A novel tool for organisational learning and its impact on safety culture in a hospital dispensary

Mark A. Sujan *

Warwick Medical School, University of Warwick, Coventry, CV4 7AL, UK

ABSTRACT

Incident reporting as a key mechanism for organisational learning and the establishment of a stronger safety culture are pillars of the current patient safety movement. Studies have suggested that incident reporting in healthcare does not achieve its full potential due to serious barriers to reporting and that sometimes staff may feel alienated by the process. The aim of the work reported in this paper was to prototype a novel approach to organisational learning that allows an organisation to assess and to monitor the status of processes that often give rise to latent failure conditions in the work environment, and to assess whether and through which mechanisms participation in this approach affects local safety culture. The approach was prototyped in a hospital dispensary using Plan-Do-Study-Act (PDSA) cycles, and the effect on safety culture was described qualitatively through semi-structured interviews. The results suggest that the approach has had a positive effect on the safety culture within the dispensary, and that staff perceive the approach to be useful and usable.

1. Introduction

Since the publication of the landmark Institute of Medicine report [1], there has been a significant increase in research about patient safety and the factors that contribute to or adversely affect the delivery of safe care to patients. The report included earlier findings of the Harvard Medical Practice Study [2] that studied 30,000 discharges from 51 hospitals in New York State and concluded that around 3.7% of patients had suffered an adverse event during the course of their treatment. Around half of these were found to be preventable. The Institute of Medicine report extrapolated these figures and estimated that there may be as many as 98,000 deaths in the US resulting from medical error. Since, further studies in the US as well as other countries have found similar and often slightly higher figures [3–5]. There is now available a wealth of research from different medical specialities and different countries that indicates that healthcare is a high-risk domain where patients may be harmed, e.g., in surgery [6,7] or medicines management and prescribing [8,9].

In the UK, an influential report by the Department of Health [10] recognised that within the National Health Service (NHS) knowledge about the extent of harm that results from the treatment that patients are undergoing was scarce. The report recommended the development of a reporting system that

systematically captures data about incidents in the NHS and thus provides an indication of the extent and the nature of harm that patients suffer in the NHS. As a result, the National Patient Safety Agency (NPSA) was established and the agency developed the National Reporting and Learning System (NRLS), a national incident reporting system. The report also emphasised the need within the NHS to change its current culture of blame to an open, fair and just culture, often abbreviated as safety culture. This was reflected in subsequent reports and policy guidelines, such as the NPSA "7 steps to patient safety" [11], which includes as first step the building of a safety culture. Part of the underlying reasoning within the NHS is that fear of punishment following errors acts as a fundamental barrier to reporting, which in turn is seen as an essential mechanism to enhance patient safety. For example, in the investigation into the Bristol Royal Infirmary deaths a deficient safety culture was identified as a causal factor [12].

In order to identify risks to patient safety and to trigger improvements many healthcare organisations are relying on incident reporting. This approach to organisational learning has been promoted within the NHS for the past ten years [13–17]. There are different types of incident reporting systems in operation, both at the local level as well as the NRLS that operates nationally. Incident reporting is based on the assumption that useful learning can be generated from operators' feedback about incidents (events without harm or with less serious levels of harm) rather than waiting for an accident to happen [18–20]. The precursors and the contributory factors are assumed to be similar in both cases. Hence, the analysis of an incident can offer free

* Tel.: +44 24 7657 4887; fax: +44 24 7652 8375.
  E-mail address: m-a.sujan@warwick.ac.uk

Table 1
General Failure Types (GFT) identified in the Oil & Gas industry [19].

General Failure Types (GFT)	Explanation
1. Hardware	Quality and availability of tools and equipment.
2. Design	Inadequate design leading directly to errors and violations.
3. Maintenance management	Management of maintenance activities.
4. Procedures	Quality, accuracy, relevance, availability and workability of procedures.
5. Error-enforcing conditions	Conditions relating either to the workplace or the individual that can lead to unsafe acts.
6. Housekeeping	Organisational inaction in response to known problems.
7. Incompatible goals	Goal conflicts at the individual, group or organisational level.
8. Communications	Communication problems including absence of communication channels, message failures, reception failures.
9. Organisation	Inadequate organisational structure, organisational responsibilities and management of contractor safety.
10. Training	Inadequate understanding of training requirements, low priority given to training, inadequate definition of competence requirements.
11. Defences	Failures in detection, warning, personnel protection, recovery, containment, escape, and rescue.

lessons about weaknesses in the system's defences and deficient organisational processes resulting in latent conditions. These can be addressed before something bad happens. In this sense, incident reporting opens up windows onto the underlying system dynamics in the same way as accidents or adverse events would [14].

There has been considerable research into barriers to successful learning from incident reporting, such as lack of training in the use of incident reporting, usability problems of the systems that have to be used, uncertainty about what constitutes a reportable incident, blame culture and fear of consequences, lack of feedback and the absence of learning relevant to local practices [21–25]. The perceived lack of learning and absence of relevance to the local work environment may have a detrimental impact on the willingness of staff to contribute to incident reporting [26].

The aims of the work reported in this paper were to prototype and to implement a local proactive risk monitoring tool for organisational learning in healthcare (PRIMO) to complement incident reporting within the dispensary of a hospital pharmacy, and to assess whether the tool had any effect on the local safety culture. The project aim was the result of a very practical need: very few incident reports were available within the dispensary and the learning that could be extracted from these in terms of error-producing conditions and latent factors was minimal. The PRIMO approach is intended to operate alongside incident reporting, but its aim is to elicit a rich contextual picture of the local work environment, to move away from negative and threatening notions of errors and mistakes, and to encourage active participation and ownership with clear feedback and demonstrable learning for local work practices. This tool should be of immediate relevance to practitioners and generate actionable learning from their experiences and expertise.

Section 2 provides the theoretical background to PRIMO. An overview of PRIMO is provided in Section 3. The piloting of the tool within the dispensary of a hospital pharmacy is described in Section 4. The second part of the paper provides a qualitative characterisation of the impact the tool has had on local safety culture (Section 5), as well as recommendations for further development of PRIMO (Section 6). Limitations of the study design and conclusions are presented in Sections 7 and 8.

2. Background to the proactive risk monitoring (PRIMO) tool

Within the Oil & Gas industry, Reason and colleagues developed a tool – Tripod-Delta – for organisational learning that does not depend on incidents or accidents [27]. The aim of Tripod-Delta is the proactive identification and prioritisation of those organisational processes that frequently contribute to latent failure conditions in the work environment. These are referred to as

General Failure Types (GFT), and a common set of GFTs identified in Oil & Gas is described briefly in Table 1. The current status of GFTs within an organisation is assessed through a checklist. The checklist contains specific indicators drawn from a larger database of indicators for each GFT. Indicators are simple yes/no-statements that indicate the presence or absence of a risk factor in the work environment. In this way an organisational risk profile based on scores for the individual GFTs is constructed which can be managed over time (i.e., prioritising those GFTs that score worst). The database of indicators is constructed by domain experts, and the intention of Tripod-Delta was to encourage ownership by the people who would be using it.

Reason points out that the development of the indicator database is time consuming [19], and later refinements of Tripod-Delta for railway maintenance and aviation maintenance operations have employed a survey tool instead, where respondents could indicate on a Likert-scale their perception of the status of a particular GFT. As opposed to the indicator checklist that produces an objective assessment of the presence or absence of indicators, a survey relies on perceptions of staff and is therefore subjective. As a result, the findings may vary depending on how staff relate to hazards and risks in their work environment.

3. PRIMO overview

The inspiration for the Proactive Risk Monitoring for Organisational Learning in Healthcare tool (PRIMO) comes from Tripod-Delta. The aim is to identify and to prioritise for action those organisational processes that frequently give rise to latent conditions based on staff perceptions. However, significant changes were made to the process to account for the different cultural environment that healthcare presents:

- *Narratives:* In order to ensure that the factors that are selected for monitoring are directly related to the local context, these are identified empirically based on the qualitative analysis of narratives describing problems in the work environment submitted by staff.
- *Participation and feedback:* As pointed out in the introduction, there are serious barriers to regular incident reporting in healthcare. In order to overcome these, staff participation through the submission of free-text narratives and the completion of questionnaire surveys and regular feedback to staff are emphasised in PRIMO.
- *"Easy wins"-improvements:* Reason points out that the focus of Tripod-Delta is on managing risk profiles, not on eliminating specific symptoms [19]. However, in order to maintain staff participation and to combat participation fatigue, fast and
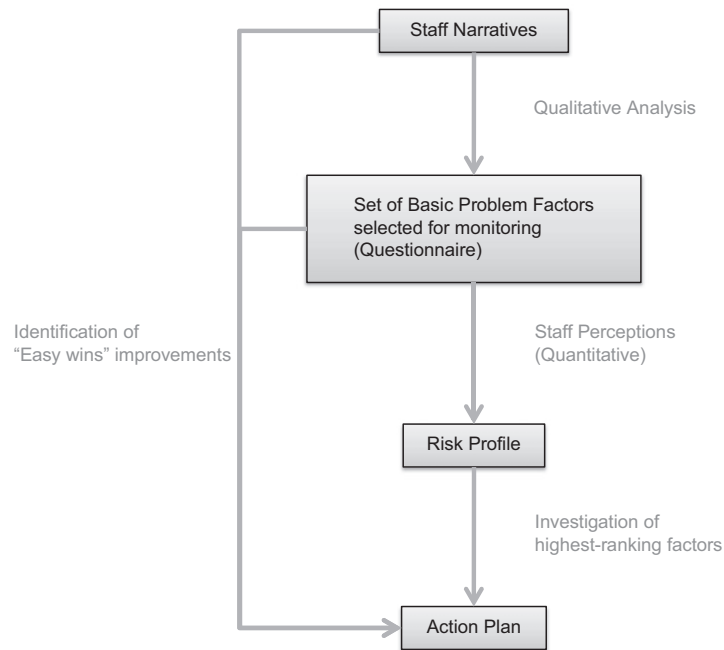
Fig. 1. Logic flow of the PRIMO approach.

visible improvements ("easy wins") to the local work environment are an important part of the PRIMO strategy that complements its longer-term aim.

- *Staff ownership:* In addition to its management function, an important and explicit aim of PRIMO is to strengthen local safety culture. There is no evidence that Tripod-Delta actually created greater ownership among front line staff or that it was perceived by front line workers as something other than a management tool.

The resulting PRIMO process consists of a number of elements: staff narratives about hassle in their work environment, a questionnaire for monitoring problem factors, and an action plan detailing both "easy wins" and longer-term actions and improvements. The flow of the PRIMO process is represented in Fig. 1. The process starts with the elicitation of staff narratives. The narratives are used to identify empirically (through qualitative analysis) the Basic Problem Factors for subsequent monitoring to ensure that these factors are relevant to the local work environment. Monitoring takes place using a questionnaire that is filled in every other month. The questionnaire elicits perceptions from staff about the amount of hassle that these Basic Problem Factors cause to their daily work. In this way, a risk profile is constructed over time. Once the risk profile starts to stabilise, high-ranking problem factors can be prioritised and investigated for subsequent improvement. The action plan that is produced following the analysis of the narratives and the survey results, details both short-term and longer-term actions and improvements as a result of this staff feedback. Ongoing submission of staff narratives and their review is used to identify problem factors that should be included in the monitoring activity as a result of a changing local context.

4. PRIMO pilot study

PRIMO was prototyped and piloted in the dispensary of the pharmacy of an NHS hospital in England. The hospital is the main provider of acute services across its region and has a capacity of 259 inpatient beds. The hospital pharmacy department employs 50 staff, the majority of which work in the dispensary on a rotational basis. Staff roles working in the dispensary include pharmacists, technicians, assistants and receptionists. The main functions of the dispensary include the dispensing and packaging of drugs for patients on wards and for patients to take home. Dispensary activities include validating prescriptions for appropriateness and accuracy, checking doses and interactions and providing a final check of medicines before they are given to the patient.

The process was prototyped and piloted over one year. Early results of the pilot have been described in [28]. Following the identification of a preliminary set of problem factors for monitoring (from the qualitative analysis of staff narratives), the questionnaire was prototyped during the final nine months using pragmatic Plan-Do-Study-Act cycles [29].

4.1. Narratives – Basic Problem Factors

The qualitative analysis of the staff narratives revealed references (i.e. coded at least once) to 11 Basic Problem Factors as shown in Table 2 along with the corresponding lower level codes generated from the narratives. Some of the factors identified, such as training, procedures and communication map directly onto Reason's original framework. Issues surrounding staffing levels, demand management & workload and teamwork & attitudes were felt to be of particular importance in order to reflect the narratives adequately and were included as separate Basic Problem Factors. These changes reflect differences between a dispensary environment and technical environments, such as Oil & Gas or railways and aviation maintenance. The identified set of Basic Problem Factors was included in the questionnaire for monitoring. Narratives are being elicited on an on-going basis and the questionnaire can be modified and extended to reflect different or novel Basic Problem Factors as they appear in the narratives.

4.2. Questionnaire – risk monitoring

4.2.1. Prototype development
The set of Basic Problem Factors identified in the narratives was selected for continuous monitoring through a questionnaire

Table 2
Set of Basic Problem Factors identified empirically from the narratives.

Basic Problem Factor	Lower level codes	Example from narratives
1. Staffing	• Absences • Staff shortage • Inappropriate skill mix	"It was just one of those days where I felt I wasn't getting anywhere, we were short staffed due to sickness and annual leave, the phones never stopped and sometimes I think I am the only person who can hear them ringing."
2. Demand management & workload	• Concurrent activities • Exceptional increase in demand • Queue building up • No time allocated to paperwork	"Then I was trying to train a new girl, but with no support to answer the phones or the hatches we were constantly interrupted so I was losing my train of thought and she was losing her concentration and with the work we had to try and get through it was quite unnerving for her."
3. Training	• Training conflicting with other priorities • Interruptions to training • Staff inexperienced/not fully trained	"The majority of dispensers are inexperienced and still learning therefore we need the TTO (to take out medications) endorsements to be clear. I then have to go back to the dispenser and ask them to change what they've dispensed - more duplication of work!"
4. Equipment & IT	• IT design inappropriate • IT interaction problem • Stock keeping problems • Unavailable/malfunctioning equipment	"Tracker (log of prescriptions arrived, dispensed and completed in pharmacy) consistently going down so couldn't get information for ourselves or ward on the state of TTOs."
5. Teamwork & attitudes	• Negative attitude towards work • Communication style during conflicts • No consideration for implications on others • Reluctance to take on unallocated tasks	"The pharmacist was quite angry that it had taken me so long to do!"
6. Work environment	• Insufficient space • Messy/untidy work environment • Frequent interruptions	"Folders left out and bits of labels all over work bench made work difficult as no space. Leaflets, meds and bits of labels, etc do get left on bench but it happens when we are busy and everybody has different ways of working, but it can be very untidy sometimes."
7. Safety culture & acting on known problems	• Issues not addressed straight away • Recurrent problems not resolved • Unjust blame • Not seeking clarification (individual)	"I asked the dispenser why they had labelled the box as 1 twice a day when this was not endorsed anywhere on the prescription. They said that they did what they thought was right."
8. Procedures	• Absence of procedure • Awareness of procedure (external) • Awareness of procedure (internal) • Inappropriate procedure • Procedure not followed	"Plus I had 2 patients who phoned to say that they had not received enough medication from us on their outpatient prescriptions. In both cases the doctor had requested patients to have 6 weeks but we had only given 4 weeks. When I explained we only supply 4 weeks from the hospital they were rather miffed as they […] were not told about this. Are the outpatient clinic doctors aware of our 4 week policy? And is this information displayed anywhere so patients are aware"
9. Job description and allocation of responsibility	• Inadequate allocation of responsibility • Allocation of responsibility unclear	"Just before lunch I noticed the clinical check tray was full to overflowing, only had one technician and they weren't 'medicines management' trained. I wondered how come there were so many TTOs. Couldn't they have been dealt with on ward visit and saved dispensary pharmacist the job?"
10. Communication & information	• External communication inadequate • Internal communication inadequate • Missing information	"EDS (Electronic Discharge Summary) came up to pharmacy and a pharmacist had recorded that most of what the patient needed was at the community hospital (where the patient was being transferred to) but there was no community hospital name on the prescription. I rang the ward to find out which hospital and the ward said they were actually going to a nursing home. I think there was a misunderstanding on the ward before the EDS came up to pharmacy."
11. Management of change	• Implications of change not considered • New failure modes introduced (IT) • Not prepared for regulatory change	"Also prior to EDS (paper copies of TTOs were used) any TTOs for patients going to a community hospital the ward staff were to liaise with the hospital about which items were required to be dispensed. With EDS this doesn't happen and the clinical chequer may not notice. The dispenser is then on occasions dispensing unnecessarily. These TTOs are also more likely to be on transport."

to be completed by all pharmacy staff with regular duties in the dispensary on a bi-monthly basis. The questionnaire elicits from staff their perception about the extent to which the Basic Problem Factors caused them problems during their work during the previous week. Staff rate this on a 5-item Likert scale ranging from 1 (not at all) to 5 (to a large extent). For further differentiation, each Basic Problem Factor was broken down into three constituent dimensions identified from the narratives (selected from lower level codes, Table 2) and the literature.

