

**An exploration of bedside checking processes
for inpatients in the acute care setting**

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Abstract

Title An exploration of bedside checking processes for inpatients in the acute care setting

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Methods We conducted an investigation into the checking processes that take place in hospital. We aimed to understand how bedside checks help maintain patient safety by helping to ensure correct identification of patients, especially in the context of the routines of healthcare work. We performed a review of relevant peer-reviewed literature, guidelines and policy documents. We carried out observations of practice in a number of acute hospital settings and interviewed staff about the role of checking procedures in their work. We also conducted a task analysis of wristband application and use.

Results We reviewed over 110 articles and documents from a range of sources. We conducted 14 interviews with staff and 13 sessions of observation of practice. Some aspects of checking are well disseminated (for instance, in relation to blood transfusion and pre-surgical checks) whereas there is more scope for development in other areas. Checking procedures work best when they are incorporated into healthcare professionals' work routines. Many staff have a highly-developed sense of safety but this tends to rely on informally-learned personal habits rather than formal risk assessment processes.

Conclusion Bedside checking procedures show many strong existing features but can be developed further. The role of technology should be to supplement, rather than supplant, the human elements that lead to safety in hospital.

Implications for practice We have identified and listed a number of potential solutions. These should be evaluated carefully in practice, especially when they rely on new technology. Policymakers and managers should consider how the healthcare working environment can best be structured to promote checking and safety behaviour, and how policies and procedures can be designed to 'make sense' to practitioners. The role of non-clinical staff in maintaining and promoting patient safety, especially in verifying patient identity, should be acknowledged.

List of abbreviations/glossary

ADE	adverse drug event
ATC	air traffic control
BCSH	British Committee for Standards in Haematology
FDA	Food and Drug Administration
HRA	Human Reliability Associates
IBCT	incorrect blood components transfused
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
MPS	Medical Protection Society
NICU	neonatal intensive care unit
NMC	Nursing and Midwifery Council
NPSA	National Patient Safety Agency
PDSA	plan-do-study-act
PSRP	Patient Safety Research Portfolio
RCN	Royal College of Nursing
RFID	radio frequency identification technology
RTC	rail traffic control
SPN	safer practice notice
WBIT	wrong blood in tube

Executive Summary

Background

This report represents a multi-method exploration of bedside checking processes in acute care. It was commissioned by the National Patient Safety Agency (NPSA) through the Patient Safety Research Portfolio (PSRP). It builds on substantial work carried out by the NPSA in the last few years, most notably the documents Right Patient, Right Care (2004), the Safer Practice Notices on wristband use (2005), correct site surgery (2004), Right Patient, Right Blood (2006) and the initiatives related to medication safety. Patient safety incidents in all these clinical activities can arise from misidentification and the mismatching of patients to their care.

Two previous studies commissioned by the NPSA, the reports 'Mismatching between planned and actual treatments in medicine – manual checking approaches to prevention' and 'Ensuring patients are correctly matched with samples or specimens taken from them and treatment planned for them', both published in 2004, focused respectively on the human and technological aspects of the subject. The former recommended ethnographic study of checking in practice, and the PSRP called for proposals to carry out such work.

Aims and methods

- 1 To update the above review of manual checking procedures in healthcare by gathering literature, a selection of published guidance and practical intelligence relevant to bedside checks in hospital patients appearing since that report was prepared.
- 2 To perform a functional task analysis of the application and use of wristbands for patient identification. This was conducted using standard task analytical methods.
- 3 To perform an ethnographic study of those checking procedures within their professional and organisational social contexts. Data were gathered by semi-structured interviews with, and non-participant observation of, staff in acute care settings. Staff studied included nurses, operating theatre staff, porters and ward clerks, in general and specialised hospital wards and the radiology and Accident and Emergency departments

Results and discussion

We have data from over 110 recently published papers, guidelines etc, 14 interviews, one focus group and 13 observation sessions totalling over 32 hours of observation. The findings from each stream are brought together firstly within the clinical activities of interest ('first

order analysis'), then the more general thematic analysis is presented ('second order analysis').

'First order' analysis - specific activities

- *Wristband application.* Wristbands are commonly used in the United Kingdom (UK). Surveys have typically found error rates of 2-3%, the commonest errors being absent wristbands, illegible wristbands and erroneous information on wristbands. Current practice reveals a considerable variation in types and colours of band used, with ten types of five colours being used in one trust alone. Methods of application and information recorded also varied on the band. A safer practice notice with deadlines for implementation of the guidance (on standardisation of information) was issued by the NPSA early in July 2007. More sophisticated technologies such as the use of photographs, or barcodes, have been described. However, the critical point in the task, that of making sure that all patients are given the right wristband, remains subject to human control. Once applied, wristbands are used extensively for activities such as the three specific ones listed below. However, other opportunities for re-establishing and verifying patients' identity, such as at the beginning of shifts, on first meetings with new staff, during handover and during transfers, have yet to fulfil their potential.
- *Transfusing blood.* Blood transfusion has been the subject of specific and detailed checking procedures for some time and it is no surprise that compliance with checking is generally good. Again, the use of barcoding has been tested with some promising results. Technological systems for validation and verification can only complement and enhance the human element and can never replace it.
- *Correct site surgery.* Correct site surgery has received considerable attention since the issuing of the NPSA's Safer Practice Notice (SPN) in 2004. Whilst marking practice may not have changed completely, the alert does seem to have had a beneficial effect in bringing the issue of correct site surgery into the professional consciousness of healthcare workers. However, simple, low-technology solutions such as pre-procedure briefings do not appear to be widely used amongst those interviewed. More sophisticated aids such as radiofrequency identification and marking labels which incorporate chips have been described, but not fully evaluated, in the literature on this topic. In general, pre-surgical checking procedures are compliant with guidance.

- *Medicines administration.* Medication safety has also been the subject of NPSA guidance, though too late to affect our interview and observational data. Our observations reveal frequent distractions during drug rounds, and suggest that patient self-medication, whilst feasible and already widespread, brings particular risks which must be satisfactorily assessed before implementation. Again, barcoding has been used with apparently successful results, but hospital-wide systems are costly to install and maintain.

'Second order' analysis - themes

The data were subjected to further analysis for overarching conceptual themes.

- *Identity and verification.* Patient identity is expressed and conceptualised in many ways by staff. These include not only names but factors such as location on ward, diagnosis and order on operating list. While these informal clues are powerful, they must not be allowed to take the place of formal identification procedures. Our observations suggest that it is not universal practice to establish positively a patient's identity, leading questions often being used as a substitute. Whilst the relative merits of single vs two-person checking are debated, there is little in the literature or in our empirical data to allow us to comment on this issue.
- *Safety sensitivity.* Many staff have a highly-developed 'sixth sense' for safety and checking which extends beyond the highly standardised activities listed above to incorporate many other checking behaviours into their personal work routines. For instance, senior nurses described start-of-shift ward rounds where they checked not only patient identity but also equipment, nutritional needs, prescription charts and so on. Quite how these are learned, taught or developed is not clear. There is, however, little evidence of formal risk assessments in everyday work.
- *Working environment.* The ward environment is typically busy and complex, with multiple information flows and many distractions. Staff are generally very aware of the potential conflicts between, for instance, efficiency/throughput and safety. There is little use of technological solutions and little evidence that ward routines have been planned with safety in mind.
- *Roles and responsibilities.* Most attention has been focused on clinical staff in the promotion of patient safety. However, our data suggest that the actions of non-clinical

staff, particularly porters and ward clerks, can influence aspects of safety, especially patient identification. We are not aware that this has been noted before. We have also noted how actions designed to enhance patients' safety may be less comfortable or convenient for them, or may not be fully understood by them. These difficulties need to be resolved if patients are to play their part in maintaining safety.

- *Policies, procedures and documentation.* We observed a number of beneficial features including the use of common casenotes to aid communication between different groups of staff. However, there is still a concern that the burden of documentation distracts from what staff feel is the real business of patient care. Some documentation is of course necessary, but forms and charts should be carefully designed, standardised as much as possible within hospitals, and versions tracked. Critical incident reporting schemes should be structured to ensure that reported problems are seen to be acted upon.
- **Recommendations for policy and practice**
- Proposed solutions to misidentification problems, especially those at national policy level, should take account of the complex, dynamic nature of the healthcare systems into which they are introduced. Our research has shown that unless safety improvement initiatives are based upon an in-depth understanding of the 'low-level organisational space', their content may be flawed and their impact limited. Further, although we have identified a number of possible solutions we would stress that they may have 'side effects' when introduced into the complex healthcare system. For this reason we suggest that they should undergo formal risk assessment before introduction, and that their introduction should be accompanied by evaluation.
- Recommendations and guidelines should address underlying factors likely to affect their effectiveness, and should also be concerned with their implementation and resulting consequences. Protocols, guidelines and checklists should be as simple as possible.
- Attention should be paid to the role of NHS staff who are lower in the organisational hierarchy. Their role in maintaining safety should be acknowledged, and means of encouraging them to strengthen it investigated.
- Consideration needs to be given to the point at which formal identification of patients should be performed within the 'patient journey'. For instance, what is the role of the

ambulance service in establishing identity? At what point should wristbands be applied in A&E? Should patients attending as day cases wear wristbands?

- We echo the recommendation of the Human Reliability Associates (HRA) report that new technologies should be risk-assessed within their specific application context, and should not rely exclusively on the assessments produced by medical device manufacturers. In particular, the establishment of the role of an individual who can help integrate new technologies into their clinical context within hospitals should be considered.
- Pilot studies concerned with the introduction of new technology should consider the actual working practices of people, including the informal and formal sources of knowledge and procedures that they utilise.
- **Recommendations for research**
- An educational package should be developed whereby the tacit knowledge implicit in what we describe as the 'sixth sense' for safety is elucidated and incorporated into training in a number of professional groups and for key non-clinical staff. This should then be applied and evaluated.
- Further work is needed to explore how checking protocols are constructed for healthcare use, and identify the 'critical factors' within protocols to allow for a balance between simplicity and effectiveness.
- The role of safety and attitudes to risk amongst staff should be delineated more closely and in a larger study. In particular, it would be useful in understanding why some developments in safety are taken up, and why some are not, and how this might relate to existing notions of risk and safety.
- It would be useful to invite staff to define how they 'operationalise' the concepts of quality, safety, efficiency etc in their own work context, and how they might rank these different attributes as part of their professional activity.
- Whilst healthcare still has some way to go in reaping the benefits of an industrial-style approach to safety, there will most probably be limits to the transferability of such models into the healthcare setting, and these should be explored.

- We recommend the development of some simple markers of safe practice which could not only be used to focus the attention of staff but potentially could be used as measures of change. It is important to stress that such markers should be developed in conjunction with clinical staff or their representatives, should 'make sense' clinically, should be domain-specific and should not be used as 'targets' for organisational performance as this renders the whole business of safety meaningless.
- The relationship between staffing levels and safety should also be explored. Two broad possibilities have been articulated. The first is that reduced staff numbers jeopardise safety. The second is that those staff who remain have a heightened awareness of safety and practice is, paradoxically, made safer. The practical issue here, which such work would help to illuminate, is how the safety of healthcare can be sustained whilst still maintaining throughput and quality of care.
- Guidelines and recommendations issued by major bodies place a strong emphasis on the rigid enforcement of formal procedures and policies. However, little is known about how enforcement should be carried out in order to minimise the likelihood of non-compliance, nor is there a clear understanding of how effective such approaches might be.
- As reporting of incidents is voluntary in the UK, it would be useful to commission research to try to estimate the true number or percentage of incidents (for instance, by observation or representative surveys).
- There should be further exploration of how patients understand the potential conflicts between their safety, their comfort and convenience, and efficiency of care, to name but a few relevant attributes. It would also be useful to know how best to present these issues to patients and their carers, and whether it is possible to preserve patient choice against a background of the promotion of safety.

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1 Introduction and background

1.1 Safety: the systems approach

The 'patient safety' movement aims to bring the safety benefits of systems thinking and analytical techniques from other high-risk industries to bear on healthcare [1-5]. This clearly has the potential for great gains in safety, though there are still some probable problems in transferring techniques from process industries to those that are concerned with the provision of services [6]. Reason's model of accident causation is well known within healthcare [5]. He argues that, within a given system, there are many possible factors tending to cause or contribute to accidents. This continuous, 'normal' propensity for accident [7] is usually offset by the effect of a number of barriers, or controls, within the system. These act to prevent potential accidents, but when they fail, causal factors are unimpeded and an accident can take place. The systems perspective argues for a more holistic approach to dealing with problems of risk and safety [8-10] and analysis thus has to take existing controls as well as causative factors into account [5].

1.2 Application to healthcare

Healthcare is highly dynamic, poorly standardised and delivered by a number of professional 'tribes', whose members may be reluctant to follow guidelines and engage in formal teamworking, despite the expected safety benefits [11]. A further characteristic of the service is the tendency not to perform formal risk assessments on new techniques and practices. There may be different priorities amongst different professional groups. For instance, nurses may see patients' comfort, rather than safety, as their primary concern [12] whereas in high-risk, high-technology specialties such as anaesthesia, our own work suggests that practitioners' first concern is safety, and this is learned tacitly as part of the clinical apprenticeship [13]. How do we square this with the explicit, standardised procedures which are a feature of successful industrial systems [14]? Paradoxically, people are not only the cause of adverse events, but can also be, through their actions to promote safety, the strongest safety link in the healthcare system [15]. Whilst this applies to staff in any industry, in healthcare, patients can also help with the timely detection of error in certain circumstances [2].

1.3 Mismatching of patients and their care

Positive identification of patients is required for many clinical activities (Table 1). Mismatching is defined as "status of the medical process where patients are not correctly linked with their specimens or specified treatments" [12] and is a substantial source of error

in healthcare. A fuller account is given in Section 2 of this report, but three salient points emerge from the HRA review of the literature [12]. First, the incidence of mismatching errors is hard to establish. Second, the consequences of a given error are likely to depend on its context. Third, it is clear that the final ‘bedside’ check – that is, in the presence of the patient – is the ‘last point of recovery’ where errors arising earlier in the causative chain may be detected. Thus, in all the clinical domains studied, the failure of such checks is thought to be a major contributing factor to mismatching [14]. Guidelines generally place a clear emphasis on having procedures and policies in place and rigidly enforcing them. However, the guidelines provide little advice for their intended users about factors that may give rise to procedural non-compliance and what steps could be taken to reduce this likelihood.

- Transfer of patient
- Admission of patient
- Health professional meeting patient for the first time
- Venepuncture
- Obtaining of other specimen – biopsies, body fluids, amniocentesis samples
- Drug administration
- Surgical operation
- Blood transfusion
- Radiological investigations
- Radiotherapy
- Confirmation of death

Table 1 Procedures requiring positive identification of patient

1.4 Bedside checking procedures: rationale for research

Bedside checks are poorly studied, and there is a need to understand the processes of bedside checking within organisational, professional and social contexts. This is more urgent in view of imminent developments in the health service. For instance, the growth of ‘near-patient’ testing means that checking by staff who take and process samples will be vital. Most importantly, the introduction of computerised systems under the government’s plans for a national IT infrastructure [16] has much to offer patient safety (for instance, through barcoding or biometric identification) but its full potential will not be realised if the new systems do not take account of the social context of practice. Vital safety clues may be lost in the move towards electronic systems unless these are understood within their practice context and incorporated into systems design. Any hospital or organisation planning their implementation will need to consider that the introduction of new procedures or new

technological solutions will induce changes in the various activities and in the system as a whole.

The main recommendations from the report of Sujan and colleagues [12] were the need to:

- a) promote risk assessment of checking procedures and processes
- b) assess the underlying contextual factors contributing to patient safety incidents relating to checking processes and links with incident reporting systems
- c) explore working practices of healthcare personnel including formal and informal sources of knowledge and the procedures they utilise.

It is these issues that the research is designed to address.

1.5 Aim

The overall aim of this work was to explore bedside checking procedures for NHS inpatients in acute hospitals.

Within the original proposal there were four specific objectives:

1. To update the Human Reliability Associates (HRA) 2004 review of manual checking procedures in healthcare and other industries by gathering literature, guidance and 'best practice' solutions relevant to bedside checks for hospital patients appearing since that report was prepared.
2. To perform a functional task analysis of existing bedside checking procedures.
3. To perform an ethnographic study of those checking procedures within their professional and organisational contexts.
4. To bring together the findings of the above inquiries into a practically-orientated report with an assessment of 'best practice' solutions and guidance for practice.

The scope of the work was subsequently modified as the research progressed. We felt that there was less benefit in an exhaustive search for existing guidance than in exploring the underlying issues relating to how checks are performed in practice, and have simply reproduced a few representative documents in Appendix 2. In the task analysis, we have focused on wristband use and application as this became a priority for the NPSA during the

course of the work. We have, however, brought together a number of examples of existing good practice as originally intended. These are listed in Table 9.

2 Literature review and collection of guidance on checking

2.1 Aims

We aimed to update and augment the work of Sujan and colleagues through the following three strands:

- 1 Search for material published since the HRA review through the usual methods for systematic review [16].
- 2 This was supplemented by a search of 'grey literature' resources and a brief web-based search for other relevant policies, procedures and guidance, especially those issued by healthcare professional organisations.
- 3 In addition, we planned to summarise existing information from the National Reporting and Learning scheme and review relevant root cause analyses conducted elsewhere (for instance, from the Joint Commission on Accreditation of Healthcare Organisations (JCAHO) in the United States).

