A Pragmatics' View of Patient Identification

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ABSTRACT

Background: Patient identification is a central safety critical aspect of healthcare work. Most healthcare activities require identification of patients by healthcare staff, often in connection with the use of patient records. Indeed the increasing reliance on electronic systems makes the correct matching of patients with their records a keystone for patient safety. Most research on patient identification has been carried out in hospital settings. Our aim was to investigate the process of identification of patients and their records in the context of a primary healthcare clinic.

Method: A qualitative field study was carried out at a Walk-In Centre in London (UK).

Results: The identification of patients and their records was found to be a context dependent process, both when formalised in procedures and when relying on informal practices. We discovered a range of formal and informal patient identifiers were used in this setting, depending on the task at hand. The theoretical lens of Pragmatics was applied to offer an explanation of this identification process.

Conclusions: Context provide the cognitive scaffolding for a process of 'suitably constrained guesswork' about the identity of patients and their records. Implications for practice and for system design are discussed. Practitioners and technology designers should be aware of the risk for misidentifications inherent in this natural information processing activity.

INTRODUCTION

Patient identification − that safety-critical activity of matching patients with their care, treatment and records [1] − is a matter of context-dependent 'suitably constrained guesswork'. This conclusion becomes apparent when observing the daily work of healthcare staff, reading the literature and even just reflecting on our daily first-hand experience of recognising people in everyday settings. Identification of people is an everyday ubiquitous activity, and, similarly, patient identification is a ubiquitous activity in healthcare settings. Most healthcare activities involve, explicitly or implicitly, identification of patients by healthcare staff, when registering patients, giving medication, discussing diagnoses, etc. Computerised or paper records may be required for these activities. The use of multiple identifiers such as names and date of birth is recommended for safe practice [2, 3].

Errors occur in patient identification, sometimes with serious consequences. The variety of reporting systems and categorizations, and the fact that identification mix-ups may be perceived as "too trivial to merit reporting" [4], hinders the collection of comprehensive statistical evidence of misidentifications of patients or their records across settings and countries. Data collected by the National Patient Safety Agency (NPSA) in the UK show how in the period February 2006 to January 2007, 24,382 cases of patients being mismatched to their care were reported, with an estimate of more than 2,900 cases related to the use of wristbands [5]. In addition, there is qualitative or anecdotal evidence presented in studies, reports or the news. For instance, cases of registration errors are described in [6]; a barcoding near-miss in [7]; a case of misidentification in the pediatric emergency department in [8]. The classic paper 'The Wrong Patient' [9], is the detailed analysis of the case of a patient who was mistakenly taken for an invasive electrophysiology procedure scheduled for another patient with a similar name. At least 17 times before beginning the procedure, clinicians had the chance to check the patient's identity and correct the mistake but failed to do so, always assuming they had the right patient. It is also not uncommon to read about cases of identification errors in the news, for instance in relation to medication errors (medications meant for another patient) [10], switching of newborn babies [11], or a CT scan carried out on the wrong pregnant woman [12].

Solutions (technologies and protocols) exist to support correct patient identification [13]. In particular, the effectiveness of wristbands and barcodes in hospital settings is widely recognised [5]; 'auto-identification' technologies such as radio frequency identification (RFID) are also being increasingly applied. However, these solutions are not without their problems. Full compliance with protocols may be difficult to achieve [14]; there are risks or unintended consequences associated with the use of technology, such as data entry errors when registering patients, the "reliance on imperfect technical solutions as if they were perfect", and the "elimination of human checking processes when automated systems are implemented" [2].

Identification errors are not uncommon but they happen in the complex context of health care provision where million of patients are identified correctly every day - despite their names being imperfect identifiers and their care fragmented among many practitioners. We argue that the process of patient identification − both when formalised in protocols or procedures, or when relying on informal practices - depends on context. In this paper we provide examples of how

patient identification happens in practice, provide reasons for why it happens this way and suggest some implications for safety and for technology design.