The questionnaire was prototyped using PDSA cycles with increasing sample size. After four PDSA cycles, the questionnaire produced no further suggestions from staff about the need to improve usability or to include additional Basic Problem Factors. The Basic Problem Factor relating to Management of Change was perceived as not being particularly relevant at present by respondents during the first two PDSA cycles and it was excluded from

subsequent versions of the questionnaire in order to reduce the time taken to complete the questionnaire. The dynamic nature of the questionnaire allows this factor to be reintroduced should evidence from narratives or other sources indicate that it may be causing problems to staff. The questionnaire now monitors 10 Basic Problem Factors with three dimensions each, totalling 30 questions. An example from the questionnaire relating to Equipment & IT is presented in Fig. 2 (the full set of questions is shown in Appendix 1). At present, the average time taken to fill in the questionnaire is 21 min (range: 5–40 min).

4.2.2. Monitoring results

After five PDSA cycles of distributing the questionnaire during a nine-month period (excluding the first PDSA that was completed

4. RiskFactor: Equipment & IT						
Assess to what extent the design, usability and availability of equipment and IT caused you problems during last week.	**Not at all**				**To a large extent**	
4.1 To what extent did unavailable or malfunctioning equipment / IT negatively affect your work? **Example:** *Cash till wasn't working properly; PCs running very slow, wards with printers that don't work /not setup to print.*	1	2	3	4	5	Your comments:
4.2 To what extent did the suitability and usability ofequipment / IT negatively affect your work? **Example:** *EDS system is slower to process than paper; pilot discharge team but IT on wards was a limiting factor; using laptop at clinical check station restricted speed & efficiency with which I could work.*	1	2	3	4	5	Your comments:
4.3 To what extent did the use of unfamiliar equipment / IT negatively affect your work? **Example:** *Unfamiliarity with EDS system; I don't have an EDS username/password – this can waste time when on reception; I don't know all the small bits and pieces of the EDS programme.*	1	2	3	4	5	Your comments:
Issues not covered: *Did any other equipment and IT issues not covered above cause you particular problems during last week? If so, please provide a short example.*						

Fig. 2. Example (Equipment & IT) from the prototype questionnaire.

Table 3
Mean scores for each Basic Problem Factor elicited during the initial nine-month period (scores ranging from 1: no hassle to 5: a lot of hassle). Two factors (4. Equipment & IT, 6. Work environment) were selected for improvement work following the May 2010 distribution.

Basic Problem Factor	January 2010 (8/8 responses) Mean (SD)	March 2010 (24/34 responses) Mean (SD)	May 2010 (29/34 responses) Mean (SD)	August 2010 (24/34 responses) Mean (SD)	October 2010 (21/34 responses) Mean (SD)	Mean (Jan – Oct)
1. Staffing	3.0 (0.6)	3.0 (1.3)	2.9 (1.2)	2.5 (1.1)	2.6 (1.1)	2.8
2. Demand management & workload	2.6 (1.1)	3.1 (1.3)	2.6 (0.9)	2.4 (1.0)	2.5 (1.0)	2.6
3. Training	2.1 (0.9)	2.1 (1.0)	2.2 (1.1)	1.8 (0.7)	1.8 (0.6)	2.0
4. Equipment & IT	2.5 (0.8)	2.8 (0.9)	2.6 (0.9)	2.4 (1.2)	2.5 (1.1)	2.6
5. Teamwork & attitudes	2.3 (1.2)	2.6 (1.1)	2.5 (1.2)	2.2 (1.1)	2.2 (0.9)	2.4
6. Work environment	2.8 (1.0)	3.2 (1.0)	2.6 (1.0)	2.1 (1.0)	2.4 (1.1)	2.6
7. Safety culture & acting on problems	2.2 (0.9)	2.8 (1.1)	2.9 (1.2)	2.8 (1.1)	2.7 (1.1)	2.7
8. Procedures	1.5 (0.7)	1.9 (1.0)	1.9 (0.9)	1.9 (1.1)	1.9 (0.9)	1.8
9. Job description & allocation of resp.	1.7 (0.7)	2.6 (1.3)	2.3 (1.1)	1.9 (1.1)	2.1 (1.0)	2.1
10. Communication & information	2.0 (0.6)	2.6 (1.3)	2.6 (1.1)	2.6 (1.2)	2.5 (1.1)	2.5

with one person) the mean scores shown in Table 3 were obtained (1: Factor did not cause any hassle; 5: Factor caused a lot of hassle).

In the questionnaire, each Basic Problem Factor had been broken down into three constituent dimensions. These dimensions were derived from the analysis of the narratives (see lower-level codes, Table 2) or from the literature in those cases where less than three dimensions had been identified. The dimensions receiving the highest (i.e., worst) scores included unavailable equipment, number of staff and missing information.

4.3. Action plan – short-term and long-term improvements

The quantitative results need to be treated with caution as the pilot collected data only over a limited period of time and results were statistically not significant. Bearing this limitation in mind, the results of the questionnaire from this initial nine-month period together with the narratives pointed initially to staffing levels, the immediate work environment and also unavailable equipment as factors that cause a lot of hassle. The latter two factors were selected by the dispensary team for improvement activities following the May 2010 distribution of the questionnaire. This selection was informed in part by the questionnaire results, the narratives and the power the dispensary team felt they had over these factors. For example, the dispensary team felt that at this point staffing levels would be difficult to address in the short to medium term, though further evidence was being collected for later review. Examples of how these problems manifest themselves or are perceived in practice can be extracted directly from the database of narratives (see Table 4 for examples relating to unavailable equipment and IT) in order to get an initial understanding of the type of problems that appear to be of relevance. Such an understanding can be the starting point for a subsequent in-depth investigation of the underlying organisational deficiencies. While the narratives provide only examples of

Table 4
Examples extracted from staff narratives relating to unavailable equipment and IT.

"*A bad day last Thursday, tracker (log of prescriptions arrived, dispensed and completed in pharmacy) consistently going down so couldn't get information for ourselves or ward on the state of TTOs (to take out prescriptions). Extra work trying to look through the different areas the TTO may be. Later on the Ascribe system was very slow and even rebooting did not help. I rang [X] […] – who's number has changed – and he said he thought all the IT systems were having problems as he was as well. Low and behold yesterday (Monday) tracker was failing again. No sooner had we reloaded it, it failed again. Monday is one of our worst days and we also had an audit starting this week with extra information to go on the tracker.*"

"*First on my list was to complete the retail sale order that arrived yesterday. After entering all of the data onto the computer, I went print my work – the printer did not work. I asked dispensary technician if she could look at it for me, she said it was an IT issue. Already 20 mins behind at this point, I phoned IT. They said they were busy and would call me back as soon as possible.*"

"*I went to put my order into a carrier bag – there wasn't any there. At this point I was feeling increasingly anxious at the amount of time I was spending on this, and concerned that if any further delays happened I would be running late for my ACT slot and cause delays for my colleagues.*"

"*A technician rang from the ward he wanted a couple of green profiles podding down to [ward X] - a 2 s job, well so I thought. When I got there the draw was bare, someone had obviously used the last one without photocopying anymore. So I had to leave an already short staffed dispensary to go to the copier to copy some green profiles which takes a little longer because you have to swap the paper in the machine etc.*"

"*10:00 – Phoned IT helpdesk to chase up a label printer which I had reported as not working the previous day – 10 mins*"

"*What a frustrating day. I was really busy. I had the previous days data basing to catch up on plus all today's, staff arriving in to book on and off the tracker with the added information required for the audit and just when you want the computers to be working at their optimum best, the access database system was on a go slow. After every 2–3 items, it crashed and you had to close it down and re open which took forever. I rang IT and they said they were aware of the problem and trying to sort but it was a problem throughout the hospital not just happening to us!!*"

hassle without a direct impact on patient safety in this instance, the underlying processes frequently contribute as latent failure conditions to adverse events. For example, in Table 4 problems with the software for monitoring the status of medications that patients are going to take home are described. This invariably causes delays to patients receiving their drugs to take home, but in the worst case patients may receive no or only some of the drugs they had originally been prescribed. Other examples in Table 4 describe the impact on workload due to IT failures. Activities such as packaging and labelling drugs are prone to slips and mix-ups when carried out under situations of increased pressure. In general, unavailable IT systems or malfunctioning printers can disrupt correct stock selection, drug preparation and label generation with the correct patient details.

