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How head and neck consultants manage patient emotional distress during cancer follow-up consultations: a multilevel study

--Manuscript Draft--

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Abstract:	<p>Objectives: Head and neck cancer (HNC) patients suffer substantial emotional problems. This study aimed to explore how utterance-level variables (source, type and timing of emotional cues) and patient-level variables (e.g. age, gender and emotional wellbeing) relate to consultants' responses (i.e. reducing or providing space) to patient expressions of emotional distress.</p> <p>Methods: Forty-three HNC outpatient follow-up consultations were audio recorded and coded, for patients' expressions of emotional distress and consultants' responses, using the Verona Coding Definitions of Emotional Sequence (VR-CoDES). Multilevel logistic regression modelled the probability of the occurrence of consultant reduce space response as a function of patient distress cue expression, controlling for consultation and patient-related variables.</p> <p>Results: An average of 3.5 cues/concerns (range 1-20) was identified per consultation where 84 out of 152 total cues/concerns were responded by reducing space. Cue type did not impact on response; likewise for the quality of patient emotional wellbeing. However, consultants were more likely to reduce space to cues elicited by patients, as opposed to those initiated by themselves. This reduce space response was more pronounced as the consultation continued. However, about six minutes into the consultation, this effect (i.e. tendency to block patients) started to weaken.</p> <p>Conclusions: Head and neck consultants' responses to negative emotions depended on source and timing of patient emotional expressions. The findings are useful for training programme development to encourage consultants to be more flexible and open in the early stages of the consultation.</p>

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Dear Editor,

Thank you for allowing us to resubmit a revised version of our manuscript. Below we describe in detail how we have addressed all comments point by point raised by the two expert reviewers. All changes in the revised manuscript are underlined and in red font.

Reviewer #2:

What is the demographics of the 43 HNC patients who ultimately were tested and reported?

An additional table (Table 3) has now been included and presented under Results section (subtitle: patient characteristics). Table 3 summarizes patient demographic information and all other relevant clinical information requested by the reviewer(s) (See first paragraph under 'Results' section on Page 8). Consequently, some patient information, reported originally on Page 9, became redundant and has therefore been removed.

Were a number of patients with differing tumour sites included -- oral cavity, larynx etc?
Detailed information about tumour sites is provided in Table 3 (Page 8 'Results' section).

Were all surgically treated? or a mixture of treatments!

Again, treatment related information is summarized in Table 3 (see 'Results' section on Page 8). In addition, general description about treatment conditions about this group has now been added in the 'Methods and Materials' section (under 'Participants and procedures' on Page 6).

What was the time interval between completion of treatment and inclusion into this project?
Presented in both the text and in Table 3 now. (Page 8 'Results' section).

Were any patients interviewed longitudinally!

All patients attending the outpatient clinic are on longitudinal follow up as per national Head and Neck cancer guidelines recommendations on post-treatment follow up, which are usually up to 5 years post-treatment. Necessary information has now been provided in 'Methods and materials' section (under 'Participants and Procedures' on Page 6).

Reviewer #3: This study gives a good glance of the impact of emotional problems of HNSCC patients. This topic should be addressed in every outpatient clinic and some nice tools are described to measure the dealing with the emotional issue. Still, there are many other factors (i.e. therapy received earlier, duration of follow up, risk factors, social and educational status of patients, emotional status of consultants) influencing the emotional distress of patients which are not addressed in this study. But they are likely confounding the results shown here. Therefore the importance of the results is limited for daily clinical practice, but still a good first description of how to take these issues into account.

A data table of the patients' characteristics should be provided.

Regarding therapy received earlier, I believe the reviewer means psychological therapy. The following sentence has now been added to clarify this query: 'However, none of the patients received any specific intervention (e.g. psychological therapy) for emotional issues before the consultation' (See Page 6 under 'Methods and Materials' section).

Information regarding duration of follow-up consultation and risk factors (smoking and alcohol consumption) has now been included in both the text and in Table 3 (see Page 8 under 'Results' section).

We do not have patient social and educational information. However, we have already recognized the potential impact of patient individual differences on emotional distress expression and management. This has been addressed as a limitation and direction for future research (see Page 13 under 'Discussion' section). We have already acknowledged the importance of emotional status of consultants in their ability to deal with patients' emotional distress (see Ref.27 for 'quality of rapport' being cited on Page 13).

A data table of patients' characteristics has been provided, as stated previously (See Page 8 'Results' section). Consequently, all subsequent table numbers have now been updated too.