METHODOLOGY

To investigate the practice of patient identification, we carried out a case study of a NHS (National Health Service) Walk-in Centre in London (UK), with a field study conducted in the period June-September 2006. The study was based on observations of the daily activities of the Walk-In Centre, shadowing receptionists and clinicians, and their consultations with patients. Whenever possible, the members of staff were engaged in informal conversations to clarify and confirm our understanding of their work. Written field notes were supplemented by sketches and copies of paper and computer systems in use. Anonymity of all participants was maintained: patient's identifiers were not recorded and/or were changed when necessary. The project received Ethical Approval from the local NHS Ethics Committee. The data were analysed with the support of qualitative research software Atlas-ti, used to sort and label the data and highlight the contextual elements affecting patient identification. More on the field study and the method for the analysis can be found in [15].

RESULTS

The setting

Walk-In Centres have been introduced in the NHS in the UK to facilitate access to healthcare. They offer ambulatory care without the need for an appointment. They are nurse led, usually open seven days a week. They offer treatment for minor injuries and illnesses, emergency contraception, medical prescriptions for minor ailments, advice on which other healthcare services are available – all services that do not usually require continuity of care and that can be solved with one visit.

The Walk-In Centre in this study is located in an area characterized by multiple ethnicities. It treats about 3,000 patients a month and shares its space with other health care services. Receptionists, nurses and doctors, manage the flow of patients. The typical workflow starts with the triaging, streaming and 'booking in' of patients at reception, moves to the consultation with clinicians, the referral to other services and request for tests if necessary, until the patients leave and are 'booked out' (Figure1). The work is fast-paced, often interrupted, and, as we will explain in the next section, it involves several patient-identification related tasks, usually with the support of paper artefacts or computer records.

Figure 1 Walk-In Centre workflow and main patient identification steps
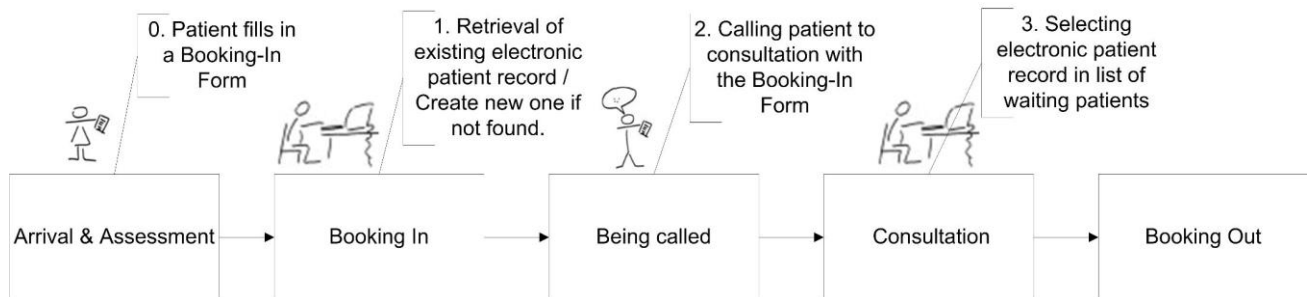
Context-dependent identification: the main workflow

Patient-identification related tasks are necessary key steps in the main workflow. These steps are centred on the production and use of a patient registration form - the 'Booking-In Form' - and the patient electronic healthcare record. At their arrival at the Walk-In Centre, patients are asked to fill in the Booking-In Form with their biographical information, contact details and healthcare problem (this step in the process is discussed more in depth in [16]). On the basis of the information provided by the patient in her paper Booking-In Form, the receptionist searches for an existing electronic patient record, and creates a new one if no matching record is found (Step 1 in the workflow). The clinician later uses the same Booking-In Form to invite the patient to the consultation room (Step 2) and to retrieve the electronic patient record added by the receptionist to the list of 'booked-in patients' (the electronic queue of patients waiting to be seen) (Step 3): the clinician will select the patient record that shows the same name and date of birth, among those showing in the electronic list of booked-in patients. This electronic record is used as official documentation of the patient's visit at the Walk-In Centre. When necessary, the patient details are copied from the Booking-In Form to prescription forms or forms to request laboratory tests (Step 4). Each one of the four steps requires matching the patient with her electronic and/or paper record. These steps are carried out following the standard rule of always applying multiple official patient identifiers when matching patients with their records: gender, date of birth, name and address. Different combinations of these identity attributes are used at the different steps. For instance, when booking-in patients (Step 1) the receptionist compares the identifiers provided by the patient in the Booking-In Form with those recorded on the electronic patient record system, and accepts an existing record as the 'right' one only if all four of the identity attributes match. However, a range of other contextual elements arising from the interaction and the activity support the matching of patients with their records. For instance, for the receptionist it is the process itself of comparing the information provided by the Booking-In form with the records on the computer screen that supports the retrieval of the correct record. The case below, observed at the Walk-In Centre, shows how if the patient's writing is difficult to read and the receptionist is

not sure of the correct spelling of the patient's name, the list of possible names appearing once a search is done with the date of birth can help:

> *Receptionist Ra searches for the patient record in the system. The patient name is difficult to read, but an existing record was on the system and this helps the recognition of the right word. Ra passes the form to receptionist Rb for data entry in another electronic system. Rb has the same difficulties reading the name. Ra says to Rb: "you'll find it there."*
> [Field note]

Most patients visiting this Walk-in Centre come from an ethnic community where people often share the same name (e.g. the name Begum is very common), and large families live at the same address. Therefore, it is not uncommon for clinicians to view very similar patient records. Table 1 shows a section of the computer screen: of the list of 11 patients, 2 of them, close together, appeared to be very similar. The similarity of the official patient identifiers (surname and age) does not facilitate the identification of the correct patient record. The patient's medical case, showing in the 'reason for visiting' provides more meaningful information. Also, the order of the records may help: clinicians expect the record for the 'next patient' to be on top of the list (this being consistent with the Walk-In Centre rule of seeing patients on a first-come first-served basis). A match exclusively based on official identifiers would make the identification of the correct record more difficult, since patient identity attributes, like the surname Begum, are not necessarily 'unique'.

Yet, patient identity attributes may be considered 'unique' in a specific context. For instance, there is only one patient called Begum on the list of patient records shown in Table 2, appearing on a specific date and time at the Walk-In Centre. The context constraints the range of potentially correct records and facilitates the identification. Incidentally, it may be interesting to note the extra elements added in the field 'Reason for visiting', shown in Table 2: e.g. "FT 16.15". These are the initials of the clinician expected to call the patient for the consultation, and the time when this is expected to happen. They have been added to the electronic record as a consequence of a change in the workflow introduced in the Walk-In Centre during the field study, now requiring allocation of patients to named nurses and doctors. This contextual information constitutes an extra identifier for the identification of the correct patient record, as the clinician would now look for and match not only the patient details but also her own initials.

Table 1. Section of computer screen showing patient records in queue of waiting patients – Similarity of data (*)

Surname	Age	Reason for visiting			Time in queue
BEGUM	31Y6M16D	SPRAINED ANKLE	0	Minor Illness Unit	34
BEGUM	33Y4M14D	SORE THROAT	0	Minor Illness Unit	30

(*) Based on field note 4 July 06 – patients' age has been changed

Table 2. Section of computer screen showing patient records in queue of waiting patients – All 'unique' names (*)

Surname	Age	Reason for visiting			Time in queue
BEGUM	31Y6M16D	SWOLLEN FINGER – FT 16.15	0	Minor Illness Unit	39
ROSS	53Y16D	ANKLE PROBLEM – EC- 16.40	0	Minor Illness Unit	25
JONES	25Y30D	MAP – TO – 16.40	0	Minor Illness Unit	20
SMITH	39Y9M8D	PROLONGED BRUISING – FT 16.45	0	Minor Illness Unit	8

(*) Field note 23 Aug. 06 – patients' details have been changed

Other patient identification activities

In addition to the patient identification activities described above, there are several other occurrences of identification of patients and their records at the Walk-In Centre. These show how ubiquitous patient identification is and how it often happens in an undetected manner. Again, in these cases too, context plays a key role in the identification of patients. Occurrences of patient identification outside of the main workflow were observed, for example, in association with:

- clinicians discussing patients' cases or asking for advice (within the boundaries of the Walk-In Centre),
- clinicians requesting lab results or asking for confirmation of treatments from family doctors (communication with external services, outside the boundaries of the Walk-In Centre).

Discussing and remembering patients

The identity attributes used for talking about patients and exchanging information about them within the Walk-In Centre are usually not the patient's name but the patient's illness, the reason for visiting or in general any event that occurred during the interaction with the patient. For instance, a nurse asking for advice would show a patient record to the doctor and say: '*This is that bloke I drained the finger of*' [Field Note]; or a doctor having problems with a patient's record would ask a colleague: '*did you see a patient, the one with long complicated history, diabetes*' [Field Note].

