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Title

The impact of using computer decision-support software in primary care nurse-led telephone triage: Interactional dilemmas and conversational consequences

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Response to Reviewers (NO AUTHOR DETAILS)

The impact of using computer decision-support software in primary care nurse-led telephone triage: Interactional dilemmas and conversational consequences

Dear Professor Timmermans,

Please find enclosed our revised submission of this research article to Social Science & Medicine.

As requested we have now added keywords one line below the abstract and reinserted identifying information that was removed for the blind review process.

The authors would like to thank the reviewers for their positive comments. Given these comments, we have not made any further changes to the manuscript.

We look forward to hearing from you with regard to the outcome of this revised submission and please do not hesitate to contact us should you require any further information.

Research Highlights

- First study using real-time audio-visual data to analyse telephone triage with CDSS
- Nurses rarely side-stepped constraints of CDSS to follow-up patients' own agendas
- Nurses may need to manage interactional dilemmas and issues of accountability
- Nurses, patients and CDSS function as multiple participants in triage interactions
- Our findings reveal potential limits to software development and nurse training

The impact of using computer decision-support software in primary care nurse-led telephone triage: Interactional dilemmas and conversational consequences

Abstract

Telephone triage represents one strategy to manage demand for face-to-face GP appointments in primary care. Although computer decision-support software (CDSS) is increasingly used by nurses to triage patients, little is understood about how interaction is organized in this setting. Specifically any interactional dilemmas this computer-mediated setting invokes; and how these may be consequential for communication with patients. Using conversation analytic methods we undertook a multi-modal analysis of 22 audio-recorded telephone triage nurse-caller interactions from one GP practice in England, including 10 video-recordings of nurses' use of CDSS during triage. We draw on Goffman's theoretical notion of participation frameworks to make sense of these interactions, presenting 'telling cases' of interactional dilemmas nurses faced in meeting patient's needs and accurately documenting the patient's condition within the CDSS. Our findings highlight troubles in the 'interactional workability' of telephone triage exposing difficulties faced in aligning the proximal and wider distal context that structures CDSS-mediated interactions. Patients present with diverse symptoms, understanding of triage consultations, and communication skills which nurses need to negotiate turn-by-turn with CDSS requirements. Nurses therefore need to have sophisticated communication, technological and clinical skills to ensure patients' presenting problems are accurately captured within the CDSS to determine safe triage outcomes. Dilemmas around how nurses manage and record information, and the issues of professional accountability that may ensue, raise questions about the impact of CDSS and its use in supporting nurses to deliver safe and effective patient care.

Keywords

UK; primary care; nurse-patient interactions; telephone triage/consultations; computer decision-support systems; conversation analysis; multi-modal analysis.

Introduction

Telephone triage is a process by which people with a healthcare problem are given advice or directed to another relevant service via telephone (Bunn, Byrne, & Kendall, 2005). This form of service delivery is used internationally, primarily as one strategy to manage the increasing workload on primary (Salisbury, et al., 2007) and emergency care (Bunn, Byrne, & Kendall, 2005). Nurses are increasingly taking on extended roles including first contact care, typically using telephones and computerised decision support software (CDSS) to assess, diagnose and triage patients (Randell, et al., 2007). In UK primary care, nurse-led telephone triage using CDSS represents a substitute for the clinical expertise of General Practitioners (GPs). However, whilst it is well-established that healthcare consultations have an impact on treatment decisions, patient experience and patient outcomes (Little, et al., 2001; Stewart, 1984), there has been little examination of how computer-mediated interaction might impact on patient care. We have already reported elsewhere (~~Anonymous~~Murdoch, et al., 2014) how nurses using CDSS, and GPs not using CDSS, utilise different question designs when conducting telephone triage for same-day primary care appointments. In particular, how the mediating technology could be seen to have interactional consequences for how nurses obtain information from patients. In this article we build on these findings by demonstrating how the interactional dilemmas addressed by nurses, in how they communicate with patients and complete the CDSS, have consequences for the consultation trajectory. To do so, we analysed video-screenshots of nurses' use of CDSS synchronised with audio-recordings of the triage calls to enable a discussion of the value of using CDSS as a tool for supporting telephone triage.

Theorising technology-mediated communication

The implementation of technology to support healthcare providers to conduct clinical consultations has foundations in a positivist philosophy (Coiera, 2003; Kaplan, 1997) that constructs a linear relationship between user, technology and patient, whereby the user accesses knowledge held within the technology and transfers 'facts' in a straightforward process to the patient. Such approaches form the body of health informatics literature promoting rational, goal-oriented models of technology-mediated communication as providing more efficient, safe consultations with up-to-date evidence (Coeira, 2003). Central assumptions underpinning health informatics approaches are the formulation of the technology itself as a container of knowledge; context as independent of how the technology is used; and the user as decision-maker (Greenhalgh, et al., 2009).

However, Greenhalgh et al.'s meta-narrative review of electronic patient record research revealed a diversity of other studies based on social constructionist, critical and recursive philosophies (Greenhalgh, et al., 2009), raising questions for positivist assumptions about the role of technology in patient-provider consultations. This research, including the use of ethnographic or sociolinguistic methodologies, has instead highlighted how technology can be seen as an agent within consultations (Swinglehurst, Roberts, & Greenhalgh, 2011); context as emergent through users interacting with technology (Suchman, 2007); and a view of the user as relational with both the patient and technology (Heath & Luff, 2000). Instead of viewing technology merely as a passive resource for up-to-date evidence, technology-mediated communication might be more usefully conceived as a novel participatory framework (Goffman, 1981), where built-in knowledge may, or may not, be animated by the user as 'information-in-context', contingent on the interplay of patient, user and technology.

Use of computer-decision support software in telephone consultations

The tension between views of technology as resource and technology as agent is reflected in debates about whether CDSS supports decisions made by nurses, or whether it is an 'expert system' in its own right (Thornett, 2001). Systematic reviews have concluded that solutions for reducing medical errors and improving patient care lie in improvements to clinical protocols, technological developments to CDSS (Kawamoto, et al, 2005; Randell et al., 2007), and that clinicians should be monitored to ensure their compliance to CDSS protocols and recommendations (Kawamoto, et al, 2005).

However, research using qualitative methods to study triage consultations in-depth, has raised questions as to whether technology can be sufficiently developed to standardise patient-provider interactions. This evidence, based on studies of urgent care and emergency services, revealed unanticipated actions by healthcare professionals using CDSS. In two studies of a national telephone advice service in Sweden, nurses reported overriding CDSS recommendations (Holmstrom, 2007), whilst Ernaster et al (2012) found that malpractice claims regarding the service commonly involved communication problems, with nurses asking too few questions of patients. Non-clinicians using CDSS to triage calls to the UK's NHS111 urgent care service have been shown to deploy 'pseudo-clinical' expertise to direct and advise patients (Turnbull, et al, 2012). Studies of NHS Direct, an historical UK 24-hour telephone advice system, revealed 'tacit practices and knowledge nurses use and rely upon to interpret the conduct of patient/callers' (Greatbatch et al, 2005; Hanlon et al., 2005; O'Cathain et al., 2004) with nurses seen to regularly deviate from and modify CDSS-prompted questions (~~Anonymous~~Pooler, 2010), potentially leading to a divergence rather than standardisation in treatment outcomes (Greatbatch et al, 2005). Analysis of emergency and out-of-hours services has also shown how call-handlers 'work around' the CDSS (Pope et al., 2013).

This work implies that we can view the institutional requirement for nurses to triage using CDSS, driven by a wider risk-minimisation agenda, as positioning the CDSS as agent within the nurse-patient-CDSS interactional context. However, this notion of agency needs to be seen as operating on a different status to both nurse and patient. The CDSS does not embody intentionality in the same way that nurse and patient do, and is dependent on being activated by the nurse. Like Swinglehurst's et al (2011) study of the electronic patient record within face-to-face consultations, the "agency" of the CDSS is partial, dialogic and unfolding as the interaction proceeds.

Goffman (1974, 1981), in his observations of everyday interactions, set out four different 'production formats' that individuals may engage in when speaking and the differing roles that emerge as a result: the 'animator', the physical source, who can inflect the message with personal style; 'author', the person who selects the words and meanings; 'principal', the person who in a particular capacity holds responsibility for the message; and 'figure', the protagonist represented in a scene described. In the context of CDSS-mediated telephone triage, Goffman's framework has implications for the agency of nurse, patient and CDSS in how we distinguish between the 'animator', 'author' and 'principal.' In contrast to the nurse and patient, the CDSS is silent within the ongoing talk and inaccessible to the patient, and embodies a materiality that 'affords' (Hutchby, 2001) certain types of actions and constrains others. The analytical issue here is therefore how the silent voice of the CDSS is animated, how this is consequential for how triage interactions progress, and whether we can reach a view of patients and nurses as authors of their own talk.

Understanding how nurses coordinate parallel activities of computer-based activity and talk with patients (or their proxys) is therefore vital. This study aimed to achieve such an

understanding, focusing on how nurses deployed and integrated CDSS in the delivery of telephone triage for same-day appointments in primary care.

Methodology

We applied conversation analytic methods to study how the CDSS structured and had consequences for nurse-patient interactions. Conversation analysis (CA) is a well-established inductive method for detailed analysis of high quality recordings of interactions and has been extensively applied in healthcare settings (~~Anonymous~~Barnes, 2005), particularly in general practice where it has been used to analyse every major facet of the face-to-face acute care encounter (Heritage & Maynard, 2006). Previous work on health communication using CA techniques has successfully identified a wide range of communication practices and dilemmas recurrent in medical encounters and that have substantive effects on communication and outcomes (Drew, 2006; Heritage, 2009).

Studies of ordinary telephone conversations have been a central topic of CA, yet it has only recently been applied to telephone consultations in healthcare settings. A common trend is to compare the latter with face-to-face consultations (Hewitt, Gafaranga & McKinstry, 2010). However, the additional use of CDSS negates any straightforward comparison, adding a layer of complexity. As far as we are aware this is the first study to incorporate CDSS video data with audio-recordings of triage calls, enabling a multimodal analysis of the turn-by-turn progression of talk and related activity between nurse, patient and CDSS.

The data presented here are taken from a study comparing communicative practices in nurse and GP-led triage. We report the findings of this work elsewhere (~~Anonymous~~Murdoch, et al. 2014). The study was nested within a large cluster randomised controlled trial (ESTEEM ~~–~~ ~~Anonymous~~Campbell, et al, 2014) which aimed to compare the

effects on primary care workload and cost, patient experience of care, safety and health status of computer-supported nurse-led telephone triage; GP-led telephone triage; and usual care. ESTEEM recruited 21,000 patients requesting same-day appointments in 42 General Practices across four different centres in England. The project was conducted in two GP practices participating in ESTEEM, located in Warwickshire and Devon. Ethical approval was provided by the South-West Research Ethics Committee.

Two intervention practices not already implementing a triage system and randomized to provide nurse-led telephone triage were approached to take part and one successfully recruited. Four nurses participated. Data were not collected until the practice was in its final week (average 8 weeks post training in CDSS) of data collection for ESTEEM. Patients (or their proxy) telephoning their practice requesting a same-day, face-to-face GP appointment were eligible for participation. The exclusion criteria included:

- Patients who were (1) too ill to participate; (2) unable to speak English; (3) temporary residents.
- Patients aged 12–15.9 years.
- Children under 12 years unless a proxy phoned on their behalf.

Data collection and consent procedure

Over a two-day period in June 2012 all triage calls were audio-recorded using an approved independent organisation (Way with Words). In addition, screen recording software recorded the nurse's view and CDSS entries in the form of a video-streamed file. Written consent was sought for transcribing and analysis of their recorded consultation, and accompanying visual data capturing nurses' use of the CDSS. Over the two-day period 47 audio-recordings of nurse triage calls and 35 video-recordings of nurses' use of Odyssey

CDSS during triage were made. Patients' written consent was given to analyse 22 recorded calls including 10 video-recordings.

Analytic procedure

Paired audio and video data were synchronized for analysis. All audio data were transcribed according to standard Jeffersonian transcription conventions (Jefferson 2004; see Appendix for a key), capturing fidelity of production of talk, and the extent to which nurses' use of CDSS was co-ordinated with the turn-by-turn accomplishment of triage activities. During transcription, all identifying features were removed or replaced with pseudonyms. In the screenshot data any visible identifying personal information was subject to blurring techniques to protect patient confidentiality.

RB, JP and JM each independently listened to all call recordings to correct transcription inaccuracies. Following identification of the gross structure of the calls (see Box 1), JM and RB systematically coded all question-response sequences across the entire dataset with moderate to high levels of coder agreement across all categories. This statistic is reported elsewhere (~~Anonymous~~Murdoch, 2014). JM, RB and JP then closely examined prototypical cases identified in the coding of question–response sequences which demonstrated recurrent patterns of interaction across the consultations and highlighted examples where some kind of interactional trouble occurred.

Here we report our findings on how the institutional requirement to manage patients, using CDSS, structured the calls and provide illustrative examples of how this structure was consequential for how interactions proceeded and information obtained from patients. Our examples provide 'telling cases' (Mitchell, 1984), where some form of 'disruption' or interactional trouble occurs, exposing difficulties faced in aligning the proximal and wider

distal context that structures CDSS-mediated interactions and its consequences for the call trajectory. Gumperz famously demonstrated the value of this approach in his studies of 'mis-communications' (1979; 1999). His theoretical arguments did not rest on how typical the cases were but how such micro-analysis of instances of talk reveal institutionalized networks of relationships and the impact of wider social forces that would otherwise go unnoticed when interactions proceed routinely. Whilst we did identify many instances of "disruptions" necessitating that nurses manage interactional dilemmas, we are not arguing that nurses routinely ran into these difficulties, nor indeed do so in everyday general practice. Instead the disruptions in our data enabled us to "track force relations at a molecular level" (Rampton, 2014).