The information provided by the PRIMO process has been used in a number of different ways:

- Longer-term actions: The risk profile that emerges from monitoring the Basic Problem Factors over time provides indications as to which processes should be investigated in more depth. For example, a deeper understanding of the extent of IT problems was gained following the third distribution of the questionnaire. This triggered a review of all IT equipment in the dispensary and associated communication channels to the IT department. The IT department also provided feedback and clarification on the procedures for reporting IT problems. The absence of significant improvements in the quantitative monitoring results for this problem factor (Table 3) suggests that this longer-term action may not yet have produced visible improvements.
- Closing the feedback loop, encouraging ownership: In order to close the feedback loop [25] the information elicited from staff needs to lead to demonstrable learning and improvement

ideally within a shorter time period than is intended with the longer-term actions directed at improving organisational processes. To this end, "easy wins" were derived each month from the specific hassle or problems reported in the narratives or the questionnaire. Demonstrable progress was made, thus avoiding the feeling of a purely bureaucratic exercise that many staff have with incident reporting [26]. Responsibility for leading on actions is allocated to one individual, and staff who provide a narrative are encouraged to take responsibility for actions that result from their narrative. For example, in response to reported problems with the work environment, actions led to the provision of a dedicated space in the dispensary for the checking pharmacist and the storage of appropriate forms at the point where they are needed. There was an improvement in the quantitative results for this problem factor the following month (Table 3), but this was not statistically significant and may have been coincidental.

4.4. Pilot evaluation

In order to assess the perceptions of staff on the extent to which PRIMO was meeting its objectives and their expectations, a 19-item quantitative survey was developed consisting of four main categories: Aims of PRIMO (5 items), PRIMO narratives (5 items), PRIMO monitoring (5 items), PRIMO safety space (4 items). The complete survey is available on request. The survey was distributed to 26 staff in the dispensary. 17/26 completed surveys were returned. Staff were asked to rate the extent to which they agreed/disagreed on a 5-item Likert scale (1=strongly disagree, 5=strongly agree).

- *Aims of PRIMO:* Respondents were largely in agreement that PRIMO has helped them to better understand organisational deficiencies in the work environment (65%), that PRIMO has contributed to useful improvements in the work environment (70%) and that they now approach safety-related issues differently (59%). Opinions were divided about whether people felt that they had a sufficiently good understanding about how PRIMO works (47%) and the feedback that they have received (47%).
- *PRIMO Narratives/Stories:* Respondents indicated that in the majority they did **not** submit a narrative at least once every three months (only 41% agreed that they did submit a narrative regularly) and opinion was divided as to whether the time spent writing a narrative was worth their while (50%). Respondents felt that writing a narrative helped them to reflect on problems (71%) and that the free-text style allowed them to express themselves more clearly (71%) (only 14/17 replied to these two questions). Only a minority would have preferred a more structured template (25%).
- *PRIMO Monitoring:* An overwhelming majority stated that they filled in the questionnaire regularly (94%). A large majority also feels that the time required to fill in the questionnaire is reasonable (76%), that the questionnaire is meaningful and usable (65%) and that they provide free-text examples when filling in the questionnaire (71%). Opinion was divided as to whether the questionnaire and the monitoring of problem factors helped them as individuals to understand organisational deficiencies better (47%).
- *PRIMO Safety Space:* The safety space refers to a dedicated physical location within the pharmacy where safety information is displayed. Respondents indicated that they largely ignored the information posted in the safety space (only 12% regularly consulted the information), that the information posted there may not be relevant to their work (only 25% felt it was

relevant) and that it was in an unsuitable location (only 25% agreed that it was in a suitable location). The majority agreed, though, that the information was easy to understand (62%).

5. Impact on safety culture

A key aim of the PRIMO approach is to contribute to a stronger, more inclusive safety culture through active staff participation and feedback. The impact on local safety culture and possible mechanisms through which PRIMO affects safety culture have been identified and described through qualitative analysis of semi-structured interviews conducted with staff towards the end of the project.

5.1. Safety culture and safety climate assessment

Since the publication of *An Organisation with a Memory* [10] there has been a growing interest in the topic of safety culture within the NHS. Research has shown that factors such as an emphasis on production, efficiency and cost, or professional norms for perfectionism among healthcare providers may combine to create a culture contradictory to the requirements of patient safety [30]. The establishment of a "no-blame" culture within the NHS that facilitates the reporting of and the learning from incidents has become one of the cornerstones of patient safety improvements. There is now awareness that major cultural transformations must accompany structural and procedural changes in order to achieve and sustain desired improvements in quality and safety of care [31].

The notion of safety culture was first explored in safety-critical industries following major disasters, most notably the Chernobyl nuclear accident in 1986 [32]. A common definition of safety culture in the nuclear industry that is now widely adopted across industries suggests that:

"The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management. Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures." [33]

Safety culture can be described as "the way safety is done around here", emphasising the importance of understanding what people actually believe and do [34]. What people believe about safety and the importance given to safety within an organisation will strongly influence their decisions, and these beliefs and attitudes are shaped by individual experience and by interacting with and observing peers [32]. In the literature there is a distinction between safety culture and safety climate. Safety climate commonly refers to more readily measurable aspects of safety culture [35] and can be regarded as the surface features of the underlying safety culture [36]. Assessment of safety climate is becoming increasingly popular and is conducted using quantitative safety climate questionnaires. A deeper understanding of safety culture requires qualitative methods as it is concerned with the more enduring underlying culture [32].

In healthcare, the quantitative assessment of safety climate using questionnaires is an established approach and recommended by bodies such as the Joint Commission [34]. Such assessments can be used to [30]:

- Identify areas for improvement and raise awareness about patient safety.
- Evaluate patient safety interventions and track changes over time.

- Conduct internal and external benchmarking.
- Fulfil directives and regulatory requirements.

There are a growing number of tools for measuring safety culture/safety climate in healthcare and a review about their validity and reliability is provided in [36]. A national survey on the adoption of culture assessment tools within the NHS England found that around one third of NHS organisations are using such tools [31]. In England, the most commonly used tool is the Manchester Patient Safety Framework MaPSaF [37], reported to be used by 28% of organisations in the survey. MaPSaF is a method for self-reflection about safety culture within a group setting rather than an assessment of climate based on questionnaires. Another tool frequently used is the Safety Attitudes Questionnaire [35] in its various forms (about 7%). In the US, the Hospital Survey on Patient Safety Culture developed for the AHRQ [38] is another prominent questionnaire-based instrument. For both SAQ and the AHRQ survey there is increasing evidence available about the validity and reliability of their dimensions.

5.2. Data collection and analysis

The dimensions, along which safety-related attitudes were explored, were derived through a review of three common instruments: SAQ, the AHRQ survey and MaPSaF. SAQ exists in different forms (full, short) and has been adapted for different specialties (intensive care unit, operating theatre, pharmacy etc). It originates from a questionnaire widely used in commercial aviation. SAQ elicits attitudes through six climate scales for 60 items. Shorter forms of SAQ focus on safety climate (19 items) and teamwork and safety climate (27 items), only. The latter is of particular relevance for PRIMO.

The AHRQ Hospital Survey on Patient Safety Culture measures safety culture on the unit (seven dimensions) as well as on the hospital level (three dimensions) and includes also outcome variables (four variables). For the purpose of PRIMO the dimensions of safety culture at the unit level are important. The acute version of MaPSaF explores safety culture along 10 dimensions.

Since PRIMO works at the unit level, not all dimensions were equally as important for the present study. Those that are concerned with attitudes and behaviours at the unit level were retained, while those concerned with higher-level management behaviours and management processes would most likely remain unaffected by PRIMO and have been discarded for the purpose of this study.

The dimensions chosen are:

- Teamwork
- Reporting and learning
- Communication about safety
- Priority given to safety
- Continuous improvement

The evaluation of the impact on safety culture was commissioned following the implementation of the PRIMO prototype, and hence no baseline data for relevant safety culture dimensions was available and a before–after study design was not possible. Staff were therefore asked directly about their perceptions of changes since the start of the project. Fifteen semi-structured interviews were conducted with pharmacy staff with regular duties in the dispensary (including receptionists, pharmacy technicians, pharmacists, pharmacy management). Participants were selected based on (a) whether they had regular duties in the dispensary and (b) whether they were able to make available time to participate in the interview. All staff roles were represented in the sample. Participation was voluntary and participants provided informed consent. The interviews were transcribed and all identifiers removed. The interview template is available on request.

The interview transcripts were analysed qualitatively using the Nvivo software package. Coding was done based on the classification of safety-culture dimensions described above for the description of the current safety-culture and any changes that had taken place since the start of the project. Mechanisms were coded for the main PRIMO instruments (narratives/stories, questionnaire, action plan, and improvements). For each instrument, codes were derived from the interviews and refined through the identification of recurrent higher-level themes. All coding was done by the author.

5.3. Results

Below, the current safety culture is characterised and changes that have taken place since the start of the project are described. Mechanisms through which PRIMO may have contributed to some of these changes are identified. Fig. 3 summarises key mechanisms and their possible effects on safety culture. Tables 5 and 6 provide examples from the interviews describing changes in safety culture and possible mechanisms, respectively.