In conclusion, we thank the reviewers for their helpful comments. We believe that the changes submitted have improved the manuscript.

We very much look forward to your reply and decision over our revisions.

Yuefang Zhou (on behalf of all authors)

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**How head and neck consultants manage patient emotional distress
during cancer follow-up consultations: a multilevel study**

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**How head and neck consultants manage patient emotional distress
during cancer follow-up consultations: a multilevel study**

Abstract

Objectives: Head and neck cancer (HNC) patients suffer substantial emotional problems.

This study aimed to explore how utterance-level variables (source, type and timing of emotional cues) and patient-level variables (e.g. age, gender and emotional wellbeing) relate to consultants' responses (i.e. reducing or providing space) to patient expressions of emotional distress.

Methods: Forty-three HNC outpatient follow-up consultations were audio recorded and coded, for patients' expressions of emotional distress and consultants' responses, using the Verona Coding Definitions of Emotional Sequence (VR-CoDES). Multilevel logistic regression modelled the probability of the occurrence of consultant *reduce space* response as a function of patient distress cue expression, controlling for consultation and patient-related variables.

Results: An average of 3.5 cues/concerns (range 1-20) was identified per consultation where 84 out of 152 total cues/concerns were responded by *reducing space*. Cue type did not impact on response; likewise for the quality of patient emotional wellbeing. However, consultants were more likely to *reduce space* to cues elicited by patients, as opposed to those initiated by themselves. This *reduce space* response was more pronounced as the consultation continued. However, about six minutes into the consultation, this effect (i.e. tendency to block patients) started to weaken.

Conclusions: Head and neck consultants' responses to negative emotions depended on source and timing of patient emotional expressions. The findings are useful for training programme development to encourage consultants to be more flexible and open in the early stages of the consultation.

Key words: head and neck cancer, emotional distress, the VR-CoDES, multilevel

Abbreviations (ordered according to appearance in the article)

HNC: Head and Neck Cancer

NICE: National Institute for Clinical Excellence

OSCE: Objective and Structured Clinical Examination

VR-CoDES: Verona Coding Definitions of Emotional Sequence

QoL: Quality of Life

PCI: Patient Concerns Inventory

Introduction

Head and neck cancer (HNC) patients suffer substantial psychological distress [1-3].

Appropriate attendance to patient emotional needs, a key feature of patient-centred care, has been found to be associated consistently with many improved patient outcomes in both general medicine [4] and oncology [5, 6]. In the United Kingdom, the National Institute for Clinical Excellence (NICE) guidelines recommended that the psychosocial issues are routinely assessed and discussed in oncology practice [7]. Despite recognised patient benefits, national efforts and many communication training programmes [8, 9], research evidence suggests a continued prevalence of unaddressed psychological issues among cancer patients [10-14]. It is, therefore, important to intricately investigate factors influencing oncologists' positive responses to patients' negative emotions in routine oncology practice.

Previous studies suggested that a number of variables, at different levels of the consultation, impact on a clinician's response to patient emotional expressions. At the conversation (i.e. utterance) level, source [15-17], type [18, 19] and timing [17, 19] of emotional expression were found to be important predictors for clinicians' responses. Regarding *source* of emotion (i.e. cues elicited by patients versus clinicians), Pollack et al. found that, when patients initiated negative emotions, oncologists responded with a terminator statement 73% of the time, to discourage further disclosure of emotions [15]. Similar findings were reported in more recent studies, where a multilevel approach was adopted to respect the clustered nature of the data contained within the consultation [16, 17]. Del Piccolo et al. found that psychiatrists provided space for further disclosure of a concern more frequently when the concern had been initiated by the psychiatrist in the first place [16]. Finset et al. supported this finding in a cancer care setting that oncologists were more likely to give room for further

disclosure of cues/concerns that were initiated by themselves [17]. However, no published evidence is available so far to support this relationship in HNC consultations. With regard to the *type* of emotion, Kennifer et al. reported that oncologists responded most empathically to intense emotions [18]. A recent multilevel study confirmed that certain cue types influenced the way that medical students responded to the simulated patients in the Objective Structured Clinical Examinations (OSCE) [19]. In this study, the cue types and responses were coded according to the Verona Coding Definitions of Emotional Sequence (VR-CoDES) [20, 21]. The importance of studying *timing* of cue expression in medical consultations has been highlighted in a ground breaking review [22]. A number of recent multilevel sequential studies have subsequently confirmed the significance of timing in relation to provider responses. For example, medical students were more likely to reduce space to emotional cues expressed by simulated patients nearer the end of the five-minute OSCE consultations [19]. In a similar direction, oncologists were found to give more space for emotional disclosure to the first cue/concern in real consultations of more than ten minutes [17]. Again, little is known about how the cue *type* and the *timing* of cue expression might impact on oncologists' responses to emotions expressed by HNC patients.