2.2 Methods

Our search was conducted in two streams:

- 1 In the computerised databases Cinahl, Psychlit, EMBASE, PubMed, PsycINFO and Medline from 2003 to 2007, using database-specific indexing terms where possible. Free text terms included 'bedside checking', 'patient verification', 'patient identification', 'drug errors', 'transfusion errors', 'theatre checks' and 'perioperative safety checking'. Medical databases returned over 3000 articles, of which 143 were relevant.
- 2 'Grey literature', identified from personal knowledge and supplemented by a Google search using the mentioned free text phrases. Google produced over 400 relevant hits.

We drew up specific inclusion and exclusion criteria, both to make sure that the exercise was properly scoped and to enable efficient searching. To save time and maintain focus, retrieved abstracts were reviewed by two members of the project team and a decision made on whether to obtain the full reference. A brief quality assessment was performed of full-text material (study type, methodological weaknesses etc [16]), and the findings summarised. Full records were kept of material retrieved, reviewed, included and excluded. As well as a 'core' search for material on mismatching, we took the opportunity to search on risk assessment of changes in healthcare, its feasibility and effect on safety.

2.3 Results

We found a small number of primary and observational studies addressing the common root causes of patient identification errors (administrative errors, verification and communication difficulties) and some case studies reporting individual errors.

The most recent analysis of the JCAHO Sentinel Event Statistics as of 31 December 2006 contains 4074 root cause analyses of adverse events, and confirms the importance of the issues addressed in this research [17]. The top 10 types of sentinel events are reported below.

Total number of sentinel events reviewed by the joint commission since 1995	Type of sentinel event	Number	Percentage
4074	Wrong-site surgery	532	13.1%
	Suicide	522	12.8%
	Op/post-op complication	494	12.1%
	Medication error	387	9.5%
	Delay in treatment	303	7.4%
	Patient fall	224	5.5%
	Patient death/injury in restraints	153	3.8%
	Assault/rape/homicide	141	3.5%
	Perinatal death/loss of function	125	3.1%
	Transfusion error	100	2.5%

Table 2 Top ten 'sentinel events' as reported by JCAHO

Wrong site surgery (13.1%), medication error (9.5%) and transfusion error (2.5%) are still amongst the most frequent events. It is worth noting, too, that the number of wrong site surgery incidents reported to the JCAHO has increased since the alert was issued. As issuing an alert raises awareness amongst healthcare staff, it tends to lead to increased reporting of certain types of incident. The data in this table should be interpreted with this in mind.

2.3.1 Issues of definition

We adopted the definition of mismatching offered as a working definition by Sujana and colleagues [12]: "A mismatching event denotes a status of a (subjective) activity within the

medical process where patients are not correctly linked with their specimens or specified treatments.”

According to the NPSA's initial specification to Sujan and colleagues [12], the aim of the overall project was to investigate manual methods to ensure that patients are correctly linked with samples taken from them and treatments specified for them. In the literature there was no exact definition of 'mismatching' that would have satisfied the requirements of this project, and the definitions employed in the studies reviewed varied according to their intentions. The definitions they provide usually address the adverse event with which the studies were concerned, mismatching being treated as one of a variety of contributing causes. A large number of the papers reviewed considered (usually implicitly) a mismatching event to be a historical, observable outcome. For example, Bates *et al* define 'substitution errors' as events when a patient received a wrong drug, or the wrong patient received a drug [18] but, as the observed outcome could arise from a number of different causes, a definition was developed that extended beyond observable outcomes and allowed the analyst to consider underlying causes and contributory factors. Other definitions focus less on events that have already occurred, but place more emphasis on the precursors potentially leading to adverse events. For example, the definition of misidentification of the Veterans Affairs (VA) National Center for Patient Safety (NCPS) is "a patient is misidentified when confusion occurs regarding vital details of care, such as blood and pathology specimens, including confusion between the identities of patients themselves" [19]. This definition was closer to the original specification of the NPSA, but its use of the term 'confusion' was ambiguous. The definition does not state clearly whether the confusion is required to have an externally observable manifestation, or whether it extends to subjective psychological processes. To the external observer, however, nothing has changed, as the nurse's subjective understanding of the situation does not have a negative outcome. For a thorough analysis of mismatching, an understanding of such processes is essential. Moreover, by itself, mishearing the patient's name is unlikely to result in an externally observable event for the patient. It is likely that the failure of one or more other interactions (from which recovery could occur) would be necessary for an observable event to occur (e.g. the nurse does not discuss the patient's name with the other nurse or the patient's wristband is missing). We can therefore characterise mismatching as an emerging property of activities within the medical process.

Bearing this in mind, the definition which was adopted in this project refined the NPSA definition and formulated it in an appropriate way for analysis purposes: a mismatching event denotes a status of the medical process when patients are not correctly linked with their specimens or specified treatments. Since such properties of the medical process are emergent properties of the activities constituting the process, it was necessary to formulate a

subsequent definition on the appropriate level of analysis, ie on the level of (subjective) activities. This is the reasoning behind the adoption of the definition above.

2.3.2 Prevalence of mismatching

It is difficult to find a true estimate of the incidence of patient identification errors [20]. In most healthcare centres incident reporting is voluntary, and we suspect that errors of misidentification are under-reported. Even if mandatory reporting were possible, many cases of misidentification would pass unreported either because they would not result in harm to the patient or because no-one would be aware that misidentification had occurred. Analysing legal claims may help, but again, because cases are often not reported, such an analysis would not necessarily reflect frequency or types of incidents. However, data are available from a number of sources:

UK National Reporting and Learning System

Reporting of patient safety incidents is voluntary in the UK. Data on incidents related to patient identification and mismatching patients with care over the period November 2003 to July 2005 are in Table 3. These show 1506 incidents of which 975 (65%) relate to mismatches with documentation, 155 (10%) are about mismatches between patients and their medical records and 140 (9%) are about failures in the manual checking processes.

The 975/1506 (64.7%) mismatches with the documentation consisted of

- a) Patients' samples obtained for diagnostic tests: 476/975 (49%) of the incidents reported
- b) Patients' records: 460/975 (47%) of the incidents reported
- c) Patients' blood samples taken for cross-matching or units of blood and blood products (for blood transfusion): 29/975 (3%) of the incidents reported
- d) Patients' medication: 10/975 (1%) of the incidents reported.

Of the 155/1506 (10.3%) incidents related to mismatches between patients and their medical records

- 99/155 (64%) were associated with the filing of a patient's records or results in another patient's medical records. This included X-rays, consent forms, and operation notes.
- Of interest is that there were 14/99 (14%) reported incidents where a patient's identification labels were filed in another patient's medical records.
- 55/155 (35%) were associated with the wrong medical records being made available for the patient.

- 1/155 (<1%) was associated with two records being available for the same patient.

Of the 140/1506 (9%) incidents associated with failures in the process for checking patients and matching them to their care, the main theme suggested by the data was a lack of compliance with procedures: 42/140 (30%).

Two additional themes that may provide more insight are the number of patients with the same or similar-sounding names, 17/140 (12%), and the number of patients who responded when another patient's name was called: 5/140 (4%).

Error types by location in acute/general and mental health

Location	Mismatches with the documentation	Mismatches with medical records	Manual checking process
Ward	329	46	53
Laboratory	161	4	7
Accident and Emergency	121	6	5
Outpatients	78	41	19
Radiology	85	13	19
Operating theatre	48	15	12
General areas	73	17	4
Intensive Care Unit	28	4	6
Day care services	10	4	4
Recovery room	3		
Anaesthetics	1		
Ambulatory care/ Independent treatment centre			1
Therapy	1		
Mental health unit (ward)		1	
Other	14	2	2
Total	952	153	132

Error types by specialty

Specialty	Mismatches with the documentation	Mismatches with medical records	Manual checking process
Diagnostic services	274	21	27
Medical specialties	220	41	40
Surgical specialties	133	25	31
Obstetrics and gynaecology	120	25	10
Accident and Emergency	113	5	4

Primary care	14	2	6
Anaesthetics	16	2	2
Dentistry - general and community	0	0	1
Mental health	1	1	0
Other	84	33	19
Total	975	155	140

Table 3. Reported incidents related to mismatches between patients and the documentation on their samples, records, blood transfusion samples and products, and medication

The NHS Litigation Authority (NHSLA)

The NHSLA have identified 25 cases involving mistaken patient identification between January 2000 and June 2005. The breakdown was:

Type of NHSLA case	Number
Wrong treatment/treatment intended for another patient	8
Mixed test results and blood samples	8
Same name error	4
Misfiled results	2
Wrong medical records	2
Admin error	1
Total	25

Table 4 Cases involving patient misidentification Jan 2000-June 2005 (NHSLA)

Medical Protection Society (MPS)

The MPS have provided the NPSA with the numbers of claims, pre-claims, reports and complaints cases opened between 2001 and 2005. The total number of cases is 182, of which some key categories are wrong site (33), wrong patient (10), wrong prosthesis (9), wrong equipment (5), transfusion problem (4) and wrong operation (4).

Other published estimates

In a study which conducted a root cause analysis of 100 patient misidentification reports, blood transfusions accounted for 25% of reports, with medication administration (22%), invasive procedures (19%) and imaging and x-rays (17%) being the other most common categories [19].

Specific clinical areas

Transfusion. Incorrect Blood Components Transfused (IBCT) was found to be the largest error category (67%) [22]. Another study suggests that wrong blood or wrong patient errors

occur at a rate of one per 12,000 units [23]. An analysis of incident reports submitted to the Serious Hazards of Transfusion Medicine (SHOT) programme [23] found that 156 out of 588 errors in 348 incidents were a “failure to carry out the pre-transfusion bedside check appropriately”. The failure of bedside checking procedures (26.5% of all errors) included factors such as confusion over patients with similar names, checking being carried out away from the bedside, interruption between completion of checking and administration, and failure to notice compatibility and donation label discrepancies. The report’s authors stated that “the most important contribution which could now be made to the safety of blood transfusion would be an initiative to improve the safety of the bedside pre-transfusion checking procedure” [23]. In another study of errors in the administration of blood transfusions in a UK haematology outpatient clinic [24], the underlying causes included frequent interruptions and distraction whilst checking, the complexity of the activity, lack of regular education and training, human error and a perception that the procedure was not appropriate or efficient. Data from the United States also suggest that patient misidentification contributes to 65% of blood transfusion errors [25].

Drug administration. Errors in drug administration have also been studied because their frequency is high, and a small proportion result in adverse drug events and serious injuries. Bates *et al* suggested that administration errors account for 26% of adverse drug events (ADEs) and patient errors or wrong drug errors represented 4% of all medication errors in hospitalised medical patients [18]. In an analysis of voluntarily reported medication error in the US, 4.8% of 105,603 medication errors involved the wrong patient: of these, 1.6% resulted in actual harm [19]. Substitution errors have been reported at a rate of 7 per 1000 patient days [26]. In the UK, it is thought that medication errors occur in at least 1.5% of hospital prescriptions and that between 3 and 8% of medications administered are incorrect*.

Correct site surgery. This is another area where research includes misidentification as an important contributor to patient safety incidents. There is some literature on the topic of wrong-site surgery, which can be a catastrophic event for a patient, caregiver, and institution.

* Dean B, Schachter M, Vincent C, Barber ND. Prescribing errors in hospital inpatients – their incidence and clinical significance. *Qual Saf Health Care* 2002;11:340-344
Dean B. Hospital medication administration errors: Their simulation, observation and severity assessment. PhD thesis, School of Pharmacy, University of London, 1999:44

Examples of surgery performed on the wrong site can include the following: spinal surgery done at the wrong level [27], peripheral nerve block performed on the wrong extremity [28], a chest tube inserted into the wrong side, surgery on the wrong limb or digit, extraction of the wrong tooth [29], kidney removed from the wrong side [30], operation on the wrong eye [31], or operation on the wrong side of the brain. A pilot study by the NPSA in 18 NHS acute care hospitals found 15 incidents involving wrong site surgery during a five-month period (November 2002 to April 2003)[15]. An earlier pilot in 28 NHS trusts found 44 incidents over nine months (between September 2001 and June 2002). If these figures reflect the national picture, it means there are more than 400 incidents a year in the UK. In the United States, the JCAHO processed root cause analysis information on 126 cases of wrong site surgery, most of which were reported between 1998 and 2000 [32]. Of these, 41% related to orthopaedic/podiatric surgery, 20% to general surgery, 14% to neurosurgery, 11% to urological surgery, and the remaining cases related to dental/oral maxillofacial, cardiovascular-thoracic, ear-nose-throat, and ophthalmic surgery. Fifty-eight per cent of the cases occurred in either a hospital-based ambulatory surgery unit or freestanding ambulatory setting, with 29% occurring in the inpatient operating room, and 13% in other inpatient sites such as the emergency department or intensive care unit. Seventy-six per cent of cases involved surgery on the wrong body part or site, 13% surgery on the wrong patient, and 11% the wrong surgical procedure. Also in the US, a survey of hand surgeons found that although wrong site surgery is rare, one in five surgeons had made this error at least once in their career [33].

Patient misidentification in the neonatal intensive care unit (NICU): quantification of risk. This report concludes that NICU patients are frequently at risk of misidentification errors as a result of similarities in standard identifiers [34]. This risk persists even after exclusion of multiple births and is substantially higher than has been reported in other hospitalised populations.

Reliable quantification of mismatching error rates is not possible because of the disparate aims and methods of the studies examined. Nevertheless, certain trends can be observed. For example, virtually all the studies indicate that mismatching is an area of considerable concern.

Summary

The literature also suggests that failure of bedside identity checking is the major contributing factor to mismatching. However, it is likely that this is due to the fact that bedside identity checking is the last point of recovery, where errors may become apparent. In addition, we

may expect that a large number of errors committed earlier in the process will be recovered through bedside verification, and therefore go unnoticed and unreported. We may assume that a more in-depth process analysis would reveal a larger number of errors in earlier stages in the process, thereby decreasing the percentage of failures attributable exclusively to a failure in bedside identity checking.

2.3.4 Identity: establishing, verifying, checking and double checking

We found little empirical work on checking of identity. Thomas and Evans [35] present an analysis of incidents and near-misses relating to misidentification in a Welsh hospital and list common human errors contributing to these. They highlight the particular problem of using 'addressograph' labels instead of handwritten patient details. This could be improved by using electronic record systems. Greenly and colleagues conducted a survey of staff perceptions of patient identification issues. Nurses perceived that it was important not to rely solely on the start-of-shift check alone [36]. Some felt that identification bands were not necessary, maintaining that they 'knew their patients'. Some staff were not adhering to policy, whilst it was common for staff not to realise that checking of identity was everyone's responsibility. It was also clear that non-clinical staff often did not understand why correct patient identification was important. Other work draws attention to the numerous ways in which staff 'identify' patients – by scheduled surgical procedure or room number [37] and point out the importance of wristbands even if more sophisticated technologies are also used [38].

Accurate registration of patients' details is a crucially important process in preventing patient identification errors. Harefield Hospital searched the hospital's Patient Administration System for cases in which a full name and date of birth were shared by two or more patients [39]. Three concepts emerged: adverse events may occur when

- (1) a patient has identifiers similar or identical to those of another patient (a 'döppleganger')
- (2) a patient is doubly registered (a duplicate registration)
- (3) registration details are derived from two or more separate sources (a hybrid registration).

It is difficult to find a true estimate of the incidence of patient identification errors due to the fact that incident reporting is voluntary, and errors of misidentification are under-reported.

Checking

One prerequisite in some verification checks (for example, those applied in the IVF laboratory [40]) is that the check should be witnessed by a second person. In principle this makes sense; in practice it is not a foolproof barrier as it may be distracting or some individuals may not be as vigilant as they would be if they had sole responsibility for a particular risk. When measures are introduced to reduce a risk in a system, individuals may subconsciously adapt their behaviour to compensate, thereby restoring the level of risk to the

status quo. Further literature on single vs double checking is discussed later in the report (see section 5.2.1).

Toft and Mascie-Taylor draw attention to a phenomenon they describe as ‘involuntary automaticity’ [41]. This refers to the tendency for human beings to work at subconscious level for many repeated familiar tasks (automaticity), which is widespread and usually beneficial. However, during the process of checking – including the use of checklists and double-checking – it may lead to error.

Prospective memory describes the ability of humans to remember intentions to perform actions after a delay. It enables humans correctly to resume tasks after being interrupted as well as to keep track of what they still have to do. This error type is highly relevant for healthcare because delays and interruptions are frequent in healthcare. ‘Multitasking’, with many parallel processes, is common and such situations put a heavy burden on prospective memory. Dieckmann and colleagues used a simulator to test the effect of interruptions on the execution of intentions [42]. Many planned intentions were not carried out, suggesting a failure of prospective memory in these circumstances. Whilst this is relevant to many aspects of work, checking tasks are likely to be affected particularly.

Bittle conducted a study using ‘Plan-Do-Study-Act’ (PDSA) cycles to evaluate registration-associated patient misidentification. He found that errors occurred between seven and fifteen times per month. Information system deficiencies, inadequate training, and the lack of a single master patient index were among the root causes identified. After three PDSA cycles, the incidence rate for registration-associated patient misidentification errors for inpatients declined by 80.3% [43].

2.3.5 ‘Low technology’ solutions

Readback is a simple strategy for ensuring that information has been correctly transmitted and received. Its benefit has been demonstrated in the reporting of laboratory test results [44] but it can be used in any setting.

The World Health Organisation has recently issued a ‘Patient Safety Solutions’ notice on patient identification [45]. This provides simple advice on protocols for checking, and on education and training, and reviews the potential barriers and risks for unintended consequences.

