Do multimorbidity and deprivation influence patients' emotional expressions and doctors' responses in primary care consultations? – An exploratory study using multilevel analysis

Yuefang Zhou[1]*, Jenna-Marie Lundy[2], Gerry Humphris[1] and Stewart W Mercer[2]

[1]School of Medicine, University of St Andrews, St Andrews, UK

[2]General Practice and Primary Care, Institute of Health and Wellbeing,

University of Glasgow, Glasgow, UK

*Corresponding author at

School of Medicine, University of St Andrews, St Andrews, Fife, KY16 9TF, Scotland, UK

Tel: +44 1334 463564; Fax: +44 1334 467470; Email: yz10@st-andrews.ac.uk

Abstract

Objective: To explore whether and how patient multimorbidity and socioeconomic deprivation conditions might influence patients' emotional expression and doctors' responses in the general practice (GP) consultations.

Methods: Video recordings of 107 consultations (eight GPs) were coded with the *Verona Coding Definitions of Emotional Sequences* (*VR-CoDES*). Multilevel logistic regressions modelled the probability of GP *providing space* response, considering patient multimorbidity, deprivation conditions and other contextual factors. Further multinomial regressions explored the possible impact of multimorbidity and deprivation on expression of and specific responses to patients' emotional distress.

Results: GPs were less likely to provide space as the consultation proceeded, controlling for multimorbidity and deprivation variables. Patients with multimorbidity were less likely to express emotional distress in an explicit form. GPs were more likely to provide *acknowledgement* to emotions expressed by patients from more deprived areas.

Conclusion: Multimorbidity and deprivation may influence the dynamics of the GP consultations in specific ways. Rigorous methodologies using larger samples are required to explore further how these two variables relate to each other and influence cue expression, provider response and subsequent patient outcomes.

Practice implications: Understanding how multimorbidity and deprivation impact on GP consultations may help inform future service improvement programmes.

Key words: the VR-CoDES, multimorbidity, deprivation, emotional distress, general practice

1. Introduction

The interaction between patient and practitioner is at the heart of patient-centered healthcare, and there has been much research on the clinical encounter, especially in the primary care setting [1]. Primary care is of growing importance globally, as populations are rapidly ageing and the burden of chronic disease is escalating. Primary care offers a holistic approach to healthcare, which in systems with universal coverage, provides care to all patient groups, irrespective of disease type, age or socioeconomic status [2]. Understanding and developing the core components of effective primary care encounters and how these are influenced by patient, doctor and system factors is essential in further developing the effectiveness of primary care [3].

Previous research has shown that the patient demographic and socio-economic status can have important influences on the consultation. In a large study of over 3,000 consultations in areas of high and low socioeconomic deprivation in Scotland, patients living in deprived areas had more complex needs to be addressed within the clinical encounter, including more mental and physical health problems, yet received shorter consultations and were less enabled by those consultations than patients living in more affluent areas [4]. The GPs working in the poorer areas reported higher levels of stress at the end of each consultation. These social influences on the consultation are likely to be due, at least, in part, to the continuing existence of the 'inverse care law', which states that the availability of good medical care tends to vary inversely with the need for it in the population served [4,5]. Doctors working in deprived areas face a higher level of need and demand, due to health inequalities in the populations being served. A recent landmark publication on the epidemiology of multiple complex conditions in Scotland showed a step-wise social gradient in the prevalence of multimorbidity, with more multimorbidity occurring in deprived areas and at a much younger

age [6]. Multimorbidity is a key factor in premature mortality, unplanned hospital admissions, poor quality of life, and use of primary care services [6]. Surprisingly, there has been little research to date on how multimorbidity influences the clinical encounter, especially in deprived areas.

Methodological and statistical challenges to studying behavioural relationships in clinical encounters might be one major reason to explain why this area is under-researched. Multilevel analysis methods have been increasingly favoured during the last decade by many healthcare communication researchers for its ability to study patient, clinician and consultation level variables simultaneously, while accounting for the clustering effect (i.e. one GP often has a number of patients included in the study sample) [7 – 10]. However, patient multimorbidity and deprivation variables have rarely been incorporated into the multilevel modelling, either as key predictors or contextual factors, to study their possible impacts on the clinical interaction (e.g. cue expression and/or provider responses).

Recent studies adopting a multilevel approach have highlighted the importance of studying both 'how' and 'when' patients express their emotional distress in clinical consultations. For example, medical students provided room for the disclosure of emotional cues expressed in vague words, but discouraged expressions of cues emphasizing physiological/cognitive correlates [9]; whereas head and neck cancer consultants did not seem to respond differently to how cues were expressed [10]. Despite this inconsistent finding regarding the effect of cue type on responses, healthcare providers working at various settings seemed unanimously to provide room for the disclosure of emotional cues at the earlier stages of the consultation and tended to block emotional expressions closer to the end [8 – 10]. The nature of how different cue types and timing of cue expressions influence GP response in primary care consultations,

however, is not clear. In particular, considering the significant impacts of patient multimorbidity and deprivation on the quality of patient life and the delivery of healthcare service [11], it is necessary to incorporate these two variables into the multilevel modelling to study their possible impacts on patients' cue expression and GPs management of cues in the primary care consultations.

As a healthcare provider's ability to provide room for the disclosure of patients' emotional needs is recognized as an important aspect of empathy, which is associated with many improved patient care outcomes [12 – 14], the GP's *providing space* response was considered as one main outcome variable. The aim of this study was, therefore, to explore the effects of patient's multimorbidity and deprivation conditions on the way that patients express their emotional distress and GPs manage this distress in primary care consultations. We attempted to seek answers to two specific research questions:

(1) How do multimorbidity and deprivation variables impact on the likelihood of the GPs' *providing space* response to patients' emotional distress, considering other consultation (e.g. cue type and timing) and patient level variables (e.g. age, gender)?