At the patient level (i.e. consultation), female patients with female oncologists were more likely to encourage empathic responses from clinicians [17]. Emotion-related quality of life of cancer patients has also been indicated as a predictor influencing the discussion around emotion during consultations [14]. There is little evidence showing how HNC patients' emotional wellbeing might relate to the dynamics of emotional discussion with their clinicians.

In the light of the studies discussed above, this study aims to explore how utterance-level variables (source, type and timing of emotional cues) and patient-level variables (age, gender and emotional wellbeing) relate to oncologists' responses to HNC patients' emotional distress.

Methods and materials

Participants and procedures

Patient participants were 58 HNC survivors attending follow-up out-patient consultations at Aintree University hospital, Liverpool, UK. Those consultations without emotional distress cues ($n=14$) and those with unusually frequent emotional cues ($n=1$) were excluded, resulting in 43 consultations included in the study. Generally speaking, the cohort was a heterogeneous group having had different treatment combinations. In addition, these patients were all on longitudinal follow-up appointments (up to 5 years post-treatment). However, none of the patients received any specific intervention (e.g. psychological therapy) for emotional issues before the consultation. Staff participants were four head and neck consultations (all male) with at least three years of working experience. Each consultant had a minimum of ten consultations. All patients completed a quality of life (QoL) survey (84% also completed a Patient Concerns Inventory (PCI) [23]) prior to the consultation being audio recorded. Informed written consent was obtained from both patient and consultants. The study was part of a larger study aiming to investigate patients' concerns in head and neck oncology settings, which was given a favourable ethical opinion on the 21st February 2011, by the North West 3 Research Ethics Committee – Liverpool East (approval number: 11/H1002/7). Therefore this study has been performed in accordance with the ethical standards laid down in an appropriate version of the 1964 Declaration of Helsinki.

Measures

The VR-CoDES, previously applied in the oncology setting [17], was employed to code both patient expression of emotional distress [20] and consultants' responses [21]. It is a well validated scheme, developed over ten years by an international expert group of researchers and practitioners. According to the manual, an emotional cue is defined as a hint suggesting an underlying negative emotion; whereas a concern is an explicitly verbalized expression of negative emotion. Examples of coded cues/concerns and responses were presented in Table 1. In coding responses to emotional cues/concerns, the dimension of *providing space* versus *reducing space* (i.e. providing or reducing room for further disclosure of emotion) has been considered in our analysis. Two medical students, trained on the VR-CoDES, coded the transcripts while listening to the tape to preserve the voice tone. Coding was overseen by an experienced coder (YZ) and a member of the VR-CoDES developer (GH). Both inter- and intra-coder reliabilities were considered satisfactory according to Altman's criteria [24] (Table 2). The subscale of mood and anxiety from the University of Washington Head and Neck Cancer Questionnaire (UW-QoL, V4 [25]) was used to indicate the quality of patient emotional wellbeing.

[Insert Table 1 about here]

[Insert Table 2 about here]

Data analysis

A two-level logistic regression was conducted to acknowledge the nested data structure, where utterances (level1) were nested within consultations (level 2). The outcome variable was *reduce space* response. Explanatory variables at level 1 were: specific type of cue and concern (1=presence, 0=absence), time location when a cue/concern was expressed relative to the first utterance start time, patient elicitation (1=patient elicited, 0=consultant elicited).

Predictive variables at level 2 were: QoL scores on mood and anxiety (0-200, with a higher score indicating a better quality), patient age, gender (1=male, 0=female), cancer stage (1 – 4, with a higher score describing increased disease severity) and consultation duration (in seconds). Analysis followed three steps: (1) a null model with random intercept, explored the variance composition at each level; (2) predictive variables were entered at level 1 followed by level 2, with variables with a significant effect at $p<0.05$ were retained for the next model; and (3) patient demographics and the consultation duration was controlled for in the final model. Analyses were conducted in STATA/IC™ 10.0 for Windows using the *xtmelogit* procedure.