5.3.1. Qualitative description of current safety culture and perceived changes

5.3.1.1. Teamwork. In the perception of staff, teamwork consists of being aware of each other, and generally working together and pulling the same way, being able to ask questions and being happy to work with each other. Teamwork as a whole within the dispensary was perceived to be functioning very well, and to be a strength of the team. Room for improvement exists as far as teamwork with staff outside of the dispensary is concerned (ward-based staff), which could be down to the fact that these people may not be fully aware of the ways the dispensary works and of the relevant procedures that are being followed. Staff feel that they can always ask for help, and that generally everybody is very approachable. Staff may sometimes hesitate to ask for help out of consideration for the already high levels of workload of their colleagues. When there are differences in opinion about how a particular task should be carried out, staff usually discuss this respectfully or consult a senior colleague. The high level of standardisation is seen to be a useful tool in minimising conflicts of this sort. Staff identified staffing levels and the resulting high levels of workload (in particular among pharmacists) as the main threat to effective teamwork. Shortage of equipment (IT) may also lead to a deterioration of teamwork as staff are waiting to use the equipment.

Some participants (6/15) explicitly felt that teamwork had improved during the course of the PRIMO project. Thinking about problems may have stimulated consideration of what these problems look like for other, possibly more junior team members, and the contribution of problem descriptions by staff who have less regular duties in the dispensary, may have added a fresh look at the way the work was carried out and contributed to a greater shared awareness that encourages looking beyond one's own immediate job. This greater awareness may also have led to more active support of other team members.

5.3.1.2. Reporting and learning. In addition to the PRIMO process, staff identified two processes for reporting and learning that are operational in the dispensary: the near-miss log captures errors that are detected at the final checking stage and the IR1 incident report forms capture more serious failures that go beyond the boundaries of the dispensary. Staff generally feel that these processes are important. In particular the near-miss log is seen as a learning opportunity to identify training needs or recurring issues. Incident reporting, albeit recognised as important, is sometimes perceived as something that has to be done without any obvious benefits. Concerns were raised about the lack of feedback from incident reporting, and staff also admitted that they had not properly understood the process once the incident reporting form leaves their desk. While staff feel responsible for patient safety, incident reporting sometimes is regarded as a process owned by management rather than by all staff.

Participants suggested (8/15) that they were feeling now more encouraged to report problems, and they were feeling less accepting than before of things that caused hassle in their work. Participants also suggested (6/15) that this may have had a positive influence on incident reporting and the near-miss log, which they felt were now being used more regularly.
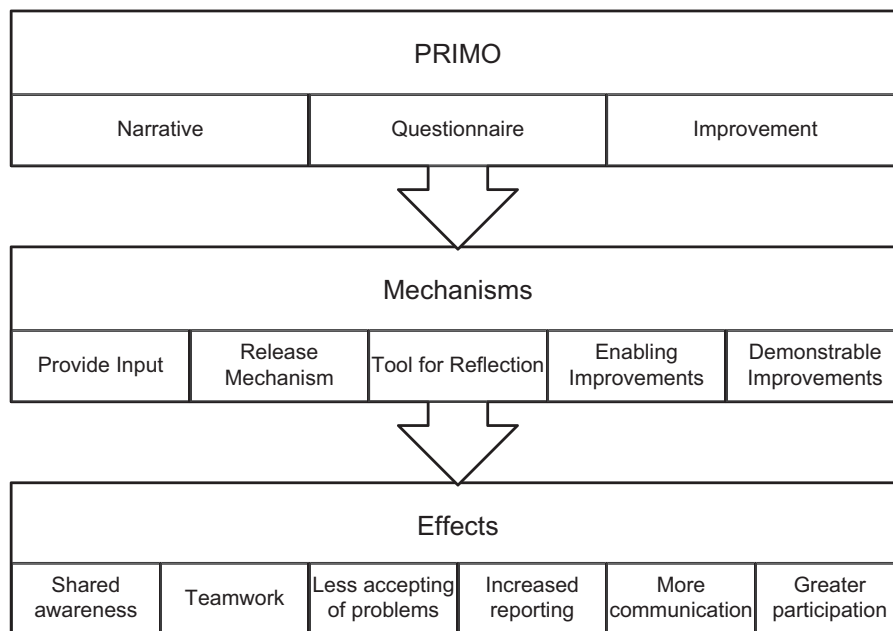

Fig. 3. Perceived effects of PRIMO on safety culture and possible mechanisms.

Table 5
Excerpts from the semi-structured interviews – changes in safety culture.

Safety culture dimension	Quotations describing changes in attitudes and behaviours
Teamwork	"*I think it's got better recently. Everyone seems to be working more pulling the same way. I think since we've done questionnaires, I think that's helped people realise that we all do need to work together.*" Participant 8 "*I think things have been better since this project started. You know, everybody seems to be mucking in a bit more I think and helping each other out, so I think that certainly seems to have changed since my time here. I've not been here that long compared to others.*" Participant 3
Reporting & Learning	"*Yes, it's definitely improved. I think people are happier to sort of say now, whereas we were all quiet before and didn't say. We weren't able to sort of speak out loud as such, but now we can actually. We feel we can approach and say if there's a problem.*" Participant 7 "*I don't think…before the project came in, I don't think the incident reports were used as much as what we should be using them. I don't think people are aware and I think now they are, so they do get used now.*" Participant 8
Communication about safety	"*I think everyone is more aware now. It's not just a senior staff issue. I think it's filtered right the way across the board and hopefully, more people are thinking about it.*" Participant 13 "*So it prompts more conversations amongst us to kind of think, does that bother you as well, is that an issue? And then we can feel that we can raise it and it isn't necessarily something that we have to put up with, so from that point of view I'd say yes, it's definitely changed.*" Participant 1
Priority given to safety	"*Yes, I think safety has probably got a higher priority or seems to have a higher priority. Whether it always had such a high priority I'm not sure, but it definitely seems like it's got a higher priority now*". Participant 15 "*We've made like quite a few changes in dispensary. I mean I don't know if she's told you. There was a massive cleanup on Saturday and organised the work stations and like the patient information leaflet is better and it's just a more sort of better way of working I think and I think that's helped it really.*" Participant 2
Continuous improvement	"*It's definitely improved from a year ago. People are talking more about safety and improving things. We've had more training as regards to dispensary and practices in there, so I think overall it's improved.*" Participant 12 "*I think with the questionnaires we do get a lot more input. Maybe sometimes you might feel… Like, in the past you might have felt a bit difficult to raise issues maybe.*" Participant 8

Table 6
Excerpts from the semi-structured interviews – mechanisms.

PRIMO element	Quotations describing possible mechanisms
Narratives/Stories	"*Yes, because we can constantly do it. You know, we can do it at any time if there is something that comes up. You can write a story to [Name] at any point and you don't have to wait for the questionnaire to come out, so we can feel that we can always raise something.*" Participant 3 "*Because again, it's sort of listing things because it had the section about IT and that is definitely something that before people thought 'We just have to put up with it,' because you don't know anything about IT yourself. But then it's good to think well, a problem is a problem no matter what it is and then it starts making you think of other things and then that's ultimately I think what leads you on to writing the stories because they don't come under necessarily the umbrella of everything in the questionnaire.*" Participant 1 "*Personally, I find it's quite nice. If I've had a day that's been full of problems it's nice to actually be able to get them down and actually tell someone about it, rather than just going home and kind of thinking about it on my own, so it's a bit of a release.*" Participant 12
Questionnaire	"*It's just so that you feel that you can say what you want to say. I mean you can answer the questions openly and honestly and you can tell her on these forms and questions. You can just let her know what's been happening and feedback to her what's been happening in dispensary, so for me, it's a way of communicating with her really because we don't always have time to sort of stop and talk as such, so to write it down and answer it via these forms is actually quite good.*" Participant 7 "*Identify things that you don't normally think that might be a problem and then when you sit and think about it, actually they are.*" Participant 6 "*Yes, yes – there has been improvement on some of the things that have been the most high on our questionnaires that have been resolved, yes.*" Participant 12
Actions/ Improvements	"*And it was done over a weekend, so I came in on a Monday and was like 'Oh my god, this is great' because it just takes an extra five minutes out of fanning around with files and there is also an extra station for another pharmacist to come in when it was really busy, which I did notice really helped when it was really busy with the pharmacist.*" Participant 4 "*I think she's doing a pretty good job to be honest. I think she's overall made people more aware of what small changes could be made to make bigger things easier, which is the whole point really; easier, safer. Easier to be safe, if you know what I mean as well.*" Participant 6 "*She's quite careful in saying some of them aren't quick-fixes, so over time we'll ask about that in a few months time because it's going to take time to actually change, so I think that's quite good because I think some people could have the attitude of 'Well I'm going to tell you and if it's not fixed within a week I'm not going to be very happy with you,' whereas she makes sure she says 'These are quick ones that we're going to sort out, but the long-term ones that are big issues, I'm dealing with and I'll get back to you about it and you can ask me in between,' and that sort of thing.*" Participant 1

5.3.1.3. Communication about safety. Staff feel that human errors can and do happen to anyone, and they are prepared to speak openly about their own mistakes. Staff have embraced the notion of "no-blame culture" and feel that they are not blamed for the mistakes they make. For the most part, staff perceive mistakes to be down to individual human errors and resulting actions appear to focus on making people aware and identifying training needs. Some senior roles appear to seek consciously for systems issues that underlie and promote mistakes. Staff perceive that they are updated about any major safety concern or development during the weekly team brief. While this meeting is perceived to be more about feeding back to staff, staff feel they can approach colleagues and senior managers informally to discuss any safety concerns they would like to raise.