(2) How do multimorbidity and deprivation variables further influence patients' cue/concern expressions and GPs' specific responses to patients' emotional distress?

2. Methods

2.1. Participants and procedure

Eight GPs and 107 patients, a subsample of a larger study [15], from the Greater Glasgow and Clyde area, Scotland, UK, participated in this study during a 24 months period between 2006 and 2008. The mean age of patients was 51.70 (range = 18 – 86, *SD* = 18.16). Approximately thirty-eight percent of patients were male and forty-eight percent of them had

more than two long-term disease conditions (i.e. multimorbidity). The average deprivation estimate, based on each patient's post code, was 2856.94 (range = 15 – 6431, *SD* = 2416). This was calculated according to the *Scottish Index of Multiple Deprivation* (SIMD, [16]), with lower rank indicating more deprived areas. GPs were recruited through practices (four GPs from highest deprivation and four from lowest deprivation according to the SIMD 2006). Patients (18 or over) were recruited in the order they attended the participating GP practices. Participation was voluntary and written consent was obtained from both GPs and patients before the video recordings of a standard ten-minute (approximate) consultation were taken by a research assistant.

2.2. Ethical approval

This study was part of a larger study funded by the Chief Scientist Office of the Scottish Government (CSO Ref: CZH/4/267). It was independently reviewed and given a favourable opinion by the local research ethics committee in Scotland, UK (approval number: REC/06/SO701/43)

2.3. Coding cues/concerns and responses

The consultations were transcribed and analyzed with the *Verona Coding Definitions of Emotional Sequences* (VR-CoDES CC and VR-CoDES-P) [17,18], during September 2009 and January 2010, for both patients' expressions of cues/concerns and GPs' responses. The coding manual defines an emotional cue as a hint suggesting an underlying negative emotion, whereas a concern is an explicitly verbalised expression of negative emotion. Examples of coded cues/concerns and responses were presented in Table 1. A PhD student (JML) and another researcher, both trained on the VR-CoDES, coded the transcripts while viewing the videoed consultations to preserve the voice tone and context. Both the patient's and GP's

speech turn numbers (i.e. conversation before interrupted by the other person) were noted while coding. Coding was overseen by one VR-CoDES developer (GH). Inter-rater reliability (IRR), measured with Cohen's Kappa [19], was undertaken on twenty randomly selected consultations across two cycles of coding (12 transcripts at the beginning and further eight transcripts closer to the end of coding). Overall, an excellent IRR value was achieved (Kappa = 0.95 and 0.91 for cues/concerns and responses respectively).

[Insert Table 1 about here]

2.4. Data analyses

To explore the effects of multimorbidity and deprivation on *providing space* response, a 3-level logistic regression was conducted to fully acknowledge the nested data structure, where utterance (level 1) was nested within consultations (level 2), and the consultation was nested within GPs (level 3). The outcome variable was *providing space* response. Explanatory variables at level 1 were: specific cue type (e.g. *Cue A*, 1 = presence, 0 = absence), the patient speech turn number where a cue/concern was observed, as an approximate indication of timing of cue/concern expression, patient's multimorbidity (1 = more than one condition, 0 = one condition), deprivation (i.e. SIMD) score, patient age, gender and consultation duration. Analyses were conducted in STATA/IC™ 13.0 for Windows using the *xtmelogit* procedure, following three steps: (1) variance composition at each level was explored in a null model with random intercept; (2) predictive variables were entered at level 1 followed by level 2 (no level 3 predictors), with variables indicating a significant effect at the 5% level (two-sided) being retained for the next model; (3) model improvements were tested and compared. In addition, to further investigate the impacts of multimorbidity and deprivation on cue expression and specific responses, multinomial regression analyses, with clustering option (for consultation), were employed using the *mlogit* command in STATA/IC™ 13.0.

3. Results

3.1. Frequency of cues/concerns and responses

As shown in Table 2, a total number of 1464 cues/concerns were identified among 107 consultations, resulting in an average number of about 14 cues/concerns per consultation. *Cue B* (verbal hints) was most frequently observed, followed by *Cue A* (vague words), *Cue D* (stressful life event) and then *Cue C* (physiological/cognitive correlates). Less than one instance of a *Concern*, *Cue F* or *Cue G* was observed in each consultation. The majority (82.24%) of the 1464 identified cues/concerns were responded by a *providing space* response.

[Insert Table 2 about here]

Table 3 presents further information regarding specific responses in two dimensions (*providing/reducing* space and *explicit/non-explicit*). As shown in Table 3, almost all (99.50%) of the *providing space* responses (*n* = 1204) were responded in a *non-explicit* manner; whereas only approximately 20% the *reducing space* responses (n = 260) were *non-explicit.* Furthermore, the most frequent responses were all in the *non-explicit providing space* dimension. *Back channel* ('OK, right.'), *active invitation* ('Would you tell me more about it?') and *acknowledgement* ('I see.') were the three most frequent responses requiring attention in further analyses.

[Insert Table 3 about here]

3.2. GPs' *providing space* responses

Descriptive statistics of the key variables included in the study are presented in Table 4. As shown in Table 4, the outcome variable (*providing space* response) accounted for over 80% of the behavioural sequences in level 1. The average patient speech turn number, where a

cue/concern was observed, was nearly 80 (range 2 – 464). Average consultation duration was approximately eight minutes (range 2 – 20). On average, patients were over fifty years old, with approximately 40% males and 48% with more than two long-term conditions. The average deprivation level of the sample participants (*mean* = 2856.94, *SD* = 2416) was slightly higher than the Scottish population in Glasgow region (*mean* = 2001.95, *SD* = 1849).

