What can we learn about patient safety from information sources within an acute hospital- a step on the ladder of integrated risk management?

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ABSTRACT

Objective To assess the utility of data already existing within hospitals for monitoring patient safety

Setting An acute hospital in Southern England

Design Mapping of data sources proposed by staff as potentially able to identify patient safety issues followed by an in depth analysis of the content of seven key sources

Data Source Analysis For each data source**:** scope and depth of content in relation to patient safety, number and type of patient safety incidents identified, degree of overlap with incidents identified by different sources, levels of patient harm associated with incidents.

Results A wide range of data sources existing within the hospital setting have the potential to provide information about patient safety incidents. Poor quality of coding, delays in reports reaching databases, the narrow focus of some data sources, limited data collection periods and lack of central collation of findings were some of the barriers to making the best use of routine data sources for monitoring patient safety. In depth analysis of seven key data sources (Clinical Incident database, Health and Safety Incident database, Complaints database, Claims database and Inquest database, the Patient Administration System and case notes) indicated that case notes have the potential to identify the largest number of incidents and provide the richest source of information on such incidents. The seven data sources identified different types of incidents with

differing levels of patient harm. There was little overlap between the incidents identified by different sources.

Conclusion Despite issues related to the quality of coding, depth of information available and accessibility, triangulating information from more than one source can identify a broader range of incidents and provide additional information related to professional groups involved, types of patients affected and important contributory factors. Such an approach can provide a focus for further work and ultimately contributes to the identification of appropriate interventions that improve patient safety.

INTRODUCTION

An integrated approach to risk management requires healthcare organizations to gather information on risk and safety from a range of information sources so that the scale and nature of key risk areas can be assessed. At a national level, the National Patient Safety Agency (NPSA) has established a Patient Safety Observatory to quantify, characterise and prioritise patient safety issues by bringing together information held by different organisations.[1] At a local level, despite the fact that hospitals in the UK collect a wealth of data on many aspects of patient care, these data have been seen as an underutilised source of information on patient safety.[2] The majority of hospitals in England and Wales rely on voluntary reports of patient safety incidents (defined by the NPSA as unintended or unexpected incidents that could have or did lead to harm for one or more patients[3]) to Local Risk Management Systems (LRMS) to identify trends and areas for further investigation. The NPSA's national database (the National Reporting and Learning System) consists almost entirely of data derived from this system. However this approach has been criticised as potentially misleading. A few studies have compared the number and types of incidents identified by LRMS with those identified by other sources including case notes,[4] internal departmental incident reporting systems[5] and computerised hospital administrative records.[6, 7] These have shown that LRMS can fail to pick up serious incidents and are more likely to identify incidents not attributable to direct staff action such as falls than those related to clinical care. Evidence also

suggests that nurses report more incidents than other staff groups, with significant under reporting by doctors.[8]

A variety of methods have been used to identify adverse events affecting hospitalised patients including retrospective case note review, [9-11] in person collection of information from staff and case records on the wards,[12] direct observation,[13] screening of administrative data[14] and staff and patient surveys.[15] Comparisons of incidents detected by different methods has shown relatively little overlap between sources.[4, 7, 16] These findings suggest that there may be a value in bringing together information on patient safety from a wider range of sources. Whilst most hospitals do not have the resources to institute some of the methodologies used in these studies, it is plausible that they are able to make better use of the data sources that they currently have. This study investigated the range of sources of information relevant to patient safety found within a single acute hospital in England, the scope of information held by these sources and how it might be used to examine key areas of patient safety.

METHODS

Design

A mapping exercise, including semi structured interviews with 33 clinical and non-clinical staff, direct examination of data sources, and attendance at clinical governance meetings, was used to identify potentially useful hospital data

sources in a large district general hospital in Southern England with 850 beds and approximately 40,000 admissions per year.