Results

Patient characteristics

Table 3 presents descriptive statistics of relevant clinical and demographic information of the 43 participating patients. The majority of patients were over 60 years of age, with about 56% males, and over half of the patients never smoked or drank alcohol. Overall, these patients had an average severity of cancer and about 30% of them had oral cavity cancer. Broadly speaking, 48.83% received a single modality treatment (i.e. surgery alone or radiotherapy alone) and 51.17% received a multimodality treatment (i.e. chemo-radiotherapy, surgery plus radiotherapy, surgery plus chemo-radiotherapy). The average consultation duration was 5.5 minutes, ranging from 1.5 to 13.18 minutes. On average, the time interval between completion of treatment and inclusion into the study (i.e. date consultation took place) was 25.44 months, ranging from one month to 55 months.

[Insert Table 3 about here].

Frequency of cues/concerns and responses

As shown in Table 4, a total number of 152 cues/concerns were identified among 43 consultations, resulting in an average number of 3.52 cues/concerns per consultation. Cue B (verbal hints) was most frequently observed, followed by Cue D (stressful life events); whereas Cue E, F and G were rarely or never observed. Subsequent *chi-square* tests confirmed no significant difference between *provide vs reduce* space response to specific cue types. Within the *reduce space* response, patient- vs clinician-elicited cue/concern, however, showed an initial difference ($\chi^2(1) = 8.067, p < 0.01$), which warrants further investigation when controlling for clustered effects of the consultation.

[Insert Table 4 about here]

Consultants' responses to cues/concerns

Table 5 shows the descriptive statistics of the variables included in the multilevel analyses, except for those reported in Table 4. The frequency of the outcome variable (reduce space response) accounted for about 55% of the entire utterances in level 1. As for the explanatory variables at level 1 (utterance), approximately 40% of the cues/concerns were initiated by patients; and on average they occurred at about three minutes after the first utterance in the consultation. Regarding predictors at level 2 (consultation), a mean score of 148.26 on QoL mood and anxiety indicated an overall satisfactory quality of emotional wellbeing. ~~The average consultation duration was about five and a half minutes, ranging from one and a half minutes to about 13 minutes. Majority of the patients were over 60 years old, with 56% males and an average severity of cancer. In addition, 33% of patients had a free flap surgery and 42% received radiotherapy.~~

[Insert Table 5 about here]

A number of findings emerged from the multilevel logistic regress analyses (Table 6). (i) Overall, little variance (7.32% in null model) was explained by the between-consultation difference. (ii) *Cue type* did not make any impact on the occurrence possibility of the *reduce space* response (Model 1 and 2). (iii) A positive linear relationship was found between *cue time* (in seconds) and the *reduce space* response ($OR=1.00$, $p<0.01$ in Model 2, effect being preserved at Model 4 with $p<0.05$). The model was significantly improved when the *cue time squared* term was included ($\chi^2(1)=4.44$, $p<0.05$), suggesting a curvilinear relationship existed between the *timing* of cue expression and the *reduce space* response ($OR=0.99$, $p<0.05$). (iv) Consultants reduced space to cues elicited by patients ($OR=2.25$, $p<0.05$ in Model 4 with effects being consistent in all models). (v) Patient emotional QoL did not influence *reduce space* response ($OR=0.99$, $p>0.05$).

[Insert Table 6 about here]

Timing of cue expression and responses

Figure 1 shows the curvilinear relationship between the *timing* of cue/concern expression and probability of *reduce space* response occurrence. X axis is the time location of a cue/concern expressed by a patient in a typical consultation up to 500 seconds (approximately 8.3 minutes, only six consultations out of our sample of 43 had a duration of over 500 seconds). Y axis is the predicted probability of a consultant's *reduce space* response (log odds). As can be seen from the Figure 1, the largest log odds occurs when a cue/concern is expressed at about 360 seconds (six minutes). This figure suggested that consultants were more likely to reduce space to emotional distress expressed closer to the end of the consultation until about six minutes into the consultation. Further into the consultation, this relationship appeared to weaken.

[Insert Figure 1 about here]

Discussion

This is the first time a multilevel modelling approach has been adopted in a head and neck cancer setting to study oncologists' responses to patients' emotional distress. The main finding regarding the curvilinear relationship between the *timing* of cue expression and the *reduce space* response is generally consistent with the findings in the literature that, oncologists were less likely to give space for disclosure of emotions that occurred later in the consultation [17]. Our contribution lies in the fact that these findings help to explain the complexity of consultants' strategies in dealing with subtle emotional issues expressed by HNC patients, by highlighting a time point when consultants started to open up for emotional disclosure. Most consultants in our study are experienced oncologists, good at working effectively in their provision of cancer care. It is likely that discussion of emotions occurs, after symptoms and technical issues have been dealt with in the initial section of the consultation. It might be argued that this is the most effective practice with HNC outpatients. It will be beneficial for future researchers to collect outcome measures to test this hypothesis. It is also important, however, not to take for granted that providing space for disclosure of emotions is always appropriate during consultations. As highlighted by Smith et al., it is important that doctors focus on both instrumental tasks, such as sharing decisions, and emotion management in consultations [26]. This is the first time evidence has been provided to support that *timing*, that is, 'when to do what' rather than 'what should be done', has become crucial to clinical practice, which has the potential to influence patient outcomes.