[Insert Table 4 about here]

A number of findings emerged from the three-level logistic regression analyses (Table 5). (1) Overall, little variance was explained by the differences from either between consultations (10.64%) or between GPs (1.86% in null model). However, the likelihood ratio test ($\chi^2(2) = 42.73$, $p < 0.001$) confirmed that a three-level model was significantly better than a single level model. (2) Neither cue type (Model 1), nor multimorbidity (Model 4) or deprivation (Model 4) influenced the probability of observing a *providing space* response. (3) A strong negative linear relationship was found between the *turn number* and the *providing space* response ($OR = 0.98$, $p < 0.001$ in Model 3). The model was significantly improved when the *turn number* squared term was entered ($\chi^2(1) = 17.98$, $p < 0.001$), suggesting that a curvilinear relationship existed between the *turn number* and the *providing space* response ($OR = 1.00$, $p < 0.001$) (also see Figure 1). (4) When multimorbidity, deprivation and other patient/consultation level variables were controlled for, the curvilinear effect of *turn number* was preserved (Model 4).

[Insert Table 5 about here]

[Insert Figure 1 about here]

Figure 1 demonstrates a curvilinear relationship between a speech *turn number* and the probability of the *providing space* response occurrence. The X-axis is the *turn number* in a

typical consultation with approximately 200 speech turns (only sixteen consultations out of our sample of 107 had a speech turn over 200), a proxy for the time when cues/concerns were expressed during consultations. The Y-axis is the predicted probability of a GP's *providing space* response. As shown in Figure 1, the GPs were more likely to provide space for disclosure of emotions at the initial stage of the consultation. As the consultation proceeded, they were more likely to block emotional discussions until closer to the end when they started to re-open the discussion around emotional concerns. This trend suggested a flexible approach in opening up opportunities for emotional disclosures in GP consultations.

3.3. Multimorbidity and emotional distress

In deciding the outcome variables in the multinomial regression analyses, a *concern* (explicit verbalization of troubling emotions that are different of a hint of emotion), *Cue B* (a most frequently observed cue) and *Cue D* (related to stressful life events that were likely influenced by patient's multiple conditions) were purposively selected to answer the second research question. As shown in Table 6, patients with multimorbidity were less likely to express emotional distress in an explicit concern form (Relative Risk Ratio, $RRR = 0.44$, $p < 0.01$), controlling for effects of other patient/consultation level variables.

[Insert Table 6 about here]

3.4. Deprivation and *acknowledgement* response

The three most frequently occurred responses were chosen as outcome variables in the multinomial regress analyses (Table 7). Deprivation had a small effect on the *acknowledgement* response ($RRR = 0.99$, $p < 0.05$), after controlling for multimorbidity and other patient/consultation level variables. That is, GPs were more likely to provide

acknowledgement type of response (e.g. 'I see' as a non-explicit *providing space* response) to patients from more deprived areas.

[Insert Table 7 about here]

4. Discussion and Conclusion

4.1. Discussion

4.1.1. Statistical challenge

This study explored the possible impacts of patient morbidity and socioeconomic deprivation conditions on the way patients express emotional distress and GPs manage the distress in primary care consultations. Both the three-level logistic regression and the multinomial regression analyses accounted for the nested data structure of the consultation. A multinomial analysis, with a clustering function, was considered in preference to the three-level multinomial analysis to investigate effects of multimorbidity and deprivation on patient cue expressions and specific GP responses. A balance was needed to be struck between appreciation of the nature of the data structure and parsimony of the results' interpretations. In response to the recent call for searching for appropriate methods to match theoretical reasoning [20], we are enthusiastic to stimulate discussion and encourage future healthcare communication researchers to further explore suitable methods and analytical techniques to tackle increasingly complex health problems within the setting context.

4.1.2. Effects of multimorbidity and deprivation on GP *providing space* response

First, the majority of cues/concerns (82%) were responded by a *providing space* response; and almost all of them were non-explicit (99%). This finding is consistent with that from previous studies that GPs commonly use non-specific acknowledgement-type strategy to

manage patients' emotional distress [21, 22]. Second, our findings showed no significant direct effects of either multimorbidity or deprivation on GP *providing space* response. It is possible that our sample size is under powered to detect a small effect size. It is also possible that some complex relationship exists between multimorbidity, deprivation and provider responses, which needs further exploration, using multilevel structural equation modelling techniques. Our further multinomial analyses on the impacts of both multimorbidity and deprivation on more detailed and subtle outcome variables confirmed the complexity in their relationship with cue expression and specific response strategies, an area that warrants further work.

Third, a strong non-linear relationship between speech turn number and the possibility of GP *providing space* response was found, after controlling for effects from both multimorbidity and deprivation variables, as well as other contextual factors. This finding suggested that GPs were adopting complex strategies in dealing with subtle emotional issues expressed by their patients in consultations, which is consistent with the findings reported in a recent study with head and neck cancer consultants [10]. GPs, similar to oncology consultants, are faced with a patient population with diverse backgrounds and complex disease conditions. It might be argued that this flexible approach in managing patients' emotional issues (i.e. general exploration of symptom related emotional concerns at the beginning, closing down to focus on diagnosis later on, and then opening up again checking for emotional issues in the end) is best clinical practice. It would be beneficial to explore further how this flexible approach might influence patient care outcomes by collecting some outcome measures.