Lee and colleagues present a case study of two paediatric oncology patients with identical names who underwent chemotherapy in the same ward in a Hong Kong hospital at the same time [46]. This was managed by nursing the patients side by side in the same room, though this was acknowledged to be controversial. This situation is especially relevant in

communities where most people's names are not unique, and in fact the authors' more general survey showed this was common in Hong Kong. Specific guidelines and measures are needed to prevent patient misidentification. Errors in filing patients' notes and laboratory reports in the hospital record deserve further attention [46].

Between November 2003 and July 2005 the NPSA received 236 reports of patient safety incidents and near misses relating to missing wristbands, and 110 where there were discrepancies with the data items on the wristbands. Mismatching patients with their care can be caused by patients not wearing a wristband or wearing a wristband that does not provide reliable and unique identifiers, and can have serious consequences [47]. A Safer Practice Notice (SPN) recommending action to the NHS on wristband compliance was issued by the NPSA in November 2005 and required action by May 2006. The action is to put in place a range of recommended procedures (eg putting wristbands onto patients, monitoring and reviewing) to be included in all relevant local policies [48]. This was followed in July 2007 by NPSA guidance on the standardisation of wristbands*. Greene reports on using 'smart wristbands' in conjunction with radiofrequency identification technology although this has not been evaluated in practice [49].

From admission, the patient should wear a wristband bearing identifiers such as name and hospital number. The information may be handwritten or typewritten or, in a high technology setting, barcoded or be contained within a chip or radio tag. In some areas, an additional red wristband is applied if the patient has a history of drug allergy. Using different coloured wristbands can, however, cause problems [50], with colours having different meanings in different parts of the country. Further, clinicians may rely entirely on the wristband details rather than checking notes. The NPSA is working to ensure safer patient identification by greater compliance with wristband wearing in acute settings. It also recognises the need for other solutions for some patient groups such as neonates, those with skin allergies and those with learning disabilities.

In principle, wristbands are an excellent idea; in practice conventional wristbands are not quite as effective as we would hope. In a survey of 712 hospitals the median total wristband identification error rate was 2.2%, and 10% of participants had error rates of 10.9% or greater [51]. Absent wristbands represented 49.5% of errors; multiple wristbands with different information, 8.3%; wristbands with incomplete data, 7.5%; erroneous data, 8.6%; illegible data, 5.7%; and patients wearing wristbands with another patient's identifying information, 0.5% [51]. A more recent study of 217 institutions found an error rate of 2.57%,

*National Patient Safety Agency. Safer Practice Notice: Standardising Wristbands Improves Patient Safety. London: NPSA, July 2007

with missing wristbands accounting for 71.6% of the errors [52]. Other types of error were illegible wristband (7.7%), wrong wristband (1.1%), erroneous information (6.8%), missing information (9.1%), and conflicting wristbands (3.7%). In hospitals where it was the policy that phlebotomists would not draw blood until wristband errors were corrected, the error rate was lower. With monitoring and quality improvement programmes the efficacy of wristbands could be substantially improved. The authors [52] suggested that use of barcoded wristbands will eliminate some errors (such as illegible wristbands) but not others (such as missing wristbands).

Greenly and colleagues [36] reported a simple method for ensuring the accuracy of information on identification bands. As part of the project, rotating teams from different hospital departments were assigned to check compliance with the hospital policy. A 'game' element was introduced where one patient in the hospital was invited to wear an extra wristband, which the surveillance team also had to find. The authors claimed that their intervention reduced the wristband information error rate from 8.2% to a sustained zero.

Wilson describes the implementation of more durable wristbands and name tags in an addiction hospital [53]. Staff capture patients' photographs on admission to hospital, and the images are thermally printed onto the wristbands. The system can also create name tags for patients. The photographs are stored in the hospital's information system along with other patient data.

A paper from Switzerland, where it was not usual for hospital patients to wear wristbands, reported a randomised factorial study of 1141 teaching hospital patients, asking firstly whether hospitals should introduce a compulsory identification bracelet and secondly whether each individual patient would wear it. Positive responses were received from 83.9% and 90.2% of patients respectively [54]. Explanations of why wristbands were thought to be useful increased the positive response rates. Patients were equally content with the use of their name or an anonymous code on the band.

2.3.6 'High technology' solutions

A study commissioned by the NPSA [55] identified the following technologies:

- Barcodes – coding technology that uses adjacent bars and spaces to present information
- Radiofrequency identification (RFID) – using radiofrequency transfer of data between a reader and a tag [56,57]

- Card-based technologies (magnetic strip or IC chip) – using cards that incorporate a magnetic strip digitally encoded with information [58]
- Biometrics (for example, finger-printing and iris scan) – using automated methods of identifying or authenticating a living person based on physiological or behavioural characteristics [59].

Of these technologies, barcodes have been more commonly applied in healthcare [60-63]. With manual processing, the type of data processing error described above (where transposition of digits led to transfer of the wrong embryos) occurs at a rate of approximately one error in every 300 entered characters, whereas barcoding produces misidentification errors at rates ranging from one character in 15,000 to one character in 36 trillion [64]. The use of barcodes in healthcare was suggested over 20 years ago, but the healthcare sector has lagged behind supermarkets and industries in adoption of this technology [61]. Where barcoding has been adopted in the healthcare sector, it has primarily been in laboratories and facilities management rather than clinical care [64-72]. Barcode technology has also been used to reduce error in drug administration [73]. A brief review with case studies was undertaken by Grotting and colleagues [74]. Barcodes also have the potential to overcome the common problem of illegible signatures: staff identity badges can be barcoded, and the barcode is scanned to document which professional is administering treatment. However, technological solutions are not infallible. For example, if there is lack of alignment between a bar-coding system and a printer, only part of the barcode is printed off; some systems in use in the NHS have poor functionality and lack forcing functions to prevent operators from omitting task steps. Of course, too, the right information must be encoded into the barcode in the first place. As Nanni and colleagues note: “The identification of patients is often ‘manual’, with inaccurate or incomplete names that can be spelled wrongly, or the date of birth can be wrong. For this reason, the [electronic patient record] system should be able at any time to retrieve, modify or load correct patient data, with particular attention to possible duplicates. Any professional who generated the variation should always be identifiable.” [75].

Bakken [76] reviewed the literature on informatics and nursing and found the following negative effects of barcode medication administration:

- 1 nurse confusion over automated removal of medications by the system
- 2 degraded nurse-physician communication
- 3 nurses dropping activities to reduce workload during busy periods
- 4 increased prioritisation of timely medication administration during goal conflicts
- 5 decreased ability to deviate from routine sequences (eg tapering of medication doses) [76].

With active RFID a patient’s location can be tracked and their care logged by means of an encoded tag. The device has been cleared for marketing by the US Food and Drug

Administration (FDA) [57], although as of course technology is not a panacea it will still be necessary to identify patients positively [15]. This is illustrated by a case report where a barcoded wristband was applied to the wrong patient. The authors comment: “Computer systems may create new kinds of errors if not accompanied by well-designed, well-implemented cross-check processes and a culture of safety”. They also suggest that ‘techno-fixes’ can weaken human vigilance, thus removing an important safety protection [77]. Human operators must be wary of misplaced trust and overconfidence in IT systems.

2.3.7 Current guidelines and policies

There are a number of current professional and institutional guidelines on checking. We have gathered a small number of these (full text in Appendix 2) but did not feel that an exhaustive search and analysis of further guidelines would be fruitful.

1 Royal College of Nursing (RCN) publication 'Right blood, right patient, right time' bases its guidance on the British Committee for Standards in Haematology [78].

2 Nursing and Midwifery Council (NMC) 'Guidelines on the administration of medicines' state "Be certain of the identity of the patient to whom the medicine is to be administered" [79].

3 Royal Pharmaceutical Society [80].

4 Royal Marsden Hospital [81].

There is also guidance on promoting correct site surgery from a number of organisations [82-87].

Perhaps the more important questions are, how far are policies adhered to and to what extent can they be 'enforced'? For instance, Murphy and colleagues studied the frequency of rejected and miscollected samples [designated as wrong blood in tube (WBIT)] [88]. One hundred and eighty-five of 360 hospitals (51.4%) returned questionnaires and 182 of them (98%) reported that a policy for sample collection existed. Apart from frequent omission of the gender of the patient, there was 96% compliance with all mandatory identifiers of the British Committee for Standards in Haematology (BCSH) guidelines. The corrected median frequency for WBIT in the 27 hospitals with one or more observed WBIT is one in 1303 samples. The authors felt that there was great variation in the policy and practice for sample collection for pretransfusion testing.

There have also been two recent evaluations of the effectiveness of NPSA patient safety alerts [89, 90]. One investigated the response to the guidance on promoting correct site surgery. The authors concluded that the alert was successful in promoting marking practice, but was less effective in changing underlying attitudes. They felt also that perhaps the most valuable contribution of the alert to improved patient safety was its role in prompting a review of current procedures and reconsideration of the value of pre-surgical marking, irrespective of whether or not staff decided to change their practice in line with the recommendations [89].

The other examined action taken in response to the alert to limit the availability of concentrated potassium chloride solutions. This proved to be effective but the authors felt that this success was likely to be due to the nature of the proposed changes in practice, in that they were supported by managers and senior clinicians, fitted in with existing values of clinical staff and were relatively simple and cheap to implement [90]. As the authors note,

other alerts should not be assumed to be as effective – as demonstrated by the correct site surgery alert above.

Transfusion

Approximately 3.4 million blood components are transfused every year in the UK. The number of ABO-incompatible transfusions has fallen from 19 in 2004 to 10 in 2005, an all-time low and a 54% reduction since 2001/2002 [78]. Since the HRA report in 2003, haemovigilance programs from around the world document that the greatest risk to recipients of blood transfusion is human error, resulting in transfusion of the incorrect blood component. As with errors in medication administration, errors in transfusion care often result from mistakes in which details of patient identification are overlooked. Three areas of transfusion are focal points for improved care:

- 1 the labelling of the patient's pre-transfusion sample
- 2 the decision to transfuse
- 3 the final bedside check designed to prevent mis-transfusion (transfusion of blood to the wrong patient) [91].

Both barcodes and RFID technology are being implemented in order to improve blood sample labelling and the bedside check.

Mistransfusion is the most important serious avoidable hazard of transfusion [92-95]. Current patient safeguards to prevent mistransfusion are inadequate. Errors in the pre-transfusion bedside check are the commonest cause of mistransfusion [96-99]. A variety of approaches has been used to reduce the risk of transfusion errors, including using specially-trained nurses to carry out all procedures in relation to transfusion, applying additional identification systems for blood transfusion [100], increasing the monitoring of blood administration practice [101], the repeat determination of the patient's ABO group at the bedside before transfusion [102] and physical barriers to transfusion, such as placing the unit of blood in a locked plastic bag which can only be opened with a code marked on the patient's wristband and the crossmatch sample [103,104]. None of these methods is ideal in that they are not viable for routine practice and/or costly, and they have not been shown to be totally effective in preventing transfusion errors.

Murphy and colleagues performed a multicentre randomised controlled trial assessing the effect of a simple intervention on the checking of patients' identity (a tag on blood bags reminding staff to check the patient's wristband) [105]. The study's conclusion was that the intervention had no overall effect on the bedside check, though the authors recognised that there were limitations in its sample size and also the variability in the clinical areas studied. Further, as the results appeared to be slightly worse in the intervention group at the late re-

audit stage, eight weeks after the introduction of the intervention, the authors speculated that the reminder could have been an irritant to the nurses and/or added to the complexity of the procedure, thus producing the opposite effect to that which was intended.

In contrast, a previous study involving some of the same authors [25] using an electronically-controlled device with barcode patient identification suggested an improvement in bedside transfusion practice. With this device staff were prompted to carry out the essential steps, for example asking patients to state their names and checking this with the identification wristband, thus providing an alert to any mismatch between the barcoded patient identification on the wristband and the label attached to the blood bag by the blood bank staff. Here, use of the electronic process dissuaded staff from becoming distracted and interrupted, and its simplicity encouraged them to complete the process once they had started it.

Recently, the NPSA has issued a safer practice notice (SPN) 'Right patient, right blood', which stipulates that the compatibility form and the patient's notes are not used as part of the final check at the patient's side. Instead, the final identity check must be done next to the patient by matching the blood pack with the patient's wristband (or identity band/photo identification card) [106].

Wrong site surgery

Although communication breakdowns have been identified as the leading cause of wrong-site surgery, the efficacy of preventive strategies remains unknown. Makary and colleagues evaluated the impact of operating room briefings on coordination of care and risk for wrong-site surgery as measured by a modified safety attitudes questionnaire. Such briefings significantly reduce perceived risk for wrong-site surgery and improve perceived collaboration among theatre personnel [107]. Since the implementation of JCAHO's universal protocol little data has been available for measuring compliance with it. In 2004, 69 incidents of wrong-site surgery episodes were reported and 90 were reported in 2005 [18].

JCAHO has identified a number of contributory factors including emergency cases (19%); unusual physical characteristics (16%); unusual time pressures to start or complete the procedure (13%); unusual equipment or setup in the operating room (13%); multiple surgeons involved in the case (13%); and multiple procedures being performed during a single surgical visit (10%) [108]. Wrong-site surgery is also more likely to happen in units that rely solely on the surgeon for determining the correct surgical site. The updated analysis of the JCAHO database [18] highlights the role of communication failure. Human error such as misuse of addressograph labels, mishearing, misspelling and misfiling may lead to

misidentification. Other factors that may contribute to an increased risk of wrong-site surgery, and the broader issue of misidentification, include illegible handwriting, the use of abbreviations related to the surgical procedure, site, or laterality (for example: RSO, Rt Salpingo-oophorectomy or Right Salpingo-oophorectomy), unavailability of health records or failure to review them, and distraction. Underlying most cases of misidentification is communication failure – between staff and patient or between care providers [109, 110].

A recent study used the ‘human factors engineering approach’ to study barriers to implementing correct site guidelines [111]. The study concluded that “[t]ime pressure, crosschecking, uncooperative communication culture, complexity in the work process, attention/distraction, and documentation concerns make guidelines that rely on verification of the site complicated and vulnerable to error.” The authors found the expectation that the operating surgeon will see each patient before the operation to mark the site was “out of sync with existing processes”. Further, how sites are marked is a factor. It is important that the mark should be as described in the NPSA guideline: an arrow. In some guidelines the site is marked with an X, and in others an X is used to mark the site that should not be operated upon. There must be a unified coding protocol for marking. Other authors have made recommendations [112-115], and a number of interventions have been reported as possibly beneficial, including timeout and the use of an airline-style ‘boarding pass’ [116], RFID [117] and SurgiChip [118].

Sandberg *et al* [119] report an experiment that demonstrated that current technology can automatically collect sufficient data to monitor remotely patient flow through a hospital, provide decision support based on predefined rules, and automatically notify stakeholders of errors.

Correct site surgery: common recommendations [107, 112-6]

Local guidelines and protocols should be developed and implemented by multidisciplinary teams.

- Abbreviations should not be used. If the procedure is specific to one side of the body (laterality) the procedure and side should be spelled out in full in all documents
- The patient (partner or family members if the patient is not able to communicate) should be involved in marking the correct site
- The verification checklist should include oral communication
- Clarify how discrepancies recognised during the verification process should be resolved

- There should be a mechanism for auditing compliance with guidelines

Medication safety

Medication errors have been studied extensively because their frequency is high, and a small proportion result in ADEs and serious injuries. In one estimate they accounted for 7000 deaths in the United States and increased hospital costs by more than \$2 billion during 1993 alone [120].

Two studies have tried to understand drug errors from the nurse's point of view [121,122]. Tang [121] set up focus groups of Taiwanese nurses to design a list of factors contributing to medication error. This was used as a prompt for nurses to use when recounting significant errors they had personally experienced. 'Personal neglect', 'heavy workload' and 'new staff' were the three main factors quoted. Ulanimo and colleagues reported a study concerning nurses' perspectives regarding medication errors [122]. Sixty-one Californian nurses were invited to rank a list of 10 possible causes of medication errors and review six patient care scenarios explaining what they might do. Failure to check the patient's name band and tiredness were the top two perceived contributing causes. All nurses surveyed perceived that information technology decreases medication errors. Medication errors continue to occur, however, despite the availability of sophisticated information technology systems [122]. In the chemotherapy setting, where the consequences of drug error may be more severe, the study of Gandhi and colleagues reported a high interception rate, reducing the potential for harm. They attribute this in part to the strong culture in the hospital studied of allowing and encouraging staff to 'speak up' if they discover a problem [123].

Pape and colleagues reported a trial of a 'do not disturb' sign hung above the medication trolley during nurses' drug rounds. There was a significant decrease in distractions after placement of the sign [124].

Three studies have reported the use of barcoding to reduce medication error [125-127]. Poon *et al* performed a direct observation 'pre and post' study to evaluate the impact of barcode technology on medication dispensing errors and potential ADEs and found that barcode technology significantly reduced the rate of dispensing errors leaving the pharmacy by 85%. The rate of potential ADEs due to dispensing errors was also significantly reduced by 63%. In a 735-bed hospital where six million doses of medications are dispensed per year, this technology is expected to prevent about 13,000 dispensing errors and 6,000 potential ADEs per year [125]. Puckett [126] found less encouraging results. A review focusing on drug administration in anaesthesia also concluded that barcoding could be useful [128].