It was not a surprise to find that consultants were more likely to reduce space for disclosure of emotions initiated by patients, compared to those raised by themselves, considering what

have already been reported in the literature in other oncology setting [17] and psychiatry consultations [16]. Giving the majority of the HNC patients completed a Patient Concerns Inventory, an instrument to help identify and raise needs/concerns, it was, however, a surprise to see that consultants, who were fully aware of the expectation to address those issues, were actually less active in acknowledging emotional issues when raised by patients. A number of possibilities might help explain why this happened. First, previous studies indicated that clinicians tended to focus more on controlling symptoms and side effects and less on dealing with psychosocial issues [10, 11]. Second, handling emotional concerns at an appropriate time in a busy outpatient clinic might be more effective than responding to emotional issues whenever patients raise them, as indicated by our finding. Third, there might be too many emotional issues raised by patients that it may be more efficient for consultants to direct them to a specialist, rather than addressing them at the consultation. Unfortunately, due to unbalanced sample size in our patient groups (adoption of PCI $n=36$, non-adoption of PCI $n=7$), it was impossible to conduct meaningful statistical analysis to test the usefulness of the PCI. Future researchers are encouraged to explore further, with rigorous design, possible impact of instruments, designed to help identify patient concerns such as PCI, on the dynamics of discussions around emotional issues during medical consultations.

An average of 3.5 cues/concerns per consultations found in our study is consistent with the mean frequency (between three and four) of cue/concern occurrence in oncology, where the same VR-CoDES was used [17, 28]. It is important to note that a higher number of cue/concern expressions does not suggest an effective consultation [28]. Our study failed to support the previous finding by Zhou et al. [19] that responses differed according to cue types. Medical students provided room for disclosure of emotional cues expressed in vague and unspecified words, but reduced space to cues emphasizing physiological/cognitive

correlates in the OSCE setting, was not replicated in our HNC setting, although a similar multilevel analysis approach and the same coding scheme were adopted. On the other hand, oncologists do appear to respond differently to different types of emotions, as suggested by both correlational [18] and experimental [29] studies that patient expressions of sadness (compared to anger and fear) were more likely to receive empathic responses from oncologists. It is worth noting that the VR-CoDES only captures the manner in which the emotion is expressed (e.g. explicitly or verbal hints using metaphors), rather than the content of emotion (e.g. sadness or anger). It will be useful for future research to investigate the impact of both variables of *how* and *what* emotion is expressed on clinician responses. Patient self-reported quality of emotional wellbeing was, unsurprisingly, not found to be significantly correlated with a consultant's reduce space response. Emotional functioning of patients prior to consultation is commonly studied, as indicator of psychological distress, to correlate with patient expressions of emotional distress at consultations [28], through complex pathways from preferences of discussing emotional issues to initiation of emotional topics [14]. How patient-level variables, beyond the common demographics, contributing to our understanding of emotional discussion, in particular clinician responses, is still largely unexplored. Future researchers are encouraged to explore further the role these important variables (i.e. patient individual differences and other social, economic and educational status factors) play in the dynamics of consultation through rigorous research design and theoretical grounding.

The reported findings should be interpreted in the light of the following limitations. Firstly, due to a limited sample size and thus low statistical power, type II errors are likely. Future researchers are encouraged to replicate these promising findings using a larger sample and with different cancer patient groups, or even in other medical settings. Secondly, the quality

of non-verbal behaviours (both emotional distress and responses) is limited due to the nature of the audio data, despite the fact that the intonations in speech have been preserved while coding. Thirdly, some clinician level variables, such as gender [17] and quality of rapport with patients [27], previously indicated as important predictors for clinicians' responses, were not included in the multilevel models in our study. A much larger sample size is required in order to conduct a three-level analysis incorporating the clinician variables (at the level 3). Finally, all findings are drawn in a correlational, rather than causal, direction. Experimental studies, a relatively new development in healthcare communication research, are needed in order to establish causal relationships, for example, manipulating the timing of cue expression and the type of emotional cue provision [29] to study clinician responses.