At the Walk-In Centre, patients are rarely known, or referred to, by name. Receptionists may remember patients' names but this is also rare. Patients don't usually come often enough to the Walk-In Centre for the members of staff to learn their names. Two episodes were observed where the patient was known by name. A receptionist was observed remembering an elderly lady's name, as she used to visit very frequently the doctor's surgery where the receptionist used to work. Similarly, after a few months of repeated visits by a patient going to the 'Fast Response Unit' based in the same clinic, a receptionist also learned the patient's name and was able to announce the patient by his name without asking. However, the same receptionist suggested that is easier to remember patients by their reason for visiting:

Receptionist: 'What was her complaint [reason for visiting]? If I remember her complaint I remember.' [Field Note]

Names are necessary to call the patient for the consultation and retrieve patient's recorded information, but they seem superfluous when other tasks are to be carried out. For instance:

The nurse is discussing with the receptionist the list of waiting patients, to help with the queue. They are checking the Booking-In forms:
Receptionist: 'the stitches is at 15.20'
Nurse: 'that's in five minutes'
[Field Note]

In this exchange what is relevant is the type of health care problem patients were presenting, so as to allocate patients on the basis of the difficulty of the case and the time needed for the consultation. Referring to the patient's problem provides enough information to identify the patient.

Communication with outside services

A patient's case often requires interacting with outside services, usually requiring the correct identification of the patient in question: for example for checking test results from the lab, or obtaining permission from a patient's family doctor to prescribe a repeat medication. Communication with these services happens either by phone, fax or letter, possibly with pre-set paper forms. Multiple patient identifiers are always used. In most cases, the member of staff would support the communication with the patient's paper and/or electronic record. In the following example, a nurse supports her request for lab tests results with paper notes, previous lab results and computer records:

The nurse is asked to check lab results for a patient.
She is holding lab test results with a small piece of paper attached [on it: patient's date of birth, telephone number, and notes like 'called'].
She calls the lab: 'I am [explains her role and where she is calling from]. I am chasing results for a patient seen here' [at Walk-In Centre].
She is asked for/answers with: Date of birth, Type of test. For the Hospital number - 'No we don't have it' - For the NHS number - 'No we don't have it'. She gives the patient's surname. [She waits].
She is asked for more confirmation, passed onto to another person. She stretches to the computer behind her with the phone and paper on her hands. She looks on the electronic patient record for the patient's history of consultation.... describes history to the lab...
[Field note]

Pieces of paper, preset forms, computer records and printouts are props always used when formal patient identifiers are the types of identity attributes required for retrieving patient recorded information. Formal identifiers need to be written down for the member of staff to use them. Communication with services outside the Walk-In Centre always relies on official patient identifiers, yet also in this case the context supports the identification of the patient record: i.e. the two NHS services share the context of 'patients sent by the Walk-In Centre' (without NHS numbers), 'patient's type of test' and patient's 'medical case' that makes the type of test relevant to the patient in question. We can expect the person on the other end of the phone to make use of

all this information to match it with the lab results available on her system – limiting the list of potential matches and easing identification of the right record.

Discussion

There is a series of formal and informal ways that patients and their records are identified at the Walk-In Centre. Coding of the field notes from this study revealed different identity attributes used for patient and record identification. Not all these identifiers are actual 'data': the identification may rely on the person's appearance, or the appearance of the Booking-In Form, or rather the Booking-In form or the electronic record being absent (not ready yet): "*... his record would be towards the end [of the list], because the form was not ready*" said a clinician of a patient invited to the consultation without the support of the Booking-In form. Elements belonging to the history of the interactions with the patients are also used, especially their medical history.

Patient identification involves matching identity attributes and this is possible when the matched attributes are of the 'same type'. Formal identifiers (for instance, a patient's name) would not assist in patient identification unless they are compared with the data shown on a supporting tool (e.g. a piece of paper or the Booking-In Form in this context, or wristbands in a hospital context). As shown at a shift handover in an emergency department in Australia, patient names did not afford recognition of patients:

> "On several occasions, we observed how incoming staff needed to ask several times 'Who is he/she?' when a patient's name was mentioned, because they could not match a name with a person. In order to help out, others refreshed their memories by referring to specific characteristics such as 'The confused woman' or 'The girl with the big family'." [17]

Conversely, matching 'informal' identity attributes with formal identifiers also does not afford recognition – the problem authorities had with The Piano Man, an unknown confused patient, found on an beach in the UK, who played piano in the hospital:

> "[The co-founder of the National Missing Persons Helpline] said a European database for missing people would not have helped in [The Piano Man's] case because 'you need a name and strong descriptive details of the person, something the authorities did not have'." [18]

In all cases - when sharing patients' information with people or through electronic systems, when relying on formal or informal identity attributes - the *context*, *relevance* and *similarity* of the attributes used for recognition are central to the process. Pragmatics can explain how and why this is the case.