4.1.3. Multimorbidity and patient's expression of emotional distress

Compared with studies using the same VR-CoDES measure in the oncology setting (*mean* = 3 – 4 per interview [8, 10, 23] the mean frequency of cue/concern expression per consultation was higher (*mean* = 13.68) in our sample from the primary care setting. This might be partly explained by the proportion (approximately 50%) of participants with multimorbidity, a complex condition often associated with depression and psychological discomfort [24, 25], which increases emotionally loaded expressions. Other studies adopting the same measure showed an increased number of cue/concern expressions with higher emotionally charged scenarios (e.g. *mean* = 8.85 with irritable bowel syndrome [9], *mean* = 15 in psychiatry [26]). It would be beneficial in future studies to compare emotional distress expressions between patients with and without multiple illness conditions.

Contrary to our expectation, patients with multiple chronic conditions were less likely to express their emotional distress in an explicit form. In other words, they were more likely to hint emotions in a *cue* form rather than explicitly verbalizing emotions in a *concern* form. Although patients with multimorbidity are commonly reported with more depressive symptoms [24] and higher depression severity levels [25], current findings on how the quality of patient emotional wellbeing prior to consultation influences disclosure of emotional distress at consultation is inconsistent. Evidence in the primary care field has pointed to a positive association between patients with higher emotional distress and more frequent cue expressions [7, 27, 28]. However, breast cancer [29] and generic cancer patients [23] showed no effect of patient's level of anxiety/depression on their cue disclosure. While it is challenging to interpret our finding based on existing work, it should be pointed out that no distinctions were made with regard to the *explicitness* of how emotion was expressed in previous studies. It might be argued that multimorbid patients perceived emotional distress as unavoidable, not as something for which they wish to explicitly discuss with their GPs,

which coincided with the promotion of the self-management of chronic diseases in the UK in the primary care service [30]. Further work is needed to confirm this hypothesis. In addition, we have not distinguished between physical and mental chronic conditions, nor have we considered the mediating role of self-perceived health-related quality of life in the relationship between multimorbidity and depression [25], examination of separate effects and casual pathways to these associations should be further explored in future studies.

4.1.4. Deprivation and GP *acknowledgement* response

GPs were more likely to provide *acknowledgement* response to cues/concerns expressed by patients from more deprived areas. The VR-CoDES defines the *acknowledgement* response as any response which provides space for the patient to say more about a cue or concern by non-specifically acknowledging what has been said (e.g. 'I see.' 'I hear that.' VR-CoDES manual p.25). At this stage we are not certain why this happened. However, it is evident that patients from more deprived areas were associated with more depressive symptoms [15]. A recent study investigated GPs' and psychiatrists' responses to emotional disclosure in patients with depression. It showed that GPs displayed a greater engagement with patients' emotions than psychiatrists, by either claiming to understand the emotions or by formulating the patients' statements [21]. On the other hand, a finding with general primary care patients suggested that GPs' responses were often non-specific acknowledgements without any actual exploration of the patient's emotions [22]. In addition, one study adopting the *Consultation and Relational Empathy* (CARE, [31]) measure, where understanding patients' concerns is incorporated, found that GP empathy was perceived significantly lower in consultations in deprived areas [15]. Putting our finding in the context of this literature, it seems that GPs working in deprived areas were reluctant in taking an active empathic approach to deal with clinical encounters with increasing complexity, characterised with more depressive

symptoms, less time and higher practitioner stress [4, 32]. Nevertheless, GPs wanted to show their recognition and understanding of patients' situations in order to engage and contain patients. Offering a non-specific acknowledgement statement (e.g. 'I see.') without actively encouraging emotional disclosure (e.g. 'Would you tell me more about it?') seemed to be the most considered strategy. Further work on the impacts of some closely related provider responses in the same VR-CoDES dimension (e.g. *acknowledgement*, *implicit empathy* and *active invitation*) on patients' perception of empathy and/or engagement will be needed to assist our interpretation of similar findings.

4.1.5. Limitations and strengths

The reported findings should be interpreted in the light of the following limitations. First, due to a limited sample size, especially with a three-level analysis, type II errors are likely resulting from low statistical power. Second, GP related variables at level three were not included in the models. Many important clinician variables, such as gender [8] and the quality of rapport with patients [33], previously indicated as important predictors for clinician responses, should be considered in future studies. Third, manual coding on transcripts has not only missed some nonverbal cues, but also produced a proxy for the timing of cue/concern expression (i.e. turn number, rather than time stamp). To replicate the important finding regarding the nonlinear relationship in the same or other settings, future researchers are encouraged to employ more advanced coding software, such as the Observer XT [34], to obtain more accurate time stamped events. Finally, all findings were drawn in a correlational, rather than a causal, direction. Studies adopting experimental methods are needed to establish causal relationships, for example, employing randomized control design [35] to study effects of multimorbidity on cue expression, or manipulating the type of emotional cue provision [36] to study clinician responses.

Despite these limitations, this is the first known study to adopt a three-level modelling approach to study GP responses to patient emotional distress in a primary care setting. In addition, patient multimorbidity and deprivation variables were appropriately incorporated into the multilevel modelling, which has not been studied before. Furthermore, the statistical flexibility adopted in this study will encourage future healthcare communication researchers to search for appropriate statistical and analytical methods to tackle challenging health problems.

4.2. Conclusion

Multimorbidity and deprivation conditions appeared to influence the dynamics of the GP consultations around the discussion of emotional distress. Rigorous methodologies using larger samples are required to explore further how these two variables might relate to each other and how they influence the expression of emotional distress and GPs' management of this distress during consultations.

4.3. Practice Implications

Understanding how primary care consultations are influenced by patients' illness conditions and socioeconomic deprivation factors is likely to enable improved initiatives in policy and training to benefit patient care.

Conflict of interest

The authors have no conflict of interest that could inappropriately influence or be perceived to influence this manuscript.