2.3.8 Lessons from other industries

In air traffic control (ATC) and rail traffic control (RTC), the processes in use share many common characteristics [12]:

- Unique identifier eg call sign/train identification number
- Codified knowledge: airline (usually)/train type
- Shared representation
- Can be used in different media
- Representation of history
- Active communication
- Formal communication procedures

A major difference from healthcare is the use of a single unique identifier which can be used easily in different media. In healthcare, it is common to use various identifiers interchangeably, and not all identifiers are suitable for all media. A barcode, for example, would not be suitable for verbal communication. Also, the identifiers used in ATC and RTC contain knowledge about certain aspects of the object, unlike hospital casenote numbers.

An obstacle to applying these practices in healthcare is the fact that most interactions in ATC and RTC are between fellow professionals, whereas in healthcare they often involve the patient, who is separate from the networks of formal and implicit knowledge that medical staff share.

The aviation and railways maintenance guidelines involve the use of checklists. We found little recent work on this since the classic but rather small-scale work of Degani and Wiener [129]. Checklists are of course widely used in healthcare also.

An important difference between healthcare and industry is the practice in industrial settings of performing risk assessments of new developments. This begins as a prospective process before the introduction of new techniques or technology (and even at the stage where such introduction is first considered, as part of the initial option appraisal) and continues after implementation, with collection of data on performance and analysis of adverse incidents. This is in contrast to the introduction of many new policies and procedures in the NHS.

2.3.9 Possible prevention strategies

There follows a summary of the main types of recommendation derived from studies reviewed by Sujan *et al* [12]:

- Use of identifier on surgical site
- Unique identifier on relevant documents
- Name-alert identifier
- Forcing functions (restricting some types of procedure by the design of equipment, eg connections that will not allow incompatible gas supplies to be connected)
- Use of several patient identifiers
- Time-out procedures, final verification process
- Use of active communication
- Read-back procedure
- Active patient involvement
- Treating one patient at a time
- No pre-labelling
- Immediate labelling
- Begin treatment/procedure as soon as possible
- Identity check performed by one member of staff only
- Routine, periodic checks (eg medication chart)
- Patients with same/similar names not in same room
- No medication administration just after shift handover
- General risk management
- Formal policies
- Continuous monitoring programme
- Near-miss reporting programme
- Reducing fatigue through adequate work schedule

In addition to the recommendations described above, the following practices were reported or observed during the fieldwork [12]:

- Use of a patient bed board
- Use of redundant checking
- Use of a named nurse to care for patients
- Bay system arrangement on wards
- Use of local drug lockers

- Patients limited to one or two per room
- Only seven patients to a named nurse

Conclusions

Our review exercise has revealed that the majority of literature since the HRA report in 2003 relates to technological advances to avoid checking errors. There is an abundance of recommendations to adopt new (but only partly evaluated) technologies as a solution to mismatching problems. The many guidelines often take into account data from incident reporting, claims and complaints but are rarely based on 'high level' evidence and there is no standardised way to describe checking, patient identification or patient verification. There is no evidence to confirm or refute the suggestion that bedside checking plays a role in detecting errors from earlier in the care process, thus reducing patient safety incidents. Whilst evidence is often lacking for policy or practice developments, it is important that this is made explicit.

3 Empirical work: approach and methods

3.1 Aims

Our aims in this part of the project were

- to build up a picture of how checking in general, and verification of identity in particular, are built into routines of healthcare work and how these relate to formal guidelines and procedures governing these activities
- to explore how notions of safety are incorporated into training and practice
- to perform a task analysis of wristband application and use

3.2 Ethnographic approach

Our approach to the data collection builds on the theoretical perspective we adopted. To us, the issue of checking, as with so many problems in clinical governance and patient safety, is a classic example of differences in 'sense making' at different levels of an organisation [130]. There can be said to be at least two conceptually separate, though co-existing organisational 'spaces'. One space, which we could term the 'high level' (strategic) space, is where organisational policies and procedures are generated and documents produced. The other is the space where the 'real business' takes place, which in healthcare is at the point where individual clinicians interact directly with patients. In respect of patient safety, as in other areas of clinical governance, these two spaces may not coincide. To improve patient safety, it is often necessary to change clinician behaviour. This is seldom achieved simply by producing and distributing policies, guidelines and recommendations [131,132]. We highlighted the differences between these two organisational spaces in our previous work documenting the hospital response to the outbreak of Legionnaires' disease in Barrow-in-Furness in 2002 [133]. Here, it was as if the hospital management created the necessary conditions for clinical staff to do their jobs in the face of a huge increase in workload, and also sanctioned a degree of 'risk-taking' and improvisation which, we believe, contributed to the success of the handling of the outbreak. It is noteworthy that this delegated decision-making, where managerial staff deferred to clinical expertise, is one feature attributed to 'high-reliability organisations' [134,135].

We aimed to build up a picture of the 'low-level' organisational space, as this is where bedside checking is located. A full description of this space in a way which allows us to make sense of it from participants' point of view calls for ethnographic methods. We have successfully used such methods both to describe how professional knowledge in the safety-

critical specialty of anaesthesia is learned and acquired [136,137] and also in the description of the Legionnaires' outbreak referred to above [133]. In ethnography, a range of qualitative methods is used to build up a picture of the phenomenon under study within its social context. Such methods are ideal when little is known about a particular subject as they help to define the boundaries of such issues and to provide hypotheses for further enquiry. Sample size is less important than for quantitative work. What matters is how closely the findings of ethnography reflect the perceptions and viewpoint of those being studied [138,139]. This is constantly tested as the work develops (see below) and as a result, it is also important for the researchers to be aware of any prior beliefs and prejudices they may have about their subject [140,141]. Thus, statistical power is sacrificed for the detailed, faithful in-depth understanding of the issues that is provided by the qualitative approach [142,143]. Ethnographic methods have been successfully used to enable analysis within a patient safety framework both in a study of medication error [144] and in the operating theatre [145].

3.3 Data collection

We aimed to carry out this work in two contrasting acute hospital trusts, selected purposively for their differences in location, practice contexts and ethnic mix of patients and staff (see section 4.1). However, practical difficulties with securing approval in the second trust meant that we were restricted to one. This was less of a problem than might be imagined as it has three separate acute sites, well spaced geographically, each with a distinct culture and identity which predate the merger into a single trust some years ago.

Within each hospital we planned to select sites to study at least the following clinical activities:

- administration of intravenous fluids, including blood
- administration of medicines
- checking of patient identity before surgery.

The different strands of data collection are designed to complement each other.

3.3.1 Observation

The data were gathered principally by observation. This is useful because it allows study of actions in the real-life, naturalistic context where they occur. It allows us to see what practitioners actually do, whereas interviews may be coloured by what respondents feel they

ought to say they do. Observations were not guided by a predetermined checklist (so-called systematic observation) as this might limit the flexibility of what is found. We took field notes during observation periods and transcribed them immediately afterwards, correcting and annotating as necessary. We performed observations as far as possible during the day and at night, in both routine and emergency settings, in a number of locations including, for instance, the Accident and Emergency department as well as general wards. We observed a range of staff, including nurses, doctors, ward clerks and theatre staff. Our planned focus of observations varied according to activity. For instance, to examine checking of patient identity before surgery, we thought it would be desirable to follow patients through the process, whereas for administration of medicines, observation of staff as they go about the activity repeatedly would be expected to be more fruitful.

3.3.2 Interviews

Preliminary interviews with staff and patients helped us to identify themes and issues to inform later work, and debriefing interviews after a period of observation helped us to ask questions of the people we had been observing, to enable clarification and further discussion [136]. Later interviews helped us to draw out emerging themes identified from early observations. Interviews were, with respondents' permission, tape-recorded and transcribed. A number of focus group interviews were also held. Sample interview prompts and questions are given in Appendix 1.

3.3.3 Survey of wristband types and compliance with policy

As a preliminary scoping investigation, we conducted a brief snapshot survey of wristband use in one hospital. The researcher visited each ward and department and spoke with the most senior nurse available on the ward and other members of the nursing staff on duty asking how they used the wristbands. A sample of each wristband currently in use was also obtained. The responses and wristband types were compared with the hospital policy in force at the time.

3.3.4 Task analysis of wristband use

Broadly, task analysis is a functional approach to knowledge elicitation which involves breaking down a problem into a hierarchy of tasks that must be performed. The objectives of task analysis in general can be outlined as the definition of:

- the objectives of the task
- the procedures used
- any actions and objects involved

- time taken to accomplish the task
- frequency of operations
- occurrence of errors
- involvement of subordinate and superordinate tasks.

In task analysis the objective constraints on problem-solving are exploited, usually prior to a later protocol analysis stage. The method consists in arriving at a classification of the factors involved in problem-solving and the identification of the atomic 'tasks' involved. The categories that apply to an individual task might include:

- time taken
- how often performed
- procedures used
- actions used
- objects used
- error rate
- position in task hierarchy.

We aimed to break down (decompose) relevant clinical activities into their constituent subtasks and operations [146-148] as follows:

- a) Break down the primary task into a number of subtasks – usually between four and eight. These subtasks will be specified in terms of their objectives
- b) Map out the subtasks into a layered diagram to ensure that the whole task is accounted for
- c) Decide on the level of detail for decomposition (task flow diagrams to be used as necessary)
- d) Continue decomposition process to produce a written account as the diagram is constructed. Note redundant checks, and errors committed earlier in the process of care which only become evident at this point
- e) Present the analysis to someone who has not been involved in it but is familiar with the task, to check consistency and validity.

As task analysis is not intended to capture the underlying knowledge structure directly, it must be complemented by more in-depth elicitation of perceptions and influencing factors by interview and observation. We aimed to address this in the other aspects of data collection.

3.4 Data analysis and synthesis

Analysis of interview and observational transcripts is largely an inductive process, that is, findings emerge from the data themselves, rather than being specifically sought to confirm or refute a predetermined hypothesis [142]. However, in the analysis as in the data collection, aspects such as formal and informal sources of knowledge and procedures used in checking informed our processes. Members of the research team individually read and re-read the transcripts, annotating recurring patterns of talk and behaviour. They then met to discuss areas of agreement and divergence, developing the emerging ideas into categories [143]. The members of the research team bring a range of perspectives from within healthcare and outside. We found this extremely useful in a previous project, as it serves both to enrich the analysis and to guard against the imposition of one particular interpretation of the data [136]. Further transcripts were then read with the emerging themes in mind, looking for material to support or supplement them. Bringing data from different sources together (triangulation) allowed us to test the validity of our data, whilst analysis of relevant documents provided a complementary version of organisational safety for comparison.

Further synthesis across and between this, the task analysis and the intelligence-gathering was performed. To guide us in this potentially complex activity we have drawn on our experience of a similar multi-source synthesis in our previous work [149-152].

4 Empirical work: results

4.1 Study sites

The data were collected in the acute hospital trusts in the north of England. The trust has three acute hospitals which maintain their distinct working cultures despite being merged into a single trust some years ago.

Most observations focused on nurses and non-clinical staff such as porters. Interviewees are listed in Table 5.

4.2 Interviews

Material from the interviews has been interwoven with observational data into the general themes set out in section 5.

Interview number	Respondent	Hospital site	Comments
1	Ward manager, critical care	1a	
2	Chief pharmacy technician	1a	
3	Operating theatre sister	1b	
4	Clinical risk manager	1b	
5	Staff nurse, radiology dept	1c	
6	Sister, acute medical ward	1c	
7	Nurse transfusion co-ordinator and student nurse	1c	
8	Ward manager, medicine for the elderly	1c	
9	Senior Nurse	1b	
10	Patient	1c	
11	Ward clerk	1c	
12	Nursing staff, Accident and Emergency	1c	Staff nurse and sister present
13	Nursing staff, Admissions Lounge	1c	
14	Day Care Surgery, sister	1c	
15	Focus group, Surgical Assessment Unit	1c	

Table 5 Summary of interview data

4.3 Observations

Initial observations (1 to 5) were designed to understand the background routines of nursing work on hospital wards over a period of time. Not only did this enable us to set subsequent work in context, it also allowed the nursing staff under observation to become accustomed to the presence of the researcher(s). During this period we observed the activities of nurses,

ward clerks and other staff, handovers between shifts, visiting time and how safety in general, and checking in particular, are enacted in practice.

Observation number	Location/focus	Hospital site	Duration
1	High Dependency Unit (am)	1a	1.5
2	Surgical ward	1a	1.5
3	High Dependency Unit (pm)	1a	1.5
4	Oncology	1c	1.5
5	Oncology	1c	1.5
6	Oncology day case unit (shadowing one nurse)	1c	6.5
7	Day Care Surgical Unit	1c	1
8	Accident and Emergency	1c	3
9	Medical Admissions Unit	1c	2
10	Porters	1c	2
11	Operating theatre porters	1c	4
12	Medical Admissions Unit	1c	3
13	Porters	1c	3

Table 6 Summary of observation sessions

The second aspect to the observation strategy was to follow what might be called the 'patient journey'. One session followed a patient from admission through the Accident and Emergency department, whilst others followed patients for elective surgery from admission, through the perioperative period. We also focused specifically on transfers and handovers of care by shadowing hospital porters.

The third group of observations focused on more specific issues in context, namely the application and use of wristbands and how identity was established and checked throughout the patient's hospital stay.

4.4 Wristbands: application and use

4.4.1 Survey of wristband types and compliance with policy

Twenty-five wards and departments were sampled in one hospital in Site I. Ten different types of wristband were found: two white, four red, one green, three paediatric (one each of pink, blue and colourless). All the departments order their wristbands from central stores, but stores change their supplier periodically. As the departments stock up in bulk this can explain why there are so many different types of wristband in use throughout the hospital.

The hospital wristband policy in force at the time of the survey specified that all patients should have a white wristband with their details on it unless they have an allergy. If they have an allergy they should have a red wristband with their personal details on it, but not

those of the allergy. The policy was not specific as to what constitutes an allergy (anaphylaxis/rash/nausea).

All the wards/departments had some way of identifying patients with allergies. In all but one department this was by using red wristbands. In the endoscopy unit, however, only white wristbands were in use, with allergies being identified in a separate document.

We found that two main strategies were employed for completing the wristbands:

1. According to hospital policy as outlined above
2. A white wristband is applied with the patient's details and a second, red wrist band is applied if the patient has any allergies. This second, red wristband has the name of the allergen on it

There was a difference of opinion between nursing staff on some wards, resulting in strategies 1 and 2 being in use at the same time.

The results from the wards are tabulated below. Wristband strategy is labelled as above (1 = hospital policy, 2 = two wristbands used, * = some other policy). Fourteen of the 23 departments surveyed (importantly including A&E) were not using the most current policy (white for identifiers, red for allergies). Only eight departments are using the new policy. One department uses a mixture of both. Two have their own policies.

Interestingly the nursing staff in all the departments (excepting A&E and the Medical Assessment Unit) said that most patients arriving on the ward already had wristbands in place and they would not be removed or changed, even if they were not in keeping with the ward policy.

This initial survey was helpful as a snapshot of current practice but also allowed us to steer later observations and interviews to address some of the issues raised.

Ward/Department	Wristband types in use	Wristband Strategy
Medical Wards		
1	Red and white	2
2	Red and white	2
MAU	Red and white	1
CCU	Red and white	2
3	Red and white	2
4	Red and white	2
5	Red and white	1 and 2
6	Red and white	2
7	Red and white	1
8	Red and white	2
Surgical Wards		
1	Red, white and green	2
2	Red and white	2
3	Red, white and green	2
4	Red and white	1
5	Red and white	1
6	Red, white and green	1
Day Case Unit	Red and white	1
Womens Unit		
1	Red and green	1
2	Red and white	2
Maternity ward	Red and white	2
Neonatal unit	Clear labels	*
Other Departments		
A&E	Red, white and green	2
ITU	Red, white and green	2
Paediatrics	Red, white, blue and pink	1
Endoscopy	White	*

Table 7 Results of wristband survey

* The neonatal unit only uses clear paediatric wrist/ankle bands as no allergies are likely to have been identified

* The endoscopy unit only uses a white wristband. Allergies are identified in the proforma.

4.4.2 Task analysis of wristband application and use

Material relevant to this table has been taken from direct observation of practice, interview and focus group data and local and national policies and procedures. As noted under section 3.3.4 above, breakdown of a given task into steps can only describe what happens; explanation and understanding has to come from other contextual material and this is what we have done in the synthesis presented here. Note that these data were collected before the NPSA's standardisation notice on wristbands was issued in July 2007. This contains guidance relevant to many sections.