By judging each source against the criteria of number and types of incidents that could be identified, mode of data collection, accessibility and content, seven sources were selected for more detailed analysis. Retrospective data collection was undertaken in respect of adult medical and surgical inpatients admitted between 1st April 2004 and 31st March 2005. Data sources were assessed to identify the completeness of information found in each source, the number and types of incident detected, patient harm resulting from each incident and the degree of overlap between incidents identified by different sources. An incident was registered if the coded event suggested the potential to cause patient harm, even if harm was not explicitly recorded, as information on harm was not always available from some sources. All incidents detected were coded by category and by level of harm using the standard coding system employed by the National Reporting and Learning System (NRLS) (Table 1).[17] Completeness of information was assessed by identifying how many of the data items required by the NRLS incident report form were present.[18] Using patient full name as an identifier, the degree of overlap between records held on each database was examined.

Table 1 National Reporting and Learning System's harm grading for patient safety incidents

No Harm	**Impact prevented-** any patient safety incident that had the potential to cause harm but was prevented, resulting in no harm to people receiving NHS- funded care **Impact not prevented-** any patient safety incident that ran to completion but no harm occurred to people receiving NHS-funded care
Low	Any patient safety incident that required extra observation or minor treatment
Moderate	Any patient safety incident that resulted in a moderate increase in treatment
Severe	Any patient safety incident that appears to have resulted in permanent harm
Death	Any patient safety incident that directly resulted in death

Data Sources

The sources interrogated included:

Five databases which made up the Trust's Local Risk Management System. The Clinical Incident database, Health and Safety Incident database, Complaints database, Claims database and Inquest database were searched for patient-identifiable entries linked to adult medical and surgical inpatients within the index year.

The Patient Administration System (PAS). PAS was searched using the 41 three-digit ICD 10 diagnosis codes for complications and misadventures.[19] Within each record, complication or misadventure codes appearing in the first of the six diagnostic code boxes, which is normally used to designate the reason for admission, were considered to indicate a pre-admission event and excluded.

Case notes. Two hundred and twenty randomly drawn records with an adult surgical or medical admission within the index year were reviewed. Reviews were undertaken using a method adapted from that described by Neale and Woloshynowych.[20] A 10% sample of case notes with no incident identified and a 25% sample of positive case notes were further reviewed by a second expert reviewer (SO). All positive cases were also discussed with two expert reviewers (SO and GN). The presence of a patient safety incident was ascribed only if all three reviewers were in agreement (75% of cases).

RESULTS

Data quality issues

Box 1 describes the range of data sources that have the potential to provide information about patient safety incidents occurring in medical and surgical inpatients that exist within the hospital. These sources could be divided into four main types: Incident Reporting Systems, Surveillance Systems, Audits and others (including case notes, the Patient Administration System, minutes from Morbidity and Mortality meetings, written claims and inquest records). Poor quality of coding, delays in reports reaching databases, the narrow focus of some data sources, time-limited data collection periods and lack of central collation of findings were some of the barriers that limited the scope for routine data sources to be used in monitoring patient safety.

Box 1 Description of data sources collecting information on patient safety in one hospital and issues related to using such sources to monitor patient safety