Participants felt (10/15) that there was generally more communication about safety. They perceived that management was discussing safety more and was more receptive to listen to staff concerns. This may have led to a greater sense of ownership and participation among staff. Staff also suggested that they were talking more about safety and possible improvements with their peers. Some staff felt that communication was more open and that they felt freer to raise concerns.

5.3.1.4. Priority given to safety. Staff perceive that patient safety is considered the highest priority, but they feel that other considerations such as cost and efficiency need to be taken into account, too. Staff feel that at times high levels of workload lead to situations where some people may get stressed and start rushing their work. However, staff also perceive that there is no pressure from management and that senior managers try to support them where possible by identifying additional resources or by explaining to external staff that there will be delays due to higher levels in demand. Staff also feel that they do not have sufficient time available to participate in patient safety improvement

activities, even though quite pragmatically they will try to make time available in some way where possible. Staff do not participate in any proactive risk identification activities and this is regarded by some as a management activity.

Some staff feel (6/15) that patient safety has now an even greater priority. They suggest that this may be helped by the fact that they can see improvements in the work environment taking place as a result of raising their concerns.

5.3.1.5. Continuous improvement. Perceptions on pursuing continuous improvement of processes and the work environment range from a feeling that people tend to complain too much and should accept certain obstacles as part of their work, to an attitude that continuous improvement was something that should be regarded a part of one's daily activities. Similarly, some staff feel as active participants in improvement activities, while others feel that it is difficult to raise issues or that they prefer to simply accept the current status.

Staff feel (5/15) that over the course of the project there have been numerous positive changes to the work environment on a regular basis. Some staff (4/15) also feel that they can participate more easily in these improvement activities.

5.3.2. Qualitative description of mechanisms

PRIMO consists of a number of key elements (or instruments). A qualitative description of the ways in which staff perceive each element to influence their attitudes and behaviour is given, focusing on the most common themes. Excerpts from the interviews are provided in Table 6 and a summary of possible mechanisms is provided in Fig. 3.

5.3.2.1. Stories. Providing input: Staff felt (10/15) that writing and submitting stories about hassle and problems in their daily work was a useful way of providing input and feedback to management. This may be due to the fact that generally safety was being talked about more and writing things down was encouraged, that staff could raise issues at any time, highlight problems in their area and make suggestions for improvement.

Tool for reflection: Some staff (4/15) perceived the stories as an interesting tool for reflection about problems. They are perceived to encourage thinking about problems, to support reflecting on one's own problems and thereby also broadening the awareness to what these issues may look like for other colleagues.

Release mechanism: Some staff (2/15) felt that writing a story was useful to them personally as a way of dealing with problems and felt that it was a useful way of communicating these to others. It was also felt that it was a good way of letting other colleagues know what one perceives as a problem and why one may not spend as much time on core duties as colleagues unaware of those problems would expect.

5.3.2.2. Questionnaire. Providing input: Staff felt (7/15) that the questionnaire facilitated providing input about problems and safety issues to management. The questionnaire is perceived as a structured way to raise problems, and as making it easier to raise concerns. Staff also felt that it was a good way of providing input in an environment where time was not always available to go and have a discussion with somebody about problems or to have dedicated meetings. It was felt that in this way more frontline information was available to management.

Tool for reflection: Staff perceived (6/15) that the questionnaire and the result charts stimulated discussion among themselves and that it led to a greater awareness of what other people felt were problems. Staff also felt that the questionnaire made them reflect on what kind of problems there were in their daily work, and that it made them regard as problems that can be

improved upon certain deficiencies that previously they had simply accepted.

Enabling improvement: Staff (11/15) felt quite strongly that the questionnaire had a positive effect on their work environment. Examples provided included replacement of old or deficient IT and a clean-up and rearrangement of the work environment. Staff felt that these were direct results of the questionnaire, since many people had raised these issues through the questionnaire and in this way enabled management to act upon this information. The questionnaire is perceived as a mechanism to highlight and prioritise certain problem areas and foster teamwork by making people working towards a common improvement goal. Staff felt that this led to a more positive work environment.

5.3.2.3. Action plan and improvements. Noticeable improvements: Staff noted positively (13/15) a number of improvements to the work environment, such as replacement of deficient IT, clean-up of the work environment and more dedicated space for pharmacists. Staff felt that these improvements had a very positive effect on the work environment, made things run smoother and easier and generally resulted in a better place to work. Staff also appreciated the explicit distinction between quick and simple improvements and longer-term improvements.

6. Recommendations

In order to further improve the development of the PRIMO process and to encourage sustainability, the following recommendations are suggested:

Recommendation 1: Emphasise visible improvements
PRIMO is a process for identifying and monitoring deficient organisational processes that give rise to latent failure conditions, typically a longer term safety improvement activity. Both the interviews and the survey of this study provide strong evidence that staff perceived the immediate improvements to their work environment as the most memorable PRIMO characteristic. The notion of "easy wins" had been conceived in order to sustain momentum and staff participation, and this strategy proved to be vital to the success of PRIMO. It should be considered granting an even greater emphasis to simple, visible improvements that can be made to the work environment in a short time frame, putting them on the same level as PRIMO's longer-term aim.

Recommendation 2: Provide regular feedback and information
Staff highlighted the fact that they had not properly understood the incident reporting process (i.e., what happens once an incident report has been filed) and that there was hardly any feedback. PRIMO tried to address both of these issues, and the interviews suggest that this has been successful to some extent. The survey results indicate that staff may benefit still from more information and education about the background to PRIMO, as well as feedback about how their input has contributed to any improvements or strategic actions. While the "action of the month" chart was perceived to be very useful, the location of the safety board proved to be unpopular with staff, and a revised strategy for providing regular feedback should be considered. This could include, for example, a dedicated staff meeting (time permitting) or the use of electronic media.

Recommendation 3: Include dedicated safety time
Staff indicated that they had no allocated time to participate in safety improvement activities. At present, they write narratives at home during their own time and fill in the

questionnaire when somebody else covers for them at work or during breaks. Investigating suitable ways of providing a time slot dedicated to safety improvement activities would enable a more structured and smooth operation of PRIMO (and other safety activities) as well as demonstrate management commitment to patient safety. Different options could be considered, e.g., a fixed departmental safety time or a personal safety time to be made use of at the discretion of the individual. This will depend on the local context and the existing safety improvement arrangements.

Recommendation 4: Develop electronic PRIMO portal

Narratives are submitted currently via email and the questionnaire is filled in when hard copies are distributed. This has a number of drawbacks, such as potential loss of anonymity, loss of data or time when hard copies get lost or misplaced, as well as a significant administrative and analytical overhead when data needs to be entered into an electronic system for analysis. The development and use of an electronic solution should be investigated where staff can access a PRIMO portal that includes information and news, and that enables direct electronic submission of narratives and e-questionnaire. The statistical analysis of the questionnaire could be automated in this way.

7. Limitations

As this was a pilot study to prototype a novel proactive approach to organisational learning, the results obtained remain preliminary. Once the process has been in use for an extended period of time and a more stable risk profile has emerged, the feasibility and utility of the process should be evaluated more rigorously.

The choice of the PDSA approach, a pragmatic improvement methodology leading to a series of rapid prototypes, led to a questionnaire that was meaningful and useful as perceived by staff. No further formal evaluation of the extent to which the Basic Problem Factors are independent of one another or of the weighting of each constituent dimension was undertaken. The use of Likert scales may lead to distortions as respondents may avoid extremes or may wish to present their organisation in a more favourable light. Further work should investigate the psychometric properties of the questionnaire in order to assess its reliability and validity.

Of greatest importance to healthcare practitioners is the generalisability and transferability of the approach to other settings. This was not part of the scope of the pilot study and needs to be validated in a larger-scale research project involving multiple sites and settings.

8. Conclusion

Healthcare organisations need to learn about organisational deficiencies that may cause latent failure conditions in the work environment [1,10]. Incident reporting is one of the key mechanisms to achieve this learning, but in practice many organisations are struggling to extract the kind of information that allows lessons that are of immediate relevance to the local work environment to be learned effectively. The interviews conducted as part of this study confirmed some of the barriers to successful incident reporting that had been identified in the literature previously [21–25], such as lack of feedback about what happens with incident reports once they are submitted, the absence of improvements to the local work environment as a result of incident reports and uncertainty about the incident reporting process in general. The PRIMO approach to organisational learning – intended to operate alongside local incident reporting – aims to overcome these barriers by emphasising participation and ownership of staff, and by producing visible improvements to the local work environment. The quantitative evaluation of the pilot and the interviews suggest that the large majority of staff contribute regularly to PRIMO, and that they can see useful improvements in their work environment.