TASK	SUBTASK	STANDARD/ RECOMMENDED PROCEDURE	VARIANCES	COMMENTS AND EXISTING CONTROLS IN SYSTEM
1 Decision to apply wristband				
	1.1 Decision to apply wristband in elective patients	Standard [47]		
	1.2 Decision to apply wristband in emergency patients	Usually when decision made to admit to hospital or refer to another clinical team		May have been in Accident and Emergency department for some time before this decision is taken. Risk for mismatching during this period. Many patients admitted via Assessment Units –does position vary cf. Accident and Emergency?
			Some patients have no wristband applied at all	Could/should wristbands be applied before attendance at hospital e.g. applied by ambulance personnel? Not always easy or possible to elicit such details in an emergency
2 Preparation of wristband				
	2.1 Take blank wristband from store			No specifications for size, material, tensile strength or robustness of

				fixing mechanism
3 Inscription	3.1 Prepare for writing	No recommendations	What type of pen? Capitals only, or capitals and lower case? What colour of ink? What size of writing (if handwritten)? What size font (if printed)? Patient 'addressograph' labels also used	All inks etc will fade/wash off over time – which are most durable? Potential for confusing letters with similar appearances, or numbers e.g. 5s and 8s, or 4s and 9s
	3.2 Decide on which details to be entered on wristband	First name, last name, date of birth and hospital number	Full name, ward, consultant in charge of care, hospital (unit) number. Allergies may also be listed	Patient may have abbreviated form of name(s), nicknames, or be known by a name other than that given
	3.3 Enter patient's details on wristband	At bedside during nurse's admission clerking	Details entered in patient's absence, usually before admission to hospital, usually by ward clerk. Completed wristband fixed to front of patient's case notes as part of 'admission pack'	Risk of loss, fixing to wrong patient's notes or of being applied to wrong patient
4 Initial verification of identity	4.1 Verify patient's name and date of birth with patient	Positive identification – 'what is your name?'; 'what is your date of birth?'	'Are you XX?' 'Is your date of birth XX/XX/XX?' Alternative is to check with patient's carers, parents or other responsible adult	Procedure cannot be applied to patients who have learning disabilities, cannot understand English or who are unconscious. Increased risk of error in those who have very similar names to others. In Accident and Emergency, one nurse stays with an unconscious patient at all times
	4.2 Verify other information on wristband	Verify NHS/hospital number with case notes and other documentation		Patient's details checked against computerised patient data system, and other documentation – operating list or pre-admission questionnaire completed by patient
	4.3 Show wristband to patient for approval before			Patient will not be familiar with his/her NHS/hospital number and

	application.			cannot therefore be involved in checking that
	4.4 .Decide if separate allergy band is necessary	Check with patient and casenotes for known allergies. Verify that these are true allergies	Patients may be labelled as allergic when reaction is part of expected pharmacological profile of drug e.g. diarrhoea with antibiotics. Patients may be incorrectly not labelled when in fact an allergy is present	Risk of perpetuating false 'allergy' in patient's record. Alternatively, risk of inadvertent administration of drug to which patient truly is allergic. Who should take responsibility for determining whether reported reaction is true allergy or not? If patient has multiple allergies, should all be recorded? If there are constraints of space, should two allergy bands be used?
5 Application to patient	5.1 Choose site for application	Wrist usual; can also be applied to ankle		
	5.2 Choose number of bands to apply	One usual for adults; two usual for neonates		
6 Utilisation	6.1 Staff check wristband on first meeting patient	No standard		
	6.2 Staff check wristband at start of every nursing shift e.g. as part of nursing handover procedure	No standard		'Getting to know patient' an essential defence against misidentification. Part of professional identity of nurses to 'know patients'
	6.3 Staff check wristband on every occasion patient leaves a ward, goes for an investigation or procedure	Closely specified procedures for surgery and other invasive investigations (usually those where specific written consent required). Most diagnostic departments have identification protocols – role of wristband checking as part of these not formally investigated in this study	Often performed when leaving for procedure. Less often undertaken when patient returns from procedure	
	6.4 Staff check wristband at	No standard.		Handovers of care often informal

	every point where care is handed over to another member of staff			and relatively unstructured
	6.5 Staff check wristband before taking blood or any other specimen	Usually well specified in local policies	Variably observed	Phlebotomists felt to check more reliably than, for instance, junior doctors. Is this a training issue? Or do those who perform a limited range and number of tasks tend to do them more accurately?
	6.6 Staff check wristband before transfusing blood	Closely specified national policies e.g. <i>Right Patient, Right Blood</i>	Generally well observed	
	6.7 Staff check wristband before administering drugs or intravenous fluids	Local policies based on national guidance	Generally observed	Staff do not always check wristbands if they are administering drugs to a patient they feel they know well, or to whom they have already given drugs earlier in the same shift
7 Re-application to patient	7.1 Re-production of wristband when previous one has become illegible or has been removed or dislodged			Are wristbands readily available throughout the hospital, or at the very least, in the areas where they are most likely to be removed?
	7.2 Re-verify patient's identity	Should proceed as under 4.1 and 4.2 above	If old wristband still available (e.g. if removed to allow venous cannulation) copy old details onto new wristband	Risk of misidentification if wristbands removed from more than one patient at a time. Risk of perpetuating error if original details on wristband incorrect

Table 8 Task analysis of wristband application and use

4.4.3 Wristband data from interviews and observation

There was some agreement and awareness of NPSA guidelines [47] as to what information should be written on a nameband:

“It should be standard yes – there’s guidance from the NPSA on that – so just again off the top of my head, it’s name, date of birth mmmm, they’re asking for NHS number whereas I think at the moment we use unit number, mm and I think that’s basically it – that’s it – just those three things.” (Interview 4)

However, the temptation to include other details was very apparent:

“The patient’s name, their date of birth, their XXX number, the area where we are and the referring clinician’s name as well.” (Interview 5)

The use of coloured namebands was discussed with interviewees agreeing that the coloured wristband used was a red one to denote that the wearer had allergies and their notes should be checked:

“A red nameband means an allergy, go and look at the notes and see what the allergy is.” (Interview 4)

“You’d ask the patient what’s their name, date of birth, what’s their address, which consultant are they under and you’d have written that all in the nursing documentation and that’s immediately transcribed into the nameband. Sometimes obviously you might not have the unit number but now we’ve got the new system – the IPM system – you just go online, fill in the details and it gives you the unit number and stuff automatically.” (Interview 8)

Checking identity when wristbands not present

On the oncology unit, patients are technically not inpatients although they may spend some hours in the hospital as they receive their treatment. Some patients are clearly well known to staff and their identity is not always formally checked. Others are relatively new to treatment and the typical greeting is “Hello, you’re X aren’t you?”. Patients do not wear wristbands or other formal identification.

We witnessed a number of different activities for which checking would be relevant. Numbers in brackets are the number of occasions observed.

- 1 Taking blood from patient (two) – in both cases, patient asked to confirm name and date of birth
- 2 Checking drugs against prescription chart (six) – according to hospital policy, with two nurses
- 3 Adding drugs (anti-emetics) to intravenous infusions (one) – apparently added without further check
- 4 Checking patient's identity before administering drugs (nine). Identified in format "Are you X/ is your date of birth XX/XX/XX?" (six). Apparently given without a formal check (three).

4.5 Drug rounds

Conduct of drug rounds

The way drug rounds are carried out varies from ward to ward. Some wards still use a large medicine trolley which is wheeled around all patients, others use individual patient drug lockers with either the nurse or the patient being responsible for the administration of medication.

"(There are) four separate rounds a day. And we don't have a medicine trolley at all – all our patients' drugs are locked in their individual lockers and we have a separate key that opens that. Some of our patients self-medicate so they have their own personal key – but we do a risk assessment on those individuals and they have to sign consent to allow them to do that. And we have to monitor that whilst it's in process. We might take a small trolley on a round with us – you know like a dressing trolley – things like paracetamol, lactulose, movicol – things that might not be in their cupboard – that we'll give as a prn". (Interview 8)

Commonly drug rounds are split up so that the nurse responsible for a group of patients does their drugs. Controlled drugs are usually administered separately at either the beginning or the end of the round, or at a prescribed time. There would seem to be confused messages and misunderstanding as to who carries out checks for controlled drugs. Whilst there is a consensus that there should be two staff doing the checks, it is not clear what level of qualification they should have. Some wards allow auxiliaries to double-check the stock levels – ie not check during administration. The real confusion seems to revolve around what student nurses are allowed to do:

"And we are not allowed to check those – to be a second checker in controlled drugs – as a student nurse – you're not allowed to do that... No, you're actually allowed to administer it – but you can't be the second checker". (Interview 7)

Typically, drug rounds follow a pattern: tablets first, then intravenous drugs, then controlled drugs. Usually two nurses will split the first part of the drug round (tablets), then when they meet up halfway round, they work together on the rest. Tablets only need to be checked by

one person, whereas intravenous and controlled drugs often need to be checked by two. Drugs given through infusion devices are generally checked by two people. More recently, new patterns of drug rounds have emerged, with nurses walking to and fro between each patient's bed and the drug/fluid cupboard. Sometimes drugs are put into an individual locker for each patient – usually the patient's own are relabelled in pharmacy but this cannot easily be done at weekends. There is a feeling that this 'one-stop dispensing' makes discrepancies more obvious.

Would this lead to potential drug interactions being missed because they are not being thought about simultaneously? Pharmacy departments check the prescription charts daily (except Sunday) looking for potential errors in order to pre-empt any later problems.

Some nurses report that when they come to the drug trolley, they select packets of tablets by recognising the colour of the packet. This may change with pharmacy's supplier.

"I think sometimes pharmacy throw us a bit because they'll have ...frusemide came in a pink and white packet for a long, long, long time and then all of a sudden it'll go to a red packet or a yellow packet. So you'll be thinking "that drug isn't in there" or you'll pick it up presuming you've got frusemide in your hand and it's not. You'll see that it's a different drug but you've picked out a pink and white box thinking that's going to be the frusemide. But when you read the name it's not frusemide, it's something else." (Interview 6)

There are potential risks when patients are on many tablets. If the nurse is distracted whilst dispensing them into the pot, she/he may not know which have been dispensed. The sensible solution is to start all over again – nurses may be familiar with the appearance of some tablets, but others may look the same. The same potential for confusion exists when administering medication – if the pot is dropped, for instance, before all the tablets have been swallowed, which have been taken and which not? The possible apparently obvious safeguard of checking how many tablets are left in the pack is not reliable – medicines are sometimes borrowed from other wards and not accounted for.

Some nurses check that all intravenous fluids are running to time, with one interviewee reporting that when on nights (s)he makes a list of what is due to run through so that (s)he can get the next bag ready. Syringe drivers would also be checked on the drug round; a new policy has just been introduced requiring nurses to check every four hours and to sign to confirm the check has taken place.

Self-medication by patients

There are potential risks with self-medication. Whilst it is convenient for the staff, and allows patients some autonomy in hospital, there is no guarantee that the medication is being taken. Drugs can be left out on lockers or bedside tables. Patients say they will take them with their breakfast, for instance, and nurses may not be free to come back again in time to check that this has been done.

Prescription charts

The design of some prescription charts means that it can be hard to tell what has to be given. For example, some charts do not have space to record the time and dose of a prn medication. Also the prescription chart is kept separately from the notes. Using continuation sheets when the chart is full rather than trying to persuade the doctor to rewrite the chart can lead to mistakes being made.

Knowledge

There was a feeling that the use of lockers for patients' drugs made things safer for student and newly-qualified nurses. There is a perception that many student nurses graduate without having a real understanding of many medications.

"They don't know what they are, what they're for and they wouldn't – if you were to prescribe somebody a ml of insulin they'd give it because they wouldn't have a clue that it's not the right dose." (Interview 8)

Timings and tasks

Do prescription times coincide with

- a) the times that drug rounds are meant to take place
- b) the times they actually take place in practice due to other demands on nurses' time.

For instance, one interviewee stated that some staff would give the 06:00 medication and others would not. This is partly about not wanting to wake the patient.

4.6 Transfusion checks

One interviewee told us that fluids are checked by two trained staff, or students will check the fluid and will sign the checked box. If involved in administration of fluids, students would run an infusion through but not start it. With regard to blood transfusion, this is checked by two trained members of staff, using casenotes and documentation that comes with the blood, then checked again with the patient at the same time as the pre-administration observations.

One problem is that nurses and doctors (less often phlebotomists) do not identify patients positively when taking the initial blood sample. The risk was described to us as “...*they just say ‘I’ve come to take some blood from you’ and get distracted before writing the request card, mixing up the details.*” (interview 7)

The whole procedure was outlined for us by interviewee 7 (transfusion specialist nurse):

‘When the blood is collected – someone is meant to come to the fridge - with patient information details so that they identify the bag of blood for the patient based on the patient information details that they have. Not based on “Oh I think it was for Irene Smith – was it Irene Smith?”, which also happens...Having identified the blood bag, they take it out, they find the G095 number on the signing-out slip in the register and they put their name, the date and the time that they’ve taken it . Gets up to the ward – we are currently still advocating two people to check at the patient’s bedside. And what we expect them to do is positive patient ID – so who are you, what’s your date of birth, confirm that with the wristband and the RTX number on the wristband then confirm those details are the same on the bag of blood and obviously on the casenotes, the prescription chart that they have. Assuming all those details correlate, in particular the patient lying in the bed more than the bits of paper that go with them, then we want them to check that the bag is what we’ve said it was going to be. So if there was a transfusion history on the patient it will be recorded in the notes. And we are expecting them to go back and double-check that if we’ve said that they are A+ with no antibodies, that historically in fact they are A+ with no antibodies and also if we’ve said they’re A+ with no antibodies that that’s what we’ve given them. That means that they have to lift up the label that we’ve put on the bag and make sure that the bag we’ve attached the label to is the one we should have attached it to. Because human error in the labs – that’s sometimes where errors arise as well. Assuming that all of that is correct, they do a full set of obs on the patient, put the bag of blood up. Assuming the obs are OK obviously.’

(Interview 7)

We learned that student nurses cannot be second checker until their third year or after completing the common foundation module. Operating department practitioners can, but not operating department assistants. Several interviewees highlighted how important the patient is as a safeguard.

4.7 Handovers and transfers

There are a variety of ways in which handovers take place. These vary from direct one-to-one communication between qualified clinical staff, transfer via telephone communication and via support staff. Most commonly these are necessary when a patient moves from one department or ward to another or goes for an investigation.

Nurse asks which one's going for X ray?

Nurse 1 replies number 8 (knows patient, has been dealing with him since admission)

Doctor 1 hands her the X ray request card, nurse 1 and takes patient through to X ray dept.....

(later) Patient 1 is back from X ray. X ray staff return patient to bed in bay 8, no checks of identity made. Nurse 1 knows patient (no wristband applied as yet).

(Observation 8)

However, it is not simply the patient and relevant information that have to be transferred. Sometimes, as in the case of moving patients between wards, other points have to be attended to – for instance, patients' drugs are kept in their bedside lockers if they are administering their own medicines, and one interviewee recounted an incident where a patient's drugs had been left in the locker after the patient had been moved.

4.8 Pre-procedure checks: surgery and other invasive procedures

These can be seen as a 'special case' of transfer. The processes for checking for invasive procedures tend to be quite formalised. Nevertheless, there is still the potential for confusion.

Interviewees were invited to describe or 'walk us through' pre-procedure checks with which they were familiar. One person explained the procedure for endoscopy:

"...we use the daycase endoscopy checklist and so we check on our ward things like – have they got a nameband on, has the consent been signed, have they got a venflon in the right arm, have they had their observations done, have they got two pillows...and there's a checklist that we complete before they go across. And the nurse goes over, hands them over, to the endoscopy team. They then check the patient to the details of the notes and everything, and then that nurse comes back. Endoscopy ring us and give us the specific

details of exactly what they've done, what drugs they've had and then we accept the patient back." (Interview 8)

We also observed the transfer of patients to and from the operating theatre (see box below). There are a number of differences between these two transfers.

A transfer of patient from ward to theatre

Ward 22 to theatre.

Porter has slip with name, hospital number and ward on it, looks for patient on board
Patient's name doesn't appear on the board, ward clerk asks who he's looking for
Eventually transpires that patient is on ward 23

Arrive on ward 23

Ward clerk asks who porter is there for

Porter states patient's name

Bed 21 he's told by ward clerk and passing staff nurse

Nurse gets bedding and patient's notes

Porter and nurse help patient onto trolley. Staff nurse then checks the following:

Wristband – name, hospital number, against patient's notes and the porter's slip

Allergies – penicillin (has red band on)

When the patient last ate/drank

Checks consent form with patient – correct procedure and that the signature is the patient's

Checks gown, dentures, loose teeth, any metal work, jewellery, hearing aids

Checks that the patient has a mark on the leg

Mark is in correct place but in red marker pen (unsure if this is indelible).

Checks stocking on other leg

Nurse then signs to confirm that everything is correct

She also signs the correct site surgery form

Patient is transferred to theatres and into anaesthetic room

ODP checks patient's wristband again against patient's notes

Checks allergies, when they last ate/drank, teeth

Checks mark on leg

SHO is in anaesthetic room too

Comment made about 'thin' arrows to SHO

Says sorry, and they only had red pen available on ward 23!

B Return of a patient from theatre to ward

Normally transferred by nurse from ward and theatre porter but 'presumably' ward nurse is busy so recovery nurse and porter are transferring patient

Arrive on ward 19, ward clerk says 'do you want to take her to bed 4'

No formal check of patient's identity, ward clerk presumably knows who was in theatre, recovery had already phoned the ward to tell them that X was coming back so ward was aware of identity of patient before they arrived

Auxiliary comes with transfer slide and transfers patient to bed

No formal handover to ward staff by theatre staff

(Observation 11)

4.9 Themes

4.9.1 Identity and verification

Our interviews and observations revealed that patients are identified in many ways. These are described and the advantages and disadvantages of each are discussed.

Appearance

A person's physical appearance is their primary and most obvious expression of identity, at least to those around them. It is also probably the main means by which human beings recognise each other, but is of course only useful if the person is already known to the observer. Thus, for initial establishment of identity in new patients it must be supplemented by other methods. It follows too that it would in theory be possible to use appearance to confirm and verify a patient's identity by photography, though appearances can change considerably in a short period of time when patients are very ill, and the presence of a photograph might distract staff from making a positive verbal identification of a patient and checking his/her wristband.

Names

An individual's name is, to them, probably the most powerful embodiment of their identity. However, although it is intimately bound up with one's private sense of self, the public use of names is not straightforward in many cases. Full names are not always used and there is also potential for confusion from abbreviations and nicknames. It is a matter of English law that an individual's name is that by which they are known – which may be different from any written documentation referring to that person.