Data source	Incident Reporting systems	Surveillance Systems	Audit Data	Patient Administration System	Case notes and other written records
Description	Includes the Local Risk Management System, containing coded information on clinical and health and safety incidents, complaints, claims and inquests. Pathology, diagnostic services (radiology, endoscopy etc) and electro biomedical departments had internal incident reporting systems	A number of mandatory and voluntary surveillance systems existed. These tended to be focused on key public health concerns such as infection control e.g. MRSA bacteraemia surveillance, or specific high risk areas e.g. transfusion of blood products or the introduction of new drugs	A number of local hospital audits e.g. Resuscitation Audit and national audits e.g. National Confidential Enquiry into Peri operative Outcomes and Deaths collected information on outcomes of clinical care such as complications or errors in the process of care, residual disability or death	Clinical information was available as a by product of the hospital's administration and reimbursement system. 41 ICD 10 codes were being used to code for complications and misadventures	Included patient case notes, minutes of Morbidity and Mortality meetings, written records related to claims and inquests
Categories of incident commonly found in these sources	Patient accidents, medication errors, equipment failures, access to care, admissions and discharges, communication failures, complications or delays related to diagnostic testing	Infection control, blood transfusion, medication incident	Clinical assessment, implementation of care and monitoring, infection control, medication errors and treatments and procedures	Infection control, treatment and procedures	Access to care, admissions and discharges, clinical assessment, implementation of care and monitoring, infection control, communication, infrastructure, medication errors and treatments and procedures
Mode of data collection	Continuous	Majority continuous	Majority have limited period of data collection	Continuous	Continuous or recurring
Accessibility	Majority electronic	Majority electronic	Mixture of electronic	Electronic	Paper

			and paper		
How complete are individual reports Graded 1-4*	Mainly 3 Information about incidents in complaints and claims records is usually from the patient/carer's perspective only as is any reference to harm	2-4 Varies between sources from limited information required by MRSA bacteraemia surveillance to detailed reports required by Serious Hazards of Transfusion Reporting System	2-3 Sometimes clinical judgment is required to identify both incident and degree of harm which may not be referred to explicitly in the record. Complication of care may be recorded but information on patient harm missing	2 Very little information on the incident. Information related to patient harm limited to whether the patient was discharged alive or died	3-4 Case notes provide the most comprehensive information on incidents. Inquest and Claims records can contain post mortem reports and detailed hospital reports
Issues related to using data source	Under reporting especially by health professionals other than nurses Poor quality of coding of incidents by type/ subtype Lack of risk factor information e.g. age, gender, ethnicity Profession of reporter or person involved in the incident not always collected Bias towards low harm no harm events Delays in complaints and claims reaching hospital Subjectivity of content of complaints and claims records Information from departmental incident reporting systems not shared outside those departments	Narrow focus Information often not collated and analyzed locally	Lack of central collation of findings Poor quality of some local audits Short term data collection and limited sample sizes National audits such as the confidential enquiries may only sample a small number of patients from each hospital	Misses complications of treatment not specifically coded using one of the 41 ICD 10 codes Completeness and accuracy of use of these codes by medical coders Judgment may be required to separate complications that were the main reason for an admission from those that occurred during an admission Bias introduced by the limited number of codes which will tend to identify more surgical than medical patients	Time taken to gather information from written records Missing records or parts of records Poor legibility Sensitivity of material and willingness of staff to share information with a wider audience

* Completeness rating: 1= no patient identifiable information, 2= patient identifiable information, subjective/ implicit information or scanty details on incident, link to harm not clear, 3=patient identifiable information, more detailed information about incident (place, time, person), some links with harm, no prevention or further action, 4= patient identifiable information, more detailed information about incident (place, time, person), harm described/ graded for harm, action or prevention described.

Of the seven data sources selected for more detailed analysis, case notes contained the most detailed information on individual incidents including risk factors such as age, ethnicity or comorbidities, time, place and location, description of the incident, levels of harm and contributory factors. The Clinical Incident database also contained many of these data items but information on risk factors and contributory factors was usually not entered. In addition, the category of healthcare professional who was either involved in the incident or who made the report was often missing. It was difficult to make objective assessments of patient harm for incidents detected in the Complaints database or on the PAS system. For the former, information on harm was principally from the patient or carer's perspective only and for the latter there was inadequate detail. Elucidating the temporal sequence of events was sometimes challenging with individual PAS records, occasionally leading to difficulty distinguishing preadmission diagnoses or comorbidities from in-hospital incidents.