Acknowledgements

The authors wish to thank all patients and GPs who participated in this study. Thanks are also given to Maria Angela Mazzi from the University of Verona, who kindly provided statistical advice. Finally, we are grateful to Maria Higgins, who assisted with the data coding.

Authors' statement

I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

Role of funding

The funder of the study has no role in any of the following: study design; collection, analysis and interpretation of data; writing of the report; and in the decision to submit the article for publication.

References

[1] Howie JGR, Heaney D, Maxwell M. Quality, core values and the general practice consultation: issues of definition, measurement and delivery. Fam Pract 2004;21:458–68.

[2] World Health Organisation. The World Health Report 2008: Primary Healthcare, Now More Than Ever. WHO: Geneva; 2008.

[3] Mead N, Bower N. Patient-centeredness: a conceptual framework and review of the empirical literature. J Soc Sci Med 2000; 51:1087–110.

[4] Mercer SW, Watt GMC. The inverse care law: clinical primary care encounters in deprived and affluent areas of Scotland. Ann Fam Med 2007;5:503–10.

[5] Hart JT. The inverse care law. Lancet 1971;297:405–12.

[6] Barnett B, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. The epidemiology of multimorbidity in a large cross-sectional dataset: implications for health care, research and medical education. The Lancet 2012;380:37–43.

[7] Del Piccolo L, Mazzi MA, Dunn G, Sandri M, Zimmermann C. Sequence analysis in multilevel models: A study on different sources of patient cues in medical consultations. Soc Sci Med 2007;65:2357–70. doi:10.1016/j.socscimed.2007.07.010. PubMed: 17868965.

[8] Finset A, Heyn L, Ruland C. Patterns in clinicians' responses to patient emotion in cancer care. Patient Educ Couns 2013; 93:80 –5.

[9] Zhou Y, Collinson A, Laidlaw A, Humphris G. How do medical students respond to emotional cues and concerns expressed by simulated patients during OSCE consultations? A multilevel study. PLoS One 2013; 8(10):e79166. doi:10.1371/journal.pone.0079166.

[10] Zhou Y, Humphris G, Ghazal N, Friderichs S, Grosset D, Rogers S. How maxillofacial consultants manage patient emotional distress during head and neck follow-up consultations: a multilevel study. Eur Arch Otorhinolaryngol 2014; doi:10.1007/s00405-014-3209-x.

[11] Lawson KD, Mercer SW, Wyke S, Grieve E, Guthrie B, Watt GCM, Fenwick EAE. Double trouble: The impact of multimorbidity and deprivation on preference-weighted health related quality of life a cross sectional analysis of the Scottish Health Survey. Int J Equity Health 2013;12:67. doi:10.1186/1475-9276-12-67.

[12] Zachariae R, Pedersen CG, Jensen AB, Ehrnrooth E, Rossen PB, von der MH. Association of perceived physician communication style with patient satisfaction, distress, cancer-related self-efficacy and perceived control over the disease. Br J Cancer 2003;88:658–65.

[13] Kim SS, Kaplowitz S, Johnston MV. The effects of physician empathy on patient satisfaction and compliance. Eval Health Prof 2004;27:237–51.

[14] Hojat M, Louis DZ, Markham FW, Wender R, Rabinowitz C, Gonnella JS. Physicians' empathy and clinical outcomes for diabetic patients. Acad Med 2011;86:359–64.

[15] Jani B, Bikker AP, Higgins M, Fitzpatric B, Little P, Watt GCM, et al. Patient centredness and the outcome of primary care consultations with patients with depression in areas of high and low socioeconomic deprivation. Br J Gen Pract 2012;e576–81. doi:10.3399/bjgp12X653633.

[16] SIMD: Scottish Index of Multiple Deprivation. Available from http://www.scotland.gov.uk/Topics/Statistics/SIMD [accessed on 26 November 2014].

[17] Zimmermann C, Del Piccolo L, Bensing J, Bergvik S, De Haes H, Eide H, et al. Coding patient cues and concerns in medical consultations, the Verona coding definitions of emotional sequences (VR-CoDES). Patient Educ Couns 2011;82:141–8.

[18] Del Piccolo L, de Haes H, Heaven C, Jansen J, Verheul W, Bensing J, et al. Development of the Verona coding definitions of emotional sequences to code health providers' responses (VR-CoDES-P) to patient cues and concerns. Patient Educ Couns 2011;82:149–55.

[19] Cohen J. A Coefficient of Agreement for Nominal Scales. Educ Psychol Meas 1960; 20:37–46.

[20] Connor M, Fletcher I, Salmon P. The analysis of verbal interaction sequences in dyadic clinical communication: a review of methods. Patient Educ Couns 2009;75:169–77. doi:10.1016/j.pec.2008.10.006. PubMed: 19097842.

[21] Davidsen AS, Fosgerau CF. General practitioners' and psychiatrists' responses to emotional disclosures in patients with depression. Patient Educ Couns 2014;95:6 –8. doi:10.1016/j.pec.2013.12.018.

[22] Epstein RM, Hadee T, Carroll J, Meldrum SC, Lardner J, Shields CG. Could this be something serious? – reassurance, uncertainty, and empathy in response to patients' expressions of worry. J Gen Intern Med 2007;22:1731–9.

[23] Oguchi M, Jansen J, Butow P, Colagiuri B, Divine R, Dhillon H. Measuring the impact of nurse cue-response behaviour on cancer patients' emotional cues. Patient Educ Couns 2011; 82:163–68.

[24] Spangenberg L, Forkmann T, Brähler E, Glaesmer H. The association of depression and multimorbidity in the elderly: implications for the assessment of depression. Psychogeriatrics 2011;11:227–34.