Further, patients are never required to prove who they are on admission and indeed there may be a number of reasons why patients may give a false identity. They may be foreign nationals who are here illegally, or involved in another type of identity fraud. The risks for patient safety, for instance mismatched transfusion, are thus increased.

Name boards

Most hospitals have small boards at the head end of patients' beds where their names are handwritten. There is usually a 'master location board' at, or near, the nurses' station. These are useful physical prompts for identity, but are not foolproof. Patients can be moved at short notice, and it is not unusual given rapid turnover of patients on wards for a new patient to be brought into a bed which has been prepared for them without the name of the previous occupant being erased. As the time immediately after admission is likely to be one of the riskiest periods of the patient's stay in terms of identification, as the staff have not yet become familiar with that individual, this also poses a significant risk.

'Master boards' also need to be promptly updated as frequently as patients are admitted, discharged or moved. Further, this board is usually mounted directly opposite the nurses' station. Whilst this makes it clearly visible to nursing and other staff as they are trying to locate a patient, or arranging investigations etc on the telephone, it is also, by virtue of its position, exposing the names of all patients to everyone who comes onto the ward. Some wards have this 'master board' in a room off the main ward. Whilst this is more discreet, it also removes an important visible clue to patients' locations and identities from an area where much of the identity-dependent ward business is transacted.

Wristbands

These are dealt with separately (see section 4.4).

Patients' casenotes

There is much identifying information in the patient's casenotes. The outer cover carries the patient's name, date of birth and hospital number, and frequently home address also. It has been common for serious allergies and other hazards to be written on the front of the case notes too. They of course contain all available clinical information about that individual, and in that sense can be said to embody that patient's clinical identity. The thickness and state of repair of casenotes vary (some patients have multiple volumes) and these non-informational characteristics are also used to help identify a patient's notes, and by implication that patient. This is of course not 100% accurate, nor is the usual practice of storing casenotes in numbered dividers in trolleys on the ward, as notes are frequently replaced into the wrongly numbered divider. Most hospitals in England still use paper case notes, but as they transfer to electronic systems, the functions of these 'non-informational' aspects should not be forgotten.

Location

Patients are often identified by their location. This can be a physical location – which bed they are occupying, for instance, or which chair in the outpatient clinic or chemotherapy room. Location is often used as a form of ‘shorthand’ in communication between staff in describing a patient, for instance, ‘the first bed on the left as you go into the third bay’. Alternatively, bed numbers are used. Location can be organisational also, as an individual is referred to as ‘the third patient on Mr X’s list’ or ‘the first endoscopy this afternoon’. There is thus a temporal element here too, as patients are ordered by time of attendance or time of expected procedure. As such timings change, there is potential for error here too.

Clinical characteristics

Patients are also identified and conceptualised by staff according to their clinical characteristics, most commonly by diagnosis or surgical procedure.

Other artefacts

These are various. During medication rounds, the patient’s prescription chart may represent the patient’s identity in some way. A tray may be used to hold all the drugs a patient may receive as part of a session of chemotherapy. We observed all the trays for one day being stacked in order of expected arrival.

Whilst staff do not rely solely on such informal means of matching activities and treatments to patients, it is important to recognise what methods are used in practice.

4.9.1.2. ‘Knowing the patient’

Staff, particularly nurses, pride themselves on knowing their patients. They clearly regard this as an important aspect of their professional practice. This encompasses not only knowing the patient as a person, but also details of their medical history and, in the case of the chemotherapy unit, being familiar with the drug regimen the patient is receiving. In the case of surgical patients, the preoperative visit by the anaesthetist is almost an ‘article of faith’ in anaesthetic practice. It is seen as a safeguard in that it is then possible to recognise the patient again on his/her arrival in the anaesthetic room, where the last check while the patient is still conscious is to be made. It is now common practice for nurses to perform pre-admission assessments of patients. The desire to meet and know patients personally is commendable, but can expose a tension with standardised safety practices, in that it may

lead staff not to perform the prescribed checks on every occasion when they feel they know their patients well. This is illustrated in the interview extract in the box below.

“I think once they know the patient well they think...if I’m on all day and I’ve done that morning round and then I come to do it again three hours after, I don’t check the patient off again.”

If I come, if I’ve had a day off and I come, I always say “I need to check who you are, I’ve not met you and I need to check your nameband”. So I think once you’re confident you know who that patient is then you do just give them their medication.”

(Interview 6)

Another respondent said that she would always check every single patient if she’d been off duty for a few days, and would also check identity when administering intravenous fluids or controlled drugs. It is also increasingly common to work longer days (14-hour shifts are not unusual) so nurses may perform three drug rounds within this time and may be less likely to check a patient’s identity than if they were to perform three drug rounds on three separate days.

The question then is, at what point do nurses feel they know the patient well enough to stop checking their identity? Is it simply a matter of time, or does it depend on how much, and how intensively, a nurse interacts with a particular patient? Some patients may need more attention, or more activities which require checking from nurses, and one would expect nurses to learn these patients’ identities more rapidly.

4.9.1.3 Checking in context

Identity confirmation is a dynamic process, not just a one-off application of a wristband. Safe practice demands that it is constantly reverified and reaffirmed.

There are two key areas:

How are checks performed in practice? How many times, and in what situations, is identity checked and maintained?

How much checking is single person checking, and how much involves two people?

Checking in practice

Checking relating to wristbands, and in relation to drug rounds, are reported in sections 4.4.3 and 4.5 respectively.

The view was expressed that checking needs to be an embedded part of healthcare work:

“If checking tasks are built into professional routines they are more likely to be done and done correctly. If they are seen as somehow separate, or performed as isolated tasks, they are more likely to be delegated to someone more ‘junior’, who is less able to do anything about it if things are not right.” (Interview 1)

This respondent also cautioned that such behaviour may in fact be common, but not always obvious unless an observer is actively seeking it. This ‘covert’ safety-promoting behaviour illustrates the fact that once such activities become routine, they are often performed subconsciously.

In general, most medications can be administered after checking by one qualified nurse. Controlled and intravenous drugs must be checked by two qualified nurses. Blood for transfusion also needs to be checked by two people. All drugs in the operating theatres are checked by two people.

Single person vs two-person checking

The issues relating to single vs double checking were well articulated by two respondents:

“I think if you check it on your own you check it over and over again – make sure you’ve got the right drug there. When you’re checking with someone else, the second checker can be shouted away, they’ll turn away – you carry on checking them on your own, but presume they’re watching you. So I think it [single checking policy] should be brought in – the quicker the better really. I think that when it comes in it’ll be safer if you can check it with just one of you. I think you are much more vigilant when it’s just one. I don’t know if everyone would agree with that. I think you both know each other, you trust each other and you just presume the other person is checking what you’re checking – you know. One is reading the drug chart, the other is reading the bottle and you both are saying ‘yes, yes’. We can look at things and think we are seeing what we’re not, can’t we? And I think if you’re on your own, you check and you check again. I think it would be much safer.” (Interview 6)

“In the 17 years I’ve been here the checking of medicines has changed quite radically during that period of time. When I first started as a student everything had to be double-checked, regardless of what you were giving and then as time went on....at the time I became an E grade in medicine they decided that it was safer for one nurse to do the checking because she wasn’t chatting to the other nurse. So then it became one nurse’s responsibility to do that...which in a lot of respects I found quite useful. When it’s only one you know what you’re doing. You’re not distracted by somebody but obviously...and you’re not relying on the other person to check it – you’re relying on only yourself. So that was quite helpful.”

(Interview 8)

As already mentioned in section 4.5 there was some confusion about who could and could not be second checker, particularly with regard to the status of student nurses. The question was also raised, would it be possible for a machine to act as the second checker – for instance, in systems where staff and blood/medications are barcoded?

4.9.2 Safety sensitivity

An awareness of risk and safety is part of the professional identity of staff. Clearly this will vary from individual to individual, and one would expect this variation to be reflected in staff behaviour in respect of safety generally, and checking in particular.

An ex-nurse highlighted how easy it is for things to go wrong, or make an assumption that turns out to be incorrect. An experienced nurse described to us how, during medicine rounds, she checked not only the identity of the patient, but also the drugs in the box, medications discontinued, food chart, fluid balance, patient’s needs for help with eating/drinking, speech and language therapy needs, check prescriptions, early warning scores, blood sugars, moving and handling sheets. As she did so, she compiled a list of necessary actions for herself and for the doctors. Another senior nurse described similar overall checks as part of her daily work – including oxygen, suction and pressure mattresses and other equipment at the start of each shift. These nurses have presumably developed these ‘internalised’ constructions of safety during their clinical career. They appear to have become a part of their professional identity as nurses, and could be described as informal, even subconscious, risk assessments.

We also noted what we called ‘levels of danger’. Staff working in areas where there is a higher volume of what might be termed ‘high risk’ activities tend to take this higher level of risk for granted. This is not to say they are casual or blasé, but simply reflects their greater familiarity with this level of risk. Thus, staff working on the oncology unit are very familiar with the drugs used, and have an extensive personal knowledge of regimens prescribed for

current patients. They deal constantly with highly toxic chemotherapeutic agents, and do not become so concerned with, for instance, the checking of intravenous saline or antiemetics as staff on wards where such activities might be less frequent, or might be the 'riskiest' procedures undertaken.

How then is this sensitivity to safety – one might call it a 'sixth sense' – developed? Is it taught in some way, or simply learned informally on the job? Older nurses expressed the view that safety-critical learning was not emphasised as much as previously – such things were no longer 'drummed into' nurses whereas an early understanding of the consequences of, for instance, giving the wrong drug should be 'inbred from the start'.

There was an awareness too that safety is only one of a number of possible goals of healthcare, and that there may be conflicts with others, especially efficiency and 'throughput'. Patient comfort may also conflict. For instance, nurses may choose not to waken a sleeping patient to give medication prescribed for 06:00. There may also be conflicts with patient 'dignity' – could repeated checking be perceived as insulting?

"I'm aware that there are nurses who rush everything because...I find newly qualified staff are very ... all the D grades, or wherever they are on the agenda for change, seem to have this very different thing, they've very blinkered ideas and have their heads down and are blinkered and they're very focused on – we've got to get the work done, we've got to get the work done, we've got to get the work done as though they are going to self-combust – or the patients are if it's not done within a dot of time – and I find they're the ones that concern me – that they might not be checking things quite as much as they should be because they're so paranoid about not running out of time. So that's what concerns me sometimes ... and I try to encourage newly qualifieds not to care what work's left to do and just take their time with their medicines, and start them as early as possible to give them a much longer period of time to give them out safely." (Interview 8)

4.9.3 Working environment

Our observations revealed a working environment where many different activities were happening simultaneously. There were multiple and complex information flows, yet paradoxically in some ways a deficiency of information to do with the patient.

Essential items are often not readily available – we observed that the absence of casenotes, dressing packs and blood results not only took up valuable time but also had the potential for affecting safety by diverting attention away from the patient. Obviously, casenotes are very important for identification and information purposes.

There were many potential distractions – for instance, in one short extract of one early transcript, there were telephone calls, telemetry alarms, continuing uncertainty about a patient's transfer, setting up for a procedure and sorting out staffing problems. Others are described in the interview transcripts in the box.

“I think you should have uninterrupted medicine rounds and I'm not – I'm always interrupted if I'm doing the medicine round. And I have known me throw the medicine away and start again so that – you know I'll think I've forgotten where I'm up to and I need to start again. If you've got someone on 20 tablets in a morning, I'm constantly being interrupted and pulled away – I've to answer the phone, I've to, you know, sort a query out, or even have to go to another ward – and that's dangerous, that's very dangerous. You should have a protected medicine round and not be interrupted but it can't happen because someone always needs you – either to put somebody on the toilet or help them feed – I won't do that – help them feed – but you are interrupted all the time. It's time – a lot of it is time and yet you're constantly told that in court that would not stand up in a court of law. But that is why I think that mistakes happen. From a ward level point of view you think do people not understand that the biggest issue is staffing levels and time. At the moment we've got about six students on here – you can't teach them and they're constantly asking questions – you're trying to teach them and you're trying to get on with your work – it is a time factor. You think “Oh be quiet – don't ask me any more questions, I just need to get on with my job now”. And you also only need one patient to go off and to take one or two nurses off the ward and it sends everything else – it has a knock-on effect on everything else.” (Interview 6)

“When I think about this morning – all my day so far has been me running from one place to the next to the next to the next and before I go home I'll have to sit down quietly and reflect – have I signed for this, have I done this, have I done this, have I done this? – because I've been interrupted probably on average every three minutes throughout my entire shift. And it's

quite hard to focus and step back and go – you know – (laughs) – “Where am I up to?” and that’s why you need to have it inbred that you sign the prescription there and then, that you put it on the fluid balance there and then, you put it on the food chart there and then – you can’t possibly remember all of that.” (Interview 8)

One particular area of concern was the conceptual grouping of patients. For instance, in the observation extract below, three patients are being discussed at the same time. Does this increase the potential for confusion?

How’s it going? The afternoon staff’ll put a new cannula in for you. Still dripping

*Right T – just want you to sit forward and I’ll put the back rest out – I’ll take some pillows away. Just let yourself relax down. I’m going to ? the bed. We’re going to slide you on 3.
1...2...3*

Suppose I’d better phone J re Mrs F and ward 2

What about Mr X?

CP has said Mrs F to ward 2 and Mrs M to ward 4

He’s still down on MAU – can you give me any idea? I’ll tell him again.

(Observation 1)

Sometimes there appears to be little or no ‘surge capacity’ to cope with increased demand. If there is no ‘slack in the system’, staff performance cannot keep pace with the demand and performance drops. This was not articulated by staff themselves, but was suggested instead by the observation transcripts. The question that arises is, if the surge in activity comes during a predictable ‘scheduled’ activity (for instance during a drug round) do you stop the drug round so that the extra staffing capacity can be diverted, or try to continue with the tasks simultaneously?

On the day case chemotherapy unit, we observed staff dealing not only with their planned patients for chemotherapy, but also arranging for unscheduled attendances by patients on chemotherapy who community healthcare staff were worried about. This is one factor which leads to nurses continually having to reprioritise their work. It may be possible to arrange work so that scheduled and emergency patients are dealt with separately. One interview respondent described how in the pharmacy department, a rota had been introduced for drug checking, to help limit distractions.

The healthcare organisation is also perceived as becoming more complex:

“In the old days when we were all in medical unit Y for example we all just – if you had a problem you’d ring somebody because they were experienced. They’d come down, there and then, help you with it and that would be it – solved. These days you haven’t got a clue about who you are supposed to ring about various things – by the time you get them they’re on annual leave and so therefore you are left in a predicament of – you know you can’t really deal with something.” (Interview 8)

Some aspects of nursing routine deserve attention. As noted above, long shifts are worked on some wards. Whilst there seems to be an informal rule on some of these wards that an individual should not work more than two such long shifts on successive days, this is not policy and, depending on exact working patterns, may contravene the European Working Time Directive. It is possible for nurses to become fatigued. Not only the length of shifts, but also the timing of tasks within them, is relevant. Should safety-critical tasks be scheduled so that they are done early in shifts rather than towards the end? Redistributing work may also help. For instance, the 10am drug round is typically the longest – but could some drugs be rescheduled to be given at other times so that the 10am round was not so onerous?

4.9.4 Roles and responsibilities

Interprofessional relationships

There are two aspects to this. The first is how existing staff groups interact with each other. We observed some authority gradients in interactions between different staff groups. However, this was not simply doctors holding greater influence than nurses. Experienced nurses would challenge trainee doctors. For instance, we observed two trainee doctors discussing the dose of dopamine infusion and how to prescribe it. The nurse intercepted them before the drug was written on the prescription chart and told them how the nursing staff like it to be prescribed. The respondent in interview 1 related how nurses might also instruct doctors to prescribe drugs for 10am, not 6am. At present, however, this ‘speaking up’ for safety is not universal and appears to depend more on the personalities of the interacting individuals. The alternative is, of course, to change the design of systems so that this sort of negotiation is not necessary in the first place. Particular combinations of staff – for instance, in early August, when newly qualified doctors and student nurses are both on the wards together was described by one senior nurse as a ‘living nightmare’.

The second aspect is how safety might be affected when the boundaries of staff roles change, when new roles are created, or when work previously performed by one professional group is diverted to another. Whilst this is beyond the scope of this work, it is clearly occupying the minds of our interviewees. “What’s the appropriate grade of person who should be doing this? And then what training do they need?” (*Interview 2*). We feel too that this is one factor leading to the comment “It would be OK if you could just get on with your job”, although it also expressed frustration at, for instance, the lack of availability of essential items and the growth in documentation.

The patient’s role in safety

We observed patients’ confusion about drug names and doses and the differences between brand and generic names. The second transcript in the box illustrates how the unfamiliar notation makes it difficult for patients to engage properly with their own safety.

Patients may also unwittingly stand in the way of safety procedures. For instance, a ward sister recounted how, if she is doing the drug round, patients are pleased to see her and start asking her (unrelated) questions. “We can’t turn round and say ‘Please be quiet while I give these out’. Sometimes I have said to a patient ‘Please let me finish checking your medication so I get it right to give you’ if they’re on huge amounts. I don’t think they see that, the patients”.

Patients can however become quite knowledgeable about ward routines – we observed a patient silencing the alarms on the drug infusion pump in the chemotherapy unit. Whilst this appeared not to jeopardise his safety in the instance we observed, it could certainly do so in other circumstances.