Numbers of incidents and degree of overlap between sources

Table 2 shows the number patient safety incidents identified by each of the seven data sources in total and the number identified exclusively by each source. Case notes potentially identify the largest number incidents. Seventy one patient safety incidents were found across 220 inpatient admissions (32.3%). Of these, 40 (18.1%) fulfilled the definition of an adverse event (an unintended injury or complication of care leading to prolonged admission, disability at discharge or death and caused by healthcare management rather than the disease process), the term most often used to describe incidents in previous studies. Sixty five

patient safety incidents were single events. Three patients experienced 2 incidents during the index admission. Based on these findings, it can be estimated that 8,781(95% CI 6,495-12,144) incidents could potentially be identified across the 27,270 adult medical and surgical admissions between 1.4.04 and 31.3.03. The second largest source of patient safety incidents was the Clinical Incident database with 484 incidents identified within the index year. This was followed by PAS (462 incidents), Complaints (221 incidents) and Health and Safety (176 incidents). Inquest and Claims records identified small numbers of events, 21 and 10 respectively.

Table 2 Number of incidents identified by each of the seven data sources for adult medical and surgical patient admissions between 1.4.04 and 31.3.05.

Data Source	Total no. of incidents identified	No. of incidents exclusively identified by source
Case Notes*	8781	NA**
Clinical Incidents	484	428
PAS	462	399
Health and Safety	221	197
Complaints	176	148
Inquest	21	10
Claims	10	7
Total	10190	

***estimate based on a sample of 220 inpatient admissions**

****Of the 71 patient safety incidents identified from case notes, 10 were also found by other sources**

Table 3 demonstrates that the degree of overlap between incidents picked up by different data sources was small.

Table 3 Degree of overlap between incidents identified by each data source, April 2004 to March 2005

Clinical Incidents (484)	**Clinical Incidents**					
Claims (10)	3	**Claims**				
Inquests (21)	9	0	**Inquests**			
Complaints (176)	4	2	2	**Complaints**		
Health & Safety (221)	7	0	1	10	**Heath & Safety**	
PAS (462)	35	1	3	12	14	**PAS**
Case notes (71)	3	0	0	2	1	6

Types of incidents identified by different data sources

Different data sources tended to identify different proportions of incidents in each category. (Table 4) 37.5% of incidents identified via the Clinical Incident database were medication errors and equipment failures. Complaints provide an insight into incidents related to communication failures (22% of total). The PAS system, Inquests database and case notes identified many incidents linked to surgical interventions and to investigative procedures. The PAS system was also useful in identifying incidents related to infection control. (See Box 2 for examples of incidents detected by different data sources)

Table 4 **Numbers and proportions of incidents in each category detected by different data sources, April 2004 to March 2005**

NPSA Incident Categories	Clinical Incidents	Complaints	Health & Safety	Claims	Inquests	PAS	Case notes
Access, admission, transfer	67 **(13.8%)**	15 **(8.5%)**					8 **(11.3%)**
Clinical assessment	39 **(8.1%)**	12 **(6.8%)**		2 **(20%)**	5 **(23.8%)**		13 **(18.3%)**
Consent, communication& confidentiality	33 **(6.8%)**	39 **(22.2%)**					
Disruptive, aggressive behaviour	2 **(0.4%)**	1 **(0.6%)**	2 **(0.9%)**				
Documentation	43 **(8.9%)**	3 **(1.7%)**					
Care & ongoing monitoring and review	31 **(6.4%)**	29 **(16.5%)**		1 **(10%)**	1 **(4.8%)**		7 **(9.9%)**
Infection Control	2 **(0.4%)**	16 **(9.1%)**		2 **(20%)**	1 **(4.8%)**	181 **(39.2%)**	9 **(12.7%)**
Infrastructure	34 **(7.0%)**	29 **(16.5%)**			1 **(4.8%)**		2 **(2.8%)**
Medical equipment	73 **(15.1%)**		7 **(3.2%)**	1 **(10%)**		4 **(0.9%)**	1 **(1.4%)**
Medication error	100 **(20.7%)**	4 **(2.3%)**			1 **(4.8%)**	13 **(2.8%)**	15 **(21.1%)**
Patient abuse		3 **(1.7%)**					
Patient accident	15 **(3.1%)**	7 **(4.0%)**	212 **(95.9%)**		1 **(4.8%)**		
Self harming behaviour	1 **(0.2%)**						
Treatment, procedure	44 **(9.1%)**	18 **(10.2%)**		4 **(40%)**	11 **(52.4%)**	264 **(57.1%)**	16 **(22.5%)**
Total	**484**	**176**	**221**	**10**	**21**	**462**	**40**