Box 1: Gross structure of the triage calls

Opening: identification / greetings sequence

Problem solicit: e.g. 'How can I help you?'

Patient request / problem presentation: 'I'd like to see someone' / 'I've got cystitis'

Interrogative series: nurse/CDSS-initiated question-response sequences

Resolution: recommendation e.g. same-day appointment or self-care

Closing: arrangement making / goodbye

Findings

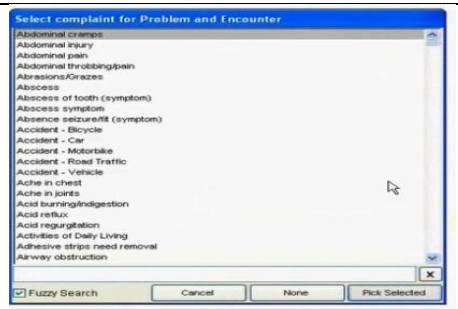
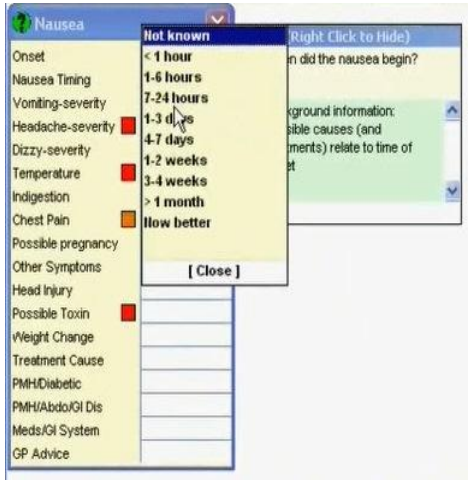
CDSS-nurse structuring of patient's problem presentation

When patients present their problems in primary care they may report a range of complex symptoms (Salisbury et al. 2013). The nurse needed to listen for these symptoms and select one (via a key descriptor) to launch the CDSS. This initial input activated a pop-up box on the computer screen with a series of symptom-related questions, marking the beginning of the

interrogative series. The nurse was able to select which questions to ask first but it was important the nurse asked those with a red or orange flag positioned adjacent to the question. Red-flagged questions had a default setting at the highest urgency level and therefore if left unanswered the CDSS would recommend an emergency response by default. Alongside this pop-up box sat a second drop-down box containing a fully-formed question and background information to be considered by the nurse, which became obscured by another drop-down box containing patients' possible response options. During the nurse's completion of questions a further pop-up box for related symptoms may have been triggered by the nurse's typed responses or, upon completing the set of questions under the first symptom, the nurse may have chosen to add an additional symptom, also triggering a further pop-up box.

In Extract 1 we can see the consequences of this requirement. The patient described two symptoms ('dizzy and sick') ruling out pregnancy as the cause. The patient then introduced backache as an additional symptom. However at this point the nurse was already in the process of typing 'nausea' as the trigger symptom in the CDSS (00:40), which activated a question series about the onset, frequency and severity of nausea symptoms. The patient then offered 'water infection' as a candidate diagnosis and further described the difficulties she was having because of the back pain. However, rather than following up the patient's proposed diagnosis or back pain as the central symptom, the nurse orientated to the pop-up box headed 'Nausea' already activated within the CDSS and began the required question series, commencing with a question about the onset of symptoms.

Extract 1: CDSS structuring patient's problem presentation

Time (Mins:Secs)	Nurse (N)/Patient (P1)	Talk	Nurse use of CDSS	Screenshot of CDSS
00:19	P1:	↑U::m it's just basically that I (.) u::m (.) I've been feeling unwell um		
00:25		(.) fo:r a couple of weeks really dizzy and sick most mornings (.)but um (.) I am trying for a (0.4) u:m >baby but I've< done >a pregnancy test< and I'm not pregna:nt		
	N:	.hh [okay]		
00:32	P1:	[U::m] (.) >but I've definitely been feeling< very very queasy (.) um and then this weeke::::nd, (.) >I don't know if it's< linked at a:ll or not		
00:40		but I >on Saturday woke up< with a (.) incredible back a::che u::m and then vest- on Sunday I couldn't actually get out of bed .hh u::m and I'm still in agony with it no::w and I'm not sure >if it's actually a< (.) a ↑water infection >or something but it's< all down my back is u::m (.) >even to< ↑sta::nd to sit anything is very uncomfortable the only thing the only way I can stop the pain is to lie in the ba:th £constantly huh£ .hh	'Nausea' typed and selected from symptom list Nausea pop-up box activated with onset question and answer prompt	
00:58	**N:**	Okay but the ↑nau:sea sort of started first a few days ago:::		

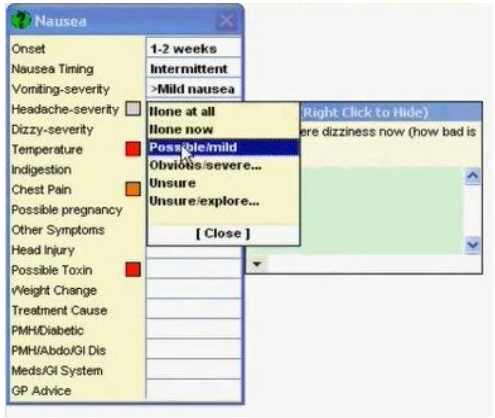
The CDSS therefore imposed constraints in terms of the topical agenda, number and order in which questions were asked, designed to elicit a response from patients that was amenable for entry into the CDSS. We have already demonstrated the consequences of these interactional constraints in that nurses tend to issue questions that request confirmation of the absence rather than presence of symptoms (~~Anonymous~~Murdoch, et al., 2014). However, once presence of symptoms had been established, the nurse had to ascertain severity or frequency of the reported symptoms.

Making sense of and managing patients' reported symptoms within CDSS

In Extract 2 we see a continuation of the same consultation with P1 provided in Extract 1. In response to the patient's information about not being sick since last week, the nurse entered 'intermittent' from a range of options into the response box for 'nausea timing'. On completion of the patient's reiteration of feeling 'really dizzy' every time she woke up, the nurse entered 'mild nausea' into the response box for 'vomiting severity'. The patient then proceeded to tell the nurse that she had been 'feeling quite dizzy'. However although the CDSS does permit completion of questions out of the order they appear on the screen, the nurse did not pursue this line of enquiry in a context-sensitive sense because this question did not arise until after the next question presented by the CDSS which related to headache. Pursuing dizziness risked the nurse failing to hold this information until it was timely to enter onto the system. So at 01:17 we can observe the nurse enquiring about headaches and the patient responding, on completion of which the nurse returned to dizziness.

However, the nurse did not ask the question as set out by the CDSS enquiring about the presence of dizziness. Instead her question was designed to refer back to the patient's prior talk by prefacing the question with 'and the' dizzine::ss. This avoided the need to ask the patient about the presence or absence of dizziness as this was already known from prior

talk. The nurse's 'recipient-designed' (Boyd & Heritage 2006) question instead appealed directly to the severity: 'quite bad' and 'topple over' or 'just a little bit' of dizziness in such a way as to fit with the list of CDSS options. Notable here is that the nurse had already been provided with information about severity 'really dizzy and sick most mornings' (Extract 1, 00:25), 'really dizzy every ti:me I wake up' (Extract 2, 01:13) and 'most of the da::y feeling quite dizzy' (Extract 2, 01:16) yet still asked the question. Nevertheless, the nurse's question could be interpreted as being sensitive to the ongoing circumstances of the call as the patient appeared to downgrade the severity of dizziness from 'really dizzy' to 'feeling quite dizzy'. The nurse appeared to design her alternative question to take account of these assessments: asking first if the dizziness was 'quite bad' reflecting in part the CDSS question prompt, or 'just a little bit of dizziness', offering the patient the opportunity to select the most appropriate answer. Finally she specified the severity of dizziness in terms of whether it caused the patient to 'topple over' and the caller's response prompted the nurse to insert 'possible/mild' into the CDSS.

Time (mins:secs)	N/P1	Talk	Nurse use of CDSS	Screenshot of CDSS
00:59	N:	Okay so the ↑nau:sea sort of started first a few days ago:::		
01:03	P1:	Yea::h prob- probably about two:: weeks ago I was sick last week sort of u::m mid morning (.) u:::m (.)	Inserts '1-2 weeks' for 'Onset'	
01:09		I haven't been sick since	Inserts 'Intermittent' for 'Nausea Timing'	
01:13		but I've been feeling (.) really dizzy every ti:me I wake up		
	N:	O[kay]	Inserts 'Mild Nausea' for 'Vomiting-severity'	
01:16	P1:	[U:m] and (.) really for most of the da::y feeling quite dizzy,		
01:17	N:	Any headaches at a:::ll		
	P1:	.hhhh no	Inserts 'None at all' for 'Headache-severity'	
	N:	No (.) okay (0.4) an- and the dizzine::ss is it (0.4) how is it is it quite ↑bad o::r would you say it's just a little bit of dizzine::ss,		
	P1:	E::r (>↑thing is it's)		
01:30	N:	(?) topple ove::r,		
	P1:	Yea::h >I don't feel like< I'm going to topple over I just feel like, (.) >you know< just dizzy > like when I< look arou:nd (I ju-) it feels like >everything just takes< a whi:le to refocus again	Inserts possible/mild for 'Dizzy-severity'	
	N:	O[kay]		
	P1:	[U:m] you know just feel like I'd, like to sit do:wn >you know< but it's not too bad >that I< (.) feel like I'm going to fall over		

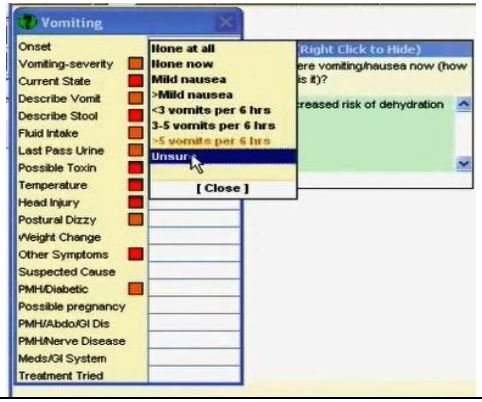
Extract 2: Making sense of patient's symptoms within CDSS

Making sense of patient's symptoms, responding appropriately to patients, and recording patient's responses accurately within the CDSS, therefore required nurses to coordinate parallel activities involving clinical, interactional and technical competence. This task was made even harder where the CDSS response options to questions did not easily match the patient's report of their symptoms. In the next two extracts we can firstly see examples where the nature of the patient's symptoms did not enable the nurse to provide a numerical answer; and secondly where the patient did not appear to understand the linguistic form of the question presented by the nurse and again was unable to provide the 'required' response.

Patient's embodied experience misaligned with CDSS requirements

In Extract 3 the nurse asked a different patient (P2) (as prompted by the CDSS) how often she had been sick, requiring a frequency-type response to be entered into the CDSS. However, the patient was unable to conform to the prescribed action agenda (she was sick every time she eats) which created difficulty for the nurse in selecting a possible answer. This difficulty was demonstrated in the video-recording with how the nurse uses the mouse, moving between the various response options. The nurse then re-issued the question as prompted by the CDSS but realized the difficulty she now had in completing the CDSS. Once again her movements with the mouse suggest her struggling to find an appropriate response and as a consequence the nurse selected 'unsure'. The patient experience was therefore not able to be accurately documented which had potential consequences for how the CDSS determined the triage outcome.

Extract 3: Patient's embodied experience misaligned with CDSS response options

Time (mins:secs)	N/P2	Talk	Nurse use of CDSS	Screenshot of CDSS
00:34			Vomiting question and response options activated by CDSS.	
00:45	N:	Okay (.) >↑and are you< sick ↑how often are you sick		
	P2:	E:r every time I ea:t,		
	N:	It's every time you ea::t	Begins search for appropriate response, moving mouse up and down between response options	
00:52	P2:	Yeah the only (piece) of food I've been able to, (.) actually hold down and not throw back up is a piece of toast (.) and that was, (0.6) e::r, (.) Sunday evening,	Stops searching for correct response	
	N:	O::h you poor thing		
	P2:	°Yeah° huh .hh		
	N:	So (.) in six hou::rs how many times would you be sick now <but >it is only< when you ea- is it only when you eat		
01:07	P2:	Yea::h and [I have]n't eaten anything since [that] (0.4) bit=	Continues search, moving mouse up and down between response options	
	N:	[(?)] [(?)]		
01:11	P2:	=of toast (0.6) well I've trie:d but, (.) yesterday morning,	Selects 'Unsure'	

Patient's linguistic skills misaligned with CDSS requirements

In Extract 4 we see the nurse animating a CDSS-prompted question aimed at determining the severity of the patient's pain. A numerical response was required, this time even more tightly defined on a scale of zero to ten. However, the patient was unable to provide the required response and the elongated vowel on 'my pai:::n?' and questioning intonation suggests the patient was unfamiliar with the medical concept of 'pain score'. Unfortunately the nurse appeared not to pick up on this as a problem of understanding the terms of the question and instead specified that she was asking about the patient's current pain. The patient was still not able to provide a numerical answer which the nurse appeared then to accept 'O:::kay'. While we were not able to obtain the video recording of the nurse's use of CDSS in this call, we can see that, as with Extract 3, the nurse was not able to record the required numerical response within the CDSS, thereby not capturing the patient's embodied experience of their pain.