The role of non-clinical staff

Non-clinical staff have a role to play in patient safety, especially with regard to identification. For instance, on one ward the ward clerk verifies every Monday that everyone’s nameband is correct and legible. Patients can be on this ward for quite long periods and the details on the wristbands can be washed off with frequent baths.

On the oncology ward, the ward clerks have an enhanced role, as they help with planning and results. This extra responsibility does not seem to be formally recognised, but it can cause problems if they are away, or leave the trust, as bank staff cannot cover these aspects of their work. Porters, too, play a previously unacknowledged role in safety, in that they are

responsible for fetching and delivering patients from wards to other areas for investigations and procedures and, if they misidentify a patient, this may lead to further errors.

Roles and responsibilities – data excerpts

Relationships between staff

I don't know if they would know to query it ... think they'd come and, you know, if they did know it was wrong or say if it's quite clear at the end of five days review antibiotics, they would say "oh should I not give it because it says"...they would come and ask you. I don't know if they would everywhere I just know on here because everyone is very approachable on here. And you know we've got an excellent reputation on here with college, from students who feel comfortable coming here. So I think because we are all approachable they would. I think if they were scared of you they might think "I'd better just give it 'cause I daren't" – I'm presuming that – I don't know if that happens. I know they feel they could come and say to us "I'm not sure about this" but it's whether they have that knowledge to know that they should or shouldn't be giving the drug. (*Interview 6*)

The patient's role in safety

9.00

Phone rings. N2 answers – patient querying a difference in his book and on packet for his capcitabine – should he take 2000 or 4000?

N2 says she will go and check script and get back to him.

N2 rings patient back and explains that *bd* must have been omitted – patient said it was his mistake – had read it wrong.

N2 says both book and packet right – just written in different way

(*Observation 5*)

Right Mr H – can I give you your aspirin?

Mr H I've already had it. When I came in I told them I took it.

N2 picks up next patient's chart – px aspirin 75mg . Checks if there are any in the patient's locked drug box – part of bedside cabinet – no. None in trolley. Goes back to storage area with trolley. Comments on how often packaging changes.

Goes back to bedside

They didn't ask for it – I've taken it this morning

I told them what I'm on and they never said anything

N2 – have you got an insulin pen?

They knew I've got it – actually I've got three. I've taken the morning one – I have to have it 20 minutes before breakfast then I take one before tea and one at night.

N2 explains that she will take them – tablets and pens – and lock them up – so that there is no chance of patient being given double dose.

Patient repeats that the staff the day before knew and did not say anything.

(Observation 6)

Intervening for safety

'I often say to staff "Who do you think is going to solve that problem? You know – that's down to you to solve". You know they see something, deal with it. There's a big emphasis on people going "Oh that's disgraceful that", but actually doing nothing about it.'*(Interview 8)*

4.9.5 Policies, procedures and documentation

There was concern about the amount of documentation required in modern healthcare and the time it takes. *"I think the problem is we document so much that often we don't have the time to actually provide the care – which worries me considerably."*(Interview 8)

One encouraging feature, recently introduced on the medical wards of one of the study sites, was shared case notes. Doctors, nurses and allied health professionals all write their progress notes in the same file. Whilst this has not been formally evaluated, it seems to have been well received by the staff we interviewed. One potential problem is that different professional groups use different styles of notation.

We also observed a 'communication' file or book on most wards, though the extent to which this was used, and the sort of information it contained, seemed to vary from ward to ward. We were not sure how highly this is valued by staff and there did not appear to be any system level control to ensure that it is used in practice.

We recorded comments that policies and procedures change too frequently, often with minor changes, and if staff do not perform the prescribed procedure very often they become confused.

Training needs tend to be well addressed when the first version is introduced but may not be with subsequent ones. Many staff do not read the policies in full. New updated versions tend to be handed out and/or summarised at ward managers' meetings.

Further, version tracking is sometimes not perfect and to compound the problem, many forms are slightly different from ward to ward, having been adapted for many areas. If patients are moved from ward to ward during admission (as is common), this can cause problems.

We observed problems with paper request forms. For instance, requests to pharmacy go in triplicate, the second and third copies being generated by carbon paper, resulting in the lower sheets being hard to read when they return from pharmacy.

Incident reporting as a form of documentation deserves mention. This respondent alludes to the perception that documentation has become a substitute for action:

"...if you have a problem on the ward these days they want a clinical incident form - they don't want to deal with the issue – they don't want to solve the problem – they want a clinical incident form – because it covers you, covers your back all the time ... whereas in fact, ten years ago they'd have just dealt with the problem – end of story – they wouldn't have documented it but the problem would have been resolved." (Interview 8)

4.9.6 Controls and barriers

We observed a number of features which tend to promote safety. These were:

- Checking procedures in general – especially where they are incorporated into individuals' personal work routines.
- Physical layout of wards, or other items e.g. drug trays in oncology unit
- Lists – though one respondent acknowledged 'lists work well for me – whereas other people have super memories and they don't need lists'
- Experience – knowing when something is not right because you have either seen it before, or you pick up some other information which leads you to question something which other have apparently not noticed – for instance, a transfusion technician who

noticed that the blood sample sent from a supposedly anaemic patient did not look like anaemic blood, and performed further checks, confirming that a misidentified sample had been sent to the laboratory. Vigilance may also be relevant here.

- Protocols – ‘if you follow the protocols to the letter you should never make a mistake’
- Concentrating on/specialising in one task – phlebotomists taking blood samples appear to be safer from point of view of confirming patients’ identity than doctors.

In general, these are unevaluated and unproven but were found by respondents to be useful.

5 Interpretation and discussion

Methodological issues

5.1.1 Synthesis of data

This study has used a number of different methods of data collection in a number of different settings. Synthesis of material from different sources could have been problematic but in fact has been quite straightforward, as it has fallen into three broad categories of data. Firstly, the intelligence-gathering is to some extent separate methodologically from the rest of the work and hence has been analysed and presented as a discrete enquiry. Secondly, there are specific, focused pieces of work – such as the task analysis work on wristbands – which lend themselves to being presented in isolation. Thirdly, by bringing data from all streams, but especially the empirical work, together into themes, we have at once unified the data whilst at the same time moved to a higher analytical level.

5.1.2 Hawthorne effect

A common concern about observational work is whether the presence of the observer in some way alters what is being observed. This can indeed be a valid criticism. The extent to which this occurs depends on a number of factors:

- *How sensitive the subject under scrutiny is to those being observed.* For instance, behaviour relating to highly personal issues is more likely to change under observation.
- *The relationship between researcher and participants.* This is crucial. Ideally, the research itself is preceded by a substantial period of information and reflection. The whole manner in which access to study sites is negotiated, the extent to which participants feel informed of the aims and nature of the work and not coerced into taking part, lays the foundations for a trusting relationship. Our study sites were selected with the knowledge of the relevant senior staff in the trusts we included (medical director and director of nursing, for instance) but within this we used personal contact and recommendation to choose initial areas for study. We then made considerable effort to hold briefing meetings for potential participants, and allowed them to ask questions and discuss any concerns.

- *The period of time over which the observations are made.* In general, the longer the time available for such work, the better the relationship which can be established. For instance, our researcher was invited back for a longer, more detailed session.

We feel that the data we have reflect accurately the behaviour of those observed.

5.1.3 Validity and generalisability

How can we be sure that we have captured what is really there during the observations? Again, this relates to the points made above. Another important safeguard is to use other methods of data collection reflecting the same phenomenon, allowing triangulation of findings from different methods. The interview data broadly support the themes and findings from the observational work.

To what extent can the findings here be taken to be representative of wider practice within the UK? There are a number of points to make here. First, our brief, as set out in our original proposal and agreed by the funding body, was to explore the issue of bedside checking through the in-depth analysis of a relatively small number of observations and interviews. This we have done. Second, the type of work we have performed does not pretend to be representative of a larger population in any statistically valid sense. The issues and themes we have raised may be coloured by local practice but are highly likely to contain elements common to practice elsewhere in the UK. Further, we gathered data on a range of wards and departments from not one but four geographically and culturally distinct hospital sites, so have a broader focus than one would expect from a single site.

5.2 Comments on themes and specific data and relationship to previous work

As expected and as is usual for qualitative work, our data collection has revealed a rich and extensive data set. Fuller analysis typically proceeds over subsequent months and years and will be published in due course. For the purposes of this report, we will bring out a few key recurrent points for further discussion in each of the following sections.

5.2.1 Identity and verification

Patient identity is expressed and conceptualised in many ways by staff. Some of these are visible and formal (eg wristbands, addressing the patient by name) and some not so obvious. For instance, patients can be 'identified' mentally by their position on the ward, their diagnosis, their position on the operating list etc [37]. These other factors are subtle yet powerful. In fact, although one might assume that establishing the patient's identity would be

the primary event from which other facts and events would follow, in practice, the contextual detail and 'downstream' knowledge of the patient actually help to shape and reinforce their identity as conceptualised by staff. We are not aware that this has previously been noted.

Wristbands have been in widespread use in UK hospitals for some years and it is very rare for an inpatient not to be identified by nameband. However, our work shows that there is considerable variation in the type of band used, information recorded on the wristband and in how they are used. At the time our work was being carried out, a patient safety alert had recently been issued by the NPSA [153], reflected in new guidance in the trusts where we performed our work. The knowledge and behaviour of our participants could thus be said to be in a state of flux. There are circumstances too in which even some of the recommended identifiers may be ambiguous. Non-European naming systems may not follow the 'first name and surname' model and in some cultures name changes at particular life stages are the norm. Also, date of birth is not a relevant indicator in some populations which may count their birth dates as '1 January (year)'. In some circumstances (eg illegal immigration) patients may feel it necessary to present themselves with a false identity to ensure treatment. These issues impinge particularly on some ethnic minorities, travellers, refugees and asylum seekers. The NPSA is aware of these issues for some patients and is working with the NHS Information Standards Board in further development of these identifiers.

There is also considerable variation in checking practices. There are well-understood and generally well-observed procedures for medication administration, blood transfusion and surgical procedures. The relative merits of single vs double checking are still debated. A recent study on the reporting of medication errors in an intensive care unit identified many latent conditions underlying prescribing and administration errors [154]. These included lack of clarity about the responsibility of the second checker and the perceived low importance of double checking. The authors recommended clarification of the role of the second checking nurse: 'Ideally, both individuals should sign that they have checked the medication and be clear what they are signing for, to increase accountability.' This was echoed by another British study [155], which combined a review of previous research studies and an analysis of drug errors reports and subsequent in-depth interviews with health professionals. Many errors occurred despite double-checking procedures. Most interview respondents talked extensively about double-checking but believed the process to be inconsistent. Four key themes were identified: deference to authority, reduction of responsibility, automatic processing and lack of time [155].

A systematic review [156] conducted in 2006 identified two studies. Both studied single- or double-checking of medication prior to administration, were Australian studies and were conducted in adult populations. The first study was a cross-over controlled trial in three

wards of a geriatric assessment and rehabilitation unit in New South Wales. This study found that the use of two nurses to administer medication orders resulted in 30% lower odds of a medication error (odds ratio 0.7, 95% confidence intervals 0.5, 0.9) [157]. The second study was based in adult inpatient units of Geelong Hospital, Australia. This was a before and after trial. Reported medication error rates were derived from medications incident records. The standard practice of double-checking medications was replaced with single-checking for nurses who were assessed as competent for single-checking of medications. In the seven-month period of double-checking five medication incidents were reported compared to four incidents reported during the seven-month period of single-checking. No denominator data is presented. The authors claim that there was no significant difference between error rates in the two periods of measurement suggesting that single-checking was as safe as double-checking. It is unclear, however, if there really is no difference or if the study was under-powered to detect such a difference [158].

Single person checks are clearly more convenient in practice, and there is a concern that, for instance, under high reliability theory, double-checking can undermine mindfulness of risk even though it is designed to prevent errors [159]. However, there is no unequivocal evidence for this. Further, the checking of identity seems to be neither so widespread nor so meticulous in a number of other situations where it would be beneficial, notably during handovers and transfers. Perhaps the greatest gains are to be had from incorporating checking behaviours into the routines of day-to-day clinical work [160].

5.2.2 Safety sensitivity

Some interview respondents clearly had a well-developed awareness of safety and risk. This constant wariness has been described as characteristic of high reliability organisations in other safety-critical industrial domains [161]. It appears to be an important safeguard or control acting to promote safety. These were mostly experienced members of staff who often had a leadership role within the clinical areas in which they worked. How then does this 'sixth sense' for safety develop? Is it a marker of experience – and if so, could there be a 'short cut' to learning from which less experienced staff could benefit? Does it reflect the age of these interviewees and hence something different about the basic training they received? Or does an interest in safety tend to go hand-in-hand with the broader view of hospital work in those who are destined to take on management roles? Here the issue of safety climate becomes relevant [162-165].

Further, staff working in high-risk areas appear to have different behaviours from those in clinical areas dealing with less hazardous activities. We postulate that there are what might be called 'levels of danger' in healthcare work. Those who work in more 'dangerous' settings

tend to be less concerned about a level of risk which would trouble those accustomed to less risky work. For example, nurses administering chemotherapy appear more relaxed about the administration of intravenous fluids than their counterparts on the general wards.

A number of respondents mentioned how easy it is for things to go wrong in healthcare, and warned of the dangers of making false assumptions. Again this preoccupation with failure is a 'high reliability' characteristic [166]. Underlying this view are notions of rarity and coincidence and how risks are perceived. Often, especially in 'low risk' areas, serious adverse events are uncommon. This can lead to a misplaced sense of safety and the belief that such events are so rare as to be unworthy of attention. Further, although many chance events are very rare, because there are so many different potential unlikely events, the probability of something rare happening is actually quite high [167]. This theoretical statistical principle is well demonstrated by Cummins' work on hybrids and doppelgängers [39]. Furthermore, potential accidents are very common indeed, so the argument (seldom explicitly articulated) that holds that adverse events are rare is fallacious for yet another reason.

It should also be stated that many safety-minded respondents were well aware of the conflicting priorities within their work at both the individual and the organisational level.

There was little mention of formal risk assessment procedures. Agnew and colleagues reviewed institutional risk assessment from the point of view of medical devices. At the time of writing, the UK Department of Health had changed its policy from a centralised 'Controls Assurance' framework to a successor system designed to give greater local flexibility (168). The danger here is that the business of managing risk within the hospital organisation is expressed through committees, procedures and formal risk assessments. Some have suggested that the 'low level organisational space' we have identified is untouched by this activity (132) but another view holds that risk assessments are indeed carried out at this level, but are driven by a desire to meet external regulatory requirements, unlike other industries where risk assessment is embedded in this space.

5.2.3 Working environment

Our observations revealed working environments which were busy, complex and prone to distractions. To some extent, this is to be expected in the healthcare setting as human beings introduce an element of unpredictability which is often not present in safety-critical industrial domains [161]. Furthermore, although this is subjective, our researchers' impression was firstly that this is normal and typical for the healthcare environment and secondly that staff managed to cope with it and keep matters under control. Nevertheless,

from the point of view of safety, it was apparent that, although certain tasks are recognised as vital to safe practice, these are often not protected properly from intrusion and distraction. It may be possible to reduce the level of unpredictability by some changes in work practices – for instance, by separating emergency from scheduled patients, or by drawing up rotas for certain tasks. Other potential solutions are discussed in Section 7.

Whilst not strictly within our remit, we wonder too whether certain predictable tasks such as drug administration could usefully be timed to avoid the ends of shifts, lessening the possible effects of fatigue. There is growing literature on the relationship between clinician fatigue and clinical performance (169-172) and this may be relevant.

Lastly, whilst technological solutions are often offered to patient safety problems, it is important not to rely on these too heavily – they should supplement and enhance the human element in the system rather than seek to replace it (128,154).

5.2.4. Roles and responsibilities

Much has been written about the role of the patient in maintaining the safety of his/her care. For instance, in two patient workshops carried out for NPSA work on wristband compliance, patients said they were aware that mistakes about their identification could easily be made by healthcare staff, and that getting this right was very important for their safety. They realised that as patients they were spending less time in hospital, and contact with health professionals in secondary care was unlikely to be longterm. They also were aware that as patients they often moved from ward to ward, or had contact with a number of services. Even though the participants were aware of the issues of identity and safety because of their involvement in the groups, they believed identity was not generally perceived as a safety issue amongst the public. From our own work we note the following. First, much healthcare work is conducted away from the patient, lessening the opportunities for patients to be involved [173]. We have outlined areas where more work could be brought out from 'backstage' to being carried out in the presence, and ideally with the active involvement, of the patient. Second, to interact with patients effectively you need to use language they will understand. Third, if practices are introduced to promote safety – for instance, forbidding distractions during drug administration – this must be carefully presented to patients to ensure their understanding and cooperation. Hospital routines and the reasons behind them are not obvious to many patients.

The roles of non-clinically trained staff, especially ward clerks and porters, in avoiding patient misidentification and mismatching, has not to our knowledge been recorded before. This is especially relevant as training and education tends to target clinical staff. Whilst this is

important too, these hitherto neglected groups should be part of an inclusive approach to safety in hospital. In particular we suggest that their relatively low status in the organisation would make it difficult to raise concerns about matters which others might not see as 'part of their job'.