Despite these limitations, this is the first time evidence was found to support a complex relationship between the timing of patient emotional expressions and clinicians' responses. Moreover, this is the first study that oncology consultants were found to close down emotional disclosure when initiated by patient using a multilevel approach in a clinical setting of head and neck cancer.

The implications of these findings may be stated tentatively. Consultants in their outpatient follow up appointments should be encouraged to allow patients to express their emotional concerns when they arise and at an appropriate timing. The current body of knowledge from healthcare communication studies supports this more flexible and engaged structure of clinician-patient interaction. The positive outcomes of this approach within the HNC field of healthcare that are expected should be an important focus for future investigation.

Acknowledgement

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Conflict of interest statement

We do not have financial disclosure or any conflict of interest.

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Figure Captions

Figure 1 Predicted probability of *reduce space* response as a function of the *timing* of emotional distress cue/concern expression

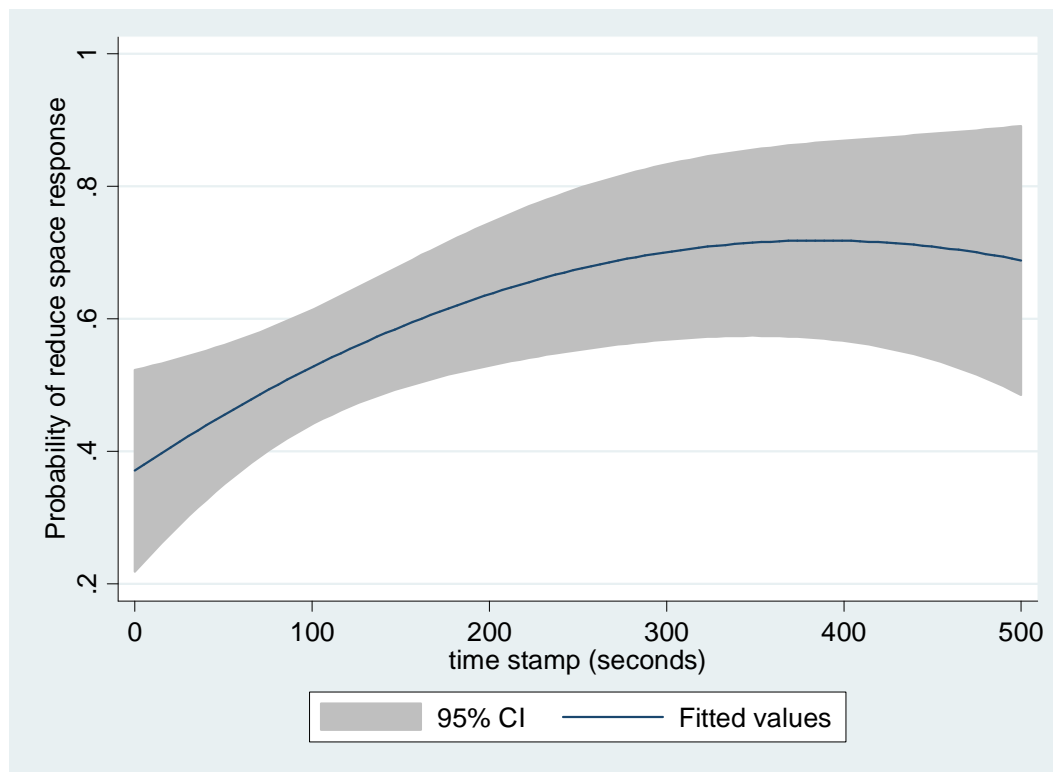


Figure 1 Predicted probability of *reduce space* response as a function of the *timing* of emotional distress cue/concern expression

Table 1 Definitions of cues and concerns and examples from the HNC* consultations