Extract 4 [01:37]

N:	So the ↑pain at the moment is nought is no pain ten is the worst ever where would you say your pain score would be (.)
P3:	My pai::::n?
N:	At the moment
P3:	Well it's still the:::re but I (.) I I've taken some paracetamol,
N:	O:::kay
P3:	So it's slightly better of course

Emergence and management of nurse accountability within CDSS

Extracts 1 to 4 demonstrated the consequences of 'the technological shaping of social action' (Hutchby, 2001 p. 453) by the CDSS, but also the nurse's skills in accurately assessing the specific nature of a patient's condition. The patient's report, the nurse's own talk, and the nurse's animation of CDSS-authored question prompts, represented three distinct speakers populating the participation framework of the consultation as it progressed towards a triage decision that was both appropriate and which was accurately documented

within the CDSS. However, if we revisit the consultation with P1 (shown in Extracts 1 and 2), the nurse's selection of 'possible/mild dizziness' under the symptom heading 'nausea' later on created a dilemma for the nurse when a similar question needed to be asked, but this time under the heading of the additional symptom 'back pain.' In Extract 5, the nurse had added 'back pain' as an additional symptom leading to the additional pop-up box and question series for back pain. In the example presented, the nurse had asked the patient whether there was any radiation of pain down the legs, again referring back to the patient's previous report. The nurse then decided to complete the subsequent question on the presence or absence of postural dizziness, clicking 'yes'. This was a logical choice given the previous report of her dizziness (Extract 1, 00:25; Extract 2, 1:13-1:16). However, as a consequence another pop-up box appeared recommending that the nurse 'Call emergency ambulance NOW'. However, it is clear from the ongoing talk that the patient was not in distress and did not require an ambulance. The nurse then selected 'ok' to clear the message and continued questioning the patient. Upon reaching the end of the question series the nurse selected the 'Triage' button to obtain the CDSS recommendation for triage, which stated in bold red 'Odyssey recommends Emergency Ambulance'. However, rather than following the CDSS recommendation, the nurse closed the CDSS and proceeded to book the patient a same-day GP appointment.

Completing the CDSS according to how the patient reported their symptoms led, in this case, to the nurse ignoring the CDSS recommended action, resonating with findings from Holmstrom's (2007) interviews with nurses working for the Swedish national telephone advice service. Whilst the CDSS is intended as a 'supportive tool' and not intended to override the nurse's clinical expertise, the nurse's actions were tied into a stream of accountability bound by the initial categorisation of 'possible/mild' dizziness and the second categorisation of the presence of postural dizziness. The clear dissonance between the

nurse's categorisation of the patient's presenting symptoms (warranting a face-to-face appointment) and the CDSS categorisation as an emergency, created a 'double-bind' (Bateson, 1962) decision for the nurse. If she called an ambulance she ran the risk of inappropriately using emergency services and if she did not, she ran the risk of the patient's condition worsening and the nurse being held accountable for not following the CDSS recommendation.

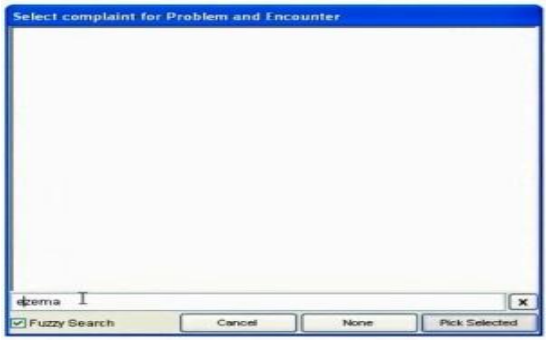
Extract 5: Managing dissonance between patient's presentation and CDSS

Time (mins:secs)	N/P1	Talk	Nurse use of CDSS	Screenshot of CDSS
3:44	N:	°O::kay° (.) is it you said it was radiating up your (.) down your back rather tha::n down your le::g (.) is that ri::ght?		
	P1:	Yes >it's not dow- it's not down< my legs at a:ll no::		
3:51		(.)	Clicks 'Yes' for Postural Dizzy question. Pop-up 'Call emergency ambulance NOW' appears.	
3:54	N:	°That's fine°	Clicks 'ok'	
	P1:	It's >kind of actually< ha:lf wa:y (.) half way >the middle of my< back right around to my left had ↑si::de,		
	N:	And you're passing urine oka::y		
		…		
4:36	N:	And have you took anything for your (.) pai::n		
	P1:	No		
	N:	No		
	P1:	No nothing (1.8)		
4:42			Clicks 'Triage' button for CDSS recommendation	
	P1:	no I was going to take some diclofenic toda::y but then I thought there'd be no point if I was coming to see someone (.)		
4:49		.hhh cos I'm >not (?)< £(?)£	Closes CDSS	
	N:	That's alri::ght lets have a little look where we can put you in then (0.6) I know it's quite sho::rt but ↑could you come in at twenty five ↑past ↑ele↑↑ven?		

Consequences of not using CDSS for nurse questioning and patient response

So far we have examined how the use of the CDSS was consequential for the call trajectory. However, in our dataset there were occasions when the nurse was unable to launch the CDSS at the start of the call. In Extract 6, we can see an occasion of a delayed start when the nurse struggled to find the correct trigger word to activate the CDSS and so commenced the consultation using her own initiative. Following the patient's description of their reason for calling, the nurse quickly established the specific prescription required. During this process the nurse misspelt eczema as the trigger word and therefore 'eczema' was not listed as an option. She then tried 'scabies' and then 'skin.' 'Dry skin' was then offered as an option, which the nurse selected and the CDSS was activated under the pop-up box 'eczema'. We can see the impact this had on the interaction - a prolonged pause at 00:46 and then an explanation offered by the nurse for the delay. While the nurse continued to try and identify the correct trigger word, she managed to progress the call by asking the patient about the nature of her symptoms (00:58). However, the choice of question is interesting because the nurse asked directly about the severity of the inflammation, in contrast to the CDSS-directed questions about the existence of other symptoms and CDSS severity question requiring a score from 0 to 10, or 'none at all' type response. The effect here is that the patient didn't specify extent of inflammation but instead reported colour, scab and dryness. The nurse then followed this with a question about response to treatment which in the CDSS would only follow all the history-taking questions and precede the triage decision. However, we can see that once the CDSS pop-up box for eczema was activated (01:51), the nurse reverted to the CDSS-directed questioning commencing with a question about onset, a repeat of an earlier question.

Extract 6: Nurse questioning without CDSS

Time (mins:secs)	N/P4	Talk	Nurse use of CDSS	Screenshot of CDSS
00:14	N:	That's lovely:: (.) ↑and what can we help you with toda:::y.		
	P4:	↑U:::m (0.4) well I nee:::d (0.4) some more crea:m for my ecze↑ma because I am literally about to run ou::t (.) of ↑i:t and my eczema's flaring up again		
	N:	O:ka::y, (.) and is this regular crea:m that you u:::se is it,	CDSS initiated	
	P4:	Um no it's a new one that I got put on last time I ↑ca:me,		
	N:	Oka::y		
	P4:	It's (.) dipro↑ba:se I think it's called,		
	N:	Diproba::se o[kay]		
	P4:	[Yea]h (.) that one (already got given) a repeat prescriptio::n [(?)]		
	N:	[And it's eczema that you've got] anywa::y		
00:43	P4:	Yeah	'Ezema' typed	
	N:	Y- you do [have] a problem with it		
	P4:	[Yeah] I do have [eczema] yeah		
	N:	[(right)] #o:kay#		
00:46		(6.6)		
	P4:	[Kuh]		
	N:	[Bear] with me a minute I'm just trying to get you up on the screen (the::re,)		
	P4:	O:↑kay (0.6)		
00:58	N:	And wha:t what has it sort of flared up is it looking more infla:med at the mome:nt,		
	P4:	Yea::h and, (0.4) it s als- we:ll it doesn't look infected but it looks a bi::t, (0.4) kind of ↑yellowy, if ↑that makes sense, (2.0) so it's not like red around i::t it's just (1.4) >kind of like< it's about the sca:b if that makes sense		
01:19	N:	°Okay° (0.6) °so°	'Sca' typed	
	P4:	And (makes) it look really dry as we:ll		
	N:	O:ka::y (.) I'm just ↑trying to get you u- on the (.) on the system >at the moment< just bear with [me at] the moment (.)=		
	P4:	[Hm mm]		
	N:	=sorry [(?)]		
	P4:	[Okay]		
		(0.8)		
	N:	And did you find the Diprobase helped anyway		
01:33	P4:	Yea::h it really did I saw a difference within like (.) a da:y (.) literally (.) good, (1.4)	'Skin' typed	

01:43	N:	So it's sort of ↑qui:te (.) um dry::: and (.) scaly it (says) at the mo[ment]	'Dry skin' selected	
	P4:	↑[Yeah]		
01:51	N:	Yea::h oka::y (0.6) and it's an ongoing problem that you've got >so you've< had it [for] quite a [whi:le]	'Eczema' pop-up activated	

Discussion

When nurses use CDSS to conduct telephone triage, they are constrained to reduce the patient's problem to one or more individual symptoms that can be measured and documented within the material structure of the CDSS. Viewed in this way, the CDSS, can be seen as a 'fixed measuring instrument', animated by nurses as a 'living questionnaire', neutral and consistent across (in this case) patients (Boyd & Heritage 2006).

Devoid of context sensitivity by internal design, the arbitration and reconciliation of the interrogative plan of the CDSS with real-time interactional concerns, necessitates what ~~Anonymous~~Pooler (2010) describes as the 'hidden labour' of telephone triage. Our data expose such hidden labour, manifested as disruptions to 'interactional workability' (May et al. 2007). In these encounters, three distinct 'speakers' are revealed managing different dilemmas: the patient, whose dilemma is to present themselves as reasonably seeking a same-day appointment for an emergent (or potential) new health problem without seeming over-sensitive (Halkowski, 2006); the CDSS, driven by a risk-minimisation agenda constraining autonomous patient input by design; and the nurse whose dilemma is to accountably meet the needs of both the patient and CDSS whilst constrained by the range of affordances that the system possesses (Hutchby 2001). Indeed they are held accountable to provide 'adequate' answers on the patient's behalf (i.e. that fit the CDSS agenda). This evidence of interactional dilemmas and disruptions exposes the difficulties faced with the introduction of new health technologies in aligning the proximal (turn-by-turn interactional level) and wider distal context (the oriented-to 'extra-situational' agendas and concerns) (Zimmerman, 1998).

With the CDSS set up to govern categorization and management of the patient on a level of risk before the encounter has even commenced, this can lead to increased interactional

asymmetries. In previous research on face-to-face consultations, it has been well-documented that particularly in the context of comprehensive history-taking, patients are caught up in asymmetries, collaborating with medicalised agendas and healthcare professional-initiated courses of action (Mishler 1984). However, Stivers & Heritage (2001) have demonstrated that patients can and do override those interactional constraints, enabling them to attend to dilemmas such as the one described above or to implement specific projects such as their perspective on the problem, their own agenda of 'lifeworld' or psychosocial concerns, or the management of medico-moral accountability.

Computer-mediated telephone triage is arguably an even more restrictive environment for patient-initiated actions, literally by design. Unlike the default turn-taking system of ordinary conversation where the content of what parties say and what is to be done, is not specified in advance (Sacks, Schegloff & Jefferson, 1974), its pre-allocated questions and fixed lists of possible answers strongly shape the expectation for a 'grammatically resonant' patient response (Fox & Thompson, 2010). However, our data revealed how the nurse-patient interaction may operate on a different trajectory to the technology. CDSS prompts, whilst at times explicitly articulated by nurses, were at other times not animated within the transcript of nurse-patient interactions, resonating with Swinglehurst et al's (2011) linguistic ethnographic research of GP's use of the electronic patient record in face-to-face consultations. Such actions have a potential impact of nurses being held legally accountable beyond the immediate interaction.

Nevertheless, these instances illustrate that the material authority of the CDSS-design on the interaction is not necessarily enacted as the interaction unfolds. Rather, these instances of dissonance between CDSS and nurse reveal the nurse negotiating the different institutional concerns of risk, patient-centred care, and demand for appointments that all need to be orientated to. Returning to Goffman, this complexity creates moments of uncertainty around whether nurses and patients can be considered to be 'authors' of their own talk. This

is potentially problematic given that it is likely that the nurse will be held in the role of 'principal', responsible for accurately documenting the patient's condition within the CDSS; and the patient as 'figure', the protagonist within the triage interaction.

Telephone triage, mediated by CDSS, has been implemented within institutional contexts with established histories of where, how and when nurses typically communicate with patients. How patients and nurses respond to nurse-led triage using CDSS is therefore related to how existing practice is organised before it is systematically introduced, a key finding of the ESTEEM process evaluation (Campbell,~~Anonymous~~ et al, ~~fth~~in press). In addition, CDSS-mediated telephone triage constrains the design of nurses' talk, and nurses have reported being uncomfortable with these constraints (~~Anonymous~~Campbell, et al, in press~~fth~~). Primary care nurse telephone triage, using CDSS, may therefore be viewed as an unfamiliar activity (Pappas & Seale, 2009; 2010) for many patients and nurses to be engaged in, with vague boundaries, rules and communicative expectations.