Whilst there is still scope for engaging staff more closely in promoting safe practice directly through the work for which they are personally accountable, further encouragement could be given to them to take a broader responsibility for safety. This has two elements. Firstly, to help sort out underlying problems as well as simply providing a 'quick fix' for the immediate problem at hand. This is important as work from the United States suggests that, although frontline healthcare staff become adept at making up for various deficiencies in their working environment, the very act of 'fixing' paradoxically works against safety at an organisational level. It does this by making the problems invisible to managers who might be able to help solve underlying issues and also because the staff involved gain satisfaction from having continued their work despite the barriers 'the system' can throw at them [173]. Secondly, a broader awareness of how individual actions in one clinical area can affect safety more widely in the hospital would be beneficial.

5.2.5 Policies, procedures and documentation

Staff vary in their knowledge of, understanding of and compliance with procedures. We are aware that it is usual for new policies and procedures to be shared at ward managers' meetings, but found it was less common for written versions to be read by all ward staff. This may be one reason why understanding varies. Different professional groups may also respond differently. Other ethnographic work funded by the PSRP, performed in the operating theatre setting, has shown how doctors and nurses differ in their interpretation and observance of safety 'rules' [174].

Some previous work has investigated compliance with safety alerts [89] and found that the most successful method of dissemination used multiple channels and was effective in changing specific behaviour but less helpful in changing underlying attitudes. Interestingly, the authors suggested that "future guidance should keep documentary requirements to a minimum". Their final conclusion is perhaps the most useful: "Perhaps the most valuable contribution of the alert to improved patient safety was its role in prompting a review of current procedures and reconsideration of the value of pre-surgical marking, irrespective of whether or not staff decided to change their practice in line with the recommendations."

Policies and procedures may be best viewed in this light – as reminders, or validations, of areas of practice which are important in some way. It may be that the detail of the policy is secondary.

In general, if staff do not feel the standards are appropriate, or that they cannot comply with them, then this not only raises doubts about how effective the standards can be in practice, but should also trigger a review of whether the standards are realistic and feasible.

Further, the work of Espin and colleagues has revealed that unsafe (that is, protocol-violating) practice persists and explored the psychological and organisational reasons why this might be so. The existence of standards makes 'non-standard' practice easy to define for the activities where protocols exist. However, problems in areas where there were no standards were more likely to be perceived as errors than as violations [175]. This has implications for how far healthcare work should be protocolised as well as how deviations should be handled.

Documentation was perceived as a distraction from clinical work, though the introduction on a number of wards of shared notes was seen as a step forward in communication.

There were many comments about the lack of standardisation of forms – even to the extent of each ward having their own adaptation of commonly-used forms such as feeding charts. Staff found the frequent re-issuing of some forms with small changes unhelpful and sometimes confusing. Prescription charts in particular were singled out as being unclear to use.

We would also highlight the relationship between the documentary function of incident reporting and the necessity to learn from the incident and address underlying system problems. The second should follow from the first, and probably does. However, the process by which incident reports are handled and acted on has become more remote from clinical areas and hence less visible to the individual who submitted the report. At one time, ward staff would have contacted directly the person they felt could help solve the problem. Now they fulfil the documentary requirements for critical incident reporting, but are disenfranchised from solving the problem, or indeed no longer know who, or which department, might help them do so. This all seems to reflect the fact that the hospital as an organisation has become more complex.

The final comment relates to evidence for change. Dixon and Shofer comment that most of the implementation processes they uncovered in interviews with senior leaders of US health systems were borrowed from other industries [166]. One possible (and highly plausible) reason for this may be that the healthcare literature has primarily been focused on evidence-based practices – the 'what' – with much less attention being paid to implementation practices - the 'how'.

6 Conclusion

Bedside checking procedures show many strong existing features but can be developed further. Some aspects of checking are well disseminated (for instance, in relation to blood transfusion and pre-surgical checks) whereas there is more scope for development in other areas. Checking procedures work best when they are incorporated into healthcare professionals' work routines. Many staff have a highly-developed sense of safety but this tends to rely on informally-learned personal habits rather than formal risk assessment processes. We have identified and listed a number of potential solutions (see Section 7 below). These should be evaluated carefully in practice, especially when they rely on new technology. Policymakers and managers should consider how the healthcare working environment can best be structured to promote checking and safety behaviour, and how policies and procedures can be designed to 'make sense' to practitioners. The role of non-clinical staff in maintaining and promoting patient safety, especially in verifying patient identity, should be acknowledged. The role of technology should be to supplement, rather than supplant, the human elements that lead to safety in hospital.

7 Recommendations for practice

The main practice point we would make is that proposed solutions should take account of the complex, dynamic nature of the healthcare systems into which they are introduced. Our research has shown that unless safety improvement initiatives are based upon an in-depth understanding of the 'low-level' organisational space', their content may be flawed and their impact limited. National policy makers who issue patient safety advice need to ensure that such initiatives are developed on the basis of real time observation of clinical practice – for instance, correct site surgery initiatives need to be based on observations of a patient's progress from the point of consent to the final pre-operative check in the operating theatre.

Further, although we have identified a number of possible solutions (listed in Table 9) many have not been thoroughly or widely evaluated. We would also stress that they may have 'side effects' when introduced into the complex healthcare system. For this reason we suggest that they should undergo formal risk assessment before introduction, and that their introduction should be accompanied by evaluation.

- Attention should be paid to the role of NHS staff who are lower in the organisational hierarchy. Their role in maintaining safety should be acknowledged and means of encouraging them to strengthen it investigated.
- Consideration needs to be given to the point at which formal identification of patients should be performed within the 'patient journey'. For instance, what is the role of the ambulance service in establishing identity? At what point should wristbands be applied in A&E? Should patients attending as day cases wear wristbands?
- We echo the recommendation of the HRA report that new technologies should be risk-assessed within their specific application context, and should not rely exclusively on the assessments produced by medical device manufacturers. In particular, the establishment of the role of a systems integrator in hospitals should be considered.
- Pilot studies concerned with the introduction of new technology should consider the actual working practices of people, including the informal and formal sources of knowledge and procedures that they utilise.
- Recommendations and guidelines should address underlying factors likely to affect their effectiveness, and should also be concerned with their implementation and resulting

consequences. Protocols, guidelines and checklists should be as simple as possible and consideration should be given to identifying the 'critical factors' within each.

Table 9 Recommendations for practice: possible solutions

Solution	Origin	Comment
General safety procedures		
Use of written protocols	[45]	Widely promoted but not always observed
Use of 'readback' to check understanding	[44]	Common practice in other safety-critical industries
National Patient Safety Alerts from NPSA	[89, 90]	Can be effective but probably depends on change in practice and behaviour
Attending to tasks immediately – reducing time delay	Referred to in interviews	High face validity
Shared documentation to aid communication between different staff groups	Observed practice in study site	Unevaluated but well received by staff
Specialising in/concentrating on one task or area of practice	Interviews	Rationale is that concentrating on one task allows rapid development of expertise and safe working routines. For instance, phlebotomists are said to have fewer misidentification errors than other staff taking blood
Style of education in patient safety	Interviews	Comments made that safety issues are no longer 'drummed into' learners. No evidence on learning style and effect on subsequent clinical behaviour
More identifying information on board at head of patient's bed e.g. allergies	Researchers' comment on data	Concerns about confidentiality of information
Checking behaviour in general		
Checklists	[129]	Study cited is classic paper from aviation industry
Incorporating checking behaviour into work routines	Interviews and observations	Hallmark of experienced staff. Risk of splitting off checking behaviour is that it may be delegated as a separate task out of context to staff who are not experienced enough to do it
Identity and verification		
Greater use of unique patient identifier – e.g. NHS number	National guidance	Policy moving towards this
Use photographs of patients on casenotes and wristbands	[53]	Study cited reports development of harder-wearing

		wristband incorporating patient's photograph. Patients' appearance can change rapidly e.g. during chemotherapy
Use of bar codes on wristbands	[49,74]	See page 29
Use of radiofrequency identification	[56, 57]	See page 28
Use of card-based systems: a. using magnetic/IC strip b. European health card or NHS card	[58] Researchers' suggestion	
Use of biometric systems	[59]	See page 29
More identifying information on board at head of patient's bed e.g. hospital number	Researchers' suggestion	Does not completely solve problem that patients may move/be moved from bed while board still carries their details
'Ticket to ride'. 'Ticket' serves as the communication form between sending and receiving personnel. The ticket includes patient identification, stability, and risk information. The transport personnel are responsible for ensuring the nurse completes the ticket and that the ticket is with the patient until return to the home unit	Intelligence-gathering	Has been used in some US hospitals
Weekly check of presence, legibility and accuracy of wristbands on ward	Referred to in interviews	Performed by ward clerk as part of her duties
Compliance with wristband use audited continuously by different clinical teams in rotation	[36]	Effective at reducing wristband errors. Must be sustained
Medication safety		
Use of visible signs that staff are busy with checking and administering drugs and not to be disturbed: a. Red tabard worn by nurses during drug rounds b. 'Do not disturb' sign hung on drug trolley	Intelligence-gathering [124]	(tried at Gartnavel Hospital, Glasgow)
Improved design of prescription forms	Deficiencies identified in interviews and observations	No comment to make
Use of PDAs instead of paper charts to record drugs given		No comment to make
Dispensing solutions e.g. pharmacy to produce packs of tablets for each patient for each day, each tablet individually identified within pack	Referred to in interviews	No comment to make

Bar codes in drug administration	[73]	See page 29
Correct site surgery		
Use of guidelines and protocols	[112-115]	Most incorporate guidance on marking, usually by senior or operating surgeon and involving patient in process. Not known which aspects are most important
Use of airline-style 'boarding pass'	[116]	This is a form which documents the verification of required actions i.e. examination of patient, informed consent, marking pause etc
Use of 'timeout' – pause before start of procedure for all staff to check correctness	[116]	No comment to make
Radiofrequency chip technology	[118]	No comment to make
Blood transfusion		
Physical barriers e.g. placing the unit of blood in a locked bag which can only be opened with a code marked on patient's wristband and crossmatch sample	[103, 104]	See page 32
Bedside check of patient's ABO group immediately before administration	[102]	See page 32
Tag affixed to blood bag reminding staff to check patient's identity	[105]	Large multicentre randomised controlled trial. Little effect on the bedside check noted

8 Recommendations for research

- Very little is known about the role and functions of checking as a human activity, its benefits and disadvantages. Some basic research in this area should be commissioned. Although its clinical benefit may not be apparent initially, in our experience such work often illuminates the practical problem at hand.
- An educational package should be developed whereby the tacit knowledge implicit in what we describe as the 'sixth sense' for safety is elucidated and incorporated into training for all professional groups. This should then be applied and evaluated.
- The role of safety and attitudes to risk should be delineated more closely and in a larger study. In particular, it would be useful in understanding why some developments in safety are taken up, and why some are not, and how this might relate to existing notions of risk and safety.
- It would be useful to invite staff to define how they 'operationalise' the concepts of quality, safety, efficiency etc in their own work context, and how they might rank these different attributes as part of their professional activity.
- Evaluative work should be commissioned to go hand-in-hand with practical developments outlined in Section 7.
- Whilst healthcare still has some way to go in reaping the benefits of an industrial-style approach to safety, there will most probably be limits to the transferability of such models into the healthcare setting, and these should be explored.
- Work should be done on some simple markers of safe practice which could not only be used to focus the attention of staff but also potentially could be used as measures of change. It is important to stress that such markers should be developed in conjunction with clinical staff or their representatives, should 'make sense' clinically, should be domain-specific and should not be used as 'targets' for organisational performance as this renders the whole business of safety meaningless.
- The practice of all clinical staff sharing casenotes should be more fully investigated. Specific questions include: How often do professionals look at what others have written?

One clearly-defined area within this is how medication and changes to it are recorded in the medical notes.

- The relationship between staffing levels and safety should be explored. Two broad possibilities have been articulated. The first is that reduced staff numbers jeopardise safety. The second is that those staff who remain have a heightened awareness of safety and practice is paradoxically made safer. The practical issue here, which such work would help to illuminate, is how the safety of healthcare can be maintained whilst still maintaining throughput and efficiency.
- The role and location of handover procedures and the place of checking/verifying identity within them.
- Guidelines and recommendations issued by major bodies place a strong emphasis on the rigid enforcement of formal procedures and policies. However, little is known about how enforcement should be carried out in order to minimise the likelihood of non-compliance, nor is there a clear understanding of how effective such approaches might be.
- As reporting of incidents is voluntary in the UK, it would be useful to commission research to try to estimate the true number or percentage of incidents (for instance, by observation or representative surveys).
- There should be further exploration of how patients understand the potential conflicts between their safety, their comfort and convenience, and efficiency of care, to name but a few relevant attributes. It would also be useful to know how best to present these issues to patients and their carers, and whether it is possible to preserve patient choice against a background of the promotion of safety.

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11 Appendices

Appendix 1

Interview prompts

Sample interview questions

What is your rôle in the ward?

How important do you feel the following are in your day-to-day work:

Patient comfort

Quality of care – how do you define this?

Avoiding mistakes

Keeping other people informed of what is going on

Efficient running of the ward

Tell me about:

How medicines are handled

How fluids and blood are handled

How patients are prepared for theatre

How do you make sure everything goes according to plan?

Have you ever seen anything go wrong with this? Have you ever seen anything nearly go wrong? Why didn't it? Why don't things go wrong more often?

What do you think about patient safety in general?

Tell me about the rôle of checking in your daily routine.

Appendix 2 Selected illustrative guidelines on checking

Nursing and Midwifery Council. Guidelines for the Administration of Medicines. London: NMC, 2002.

Principles for the administration of medicines

In exercising your professional accountability in the best interests of your patients, you must:

- know the therapeutic uses of the medicine to be administered, its normal dosage, side effects, precautions and contra-indications
- be certain of the identity of the patient to whom the medicine is to be administered
- be aware of the patient's care plan
- check that the prescription, or the label on medicine dispensed by a pharmacist, is clearly written and unambiguous
- have considered the dosage, method of administration, route and timing of the administration in the context of the condition of the patient and co-existing therapies
- check the expiry date of the medicine to be administered

Guidelines for the administration of medicines 7

- check that the patient is not allergic to the medicine before administering it
- contact the prescriber or another authorised prescriber without delay when contra-indications to the prescribed medicine are discovered, when the patient develops a reaction to the medicine, or when assessment of the patient indicates that the medicine is no longer suitable
- make a clear, accurate and immediate record of all medicine administered, intentionally withheld or refused by the patient, ensuring that any written entries and the signature are clear and legible; it is also your responsibility to ensure that a record is made when delegating the task of administering medicine
- where supervising a student nurse or midwife in the administration of medicines, clearly countersign the signature of the student.

Royal College of Nursing. Right Blood, Right Patient, Right Time: RCN Guidance for Improving Transfusion Practice. London: RCN, 2005.

Administration

You should ensure that every individual who needs a blood transfusion as an inpatient or day patient has a final identity check (BCSH, 1999). Remember to follow these action points:

- positively identify the patient (see minimum ID data set) using an open question “can you tell me your full name and date of birth?”

Patient minimum identification data set

- Name(s)
 - Surname
 - Address (in certain UK regions)
 - Date of birth
 - Hospital identity number
-
- ask another member of staff, relative or carer to verify the patient identification details if the patient is unable to do this, e.g. if they are unconscious or a child
 - check these details against the patient’s wristband for accuracy
 - check that the blood group and the donation number on the compatibility label are identical to the blood group and donation number on the blood component
 - repeat this process *for each* component administered

Royal Pharmaceutical Society of Great Britain. The Safe and Secure Handling of Medicines: a Team Approach. London: Royal Pharmaceutical Society, 2005.

9.11 Administration of Medicines to Patients

9.11.1 Sufficient information about the medicine should be available to the staff and/or patient to enable identification and correct use of the product. (See Chapter 5, section 5.6)

9.11.2 If there are any risks associated with handling or administration of a medicine, then there should be a procedure to minimise the risks and suitable equipment. Staff should also have undertaken the necessary training. (See Chapter 5, section 5.7)

9.11.3 Administration to the patient should be in accordance with locally agreed procedures, and will be accomplished in one of four ways:

- Administration by authorised nurses in accordance with authorisation by an appropriate practitioner or on their own responsibility within local guidelines
- Administration by a suitably qualified practitioner
- Self-administration by an in-patient (see Chapter 6)
- Administration by a suitably-trained person

9.11.4 Where a system of one-nurse administration is used, the nurse should follow full, locally-agreed checking procedures

9.11.5 A record of administration should be made, and the administering nurse identified

9.11.6 Medication that is not given due to refusal, wastage or lack of availability should be recorded

9.11.7 Where a second nurse checks the administration of a medicine, the identity of the checking nurse should also be recorded; however, the ultimate responsibility remains with the administering nurse

9.11.8 For continuous administration (e.g. *via* intravenous infusions, or syringe drivers) there should be a record of those involved in setting up the medication and of those involved in monitoring the administration

The Royal Marsden Hospital of Clinical Nursing procedures (Drug administration: general principles)

Empty the required dose into a medicine container. Avoid touching the preparation.	To minimize the risk of cross-infection. To minimize the risk of harm to the nurse.	
6	Take the medication and the prescription chart to the patient. Check the patient's identity by asking the patient to state their full name and date of birth. If patient unable to confirm details then check patient identity band against prescription chart.	To ensure that the medication is administered to the correct patient.
7	Evaluate the patient's knowledge of the medication being offered. If this knowledge appears to be faulty or incorrect, offer an explanation of the use, action, dose and potential side-effects of the drug or drugs involved.	A patient has a right to information about treatment.
8	Administer the drug as prescribed.	
9	Offer a glass of water, if allowed.	To facilitate swallowing the medication.
10	Record the dose given in the prescription chart and in any other place made necessary by legal requirement or hospital policy.	To meet legal requirements and hospital policy.