Box 2 **Examples of different categories of incident detected by different data sources**

Clinical Incidents: Medication error

Patient given 5 doses of Co-dydramol in one day, although prescribed four times daily - no patient complaints. Drug chart needed re-writing, previous entries illegible.

Complaints: Consent, communication, confidentiality

Patient's daughter raises concerns regarding doctor's attitude. When she spoke to doctor, she was told mother was doing very well when in fact the doctor was describing a different patient.

Health and Safety Incidents: Patient accident

Patient being weighed on sitting scales, mobility poor and brakes loose, scales moved and patient fell on her side to the floor. Slight graze to existing haematoma on right elbow and possible injury to right hip.

Claims: Treatment, procedure

Patient had right ankle injected instead of left.

Inquest: Clinical assessment

Patient attended A&E 3 times and set home with diagnosis of tonsillitis. Prescribed antibiotics. Finally presented with severe shock requiring resuscitation and surgery. Delay in diagnosing haemorrhage due to ruptured spleen. Patient died.

Patient Administration System: Infection control

Diagnosis 1	Diagnosis 2	Diagnosis 3	Diagnosis 4	Diagnosis 5	Diagnosis 6	Procedure 1
I803 ~ Phlebitis and thrombophlebitis of lower extremities unspecified	I739 ~ Peripheral vascular disease unspecified	I10X ~ Essential (primary) hypertension	T814 ~ **Infection following a procedure not elsewhere classified**	B956 ~ **Staph aureus as cause of dis classified to other chapters**	N390 ~ **Urinary tract infection site not specified**	L592 ~ Bypass of femoral artery by anastomosis of femoral artery to popliteal artery using prosthesis

Adverse Event from case note review: Treatment, procedure

Cystic artery inadvertently cut during laparoscopic cholecystectomy. Operation converted to a laparoscopy in order to control bleeding. Blood loss estimated as two litres. Post operative blood transfusion given.

Levels of Patient Harm

Incidents were graded by severity; the proportion of incidents graded as causing death, severe, moderate, low or no harm varied among the different data sources (Table 5). Incidents found in inquest and claims records tended to be associated with death or serious harm; case records identified incidents mainly causing moderate or low levels of harm and LRMS databases captured a higher proportion of incidents causing low levels of harm or no harm. Although there was not enough information available to code the majority of incidents detected by the PAS, 8.4% of patients with a coded complication or misadventure in their record died. (see Box 3 for examples of incidents graded for differing levels of patient harm).

Table 5 Proportion of incidents in different harm grades for each data source, April 2004 to March 2005

	Clinical Incidents	Complaints	Health and Safety	Claims	Inquest	Case notes
Death	8 **(1.7%)**	0	0	2 **(20%)**	21 **(100%)**	2 **(2.8)**
Severe	9 **(1.9%)**	1 **(0.6%)**	2 **(0.9%)**	0	0	2 **(2.8)**
Moderate	28 **(5.8%)**	18 **(10.2%)**	3 **(1.4%)**	2 **(20%)**	0	18 **(25.4%)**
Low	114 **(23.6%)**	38 **(21.6%)**	86 **(38.9%)**	6 **(60%)**	0	35 **(49.2%)**
No harm impact not prevented	259 **(53.5%)**	107 **(60.8)**	127 **(57.4%)**	0	0	0
No harm impact prevented	66 **(13.6%)**	0	0	0	0	0
Not possible to code	0	12 **(6.8%)**	3 **(1.4%)**	0	0	0
Total	484	176	221	10	21	71

Box 3 Examples of incidents graded for differing levels of patient harm

Clinical Incident: No harm impact prevented

Patient's “to take home” medication mislabelled as 5mg Amlodipine when contents in the bag were in fact 10mg. Nurse informed pharmacy of error and returned the drugs

Health and Safety: No harm impact not prevented

Patient found sitting on floor by staff. No obvious injury noted.