Our findings provide examples of how this uncertainty has consequences for information-gathering, and go some way towards explaining why other research has found divergence rather than standardisation in triage outcomes (Greatbatch, et al., 2005). This reveals both the potential for inequalities in how patients are managed but also raises questions for the role of CDSS as a 'supportive tool' for nurses to triage patients. Whilst the response of CDSS providers may be that software can be developed to manage the complex range of patient presentations, and that nurses can be trained to deliver a standardised service, this premise rests on the assumption that patients' problems can be efficiently elicited and aligned with the CDSS to produce a summary report that accurately reflects the reality of the patient experience.

However, if we understand triage interactions as performative, involving nurses and patients with diverse histories, skills and experience of triage, then we can see that the CDSS

summary report is a manifestation of a complex interplay of speakers that may or may not be explicitly articulated within the triage interaction. Instead of the reality of a patient's experience being accurately documented within the CDSS, it is how the nurse manages the CDSS as a third party within the interaction to perform the task of completing the CDSS that leads to the CDSS-recommended triage outcome. Seen within this view, developing software and training nurses to accomplish more accurate triage dispositions is far from certain. Instead such initiatives will only refine the nature of the performance nurses and patients are required to undertake to access care.

The overriding concern is that by constraining patient input, albeit in the service of greater good, we might not only lose sight of the patient's lifeworld, but perhaps more significantly the heart of their concerns. This could result in healthcare professionals unwittingly encouraging a reduced understanding of patient concerns or perspectives, increased potential for misalignment between patient and healthcare professional, lack of uptake of advice, poor adherence and reduced help-seeking behaviours.

~~[Anonymous 2005] Details omitted for double-blind reviewing.~~

~~[Anonymous 2010] Details omitted for double-blind reviewing.~~

~~[Anonymous 2014] Details omitted for double-blind reviewing.~~

~~[Anonymous Forthcoming] Details omitted for double-blind reviewing.~~

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Box 2: Transcription conventions (Jefferson…)

(.)	A micropause, hearable but too short to measure.
>he said<	'greater than' and 'lesser than' signs enclose speeded-up talk. Occasionally they are used the other way round for slower talk.
Underlining	indicates emphasis; the extent of underlining within individual words locates emphasis and also indicates how heavy it is.
↑ ↓	Vertical arrows precede marked pitch movement, over and above normal rhythms of speech. They are used for notable changes in pitch beyond those represented by stops, commas and question marks.
she wa::nted	Colons show degrees of elongation of the prior sound; the more colons, the more elongation.
[ ]	Square brackets mark the start and end of overlapping speech. They are aligned to mark the precise position of overlap as in the example below.
°↑I know it,°	'degree' signs enclose hearably quieter speech.
.hhh	Inspiration (in-breaths); proportionally as for colons.
£yes£	Smile voice
#sad#	Talk between markers is croaky

The impact of using computer decision-support software in primary care nurse-led telephone triage: Interactional dilemmas and conversational consequences

Abstract

Telephone triage represents one strategy to manage demand for face-to-face GP appointments in primary care. Although computer decision-support software (CDSS) is increasingly used by nurses to triage patients, little is understood about how interaction is organized in this setting. Specifically any interactional dilemmas this computer-mediated setting invokes; and how these may be consequential for communication with patients. Using conversation analytic methods we undertook a multi-modal analysis of 22 audio-recorded telephone triage nurse-caller interactions from one GP practice in England, including 10 video-recordings of nurses' use of CDSS during triage. We draw on Goffman's theoretical notion of participation frameworks to make sense of these interactions, presenting 'telling cases' of interactional dilemmas nurses faced in meeting patient's needs and accurately documenting the patient's condition within the CDSS. Our findings highlight troubles in the 'interactional workability' of telephone triage exposing difficulties faced in aligning the proximal and wider distal context that structures CDSS-mediated interactions. Patients present with diverse symptoms, understanding of triage consultations, and communication skills which nurses need to negotiate turn-by-turn with CDSS requirements. Nurses therefore need to have sophisticated communication, technological and clinical skills to ensure patients' presenting problems are accurately captured within the CDSS to determine safe triage outcomes. Dilemmas around how nurses manage and record information, and the issues of professional accountability that may ensue, raise questions about the impact of CDSS and its use in supporting nurses to deliver safe and effective patient care.

Keywords

UK; primary care; nurse-patient interactions; telephone triage/consultations; computer decision-support systems; conversation analysis; multi-modal analysis.

Introduction

Telephone triage is a process by which people with a healthcare problem are given advice or directed to another relevant service via telephone (Bunn, Byrne, & Kendall, 2005). This form of service delivery is used internationally, primarily as one strategy to manage the increasing workload on primary (Salisbury, et al., 2007) and emergency care (Bunn, Byrne, & Kendall, 2005). Nurses are increasingly taking on extended roles including first contact care, typically using telephones and computerised decision support software (CDSS) to assess, diagnose and triage patients (Randell, et al., 2007). In UK primary care, nurse-led telephone triage using CDSS represents a substitute for the clinical expertise of General Practitioners (GPs). However, whilst it is well-established that healthcare consultations have an impact on treatment decisions, patient experience and patient outcomes (Little, et al., 2001; Stewart, 1984), there has been little examination of how computer-mediated interaction might impact on patient care. We have already reported elsewhere (Murdoch, et al., 2014) how nurses using CDSS, and GPs not using CDSS, utilise different question designs when conducting telephone triage for same-day primary care appointments. In particular, how the mediating technology could be seen to have interactional consequences for how nurses obtain information from patients. In this article we build on these findings by demonstrating how the interactional dilemmas addressed by nurses, in how they communicate with patients and complete the CDSS, have consequences for the consultation trajectory. To do so, we analysed video-screenshots of nurses' use of CDSS synchronised with audio-recordings of the triage calls to enable a discussion of the value of using CDSS as a tool for supporting telephone triage.

Theorising technology-mediated communication

The implementation of technology to support healthcare providers to conduct clinical consultations has foundations in a positivist philosophy (Coiera, 2003; Kaplan, 1997) that constructs a linear relationship between user, technology and patient, whereby the user accesses knowledge held within the technology and transfers 'facts' in a straightforward process to the patient. Such approaches form the body of health informatics literature promoting rational, goal-oriented models of technology-mediated communication as providing more efficient, safe consultations with up-to-date evidence (Coeira, 2003). Central assumptions underpinning health informatics approaches are the formulation of the technology itself as a container of knowledge; context as independent of how the technology is used; and the user as decision-maker (Greenhalgh, et al., 2009).

However, Greenhalgh et al.'s meta-narrative review of electronic patient record research revealed a diversity of other studies based on social constructionist, critical and recursive philosophies (Greenhalgh, et al., 2009), raising questions for positivist assumptions about the role of technology in patient-provider consultations. This research, including the use of ethnographic or sociolinguistic methodologies, has instead highlighted how technology can be seen as an agent within consultations (Swinglehurst, Roberts, & Greenhalgh, 2011); context as emergent through users interacting with technology (Suchman, 2007); and a view of the user as relational with both the patient and technology (Heath & Luff, 2000). Instead of viewing technology merely as a passive resource for up-to-date evidence, technology-mediated communication might be more usefully conceived as a novel participatory framework (Goffman, 1981), where built-in knowledge may, or may not, be animated by the user as 'information-in-context', contingent on the interplay of patient, user and technology.

Use of computer-decision support software in telephone consultations

The tension between views of technology as resource and technology as agent is reflected in debates about whether CDSS supports decisions made by nurses, or whether it is an 'expert system' in its own right (Thornett, 2001). Systematic reviews have concluded that solutions for reducing medical errors and improving patient care lie in improvements to clinical protocols, technological developments to CDSS (Kawamoto, et al, 2005; Randell et al., 2007), and that clinicians should be monitored to ensure their compliance to CDSS protocols and recommendations (Kawamoto, et al, 2005).

However, research using qualitative methods to study triage consultations in-depth, has raised questions as to whether technology can be sufficiently developed to standardise patient-provider interactions. This evidence, based on studies of urgent care and emergency services, revealed unanticipated actions by healthcare professionals using CDSS. In two studies of a national telephone advice service in Sweden, nurses reported overriding CDSS recommendations (Holmstrom, 2007), whilst Ernaster et al (2012) found that malpractice claims regarding the service commonly involved communication problems, with nurses asking too few questions of patients. Non-clinicians using CDSS to triage calls to the UK's NHS111 urgent care service have been shown to deploy 'pseudo-clinical' expertise to direct and advise patients (Turnbull, et al, 2012). Studies of NHS Direct, an historical UK 24-hour telephone advice system, revealed 'tacit practices and knowledge nurses use and rely upon to interpret the conduct of patient/callers' (Greatbatch et al, 2005; Hanlon et al., 2005; O'Cathain et al., 2004) with nurses seen to regularly deviate from and modify CDSS-prompted questions (Pooler, 2010), potentially leading to a divergence rather than standardisation in treatment outcomes (Greatbatch et al, 2005). Analysis of emergency and out-of-hours services has also shown how call-handlers 'work around' the CDSS (Pope et al., 2013).

This work implies that we can view the institutional requirement for nurses to triage using CDSS, driven by a wider risk-minimisation agenda, as positioning the CDSS as agent within the nurse-patient-CDSS interactional context. However, this notion of agency needs to be seen as operating on a different status to both nurse and patient. The CDSS does not embody intentionality in the same way that nurse and patient do, and is dependent on being activated by the nurse. Like Swinglehurst's et al (2011) study of the electronic patient record within face-to-face consultations, the "agency" of the CDSS is partial, dialogic and unfolding as the interaction proceeds.

Goffman (1974, 1981), in his observations of everyday interactions, set out four different 'production formats' that individuals may engage in when speaking and the differing roles that emerge as a result: the 'animator', the physical source, who can inflect the message with personal style; 'author', the person who selects the words and meanings; 'principal', the person who in a particular capacity holds responsibility for the message; and 'figure', the protagonist represented in a scene described. In the context of CDSS-mediated telephone triage, Goffman's framework has implications for the agency of nurse, patient and CDSS in how we distinguish between the 'animator', 'author' and 'principal.' In contrast to the nurse and patient, the CDSS is silent within the ongoing talk and inaccessible to the patient, and embodies a materiality that 'affords' (Hutchby, 2001) certain types of actions and constrains others. The analytical issue here is therefore how the silent voice of the CDSS is animated, how this is consequential for how triage interactions progress, and whether we can reach a view of patients and nurses as authors of their own talk.

Understanding how nurses coordinate parallel activities of computer-based activity and talk with patients (or their proxys) is therefore vital. This study aimed to achieve such an

understanding, focusing on how nurses deployed and integrated CDSS in the delivery of telephone triage for same-day appointments in primary care.

Methodology

We applied conversation analytic methods to study how the CDSS structured and had consequences for nurse-patient interactions. Conversation analysis (CA) is a well-established inductive method for detailed analysis of high quality recordings of interactions and has been extensively applied in healthcare settings (Barnes, 2005), particularly in general practice where it has been used to analyse every major facet of the face-to-face acute care encounter (Heritage & Maynard, 2006). Previous work on health communication using CA techniques has successfully identified a wide range of communication practices and dilemmas recurrent in medical encounters and that have substantive effects on communication and outcomes (Drew, 2006; Heritage, 2009).

Studies of ordinary telephone conversations have been a central topic of CA, yet it has only recently been applied to telephone consultations in healthcare settings. A common trend is to compare the latter with face-to-face consultations (Hewitt, Gafaranga & McKinstry, 2010). However, the additional use of CDSS negates any straightforward comparison, adding a layer of complexity. As far as we are aware this is the first study to incorporate CDSS video data with audio-recordings of triage calls, enabling a multimodal analysis of the turn-by-turn progression of talk and related activity between nurse, patient and CDSS.

The data presented here are taken from a study comparing communicative practices in nurse and GP-led triage. We report the findings of this work elsewhere (Murdoch, et al. 2014). The study was nested within a large cluster randomised controlled trial (ESTEEM – Campbell, et al, 2014) which aimed to compare the effects on primary care workload and

cost, patient experience of care, safety and health status of computer-supported nurse-led telephone triage; GP-led telephone triage; and usual care. ESTEEM recruited 21,000 patients requesting same-day appointments in 42 General Practices across four different centres in England. The project was conducted in two GP practices participating in ESTEEM, located in Warwickshire and Devon. Ethical approval was provided by the South-West Research Ethics Committee.

Two intervention practices not already implementing a triage system and randomized to provide nurse-led telephone triage were approached to take part and one successfully recruited. Four nurses participated. Data were not collected until the practice was in its final week (average 8 weeks post training in CDSS) of data collection for ESTEEM. Patients (or their proxy) telephoning their practice requesting a same-day, face-to-face GP appointment were eligible for participation. The exclusion criteria included:

- Patients who were (1) too ill to participate; (2) unable to speak English; (3) temporary residents.
- Patients aged 12–15.9 years.
- Children under 12 years unless a proxy phoned on their behalf.

Data collection and consent procedure

Over a two-day period in June 2012 all triage calls were audio-recorded using an approved independent organisation (Way with Words). In addition, screen recording software recorded the nurse's view and CDSS entries in the form of a video-streamed file. Written consent was sought for transcribing and analysis of their recorded consultation, and accompanying visual data capturing nurses' use of the CDSS. Over the two-day period 47 audio-recordings of nurse triage calls and 35 video-recordings of nurses' use of Odyssey

CDSS during triage were made. Patients' written consent was given to analyse 22 recorded calls including 10 video-recordings.