[25] Gunn JM, Ayton DR, Densley K, Pallant JF, Chondros P, Herrman HE, Dowrick CF. The association between chronic illness, multimorbidity and depressive symptoms in an Australian primary care cohort. Soc Psychiatry Psychiatr Epidemiol 2012; 47:175–84.

[26] Del Piccolo L, Mazzi MA, Goss C, Paccaloni M, Rimondini M et al. How emotions emerge and are dealt with in first diagnostic consultations in psychiatry. Patient Educ Couns 2012;88:29–35. doi:10.1016/j.pec.2012.01.010. PubMed: 22326453.

[27] Del Piccolo L, Mead. NGL, Mazzi MA, Goss. C, Rimondini M, Zimmermann C. The English version of the Verona Medical Interview Classification System (VR-MICS): an assessment of its reliability and a comparative cross-cultural test of its validity. Patient Educ Couns 2005;58:252–64.

[28] Del Piccolo L, Saltini A, Zimmermann C, Dunn G. Differences in verbal behaviours of patients with and without emotional distress during primary care consultations. Psychol Med 2000;30:629–43.

[29] Duric VB, Sharpe P, Lobb L, Meiser E, Barratt B, Tucker A. Reducing psychological distress in a genetic counselling consultation for breast cancer. J Gen Couns 2003;12:243–64.

[30] Department of Health. Choosing Health: Making Healthy Choices Easier. London UK: The Stationary Office Ltd; 2004.

[31] Mercer SW, Watt GCM, Maxwell M, Heaney DH. The development and preliminary validation of the Consultation and Relational Empathy (CARE) Measure: an empathy-based consultation process measure. Fam Pract 2004;21:699–705.

[32] Stirling AM, Wilson P, McConnachie A. Deprivation, psychological distress, and consultation length in general practice. Br J Gen Pract 2001;51:456–60.

[33] Lelorain S, Bre´dart A, Dolbeault S, Cano A, Bonnaud-Antignac A, Cousson-Ge´lie F, Sultan S. How can we explain physician accuracy in assessing patient distress? A multilevel analysis in patients with advanced cancer. Patient Educ Couns 2014;94:322–27.

[34] The Observer XT. http://www.noldus.com/human-behavior-research [accessed on 26 November 2014].

[35] Suarez-Almazor ME, Looney C, Lui Y, Cox V, Pietz K, Marcus DM, et al. A randomized controlled trial of acupuncture for osteoarthritis of the knee: Effects of patient-provider communication. Arthritis Care Res 2010;9:1229–36.

[36] Sheldon LK, Ellington L, Barrett R, Dudley WN, Clayton MF, Rinaldi K. Nurse responsiveness to cancer patient expressions of emotion. Patient Educ Couns 2009;76:63–70.

Table

Table 1 examples of coded cues/concerns and responses from primary care consultations

Brief definitions	Cues/concerns	Responses
CONCERN: an explicit verbalization of negative emotions	‘Well I’m hell of glad to hear that, but it is **worrying** me.’ ‘I mean the report from the Royal did **upset** me for a few days you now.’	‘Bearing in mind, five months ago, you went through the whole cardiac testing.’ (NRIa: Information Advice) ‘I don't think that's you, I think you are probably well enough, your symptoms I hope now will remain at this level.’(NRSd, Shutting Down)
CUE: a verbal or non-verbal hint of troubling emotions		
Cue A: vague or unspecified words/phrases to describe emotions	‘I’ve been off for quite a while and I don’t feel **100%** about going back. ‘ ‘I am very **nervous** in the car.’	GP nods. (NPSi: Silence). ‘Hmm, is it just the car?’ (EPCEx: Content Exploration)
Cue B: verbal hints to hidden concerns (emphasis, metaphors etc.)	‘Emotionally I am **absolutely exhausted**.’ ‘I’ve got a **terrible** cough.’	‘Hmm.’ (NPBc: Back Channel) ‘Right.’ (NPBc: Back Channel)
Cue C: words/phrases emphasizing physiological or cognitive correlates (e.g. sleep, appetite)	‘I’ve felt I’ve no motivation and been very **tired,** sleeping quite a lot.’ ‘I am **not sleeping** at night…My head is pounding with it all night.’	‘Umm, other things like problems with concentration or mood?’ (NPAi: Active Invitation) ‘Right, OK.’ (NPBc: Back Channel)
Cue D: neutral expressions standing out from narrative backgrounds referring to stressful life events and conditions	‘It’s just, you know that way **I don’t think there is much point** I’ve got children still off on holiday.’ ‘Ouch I am just **having a dreadful time** and fighting with everybody (patient shakes head).’	‘Yeah, yeah.’ (NPBc: Back Channel) ‘When did this all start?’ (NPAc: Active Invitation)
Cue E: a patient elicited repetition	‘It's like a gravel.’ ‘You know, it’s like a gravel in your chest, son.’ (new turn)	‘OK.’ (NPBc: Back Channel).
Cue F: non-verbal cues (e.g. crying, sighing, frowning)	‘It's just…cause it is getting so near **(patient cries)**.’ ‘I haven't smoked for years (**patient shakes head and looks upset**).’	‘I know I know.’ (NPAc: Acknowledgement) ‘Right.’ (NPBc: Back Channel)
Cue G: unpleasant emotions occurred in the past	‘I **was only sleeping with through the drinks**…it’s been like this for a couple of years now.’ ‘I **spoke to you before** about my foot.’	‘I don’t know the answer…’ (NRSd: Shutting Down) ‘Hmm I haven't (looking at computer), how long has it been a problem for?’ (NPAi: Active Invitation)