It is widely recognised that engagement of staff is an essential prerequisite for successful patient safety and quality improvement projects [39,40], but at the same time lack of continuing clinical engagement appears to be one of the most common barriers to successful improvement interventions in the NHS [41]. In a review of the Health Foundation's Safer Patients Initiative (SPI) – one of the largest patient safety improvement initiatives within the NHS – Parand et al. [40] describe medical engagement (the study was restricted to doctors) as a complex socio-political and motivational issue that is affected by a range of inter-related factors. These include issues such as the organisation's track record in quality improvement programmes, the way the aims of the programme have been communicated and the way they are perceived, evidence of efficacy of the overall approach, the amount of resources allocated to the programme and the support from higher-level management. The experiences of the PRIMO pilot echo some of these factors, in particular the need for management support and allocation of appropriate resources, the communication of the programme aims and their perception, and most importantly evidence about the efficacy of the approach in the form of visible improvements to the work environment. Whether staff engagement can be sustained in the longer term cannot be answered from the pilot study. A recent review of the literature around clinical engagement suggests that increasing clinical engagement may remain a difficult undertaking [41]. However, an understanding of the barriers and enablers to clinical engagement and staff participation may suggest ways in which these can be addressed from the outset of any improvement programme.

The qualitative findings of the analysis of the semi-structured interviews as well as the quantitative results of the evaluation survey suggest that PRIMO has had a positive effect on safety-related attitudes and behaviours of staff within the dispensary. Staff felt that PRIMO enabled them to participate more easily in safety improvements and that it encouraged communication about safety. During the interviews some staff also indicated that as a result of the introduction of PRIMO, they now contributed more regularly to other reporting and learning processes, such as incident reporting and the local near-miss log. This crossover effect suggests that participative patient safety approaches such as PRIMO may have a beneficial effect on the general awareness of staff of patient safety issues and their willingness to participate in other organisational patient safety efforts. This may be an important factor in sustaining clinical engagement.

Appendix 1

See Table A1 below.

Table A1
Set of questions used in the monitoring questionnaire.

1. Problem Factor: Staffing
   Assess to what extent staffing issues caused you problems during last week.
   1.1 **To what extent did the number of staff in the dispensary negatively affect your work?**
   Example: *Had to fill in multiple roles as short staffed; I had to do overtime; had to have extra week of training in one area, staff cover during lunch limited*
   1.2 **To what extent did sickness and absence of staff negatively affect your work?**
   Example: *Staff were off sick therefore had to dispense for most of the day; had to work overtime to cover 8.30 am and 6 pm shifts, swapped my weekend to cover*
   1.3 **To what extent did an inappropriate skill mix of staff or the allocation of staff in the dispensary negatively affect your work?**
   Example: *Had to call techs back from wards as no cover; new staff need extra support so high no. of interruptions; no MI cover so dispensary p'cist interrupted to answer extra queries; weekend mix of staff*

2. Problem Factor: Demand Management & Workload
   Assess to what extent the anticipation and management of demands and workload caused you problems during last week.
   2.1 **To what extent did workload levels negatively affect your work?**
   Example: *Build up of clinical check work; busy periods where batches of outpatient/TTOs received clinical check work not processed quickly enough leading to empty to do tray; Pharmacists not highlighting delays to outpatients*
   2.2 **To what extent did unforeseen additional demands negatively affect your work?**
   Example: *Late discharges; passing back EDS to Drs, transferring calls to MI; High no. of FT TTOs to ACT therefore couldn't check many standard track, Cystic Fibrosis prescription/Palliative care*
   2.3 **To what extent did <u>known</u> additional demands negatively affect your work?**
   Example: *Afternoon peak in discharge prescriptions; not able to complete all tasks*

3. Problem Factor: Training
   Assess to what extent training issues caused you problems during last week.
   3.1 **To what extent did you need to perform activities that weren't properly covered in your training?**
   Example: *Dispensing or checking a Cystic Fibrosis rX; always things you haven't seen before, porter not trained on weekend*
   3.2 **To what extent did on-going training activities negatively affect your work?**
   Example: *People not trained in dispensary which led to frequent interruptions; ACT training slows rate of work,*
   3.3 **To what extent did access to training or trainers negatively affect your work?**
   Example: *NVQ training now more structured but need to keep this momentum; was the ATO trained to carry out dispensing tracker and data basing*

4. Problem Factor: Equipment & IT
   Assess to what extent the design, usability and availability of equipment and IT caused you problems during last week.
   4.1 **To what extent did unavailable or malfunctioning equipment / IT negatively affect your work?**
   Example: *PCs running very slow, wards with printers that don't work/not set up to print; Ascribe problems/system went down*
   4.2 **To what extent did the suitability and usability of equipment / IT negatively affect your work?**
   Example: *EDS system is slower to process than paper; using laptop at clinical check station restricted speed & efficiency with which I could work.*
   4.3 **To what extent did the use of unfamiliar equipment/IT negatively affect your work?**
   Example: *Unfamiliarity with EDS system; don't have an EDS username/password; unfamiliar with Tracker and Databases in Dispensary*

5. Problem Factor: Team Work & Attitudes
   Assess the extent to which individual attitudes and lack of support from others caused you problems during last week.
   5.1 **To what extent did the absence of peer support negatively affect your work?**
   Example: *Not being offered help, not feeling supported, feeling that colleagues do not take pride in their work or their attention to detail, appearing not to care about the errors they make*
   5.2 **To what extent did you feel the way your team/peers/senior communicated negatively affected your work?**
   Example: *Being talked down to, not feeling able to approach somebody due to perceived negative attitude*
   5.3 **To what extent did feelings of stress, frustration, tension, tiredness negatively affect your work?**
   Example: *Feeling frustrated after having worked on prescriptions for patients that had already been discharged; feeling stressed due to pressure from wards, couldn't resolve TTO query as other staff appeared stressed & unapproachable; feeling rushed.*

6. Problem: Work Environment
   Assess to what extent the work environment caused you problems during last week.
   6.1 **To what extent did the work environment (space, layout) negatively affect your work?**
   Example: *No space to dispense, because staff doing final checking training; insufficient space at clinical check area.*
   6.2 **To what extent did interruptions/distractions negatively affect your work?**
   Example: *Patient at the outpatients' hatch; staff interrupt and never wait, which is bad for concentration & increases errors.*
   6.3 **To what extent did a messy work environment negatively affect your work?**
   Example: *Information leaflets/medicines not where they should be & slows dispensing process; things not filed correctly; not using up part packs*

7. Problem: Safety Culture & Acting on Problems
   Assess the extent to which organisational attitudes towards problems caused you problems during last week.
   7.1 **To what extent did well-known problems negatively affect your work?**
   Example: *Drs not providing contact no. & time spent tracking down; wards sending orders already supplied as they've 'lost' it, we re dispense & then they find, patient's own meds & inpatient charts not sent; DFDs not found by ward staff but found by MM team on ward, Drs not providing written CD TTOs*
   7.2 **To what extent did problems/issues that could have been foreseen negatively affect your work?**
   Example: *Ward sends EDS to pharmacy rather than wait for ward visit; ward & dispensary don't know when ward visit times are as daily rota changes; outpatient Rxs for items we don't keep identified after Rx taken in & patient waits unnecessarily; late TTOs.*
   7.3 **To what extent is the speed with which things get done regarded as more important than completeness and accuracy?**
   Example: *Dispensing Rxs when dispensary is very busy; feel pressured to be quick even though told to be accurate; feel rushed, wards expecting Rxs quickly*

8. Problem Factor: Procedures
   Assess the extent to which the accuracy, appropriateness & availability of procedures caused you problems during last week.
   8.1 **To what extent did the absence or poor clarity of procedures negatively affect your work?**
   Example: *Sometimes parts missed on the procedure and you have to ask; ward Fluid chart not clear enough to dispense from, Pharmacists not following*

Table A1 (*continued*)

endorsement SOP
  8.2 **To what extent did inappropriate or unworkable procedures negatively affect your work?**
      Example: *Too restrictive and detailed rather than workable;*
  8.3 **To what extent did outdated procedures negatively affect your work?**
      Example: *Endorsements on patient copy of EDS*