Analytic procedure

Paired audio and video data were synchronized for analysis. All audio data were transcribed according to standard Jeffersonian transcription conventions (Jefferson 2004; see Appendix for a key), capturing fidelity of production of talk, and the extent to which nurses' use of CDSS was co-ordinated with the turn-by-turn accomplishment of triage activities. During transcription, all identifying features were removed or replaced with pseudonyms. In the screenshot data any visible identifying personal information was subject to blurring techniques to protect patient confidentiality.

RB, JP and JM each independently listened to all call recordings to correct transcription inaccuracies. Following identification of the gross structure of the calls (see Box 1), JM and RB systematically coded all question-response sequences across the entire dataset with moderate to high levels of coder agreement across all categories. This statistic is reported elsewhere (Murdoch, 2014). JM, RB and JP then closely examined prototypical cases identified in the coding of question–response sequences which demonstrated recurrent patterns of interaction across the consultations and highlighted examples where some kind of interactional trouble occurred.

Here we report our findings on how the institutional requirement to manage patients, using CDSS, structured the calls and provide illustrative examples of how this structure was consequential for how interactions proceeded and information obtained from patients. Our examples provide 'telling cases' (Mitchell, 1984), where some form of 'disruption' or interactional trouble occurs, exposing difficulties faced in aligning the proximal and wider

distal context that structures CDSS-mediated interactions and its consequences for the call trajectory. Gumperz famously demonstrated the value of this approach in his studies of 'mis-communications' (1979; 1999). His theoretical arguments did not rest on how typical the cases were but how such micro-analysis of instances of talk reveal institutionalized networks of relationships and the impact of wider social forces that would otherwise go unnoticed when interactions proceed routinely. Whilst we did identify many instances of "disruptions" necessitating that nurses manage interactional dilemmas, we are not arguing that nurses routinely ran into these difficulties, nor indeed do so in everyday general practice. Instead the disruptions in our data enabled us to "track force relations at a molecular level" (Rampton, 2014).

Box 1: Gross structure of the triage calls

Opening: identification / greetings sequence

Problem solicit: e.g. 'How can I help you?'

Patient request / problem presentation: 'I'd like to see someone' / 'I've got cystitis'

Interrogative series: nurse/CDSS-initiated question-response sequences

Resolution: recommendation e.g. same-day appointment or self-care

Closing: arrangement making / goodbye

Findings

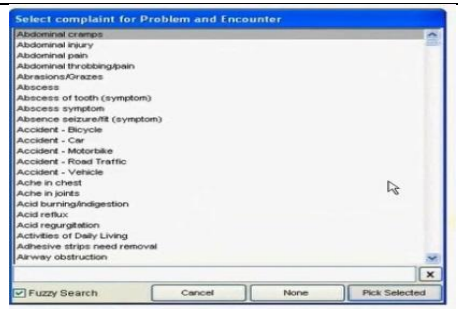
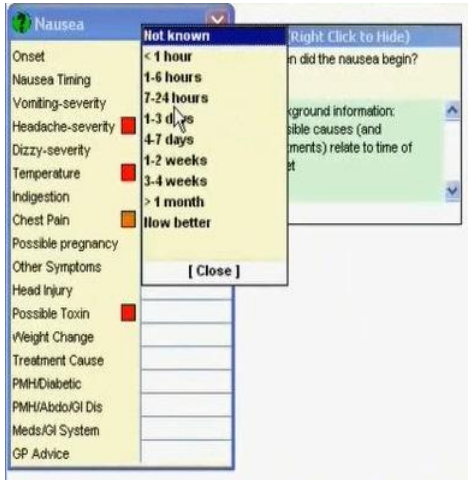
CDSS-nurse structuring of patient's problem presentation

When patients present their problems in primary care they may report a range of complex symptoms (Salisbury et al. 2013). The nurse needed to listen for these symptoms and select one (via a key descriptor) to launch the CDSS. This initial input activated a pop-up box on the computer screen with a series of symptom-related questions, marking the beginning of the

interrogative series. The nurse was able to select which questions to ask first but it was important the nurse asked those with a red or orange flag positioned adjacent to the question. Red-flagged questions had a default setting at the highest urgency level and therefore if left unanswered the CDSS would recommend an emergency response by default. Alongside this pop-up box sat a second drop-down box containing a fully-formed question and background information to be considered by the nurse, which became obscured by another drop-down box containing patients' possible response options. During the nurse's completion of questions a further pop-up box for related symptoms may have been triggered by the nurse's typed responses or, upon completing the set of questions under the first symptom, the nurse may have chosen to add an additional symptom, also triggering a further pop-up box.

In Extract 1 we can see the consequences of this requirement. The patient described two symptoms ('dizzy and sick') ruling out pregnancy as the cause. The patient then introduced backache as an additional symptom. However at this point the nurse was already in the process of typing 'nausea' as the trigger symptom in the CDSS (00:40), which activated a question series about the onset, frequency and severity of nausea symptoms. The patient then offered 'water infection' as a candidate diagnosis and further described the difficulties she was having because of the back pain. However, rather than following up the patient's proposed diagnosis or back pain as the central symptom, the nurse orientated to the pop-up box headed 'Nausea' already activated within the CDSS and began the required question series, commencing with a question about the onset of symptoms.

Extract 1: CDSS structuring patient's problem presentation

Time (Mins:Secs)	Nurse (N)/Patient (P1)	Talk	Nurse use of CDSS	Screenshot of CDSS
00:19	P1:	↑U::m it's just basically that I (.) u::m (.) I've been feeling unwell um		
00:25		(.) fo:r a couple of weeks really dizzy and sick most mornings (.)but um (.) I am trying for a (0.4) u:m >baby but I've< done >a pregnancy test< and I'm not pregna:nt		
	N:	.hh [okay]		
00:32	P1:	[U::m] (.) >but I've definitely been feeling< very very queasy (.) um and then this weeke::::nd, (.) >I don't know if it's< linked at a:ll or not		
00:40		but I >on Saturday woke up< with a (.) incredible back a::che u::m and then vest- on Sunday I couldn't actually get out of bed .hh u::m and I'm still in agony with it no::w and I'm not sure >if it's actually a< (.) a ↑water infection >or something but it's< all down my back is u::m (.) >even to< ↑sta::nd to sit anything is very uncomfortable the only thing the only way I can stop the pain is to lie in the ba:th £constantly huh£ .hh	'Nausea' typed and selected from symptom list Nausea pop-up box activated with onset question and answer prompt	
00:58	**N:**	Okay but the ↑nau:sea sort of started first a few days ago:::		

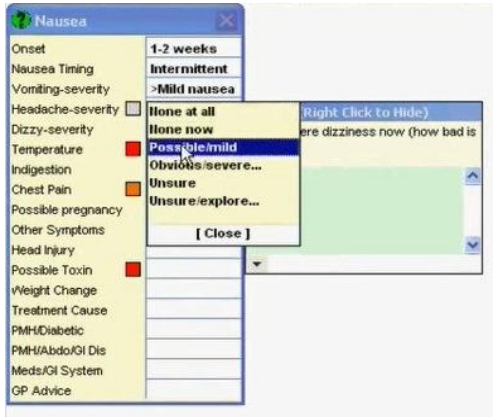
The CDSS therefore imposed constraints in terms of the topical agenda, number and order in which questions were asked, designed to elicit a response from patients that was amenable for entry into the CDSS. We have already demonstrated the consequences of these interactional constraints in that nurses tend to issue questions that request confirmation of the absence rather than presence of symptoms (Murdoch, et al., 2014). However, once presence of symptoms had been established, the nurse had to ascertain severity or frequency of the reported symptoms.

Making sense of and managing patients' reported symptoms within CDSS

In Extract 2 we see a continuation of the same consultation with P1 provided in Extract 1. In response to the patient's information about not being sick since last week, the nurse entered 'intermittent' from a range of options into the response box for 'nausea timing'. On completion of the patient's reiteration of feeling 'really dizzy' every time she woke up, the nurse entered 'mild nausea' into the response box for 'vomiting severity'. The patient then proceeded to tell the nurse that she had been 'feeling quite dizzy'. However although the CDSS does permit completion of questions out of the order they appear on the screen, the nurse did not pursue this line of enquiry in a context-sensitive sense because this question did not arise until after the next question presented by the CDSS which related to headache. Pursuing dizziness risked the nurse failing to hold this information until it was timely to enter onto the system. So at 01:17 we can observe the nurse enquiring about headaches and the patient responding, on completion of which the nurse returned to dizziness.

However, the nurse did not ask the question as set out by the CDSS enquiring about the presence of dizziness. Instead her question was designed to refer back to the patient's prior talk by prefacing the question with 'and the' dizzine::ss. This avoided the need to ask the patient about the presence or absence of dizziness as this was already known from prior

talk. The nurse's 'recipient-designed' (Boyd & Heritage 2006) question instead appealed directly to the severity: 'quite bad' and 'topple over' or 'just a little bit' of dizziness in such a way as to fit with the list of CDSS options. Notable here is that the nurse had already been provided with information about severity 'really dizzy and sick most mornings' (Extract 1, 00:25), 'really dizzy every ti:me I wake up' (Extract 2, 01:13) and 'most of the da::y feeling quite dizzy' (Extract 2, 01:16) yet still asked the question. Nevertheless, the nurse's question could be interpreted as being sensitive to the ongoing circumstances of the call as the patient appeared to downgrade the severity of dizziness from 'really dizzy' to 'feeling quite dizzy'. The nurse appeared to design her alternative question to take account of these assessments: asking first if the dizziness was 'quite bad' reflecting in part the CDSS question prompt, or 'just a little bit of dizziness', offering the patient the opportunity to select the most appropriate answer. Finally she specified the severity of dizziness in terms of whether it caused the patient to 'topple over' and the caller's response prompted the nurse to insert 'possible/mild' into the CDSS.

Time (mins:secs)	N/P1	Talk	Nurse use of CDSS	Screenshot of CDSS
00:59	N:	Okay so the ↑nau:sea sort of started first a few days ago:::		
01:03	P1:	Yea::h prob- probably about two:: weeks ago I was sick last week sort of u::m mid morning (.) u:::m (.)	Inserts '1-2 weeks' for 'Onset'	
01:09		I haven't been sick since	Inserts 'Intermittent' for 'Nausea Timing'	
01:13		but I've been feeling (.) really dizzy every ti:me I wake up		
	N:	O[kay]	Inserts 'Mild Nausea' for 'Vomiting-severity'	
01:16	P1:	[U:m] and (.) really for most of the da::y feeling quite dizzy,		
01:17	N:	Any headaches at a:::ll		
	P1:	.hhhh no	Inserts 'None at all' for 'Headache-severity'	
	N:	No (.) okay (0.4) an- and the dizzine::ss is it (0.4) how is it is it quite ↑bad o::r would you say it's just a little bit of dizzine::ss,		
	P1:	E::r (>↑thing is it's)		
01:30	N:	(?) topple ove::r,		
	P1:	Yea::h >I don't feel like< I'm going to topple over I just feel like, (.) >you know< just dizzy > like when I< look arou:nd (I ju-) it feels like >everything just takes< a whi:le to refocus again	Inserts possible/mild for 'Dizzy-severity'	
	N:	O[kay]		
	P1:	[U:m] you know just feel like I'd, like to sit do:wn >you know< but it's not too bad >that I< (.) feel like I'm going to fall over		

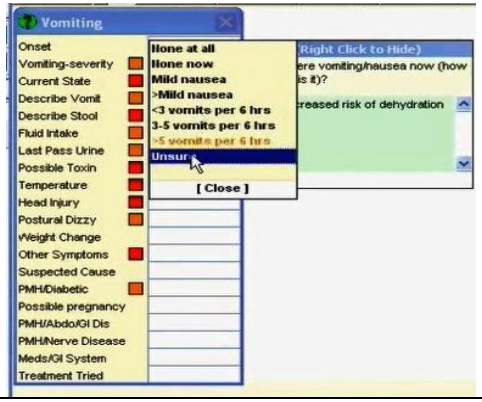
Extract 2: Making sense of patient's symptoms within CDSS

Making sense of patient's symptoms, responding appropriately to patients, and recording patient's responses accurately within the CDSS, therefore required nurses to coordinate parallel activities involving clinical, interactional and technical competence. This task was made even harder where the CDSS response options to questions did not easily match the patient's report of their symptoms. In the next two extracts we can firstly see examples where the nature of the patient's symptoms did not enable the nurse to provide a numerical answer; and secondly where the patient did not appear to understand the linguistic form of the question presented by the nurse and again was unable to provide the 'required' response.

Patient's embodied experience misaligned with CDSS requirements

In Extract 3 the nurse asked a different patient (P2) (as prompted by the CDSS) how often she had been sick, requiring a frequency-type response to be entered into the CDSS. However, the patient was unable to conform to the prescribed action agenda (she was sick every time she eats) which created difficulty for the nurse in selecting a possible answer. This difficulty was demonstrated in the video-recording with how the nurse uses the mouse, moving between the various response options. The nurse then re-issued the question as prompted by the CDSS but realized the difficulty she now had in completing the CDSS. Once again her movements with the mouse suggest her struggling to find an appropriate response and as a consequence the nurse selected 'unsure'. The patient experience was therefore not able to be accurately documented which had potential consequences for how the CDSS determined the triage outcome.