Table

Table 2 Frequency of cues of concerns and responses (consultation *n* = 107)

Cue/Concern	Response			Cue/Concern Mean per consultation
	Providing space	Reducing space	Total	
Concern	67 (67.68%)	32 (32.32%)	99	0.93
Cue A	144 (81.36%)	33 (18.64%)	177	1.65
Cue B	522 (84.60%)	95 (15.40%)	617	5.77
Cue C	118 (86.76%)	18 (13.23%)	136	1.27
Cue D	138 (85.19%)	24 (14.81%)	162	1.51
Cue E	87 (73.73%)	31 (26.27%)	118	1.10
Cue F	78 (81.25%)	18 (18.75%)	96	0.90
Cue G	48 (85.71%)	8 (14.29%)	56	0.52
Total	1204 (82.24%)	260 (17.76%)	1464	13.68

Table

Table 3 Frequencies of responses to cues and concerns (consultation *n* = 107)

Providing/reducing space	**Explicit/non-explicit**		**Top three most frequent responses***	
Providing space (*n* = 1204)	Explicit	6 (0.50%)	Content acknowledgement Content exploration Affect acknowledgement	4 1 1
	Non-explicit	1198 (99.50%)	Back channel Active invitation Acknowledgement	748 242 192
Reducing space (*n* = 260)	Explicit	205 (78.85%)	Information advice Switching Postponing	119 64 5
	Non-explicit	55 (21.15%)	Ignore Shutting down Information advise	35 10 3

* See appendix 1 for response examples

Table

Table 4 description of variables included in the study

Outcome variable at Level 1 (*n* = 1464)		Min – Max
Providing space response[a]	1204 (82.24%)	
Explanatory variable		
Level 1 (behavioural sequence, *n* = 1464)		
Turn number[b]	79.04 (*SD* = 50)	(2 – 464)
Cue/concern/response	See Table 2	
Level 2 (consultation, *n* = 107)		
Patient age[b]	51.70 (*SD* = 18.16)	(18 – 86)
Patient gender(male)[a]	35 (37.71%)	
Consultation duration[b](min)	8.07 (*SD* = 5.81)	(2 – 20)
SIMD*[b]	2856.94 (*SD* = 2416)	(15 – 6431)
Multimorbidity[a]	51 (47.66%)	

[a]Dichotomous variables are presented with percentages with absolute values
[b]Continuous variables are presented with means, standard deviations, minimum and maximum values
*SIMD: Scottish Index of Multiple Deprivation, with lower rank indicating more deprived areas. Average SIMD rank for the Glasgow region where the sample was drawn (*mean* = 2001.95, *SD* = 1849, *range* = 2 – 6484).

Table

Table 5 Multilevel logistic regression models for the outcome variable *providing space* response

	Null Model	Model 1			Model 2			Model 3			Model 4		
Fixed effects		*OR*	*95% CI*	*P*	*OR*	*95% CI*	*P*	*OR*	*95% CI*	*P*	*OR*	*95% CI*	*P*
Level 1 (*n*=1464)													
Concern		0.85	0.22, 3.33	>0.05									
Cue A		1.41	0.36, 5.47	>0.05									
Cue B		2.07	0.55, 7.79	>0.05									
Cue C		2.69	0.66, 11.06	>0.05									
Cue D		2.07	0.52, 8.35	>0.05									
Cue E		0.98	0.24, 3.85	>0.05									
Cue F		1.56	0.38, 6.48	>0.05									
Cue G		1.99	0.44, 9.15	>0.05									
Turn number[a]					0.99	0.99, 0.99	0.000**	0.98	0.97, 0.99	0.000**	0.98	0.98, 0.99	0.000**
Turn no. squared[b]								1.00	1.00, 1.00	0.000**	1.00	1.00, 1.00	0.000**
Level 2 (*n*=107)													
Multimorbidity											1.05	0.68, 1.62	>0.05
SIMD[c]											1.00	0.99, 1.00	>0.05
Consultation duration											1.01	0.99, 1.02	>0.05
Patient age											0.99	0.98, 1.00	>0.05
Patient gender (ref: male)											1.00	0.65, 1.55	>0.05
Random effect (intercept)													
Level 2 variance (*95% CI*)	0.40 (0.21, 0.77)	0.42 (0.22, 0.81)			0.45 (0.24, 0.86)			0.43 (0.23, 0.84)			0.61 (0.42, 0.87)		
Level 2 *ICC*[d]	10.64%	11.11%			11.63%			11.20%			14.32%		
Level 3 variance	0.07 (0.01, 0.55)	0.07 (0.01, 0.57)			0.13 (0.03, 0.64)			0.12 (0.02, 0.62)			0.33 (0.14, 0.78)		
Level 3 *ICC*	1.86%	1.85%			3.36%			3.13%			7.91%		
Log likelihood	-663.388	-652.619			-643.100			-634.111			-631.585		
LR[1] test	$\chi^2(2)=42.73$, $p<0.001$	$\chi^2(2)=40.37$, $p<0.001$			$\chi^2(2)=52.52$, $p<0.001$			$\chi^2(2)=48.99$, $p<0.001$			$\chi^2(2)=33.78$, $p<0.001$		
LR[2] test	n/a	n/a			$\chi^2(1)=40.58$, $p<0.001$ Better than Null model			$\chi^2(1)=17.98$, $p<0.001$ Better than Model 2			$\chi^2(5)=5.05$, $p>0.05$ No better than Model 3		

**$p<0.01$; *$p<0.05$

[a]Cue time is entered grand mean centred.

[b]Computed via turn number x turn number, based on the grand mean centred term.