Definitions	Typical examples from the H&N cancer consultations
CONCERN: a clear and unambiguous expression of an unpleasant current or recent emotion where the emotion is explicitly verbalized with or without a stated issue of importance.	‘Are you sure it’s nothing else though? That’s what I am concerned about.’ ‘I am now feeling quite anxious.’ ‘I am concerned that it might be like a...something there.’
CUE: a verbal or non-verbal hint suggests an underlying unpleasant emotion and would need a clarification from the health provider. Instances included:	
Cue A: vague or unspecified words or phrases in which the patient uses to describe his/her emotions.	‘Well, I am really nervous now.’ ‘I am so stressed out at the moment.’ ‘Just tightness sometimes isn't it. You know sometimes I go ouch you know.’
Cue B: verbal hints to hidden concerns (emphasizing, unusual words, unusual description of symptoms, profanities, exclamations, metaphors, ambiguous words, double negations, expressions of uncertainties and hope).	‘What the hell is wrong with me?’ ‘It wiped me out completely.’ ‘And I’ve got this funny sensation...creeping feeling.’
Cue C: words or phrases that emphasizes (verbally or non-verbally) physiological or cognitive correlates (regarding sleep, appetite, physical energy, excitement or motor slowing down, sexual desire, concentration) of unpleasant emotional states.	‘I’ve gone off my appetite; I am not eating properly at all.’ ‘I am still feeling a bit tired.’ ‘I cannot seem to open my mouth as wide as I used to.’
Cue D: neutral expressions that mention issues of potential emotional importance which stand out from the narrative background and refer to stressful life events and conditions.	‘I’ve been made redundant, busy suing my employer.’ ‘I’m bad tempered all the time. I’m seeing a counsellor.’ ‘If I’m having my tea, and something gets stuck, then that’s it. I can’t eat anymore. And that’s about it now.’
Cue E: a patient elicited repetition of a previous neutral expression (repetitions, reverberations or echo of neutral expression within a same turn are not included).	Turn 1. ‘It just feels tight.’ Turn 2. ‘It just feels tight when I swallow.’
Cue F: non-verbal cues including clear expressions of negative or unpleasant emotions (crying) or hint to hidden emotions (sighing, silence after provider question, frowning etc).	Not available with audio data.
Cue G: a clear and unambiguous expression of an unpleasant emotion which occurred in the past (more than one month ago) or is without time frame.	‘I was really worried at the time.’ ‘I had a bit of a panic when I came here last time...that little lump.’ ‘I really had a rough time.’

*HNC: head and neck cancer

Table 2 Results of inter- and intra-coder reliability ($n=44$)

Type	Occasion of check	No of transcripts	Cohen's Kappa (95% CI)		
			Cues/concerns	Elicitation (patient/ clinician)	Response (provide/reduce space)
Inter-coder	Beginning	2	0.71(0.64, 0.81)	0.82 (0.69, 0.97)	0.74 (0.54, 0.80)
	Closer to the end	3	0.75 (0.48, 0.80)	0.78 (0.58, 0.88)	0.86 (0.69, 0.92)
Intra-coder	Coder 1	2	0.79 (0.76, 0.85)	0.93 (0.81, 0.99)	0.79 (0.66, 0.84)
	Coder 2	2	0.92 (0.81, 0.98)	0.86 (0.79, 0.98)	0.84 (0.67, 0.91)

Table 3 Patient characteristics (n=43)

Clinical/demographic information	Descriptive statistics
Age (year)	Mean=62.86 (SD=15.10), (range=21 – 91)
Gender:	
Male	24 (55.81%)
Female	19 (44.19%)
Smoking:	
Never smoked	26 (60.47%)
Currently smoking	11 (25.58%)
Previous smoked	6 (13.95%)
Alcohol:	
Yes (including rarely)	17 (39.53%)
No (never)	24 (55.81%)
Previous alcoholic	2 (4.65%)
Cancer stage	Mean=2.19 (SD=1.20), (range=1 – 4)
Tumour site:	
Oral cavity	13 (30.23%)
Larynx	10 (23.26%)
Oro-pharynx	11 (25.58%)
Other (thyroid, nose, salivary gland, unknown)	9 (20.93%)
Treatment:	
Surgery alone	17 (39.53%)
Radiotherapy alone (RT)	4 (9.30%)
Chemo-radiotherapy (CRT)	3 (6.98%)
Surgery + RT	16 (37.21%)
Surgery + CRT	3 (6.98%)
Follow-up appointment duration (minutes)	Mean=5.50 (SD=2.84), (range=1.5 – 13.18)
Time interval between treatment completion and video consultation (months)	Mean=25.44 (SD=14.43), (range=1 – 55)

Categorical variables are presented with percentages with absolute values, while continuous variables are presented with means, standard deviations, minimum and maximum values.