Extract 3: Patient's embodied experience misaligned with CDSS response options

Time (mins:secs)	N/P2	Talk	Nurse use of CDSS	Screenshot of CDSS
00:34			Vomiting question and response options activated by CDSS.	
00:45	N:	Okay (.) >↑and are you< sick ↑how often are you sick		
	P2:	E:r every time I ea:t,		
	N:	It's every time you ea::t	Begins search for appropriate response, moving mouse up and down between response options	
00:52	P2:	Yeah the only (piece) of food I've been able to, (.) actually hold down and not throw back up is a piece of toast (.) and that was, (0.6) e::r, (.) Sunday evening,	Stops searching for correct response	
	N:	O::h you poor thing		
	P2:	°Yeah° huh .hh		
	N:	So (.) in six hou::rs how many times would you be sick now <but >it is only< when you ea- is it only when you eat		
01:07	P2:	Yea::h and [I have]n't eaten anything since [that] (0.4) bit=	Continues search, moving mouse up and down between response options	
	N:	[(?)] [(?)]		
01:11	P2:	=of toast (0.6) well I've trie:d but, (.) yesterday morning,	Selects 'Unsure'	

Patient's linguistic skills misaligned with CDSS requirements

In Extract 4 we see the nurse animating a CDSS-prompted question aimed at determining the severity of the patient's pain. A numerical response was required, this time even more tightly defined on a scale of zero to ten. However, the patient was unable to provide the required response and the elongated vowel on 'my pai:::n?' and questioning intonation suggests the patient was unfamiliar with the medical concept of 'pain score'. Unfortunately the nurse appeared not to pick up on this as a problem of understanding the terms of the question and instead specified that she was asking about the patient's current pain. The patient was still not able to provide a numerical answer which the nurse appeared then to accept 'O:::kay'. While we were not able to obtain the video recording of the nurse's use of CDSS in this call, we can see that, as with Extract 3, the nurse was not able to record the required numerical response within the CDSS, thereby not capturing the patient's embodied experience of their pain.

Extract 4 [01:37]

N:	So the ↑pain at the moment is nought is no pain ten is the worst ever where would you say your pain score would be (.)
P3:	My pai::::n?
N:	At the moment
P3:	Well it's still the:::re but I (.) I I've taken some paracetamol,
N:	O:::kay
P3:	So it's slightly better of course

Emergence and management of nurse accountability within CDSS

Extracts 1 to 4 demonstrated the consequences of 'the technological shaping of social action' (Hutchby, 2001 p. 453) by the CDSS, but also the nurse's skills in accurately assessing the specific nature of a patient's condition. The patient's report, the nurse's own talk, and the nurse's animation of CDSS-authored question prompts, represented three distinct speakers populating the participation framework of the consultation as it progressed towards a triage decision that was both appropriate and which was accurately documented

within the CDSS. However, if we revisit the consultation with P1 (shown in Extracts 1 and 2), the nurse's selection of 'possible/mild dizziness' under the symptom heading 'nausea' later on created a dilemma for the nurse when a similar question needed to be asked, but this time under the heading of the additional symptom 'back pain.' In Extract 5, the nurse had added 'back pain' as an additional symptom leading to the additional pop-up box and question series for back pain. In the example presented, the nurse had asked the patient whether there was any radiation of pain down the legs, again referring back to the patient's previous report. The nurse then decided to complete the subsequent question on the presence or absence of postural dizziness, clicking 'yes'. This was a logical choice given the previous report of her dizziness (Extract 1, 00:25; Extract 2, 1:13-1:16). However, as a consequence another pop-up box appeared recommending that the nurse 'Call emergency ambulance NOW'. However, it is clear from the ongoing talk that the patient was not in distress and did not require an ambulance. The nurse then selected 'ok' to clear the message and continued questioning the patient. Upon reaching the end of the question series the nurse selected the 'Triage' button to obtain the CDSS recommendation for triage, which stated in bold red 'Odyssey recommends Emergency Ambulance'. However, rather than following the CDSS recommendation, the nurse closed the CDSS and proceeded to book the patient a same-day GP appointment.

Completing the CDSS according to how the patient reported their symptoms led, in this case, to the nurse ignoring the CDSS recommended action, resonating with findings from Holmstrom's (2007) interviews with nurses working for the Swedish national telephone advice service. Whilst the CDSS is intended as a 'supportive tool' and not intended to override the nurse's clinical expertise, the nurse's actions were tied into a stream of accountability bound by the initial categorisation of 'possible/mild' dizziness and the second categorisation of the presence of postural dizziness. The clear dissonance between the

nurse's categorisation of the patient's presenting symptoms (warranting a face-to-face appointment) and the CDSS categorisation as an emergency, created a 'double-bind' (Bateson, 1962) decision for the nurse. If she called an ambulance she ran the risk of inappropriately using emergency services and if she did not, she ran the risk of the patient's condition worsening and the nurse being held accountable for not following the CDSS recommendation.

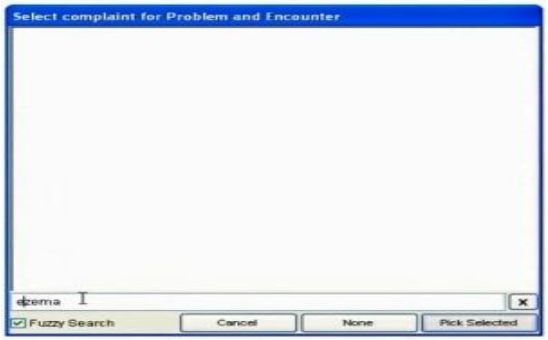
Extract 5: Managing dissonance between patient's presentation and CDSS

Time (mins:secs)	N/P1	Talk	Nurse use of CDSS	Screenshot of CDSS
3:44	N:	°O::kay° (.) is it you said it was radiating up your (.) down your back rather tha::n down your le::g (.) is that ri::ght?		
	P1:	Yes >it's not dow- it's not down< my legs at a:ll no::		
3:51		(.)	Clicks 'Yes' for Postural Dizzy question. Pop-up 'Call emergency ambulance NOW' appears.	
3:54	N:	°That's fine°	Clicks 'ok'	
	P1:	It's >kind of actually< ha:lf wa:y (.) half way >the middle of my< back right around to my left had ↑si::de,		
	N:	And you're passing urine oka::y		
		…		
4:36	N:	And have you took anything for your (.) pai::n		
	P1:	No		
	N:	No		
	P1:	No nothing (1.8)		
4:42			Clicks 'Triage' button for CDSS recommendation	
	P1:	no I was going to take some diclofenic toda::y but then I thought there'd be no point if I was coming to see someone (.)		
4:49		.hhh cos I'm >not (?)< £(?)£	Closes CDSS	
	N:	That's alri::ght lets have a little look where we can put you in then (0.6) I know it's quite sho::rt but ↑could you come in at twenty five ↑past ↑ele↑↑ven?		

Consequences of not using CDSS for nurse questioning and patient response

So far we have examined how the use of the CDSS was consequential for the call trajectory. However, in our dataset there were occasions when the nurse was unable to launch the CDSS at the start of the call. In Extract 6, we can see an occasion of a delayed start when the nurse struggled to find the correct trigger word to activate the CDSS and so commenced the consultation using her own initiative. Following the patient's description of their reason for calling, the nurse quickly established the specific prescription required. During this process the nurse misspelt eczema as the trigger word and therefore 'eczema' was not listed as an option. She then tried 'scabies' and then 'skin.' 'Dry skin' was then offered as an option, which the nurse selected and the CDSS was activated under the pop-up box 'eczema'. We can see the impact this had on the interaction - a prolonged pause at 00:46 and then an explanation offered by the nurse for the delay. While the nurse continued to try and identify the correct trigger word, she managed to progress the call by asking the patient about the nature of her symptoms (00:58). However, the choice of question is interesting because the nurse asked directly about the severity of the inflammation, in contrast to the CDSS-directed questions about the existence of other symptoms and CDSS severity question requiring a score from 0 to 10, or 'none at all' type response. The effect here is that the patient didn't specify extent of inflammation but instead reported colour, scab and dryness. The nurse then followed this with a question about response to treatment which in the CDSS would only follow all the history-taking questions and precede the triage decision. However, we can see that once the CDSS pop-up box for eczema was activated (01:51), the nurse reverted to the CDSS-directed questioning commencing with a question about onset, a repeat of an earlier question.

Extract 6: Nurse questioning without CDSS

Time (mins:secs)	N/P4	Talk	Nurse use of CDSS	Screenshot of CDSS
00:14	N:	That's lovely:: (.) ↑and what can we help you with toda:::y.		
	P4:	↑U:::m (0.4) well I nee:::d (0.4) some more crea:m for my ecze↑ma because I am literally about to run ou::t (.) of ↑i:t and my eczema's flaring up again		
	N:	O:ka::y, (.) and is this regular crea:m that you u:::se is it,	CDSS initiated	
	P4:	Um no it's a new one that I got put on last time I ↑ca:me,		
	N:	Oka::y		
	P4:	It's (.) dipro↑ba:se I think it's called,		
	N:	Diproba::se o[kay]		
	P4:	[Yea]h (.) that one (already got given) a repeat prescriptio::n [(?)]		
	N:	[And it's eczema that you've got] anywa::y		
00:43	P4:	Yeah	'Ezema' typed	
	N:	Y- you do [have] a problem with it		
	P4:	[Yeah] I do have [eczema] yeah		
	N:	[(right)] #o:kay#		
00:46		(6.6)		
	P4:	[Kuh]		
	N:	[Bear] with me a minute I'm just trying to get you up on the screen (the::re,)		
	P4:	O:↑kay (0.6)		
00:58	N:	And wha:t what has it sort of flared up is it looking more infla:med at the mome:nt,		
	P4:	Yea::h and, (0.4) it s als- we:ll it doesn't look infected but it looks a bi::t, (0.4) kind of ↑yellowy, if ↑that makes sense, (2.0) so it's not like red around i::t it's just (1.4) >kind of like< it's about the sca:b if that makes sense		
01:19	N:	°Okay° (0.6) °so°	'Sca' typed	
	P4:	And (makes) it look really dry as we:ll		
	N:	O:ka::y (.) I'm just ↑trying to get you u- on the (.) on the system >at the moment< just bear with [me at] the moment (.)=		
	P4:	[Hm mm]		
	N:	=sorry [(?)]		
	P4:	[Okay]		
		(0.8)		
	N:	And did you find the Diprobase helped anyway		
01:33	P4:	Yea::h it really did I saw a difference within like (.) a da:y (.) literally (.) good, (1.4)	'Skin' typed	

01:43	N:	So it's sort of ↑qui:te (.) um dry::: and (.) scaly it (says) at the mo[ment]	'Dry skin' selected	
	P4:	↑[Yeah]		
01:51	N:	Yea::h oka::y (0.6) and it's an ongoing problem that you've got >so you've< had it [for] quite a [whi:le]	'Eczema' pop-up activated	

Discussion

When nurses use CDSS to conduct telephone triage, they are constrained to reduce the patient's problem to one or more individual symptoms that can be measured and documented within the material structure of the CDSS. Viewed in this way, the CDSS, can be seen as a 'fixed measuring instrument', animated by nurses as a 'living questionnaire', neutral and consistent across (in this case) patients (Boyd & Heritage 2006).

Devoid of context sensitivity by internal design, the arbitration and reconciliation of the interrogative plan of the CDSS with real-time interactional concerns, necessitates what Pooler (2010) describes as the 'hidden labour' of telephone triage. Our data expose such hidden labour, manifested as disruptions to 'interactional workability' (May et al. 2007). In these encounters, three distinct 'speakers' are revealed managing different dilemmas: the patient, whose dilemma is to present themselves as reasonably seeking a same-day appointment for an emergent (or potential) new health problem without seeming over-sensitive (Halkowski, 2006); the CDSS, driven by a risk-minimisation agenda constraining autonomous patient input by design; and the nurse whose dilemma is to accountably meet the needs of both the patient and CDSS whilst constrained by the range of affordances that the system possesses (Hutchby 2001). Indeed they are held accountable to provide 'adequate' answers on the patient's behalf (i.e. that fit the CDSS agenda). This evidence of interactional dilemmas and disruptions exposes the difficulties faced with the introduction of new health technologies in aligning the proximal (turn-by-turn interactional level) and wider distal context (the oriented-to 'extra-situational' agendas and concerns) (Zimmerman, 1998).

With the CDSS set up to govern categorization and management of the patient on a level of risk before the encounter has even commenced, this can lead to increased interactional

asymmetries. In previous research on face-to-face consultations, it has been well-documented that particularly in the context of comprehensive history-taking, patients are caught up in asymmetries, collaborating with medicalised agendas and healthcare professional-initiated courses of action (Mishler 1984). However, Stivers & Heritage (2001) have demonstrated that patients can and do override those interactional constraints, enabling them to attend to dilemmas such as the one described above or to implement specific projects such as their perspective on the problem, their own agenda of 'lifeworld' or psychosocial concerns, or the management of medico-moral accountability.

Computer-mediated telephone triage is arguably an even more restrictive environment for patient-initiated actions, literally by design. Unlike the default turn-taking system of ordinary conversation where the content of what parties say and what is to be done, is not specified in advance (Sacks, Schegloff & Jefferson, 1974), its pre-allocated questions and fixed lists of possible answers strongly shape the expectation for a 'grammatically resonant' patient response (Fox & Thompson, 2010). However, our data revealed how the nurse-patient interaction may operate on a different trajectory to the technology. CDSS prompts, whilst at times explicitly articulated by nurses, were at other times not animated within the transcript of nurse-patient interactions, resonating with Swinglehurst et al's (2011) linguistic ethnographic research of GP's use of the electronic patient record in face-to-face consultations. Such actions have a potential impact of nurses being held legally accountable beyond the immediate interaction.