Pragmatics is a rich field of study that spans from linguistics to psychology and philosophy. Broadly speaking, pragmatics "is an approach to description, to information processing, thus to the construction, interpretation and communication of experience" [19] It offers a context-dependent theoretical explanation of human behaviour and use of language. One of the main principles of this approach is that: "The *meaning* of an expression cannot be fully understood without understanding the *context* in which the expression is used" [19].

Context

From a pragmatics' point of view, context is not only constituted by the 'outside world' or a person's specific situation, but it also consists of a person's assumptions and expectations and these will influence the interpretation of the information:

> "A context ... is not limited to information about the immediate physical environment or the immediately preceding utterances: expectations about the future, ... anecdotal memories, general cultural assumptions, beliefs about the mental state of the speaker, may all play a role in interpretation" [20].

Context then also implies a variety of frames of reference, a multiplicity of "map coordinates' of one's vantage point" [19]. Following this approach, "[t]he description of an entity is incomplete, indeed un-interpretable, unless it specifies the point of view from whence the description was undertaken" [19]. A sentence like: *'the stitches is at 15.20'* makes sense only in the context of the space and the activity where it is expressed. Here is another example, from a different healthcare context, taken from the literature:

> "During morning rounds ... HS [the on-call resident], who will be admitting the patients, checked his patient summary sheet and asked TK [a fellow], 'can the trauma [patient] go to the floor?' TK told him if they need room, then the patient can be discharged". [Field note reported in [21]]

No matter how many other trauma patients were in the hospital at the time, the expression 'can the trauma go to the floor' made sense to the clinicians involved in the exchange and the patient was successfully recognised by the single word 'trauma'. For the same reasons, when in a conversation we refer to someone who is present in the same room, sharing a glance may be enough to understand who the person is we are talking about – the context of our discussion as well as the glance would remove, or at least reduce, ambiguity in identification.

Relevance

Another reason why an utterance such as *'the stitches is at 15.20'* makes sense is because the information appears to be relevant to the people involved in the interaction. Sperber and Wilson (1986) argue that human communication involves capturing someone's attention, "hence to imply that the information communicated is relevant" [20], and that the property of 'relevance' is the key to understand both human communication and cognition. Again, the idea is that the human being has to find an efficient solution to cope with the huge amount of information available in the environment:

> "In the immense, Herculean task of natural – biological – information processing, the bulk of the input is in fact blocked, i.e. deemed – in the appropriate context – to be either irrelevant or not urgent. Only small morsels of the input, judged to be either relevant or urgent in context, are let through for further processing. The selective exercise of the mind's contextual judgement ... is the sine qua non of natural biological information processing, which is undertaken under severe limits: Finite time, finite storage capacity, finite means".[19]

In any communication exchange the hearer will expect the information communicated to be relevant and she will interpret this information on the basis of what "best satisfies this expectation" [20]. The same is true when communication is not face to face, as in the case of a telephone conversation [22] or computer-mediated-communication. In the case of telephone calls, auditory information may not be sufficient for the person on the receiving side of the phone line to recognise who is calling, especially if the call appears to be 'out of context', or 'not relevant' to the person called. Schegloff explains this phenomenon with the impact of expectations (the expected potential event): the answerers solve the recognition problem by searching not for "all those they know or all recognizables" but for those who are "potential callers". [22]

