053	1,053

Age, level of education (primary and below; secondary; tertiary and above), and type of cancer (breast, gastrointestinal, genitourinary, respiratory, other) are controlled for in all models.
Abbreviations: RRR, relative risk ratio; UHA, unplanned hospital admission.
[a]Reference category is "accurate prognostic belief."
*$P<.05$; **$P<.01$.

eTable 3B. Complete Case Analysis Assessing Association Between Change in Prognostic Belief and Change in Health Status

	Model 1	Model 2	Model 3
	Change in Symptom Burden Score RRR (95% CI)	Change in Physical Well-Being Score RRR (95% CI)	Change in Functional Well-Being Score RRR (95% CI)
Change to inaccurate (n=37 observations)[a]			
Change in symptom burden score	0.76 (0.44–1.30)		
Change in physical well-being score		1.35 (0.73–2.50)	
Change in functional well-being score			0.78 (0.44–1.37)
Number of responses	0.73* (0.55–0.97)	0.74* (0.56–0.98)	0.75 (0.57–1.00)
Change to uncertain (n=91 observations)[a]			
Change in symptom burden score	1.07 (0.76–1.52)		
Change in physical well-being score		0.71 (0.47–1.08)	
Change in functional well-being score			0.72 (0.49–1.08)
Number of responses	0.88 (0.73–1.05)	0.88 (0.73–1.06)	0.90 (0.75–1.08)
Change to accurate (n=107 observations)[a]			
Change in symptom burden score	1.70** (1.25–2.32)		
Change in physical well-being score		0.79 (0.53–1.17)	
Change in functional well-being score			0.73 (0.50–1.07)
Number of responses	0.89 (0.75–1.05)	0.89 (0.75–1.05)	0.90 (0.76–1.07)
Observations	571	571	571

Age, level of education (primary and below; secondary; tertiary and above), and type of cancer (breast, gastrointestinal, genitourinary, respiratory, other) are controlled for in all models.
Abbreviation: RRR, relative risk ratio.
[a]Reference category is "no change."
*$P<.05$; **$P<.01$.