Table 4 Frequency of cues of concerns and responses (consultation $n=43$)

Cue type/ Elicitation	Response			Cue/Concern Mean	Chi-square		
	Providing space	Reducing space	Total		Value	<i>df</i>	<i>P</i>
Concern	4 (26.67%)	11 (73.33%)	15	0.35	2.198	1	0.138
Cue A	5 (38.46%)	8 (61.54%)	13	0.30	0.226	1	0.634
Cue B	33 (43.42%)	43 (56.58%)	76	1.77	0.106	1	0.744
Cue C	10 (52.63%)	9 (47.37%)	19	0.44	0.547	1	0.459
Cue D	14 (58.33%)	10 (41.67%)	24	0.56	2.131	1	0.144
Cue E	0 (0%)	1 (100%)	1	0.02		N/A	
Cue G	2 (50%)	2 (50%)	4	0.09	0.046	1	0.830
Total	68 (44.74%)	84 (55.26%)	152	3.53	1.684	1	0.194
Patient- elicited	19 (30.16%)	44 (69.84%)	63	1.47	8.067	1	0.005*
Clinician- elicited	49 (55.06%)	40 (44.94%)	89	2.07	0.910	1	0.340

No instance of Cue F was observed.

* $p < 0.01$.

Table 5 description of variables included in the study

Outcome variable at Level 1 ($n=152$)		Min - Max
Reduce space response ^a	84 (55.26%)	
Explanatory variable		
Level 1 (utterance, $n=152$)		
Cue time ^b (sec)	164.59 (SD=148.95)	(2-702)
Patient elicitation ^a	63 (41.45%)	
Level 2 (consultation, $n=43$)		
UW-QoL* mood+anxiety ^b	148.26 (SD=43.64)	(30-200)
Consultation duration ^b (sec)	329.77 (SD=170.20)	(90-791)
Patient age ^b	62.86 (SD=15.10)	(21-91)
Patient gender(male) ^a	24 (55.81%)	
Cancer stage ^b	2.19 (SD=1.20)	(1-4)

^aDichotomous variables are presented with percentages with absolute values

^bContinuous variables are presented with means, standard deviations, minimum and maximum values

*QoL: quality of life [25]

Table 6 Multilevel logistic regression models for the outcome variable *reduce space response*

Fixed effects	Null Model			Model 1			Model 2			Model 3			Model 4		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Level 1 (n=152)															
Concern	3.05	0.34, 27.53	>0.05	2.46	0.23, 26.10	>0.05									
Cue A	3.11	0.32, 30.33	>0.05	3.03	0.27, 33.85	>0.05									
Cue B	2.33	0.32, 16.66	>0.05	1.77	0.21, 15.14	>0.05									
Cue C	1.72	0.20, 14.48	>0.05	1.29	0.13, 12.85	>0.05									
Cue D	1.00	0.13, 7.80	>0.05	0.73	0.08, 6.79	>0.05									
Cue time ^a	1.00	0.99, 1.01	0.067	1.00	1.00, 1.01	0.006**	1.01	1.00, 1.01	0.018*	1.01	1.00, 1.01	0.013*			
Cue time squared ^b				0.99	0.99, 0.99	0.036*	0.99	0.99, 1.00	0.056	0.99	0.99, 0.99	0.047*			
Patient elicitation	2.96	1.37, 6.38	0.006**	3.10	1.42, 6.79	0.005**	2.35	1.11, 5.00	0.026*	2.25	1.01, 4.79	0.036*			
Level 2 (n=43)															
QoL mood+anxiety							0.99	0.98, 1.00	>0.05						
Consultation duration										1.00	0.99, 1.00	>0.05			
Patient age										0.71	0.32, 1.55	>0.05			
Patient gender (ref: female)										0.98	0.95, 1.00	>0.05			
Cancer stage										1.05	0.78, 1.40	>0.05			
Random effect (intercept)															
Level2 variance	0.26 (0.02, 3.34)	□ 0		□ 0			□ 0			□ 0			□ 0		
(95% CI)															
Level 2 ICC ^c	7.32%	□ 0		□ 0			□ 0			□ 0			□ 0		
Log likelihood	-103.96	-95.99		-93.77			-94.81			-94.42					
LR ¹ test	$\chi^2(1)=1.11, p>0.05$	$\chi^2(1)=0, p>0.05$		$\chi^2(1)=0, p>0.05$			$\chi^2(1)=0, p>0.05$			$\chi^2(1)=0, p>0.05$			$\chi^2(1)=0, p>0.05$		
LR ² test	n/a	$\chi^2(7)=15.94, p=0.026^*$ Better than Null model		$\chi^2(1)=4.44, p=0.035^*$ Better than Model 1			n/a			n/a			n/a		

** $p<.01$; * $p<.05$ ^aCue time is entered grand mean centred^bComputed via cue time stamp x cue time stamp, based on the grand mean centred term^cintra-class correlation indicates the proportion of total variance due to between-group differenceLR¹ test = likelihood ratio test comparing the mixed effects logistic model to a standard logistic modelLR² test = likelihood ratio test for model improvement