Relevance implies that human understanding is a form of "suitably constrained guesswork" [20] – the constraints constitute a form of cognitive scaffolding [23] and they are offered by the personal and interactional context, the human activity, the subjects' intentions. Patient identity and record recognition based on statements such as '...*one called Smith, got yellow marking everywhere*' [Field note] is possible because the elements used for recognition are based on shared contextual knowledge and they are relevant to the task at hand. The sentence only makes sense to the member of staff because of the shared knowledge, the common understanding of the nurses' work and the relevance to the expected workflow. The description of a patient identity – or of her Booking-in form with yellow marking everywhere – would be too ambiguous, or meaningless, outside of the specific situation at the Walk-In Centre. Clinicians and receptionists share the same assumptions and expectations – the same 'psychological' context – collaborating on the Walk-In Centre workflow – sharing the same physical and working context. The exchanges are only meaningful in this context and they are only 'contextually relevant' to this particular activity. Indeed as seen in Table 1, patient identity information alone can be ambiguous even *within* the physical context of the Walk-In Centre. While instead Table 2 shows how at a given day and time at the Walk-In Centre, context provided the tacit and necessary constraints to facilitate recognition of a patient called Begum. It reduced ambiguity in identification, reducing the number of 'possible candidates'.

Similarity

In patient identification, the matching between attributes is done on the basis of their 'similarity'. This is another concept used in pragmatics, where similarity is known to be 'a matter of degree': "In principle anything can be similar to anything else ... provided the appropriate context, frame, or point of view is construed." [19]. Even more then is identification a 'matter of probability', the 'likelihood' that the matching is correct. In the case shown before, the receptionists Ra and Rb judged that, given the context and the matching of all other attributes available, the similarity between the patient name scribbled on the Booking-in Form and the one shown on the electronic record system meant that this was the correct patient record.

Because of the role of context in human communication, "a mismatch between the context envisaged by the speaker and the one actually used by the hearer may result in a misunderstanding" [20]. A doctor recounted in a court hearing in the UK:

> "... I was leaving the ICU and I was approached by the surgical senior house officer who said 'We've seen the patient and we'll be taking over his care' and as he was the only referral I had made, I assumed she was talking about him". [Doctor's statement reported in [24]]

The senior house officer was in fact talking about another patient. The case is reported in a news article entitled: "Death of a patient lost in the hospital system", as the misunderstanding meant that the patient in question was not taken care of and later died. The assumption over the identity of the patient was made on the basis of context and relevance of the interaction: the exchange happened in the ICU, where the doctor had made a referral for one patient only and she expected this to be acted upon. Similar reasoning is an everyday practice, when we refer to things or people by pronouns assuming they have been "previously identified" [25].

Mix-ups with the use of formal identifiers – especially names - are associated with the fact that given the context (a ward at a given time, a waiting room, etc.) we expect patient names to be unique even though they are not. There are numerous cases of patients mix-ups due to similarity of names reported in the literature and in the news: "Patients with similar names present challenges to the best-functioning health care systems" [9]. As pointed out in [26], the 'extraordinary' coincidences of patients with similar names are in fact 'ordinary'. At the Walk-In Centre, the similarity of two patients' names led one doctor to mistake one patient record for the other:

> *The doctor goes to reception to get the form for the next patient. The doctor – rushing back to his room with the form in his hand: 'I got the wrong form! Because they have the same name.'*
> *Researcher: How did you realise?*
> *Doctor: 'I didn't realise. It's just the next patient is the same patient!'*
> [Field note]

Relying on the patient's surname for matching patients with their forms and for selecting patients' records can lead to mix-ups as we assess the similarity of the identifiers available and think we have the right record when we have not. The wider range and greater number of identity attributes used (e.g. age, but also reason for visiting, allocated time and allocated clinician, the position of the record in the list, etc.) the more elements are provided for a correct 'guess' and for detection of record mix-ups.

CONCLUSIONS

In patient identification, the similarity and contextual relevance of the identifying attributes are the basis for the matching of patients with their care, treatment, samples and records. The matching is a process of 'educated guesswork' supported by contextual constraints and expectations, e.g. the range of potential patients for matching is limited to 'those waiting to be

seen' at any given time and the relevance of the information to the task at hand. Furthermore, the correctness of the matching is assessed on the basis of the overall set of formal and informal identifiers in context, rather than each specific one on its own. Awareness should be raised of the dangers inherent in this natural information processing activity, both among practitioners and technology designers.