Nevertheless, these instances illustrate that the material authority of the CDSS-design on the interaction is not necessarily enacted as the interaction unfolds. Rather, these instances of dissonance between CDSS and nurse reveal the nurse negotiating the different institutional concerns of risk, patient-centred care, and demand for appointments that all need to be orientated to. Returning to Goffman, this complexity creates moments of uncertainty around whether nurses and patients can be considered to be 'authors' of their own talk. This

is potentially problematic given that it is likely that the nurse will be held in the role of 'principal', responsible for accurately documenting the patient's condition within the CDSS; and the patient as 'figure', the protagonist within the triage interaction.

Telephone triage, mediated by CDSS, has been implemented within institutional contexts with established histories of where, how and when nurses typically communicate with patients. How patients and nurses respond to nurse-led triage using CDSS is therefore related to how existing practice is organised before it is systematically introduced, a key finding of the ESTEEM process evaluation (Campbell, et al, in press). In addition, CDSS-mediated telephone triage constrains the design of nurses' talk, and nurses have reported being uncomfortable with these constraints (Campbell, et al, in press). Primary care nurse telephone triage, using CDSS, may therefore be viewed as an unfamiliar activity (Pappas & Seale, 2009; 2010) for many patients and nurses to be engaged in, with vague boundaries, rules and communicative expectations.

Our findings provide examples of how this uncertainty has consequences for information-gathering, and go some way towards explaining why other research has found divergence rather than standardisation in triage outcomes (Greatbatch, et al., 2005). This reveals both the potential for inequalities in how patients are managed but also raises questions for the role of CDSS as a 'supportive tool' for nurses to triage patients. Whilst the response of CDSS providers may be that software can be developed to manage the complex range of patient presentations, and that nurses can be trained to deliver a standardised service, this premise rests on the assumption that patients' problems can be efficiently elicited and aligned with the CDSS to produce a summary report that accurately reflects the reality of the patient experience.

However, if we understand triage interactions as performative, involving nurses and patients with diverse histories, skills and experience of triage, then we can see that the CDSS

summary report is a manifestation of a complex interplay of speakers that may or may not be explicitly articulated within the triage interaction. Instead of the reality of a patient's experience being accurately documented within the CDSS, it is how the nurse manages the CDSS as a third party within the interaction to perform the task of completing the CDSS that leads to the CDSS-recommended triage outcome. Seen within this view, developing software and training nurses to accomplish more accurate triage dispositions is far from certain. Instead such initiatives will only refine the nature of the performance nurses and patients are required to undertake to access care.

The overriding concern is that by constraining patient input, albeit in the service of greater good, we might not only lose sight of the patient's lifeworld, but perhaps more significantly the heart of their concerns. This could result in healthcare professionals unwittingly encouraging a reduced understanding of patient concerns or perspectives, increased potential for misalignment between patient and healthcare professional, lack of uptake of advice, poor adherence and reduced help-seeking behaviours.

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Box 2: Transcription conventions (Jefferson…)

(.)	A micropause, hearable but too short to measure.
>he said<	'greater than' and 'lesser than' signs enclose speeded-up talk. Occasionally they are used the other way round for slower talk.
Underlining	indicates emphasis; the extent of underlining within individual words locates emphasis and also indicates how heavy it is.
↑ ↓	Vertical arrows precede marked pitch movement, over and above normal rhythms of speech. They are used for notable changes in pitch beyond those represented by stops, commas and question marks.
she wa::nted	Colons show degrees of elongation of the prior sound; the more colons, the more elongation.
[ ]	Square brackets mark the start and end of overlapping speech. They are aligned to mark the precise position of overlap as in the example below.
°↑I know it,°	'degree' signs enclose hearably quieter speech.
.hhh	Inspiration (in-breaths); proportionally as for colons.
£yes£	Smile voice
#sad#	Talk between markers is croaky

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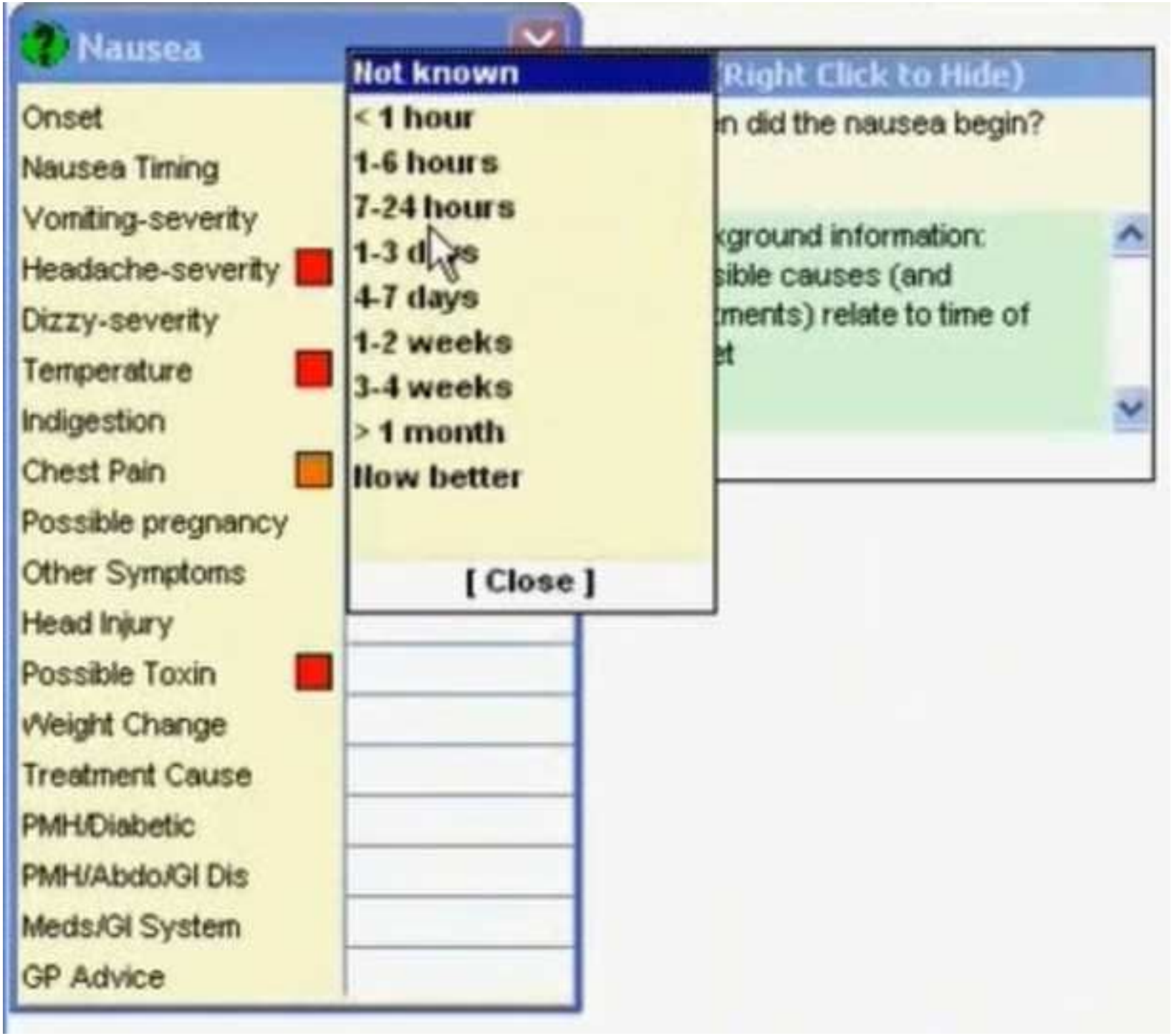

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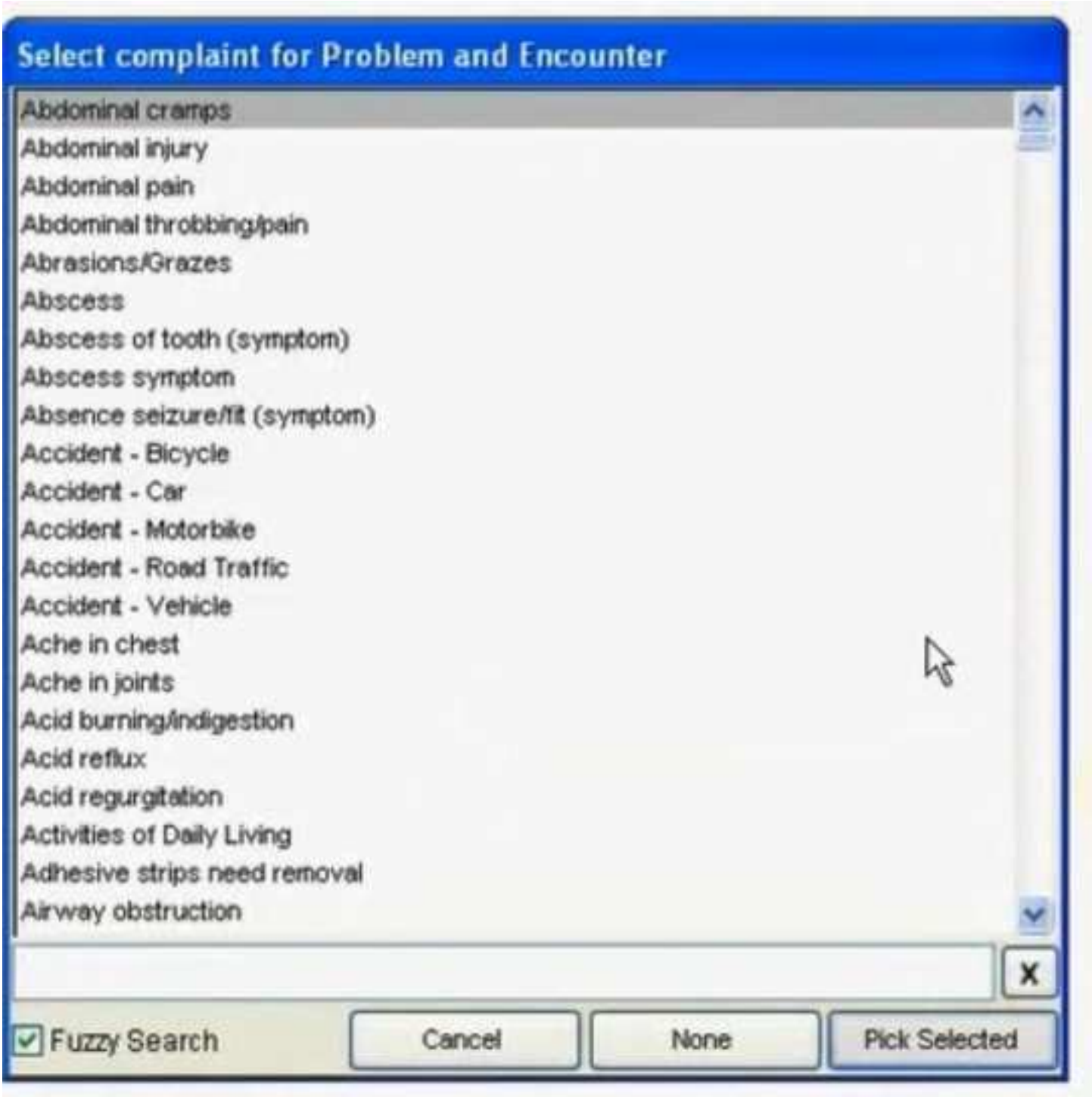

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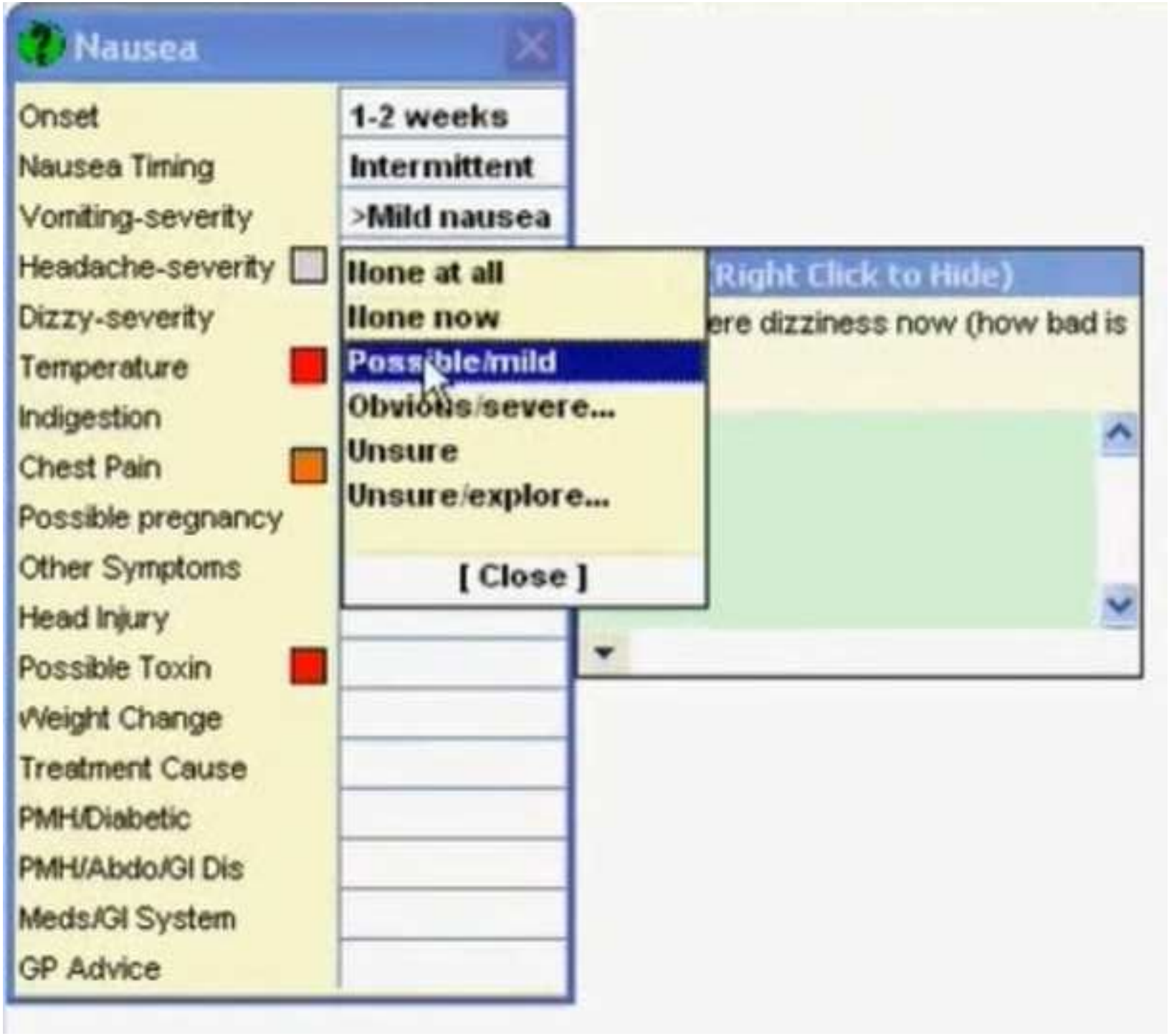