9. Problem: Job Description & Allocation of Responsibility
   Assess the extent to which the allocation of responsibility for getting things done caused you problems during last week.
  9.1 **To what extent did an unclear allocation of responsibility negatively affect your work?**
      Example: Unclear who should answer the phone; uncertainty about whose responsibility it is to follow up certain items
  9.2 **To what extent did you have to deal with people/tasks/problems in ways that aren't properly defined or supported by SOPs?**
      Example: *Adjusting the rota to fill sickness cover, communicating high work load in dispensary to senior staff/clinical director;*
  9.3 **To what extent did you have to carry out tasks/work that other roles would be better placed to do? (inadequate allocation of responsibility)**
      Example: *Telephoning ward staff and* passing *information between ward staff and pharmacists; wards and ward based team via dispensary telephone e.g. re ward visits*

10. Problem Factor: Communication & Information
    Assess the extent to which communication and information flows caused you problems during last week.
  10.1 **To what extent did missing or inaccurate information negatively affect your work?**
       Example: *Allergy status missing; time spent tracking Drs down; incomplete endorsements by pharmacists leads to questions from dispensers.*
  10.2 **To what extent did communication problems within the dispensary negatively affect your work?**
       Example: *Change in roles due to staff absence not communicated; staff not handing over; 'patient waiting' not endorsed on mental health card*
  10.3 **10.3 To what extent did external communication problems negatively affect your work?**
       Example: *Contacting Drs difficult – bleep them but don't answer; ward staff unsure if a TTO/chart has been sent to us or if they have received it back; ward phones constantly engaged so can't inform them urgent Rxs are ready*

   Other Problem Factors
       Problem factors not covered: *Did any other problem factors not covered above cause you particular problems during last week? If so, please provide a short example.*

References

[1] Kohn L, Corrigan JM, Donaldson MS. To err is human: building a safer health system. National Academies Press; 2000.

[2] Brennan TA, Leape LL, Laird NM, et al. Incidence of adverse events and negligence in hospitalized patients: results of the Harvard Medical Practice Study I. New England Journal of Medicine 1991;324:370–6.

[3] Thomas EJ, Studdert DM, Burstin HR, et al. Incidence and types of adverse events and negligent care in Utah and Colorado. Medical Care 2000;38(3): 261–71.

[4] Wilson RM, Runciman WB, Gibberd RW, et al. The quality in Australian healthcare study. Medical Journal of Australia 1995;163:458–71.

[5] Vincent C, Neale G, Woloshynowych M. Adverse events in British Hospitals: preliminary retrospective record review. BMJ 2001;322:517–9.

[6] McGuire HH, Horsley JS, Salter DR, et al. Measuring and managing quality of surgery: statistical vs incidental approaches. Archives of Surgery 1992;127: 733–7.

[7] Vincent C, Moorthy K, Sarker SK, et al. Systems approaches to surgical quality and safety: from concept to measurement. Annals of Surgery 2004;239: 475–82.

[8] Vincent C, Barber N, Franklin BD, et al. The contribution of pharmacy to making Britain a safer place to take medicines. London: Royal Pharmaceutical Society of Great Britain; 2009. report available at, accessed 12/01/11 ⟨http://eprints.pharmacy.ac.uk/1184/1/Pharmacysafer.pdf⟩.

[9] Lewis PJ, Dornan T, Taylor D, et al. Prevalence, incidence and nature of prescribing errors in hospital inpatients: a systematic review. Drug Safety 2009;32:379–89.

[10] Department of Health. An Organisation with a Memory. London: The Stationary Office; 2000.

[11] National Patient Safety Agency. 7 Steps to patient safety (available at ⟨http://www.nrls.npsa.nhs.uk/resources/collections/seven-steps-to-patient-safety/ accessed⟩ 12/01/11).

[12] Walshe K, Offen N. A very public failure: lessons for quality improvement in healthcare organisations from the Bristol Royal Infirmary. Quality in Health Care 2001;10:250–6.

[13] Barach P, Small SD. Reporting and preventing medical mishaps: lessons from non-medical near miss reporting systems. BMJ 2000;320:759–63.

[14] Vincent CA. Analysis of clinical incidents: a window on the system not a search for root cause. Quality and Safety in Health Care 2004;13:242–3.

[15] Vincent C. Incident reporting and patient safety. BMJ 2007. 334:51.

[16] Sari ABA, Sheldon TA, Cracknell A, Turnbull A. Sensitivity of routine system for reporting patient safety incidents in an NHS hospital: retrospective patient case note review. British Medical Journal 2007. 334:79.

[17] Johnson CW. Human Factors of Healthcare Reporting Systems. In: Carayon P, editor. A Handbook of Human Factors and Ergonomics in Healthcare and Patient Safety. London: Lawrence Erlbaum; 2006. p. 525–60.

[18] Johnson CW. Failure in Safety-Critical Systems: A Handbook of Incident and Accident Reporting. Glasgow, UK: University of Glasgow Press; 2003.

[19] Reason J. Managing the risk of organisational accidents. Ashgate; 1997.

[20] Van der Shaaf TW, Lucas DA, Hale AR. Near miss reporting as a safety tool. Oxford, UK: Butterworth-Heinemann; 1991.

[21] Ashcroft DM, Morecroft C, Parker D, Noyce P. Reporting, reflecting on and learning from adverse events in community pharmacy: development and evaluation of an incident reporting form. Pharmaceutical Journal 2005;274: 615–7.

[22] Braithwaite J, Westbrook MT, Travaglia JF, et al. Cultural and associated enablers of, and barriers to, adverse incident reporting. Quality and Safety in Health Care 2010;19:223–9.

[23] Lawton R, Parker D. Barriers to incident reporting in a healthcare system. Quality and Safety in Health Care 2002;11:15–8.

[24] Wilson B, Bekker HL, Fylan F. Reporting of clinical adverse events scale: a measure of doctor and nurse attitudes to adverse event reporting. Quality and Safety in Health Care 2008;17:364–7.

[25] Benn J, Koutantji M, Wallace L, et al. Feedback from incident reporting: information and action to improve patient safety. Quality and Safety in Health Care 2009;18:11–21.

[26] Firth-Cozens J, Redfern N, Moss F. Confronting errors in patient care: the experiences of doctors and nurses. Clinical Risk 2004;10:184–90.

[27] Hudson P, Reason J, Wagenaar W, et al. Tripod-Delta: proactive approach to enhanced safety. Journal of Petroleum Technology 1994;40:58–62.

[28] Sujan MA, Ingram C, McConkey T, et al. Hassle in the dispensary: pilot study of a proactive risk monitoring tool for organisational learning based on narratives and staff perceptions. BMJ Quality and Safety 2011;20(6): 549–56.

[29] Langley GL, Nolan KM, Nolan TW, et al. The Improvement Guide: a practical approach to enhancing organizational performance.2nd Edn. San Francisco: Jossey Bass; 2009.

[30] Nieva VF & Sorra J. Safety culture assessment: a tool for improving patient safety in health care organisations. Quality and Safety in Health Care 2003; 12:ii17–ii23.

[31] Mannion R, Konteh FH, Davies HTO. Assessing organisational culture for quality and safety improvement: a national survey of tools and tool use. Quality and Safety in Health Care 2009;18:153–6.

[32] Eurocontrol/FAA. Action Plan 15 Safety: Safety Culture in Air Traffic Management – A White Paper. 2008 (Report available at ⟨http://www.eurocontrol.int/safety/gallery/content/public/library/Safety%20Culture/Safety_ATM_WhitePaper_final%20low.pdf⟩, accessed 12/01/11).

[33] Health and Safety Commission. Organising for safety: 3rd Report of the ACSNI Study Group on Human Factors. HSE Books, 1993.

[34] Pronovost P, Sexton B. Assessing safety culture: guidelines and recommendations. Quality and Safety in Health Care 2005;14:231–3.

[35] Sexton JB, Helmreich RL, Neilands TB, et al. The Safety Attitudes Questionnaire: psychometric properties, benchmarking data and emerging research. BMC Health Services Research 2006;6:44.

[36] Flin R, Mearns K, Yule S, Robertson EM. Measuring safety climate in healthcare. Quality and Safety in Health Care 2006;15:109–15.

[37] NPSA. Manchester Patient Safety Framework (MaPSaF) – Acute. 2006 (Available at ⟨http://www.nrls.npsa.nhs.uk/EasySiteWeb/getresource.axd?AssetID=60013&type=full&servicetype=Attachment⟩, accessed 12/01/11).

[38] Sorra J & Nieva V. Hospital Survey on Patient Safety Culture. AHRQ Publication No 04-0041, 2004.

[39] Neale G, Vincent C, Darzi AS. The problem of engaging hospital doctors in promoting safety and quality in clinical care. Journal of the Royal Society for the Promotion of Health 2007;127:87–94.

[40] Parand A, Burnett S, Benn J. Medical engagement in organisation-wide safety and quality improvement programmes: experience in the UK Safer Patients Initiative. Quality and Safety in Health Care 2010;19:1–5.

[41] Health Foundation. Are clinicians engaged in quality improvement? A Review of the Literature on Healthcare Professionals' Views on Quality Improvement Initiatives. May 2010, London.