From a healthcare delivery perspective, these findings support a recommendation that practitioners should be familiar with their patients. It is possible that the better the clinician knows a patient, the more identity attributes and contextual cues she would have at her disposal for the probabilistic matching that takes place in the identification process. Hence, the less likely it is that the patient would be the subject of misidentification. Conversely, the less a patient is known (for instance when patients become 'invisible'), the more limited the set of attributes used for the matching. In particular, there is then an increased reliance on formal identifiers not supported by other contextual cues, leading to an increased likelihood of identification errors. A study commissioned by the NPSA found that "all interventions to improve the personal knowledge of patients, such as the named nurse principle, or a reduced number of patients per nurse appear to be useful" [27].

There is an established literature on safety checks, redundancy and other techniques aimed at safeguarding against 'normal errors' [28] in complex, highly coupled environments. These safety checks are often already inbuilt in today's healthcare practice and contribute to the prevention of hazards. It might also be possible to apply a reliability approach based on 'distributed knowledge' and 'shared awareness' of the patient identity. Falzon proposes building reliability of the system as a collective development process based on "the permanent sharing, discussion and construction of knowledge about work, work situations, and rules for decision-making" [29]. In the distributed healthcare environment, the problem of guaranteeing correct patient identification may find a further solution in strengthening group awareness and shared knowledge. It is not just the single practitioner's knowing of the patient that supports correct identification but the shared knowledge of that patient. A limited example of this was observed at the Walk-In Centre when the receptionists intervened to make sure that clinicians called the correct patient to the consultation. The unplanned collaboration between receptionist and clinician in the task of 'calling the patient' allowed for the detection of an identification error (calling the wrong patient with respect to the specific Booking-In Form).

In terms of design of electronic record systems, this study suggests that technology should be designed to support patient identification as a context-dependent cognitive process. Since context is not just the outside environment but also an individual's assumptions and since patients and their information travel across different contexts, this issue may be more complex than at first appears. How can we build computerised systems that support contextual patient identification across changes in contexts: both 'physical context', for instance when the patient is moved from ward to ward, and 'technical context', when the patient is known in person but it is then her disembodied record that is recognised on a computer screen.

The NHS undertook an initiative, in collaboration with Microsoft, for a standard common user interface design that should provide a well-designed, always visible, 'patient banner' in

electronic patient records [30]. This is a greatly needed improvement over the design of some healthcare systems that we have observed in practice: some show very limited patient identifiers, others hide them all together once the record has been selected. The need for contextual patient identification in electronic records was acknowledged in the first release of the design guidelines developed by Microsoft for the patient banner (later modified), although this was described only as 'useful information':

> "In certain contexts, *the user should be able to discover* other 'temporary' information that could be used as *supplementary identification information*, such as ward, bed number, consultant responsible, and nurse caring for them this shift. This however, might be seen as *'useful' information as opposed to patient 'identification' information'*." [30]

We argue that this information is not only useful but indeed necessary to support the identification of the correct record and to detect and correct any record mix-ups.

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REFERENCES

1. NPSA. Right patient - right care. London: National Patient Safety Agency 2004.
2. WHO. Patient Identification - Patient Safety Solutions, vol. 1, solution 2, May 2007. World Health Organization 2007. http://www.ccforpatientsafety.org/common/pdfs/fpdf/presskit/PS-Solution2.pdf (accessed 3 Aug 2009)
3. Sevdalis N, Norris B, Ranger C, et al. Designing evidence-based patient safety interventions: the case of the UK's National Health Service hospital wristbands. *J Eval Clin Pract*. 2009;15(2):316-322.
4. O'Kane MJ, Lynch PLM, McGowan N. The development of a system for the reporting, classification and grading of quality failures in the clinical biochemistry laboratory. *Ann Clin Biochem*. 2008;45:129-134.
5. NPSA. Standardising wristbands improves patient safety. National Patient Safety Agency, UK 2007. http://www.npsa.nhs.uk/public/display?contentId=6073 (accessed 28 Jul 2007)

6. Hakimzada AF, Green RA, Sayan OR, et al. The nature and occurrence of registration errors in the emergency department. 2007;In Press, Corrected Proof(available online on 7 June 2007).

7. McDonald CJ. Computerization Can Create Safety Hazards: A Bar-Coding Near Miss. *Ann Intern Med*. 2006;144(7):510-516.

8. O'Neill KA, Shinn D, Starr KT, et al. Patient misidentification in a pediatric emergency department: patient safety and legal perspectives. *Pediatr Emerg Care*. 2004;20(7):487-92.