[c]SIMD: Scottish Index of Multiple Deprivation. http://www.scotland.gov.uk/Topics/Statistics/SIMD.

[d]intra-class correlation indicates the proportion of total variance due to between-group difference.

LR[1] test: likelihood ratio test comparing the mixed effects logistic model to a standard logistic model.

LR^2 test: likelihood ratio test for model improvement.

Table

Table 6 Multinomial regression results on patient cue/concern expressions given patient and consultation variables

Variables	**Concern**		**Cue B**		**Cue D**	
	RRR	*95% CI*	*RRR*	*95% CI*	*RRR*	*95% CI*
Multimorbidity	0.44**	0.24, 0.79	0.82	0.56, 1.21	1.13	0.67, 1.90
SIMD	0.99	0.99, 1.00	1.00	0.99, 1.00	0.99	0.99, 1.00
Patient age	1.01	0.99, 1.02	1.00	0.99, 1.01	1.00	0.99, 1.01
Patient gender (ref: male)	0.93	0.49, 1.76	0.92	0.65, 1.29	0.76	0.49, 1.17
Consultation duration	0.98	0.97, 1.01	1.00	0.99, 1.01	1.00	0.99, 1.01

**$p<0.01$

SIMD: Scottish Index of Multiple Deprivation.

RRR: Relative Risk Ratio (estimated using ‘all other cue types’ as reference).

Table

Table 7 Multinomial regression models of healthcare provider immediate responses to patient cues given patient and consultation variables

Variables	**Back channel**		**Active invitation**		**Acknowledge**	
	RRR	*95% CI*	*RRR*	*95% CI*	*RRR*	*95% CI*
Multimorbidity	0.81	0.56, 1.17	0.78	0.50, 1.23	0.75	0.49, 1.13
SIMD	1.00	0.99, 1.00	0.99	0.99, 1.00	0.99*	0.99, 0.99
Patient gender (ref. male)	0.77	0.43, 1.38	0.68	0.37, 1.23	0.90	0.52, 1.54
Consultation duration	1.01	0.99, 1.02	1.00	0.99, 1.00	1.01	0.99, 1.02

*$p<0.05$

RRR: Relative Risk Ratio (estimated using ‘all other responses’ as reference).

Figure

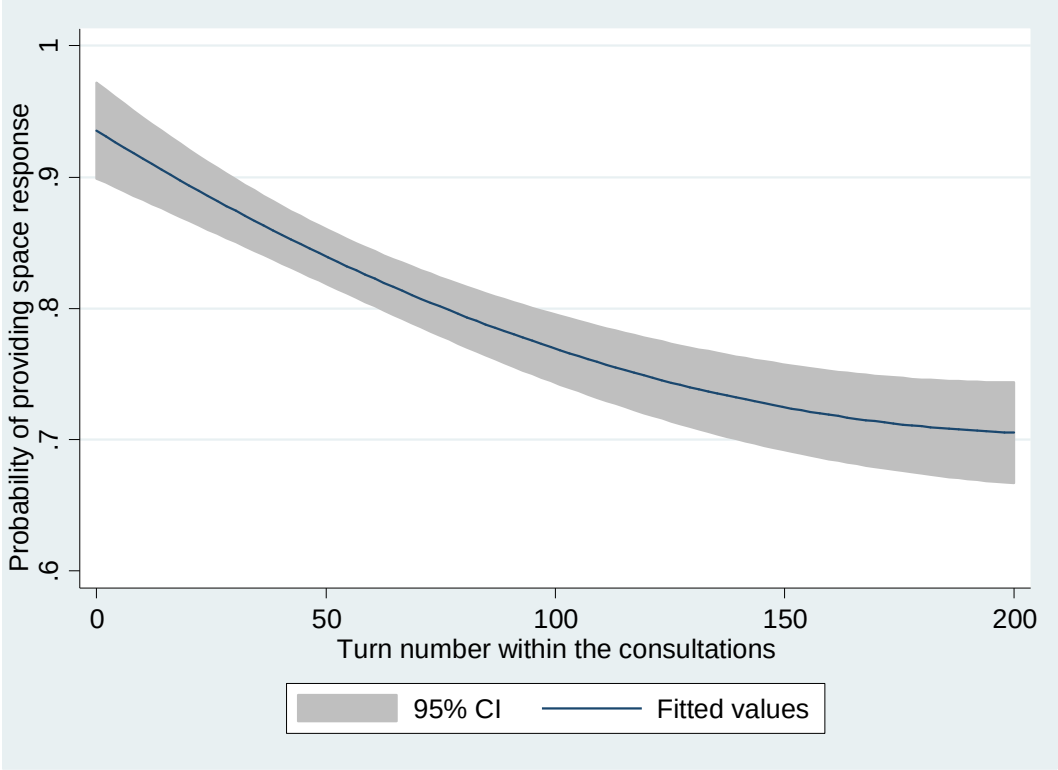

Figure 1 Predicted probability of providing space response as a function of the patient speech turn

Appendix 1 Typical examples for the top three most frequent responses in each dimension

Concern: I am worried about the operation that is scheduled next Friday.

Providing space	explicit	Content acknowledgement	The operation.
		Content exploration	What operation are you going to have?
		Affect acknowledgement	Worried.
	non-explicit	Back channel	OK, right. (word)
		Active invitation	Would you tell me more about it?
		Acknowledgement	Are you really? / I see. (sentence)
Reducing space	explicit	Information advice	You do not need to worry, it's a routine operation.
		Switching	You should talk to a nurse about this.
		Postponing	I would like to talk to you about this in a minute.
	non-explicit	Ignore	Are you still on antibiotics?
		Shutting down	Oh, don't be silly.
		Information advice	Let's look at the positive side of the situation.