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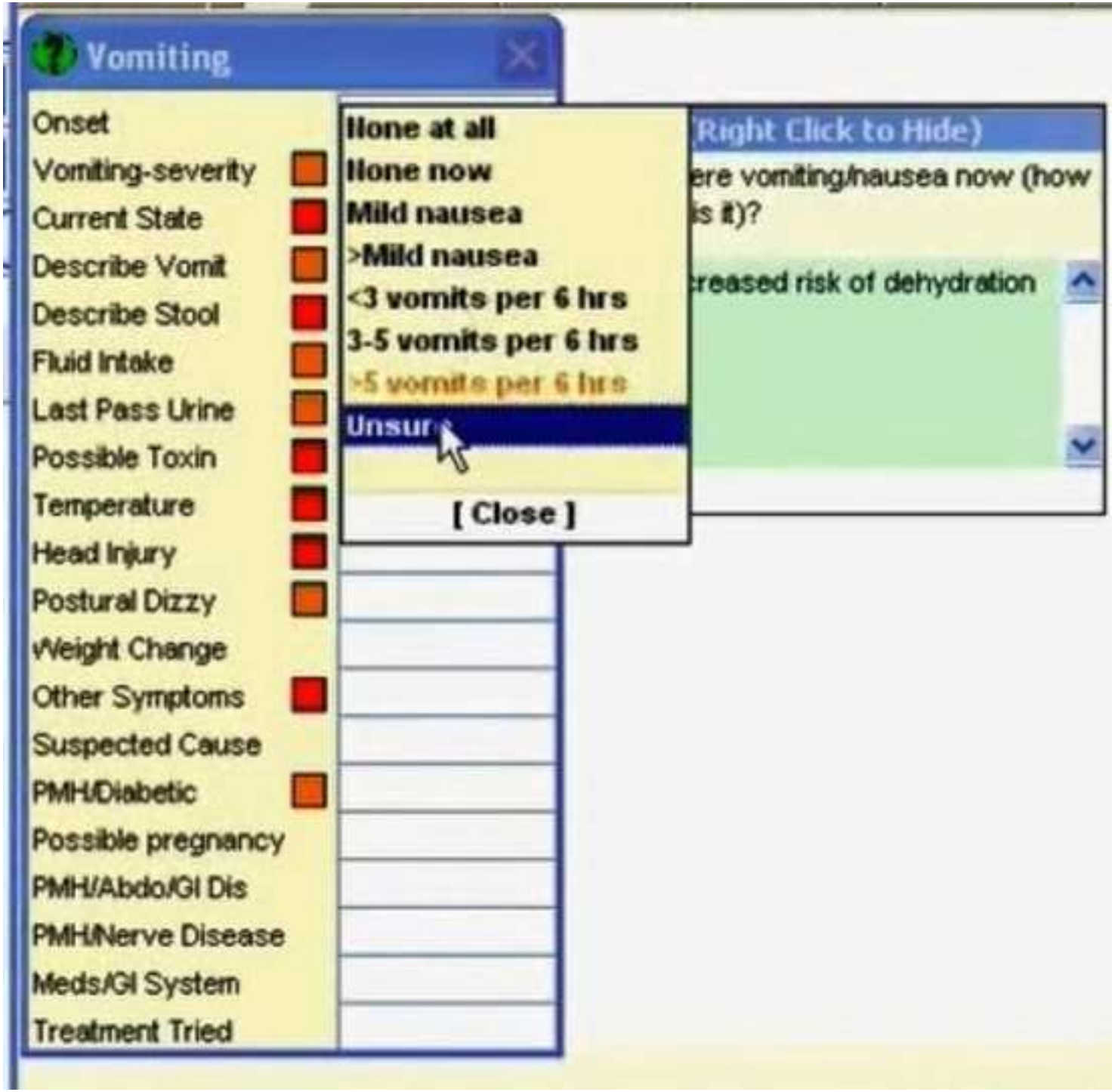

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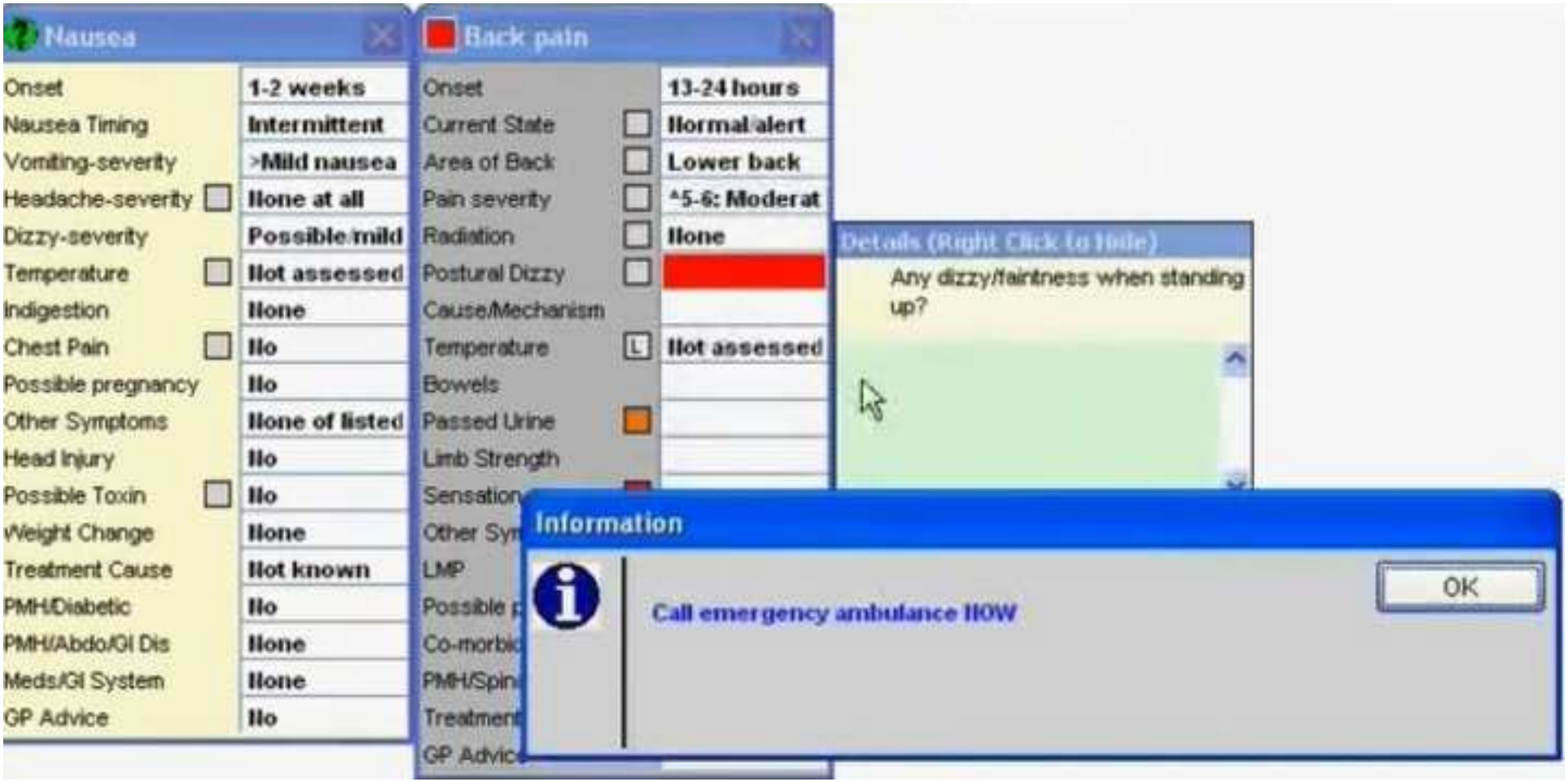

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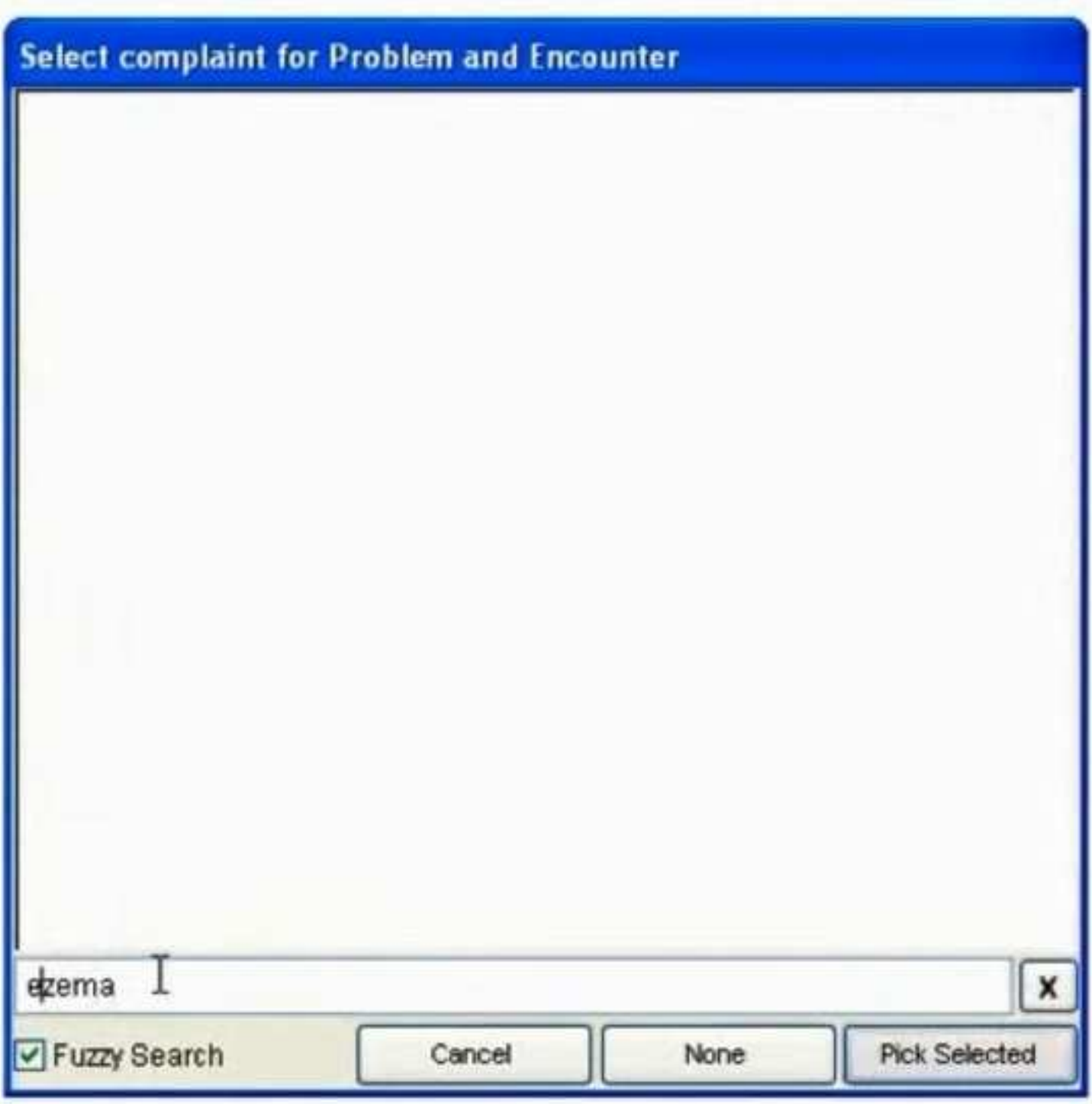

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Ethical Approval

The study was approved by the South West Research Ethics Committee, reference number: 09/H0202/53. All healthcare professionals and patients provided written consent before taking part.