9. Chassin MR, Becher EC. The Wrong Patient. *Ann Intern Med*. 2002;136(11):826-833.

10. BBC News. Woman died after wrong medicine. BBC News, UK 2006. http://news.bbc.co.uk/1/hi/scotland/4707534.stm (accessed 14/02/2006)

11. Booth J. Heartache over babies mixed up at hospital. Times Online, UK 2007. http://www.timesonline.co.uk/tol/news/world/europe/article2629613.ece (accessed 15 Oct 2007)

12. Cohen E. How to avoid falling victim to a hospital mistake. 2009. http://www.cnn.com/2009/HEALTH/11/11/hospital.mistakes/ (accessed 15 Nov 2009)

13. WHO. WHO launches 'Nine patient safety solutions'. World Health Organzation 2007. http://www.who.int/mediacentre/news/releases/2007/pr22/en/index.html (accessed 10 May 2007)

14. Garnerin P, Ares M, Huchet A, et al. Verifying patient identity and site of surgery: improving compliance with protocol by audit and feedback. *Qual Saf Health Care*. 2008;17(6):454-458.

15. Lichtner V. Patient Identity, Identification and technology. Phd Thesis. London: City University; 2009.

16. Lichtner V, Wilson S, Galliers J. The challenging nature of patient identifiers: An ethnographic study of patient identification at a London walk-in centre. *Health Informatics J*. 2008;Special Issue - Integrated Health Records: Practice and Technology, 14(2):141-150. http://jhi.sagepub.com/cgi/content/abstract/14/2/141 (accessed 25 Nov 2009)

17. Mueller FF, Kethers S, Alem L, et al. From the certainty of information transfer to the ambiguity of intuition. In: Proceedings of the 20th conference of the computer-human interaction special interest group (CHISIG) of Australia on Computer-human interaction: design: activities, artefacts and environments. Sydney, Australia: ACM Press 2006:63-70.

18. BBC News. 'Piano Man psychotic' says lawyer. BBC News 2005. http://news.bbc.co.uk/2/hi/uk_news/england/kent/4182926.stm (accessed 3 Aug 2009)

19. Givon T. Mind, code, and context: essays in pragmatics. Hillsdale, N.J.: Lawrence Erlbaum Associates 1988.

20. Sperber D, Wilson D. Relevance: communication and cognition. Oxford: Blackwell 1986.

21. Reddy M, Dourish P. A Finger on the Pulse: Temporal Rhythms and Information Seeking in Medical Work. In: Proceedings of the ACM Conference on Computer-Supported Cooperative Work CSCW 2002; 2002; New Orleans, LO: New York: ACM. 2002:344-353.

22. Schegloff E. Identification and recognition in telephone conversation openings. In: Psathas G, editor. Everyday language studies in ethnomethodology. New York: Irvington Publishers 1979:23-78.

23. Clark A. Being there: putting brain, body, and world together again. Cambridge, Mass.; London: MIT Press 1997.

24. Pinch E. Death of a patient lost in the hospital system. icBirmingham, Birmingham Post, UK 2006. http://icbirmingham.icnetwork.co.uk/0100news/0100localnews/tm_objectid=17062582&method=full&siteid=50002&headline=death-of-a-patient-lost-in-the-hospital-system-name_page.html (accessed 3 Aug 2009)

25. Kent W. Data and Reality. Amsterdam, New York, Oxford: North-Holland Publishing Company 1978.

26.   Cummins D. Patient identification: hybrids and doppelgängers. *Ann Clin Biochem*. 2007;44:106-110.

27.   Sujan MA, Henderson J, Embrey D. Mismatching between Planned and Actual Treatments in Medicine – Manual Checking Approaches to Prevention: Human Reliability Associates, for the NPSA 2004.

28.   Perrow C. Normal accidents: living with high-risk technologies: Basic Books 1984.

29.   Falzon P. Reliability management as an individual/collective development process: a constructive ergonomics viewpoint. In: Activity Analyses for Developing Work, Second Symposium of the Technical Committee 'Activity Theories for Work Analysis and Design' (ATWAD) of the International Ergonomics Association (IEA); 2008; Helsinki, Finland, 12–14 May 2008 2008.

30.   Microsoft. Design Guidance: Patient Banner - First release, version 1.0.0.0 - 5 July 2007. Microsoft Health Common User Interface 2007. http://www.mscui.org/ (accessed 28 Aug 2008)