Complaints: Low

Patient's son has written regarding her mother was who given a wrong wrist band in A&E on 2/4/04. He also has other concerns regarding a cannula which was left in his mother when discharged.

Claims: Moderate

Patient is diabetic with circulatory problems. Allegation made that insufficient care was taken during his admission to prevent development of pressure sores which became infected with MRSA.

Case Note Review, Adverse Event: Severe

Patient who was post coronary artery bypass graft gradually deteriorated over one week with symptoms of shortness of breath and a discharging chest wound. Clinical team failed to investigate reason for deterioration. After 5 days became acutely unwell and found to have developed chest wound breakdown and a passageway between the wound and chest cavity. Transferred to ITU and put on a ventilator. Recovery took several weeks.

Inquest: Death

Patient died following a right hemicolectomy. Cause of death on post mortum was I) Haemorrhage due to right hemicolectomy, II) Crohns' disease

DISCUSSION

The aim of this study was to explore the feasibility of using a range of hospital data sources to identify patient safety incidents in order to provide a better picture of the scale and scope of incidents related to key safety issues in an English hospital. The study focuses on routine data sources that are available within the hospital setting.

A number of limitations should be considered. The study was carried out in a single acute hospital and, although data sources identified by the mapping exercise as containing potentially useful patient safety information are likely to be present in other sites, accessibility, quality of coding and completeness may vary from site to site. The study also focused on data sources linked to medical and surgical inpatients only. Whilst these sources also provide information on incidents related to other specialties and outpatients, there will be additional data sources that can also be utilised for this purpose and some tailoring in relation to the issue being explored is necessary.

Many routine hospital data sources collect data for purposes other than identifying patient safety incidents. These data are observational rather than experimental and are prone to biases introduced by differential reporting levels,

the variable quality of coding and levels of completeness. The most useful supplementary information sources would be those that collect timely data on a continuous basis, which are accessible and have appropriate content. Timely and continuous data collection is important for analysis of trends over time. These conditions limit the use of many hospital sources where data collection is short-lived and non-recurring. Accessibility is also limited by the long delays in information reaching some sources, the lack of central collation, poorly coded electronic information and the amount of time required to review written records. Staff may also feel uncomfortable sharing some types of sensitive information, an attitude difficult to change if the hospital's culture is not perceived as open and fair. Important content, such as information related to risk factors including age, gender, ethnicity or profession of health care worker involved are often not available. Furthermore, the patchy nature of data collection across any health care organisation and the narrow focus of much of this data collection will inevitably mean that there will be gaps in information in certain areas.

Limited information makes it difficult to identify incidents. In the Complaints and Claims databases the descriptions of events are mainly from the patient or carer's perspective with limited information from the hospital, diagnoses in PAS records to not indicate when they occurred, and information on patient harm, apart from death, not available. To get the most out of the data available a pragmatic approach was taken to identifying incidents, judging whether the event described had the potential to cause patient harm, even if that harm was not

explicitly recorded. This may have led to some overestimation of the numbers of incidents. The relatively small sample of case notes reviewed, representing 0.8% of all adult medical and surgical admissions in the index year, also increases the degree of uncertainty around estimates of the total number of patient safety incidents that can be identified by this method. These problems of validity and reliability highlight why such sources should not be used for comparisons of facilities. However, they are less important when hospitals are using the data internally to pinpoint areas of concern as part of internal quality improvement processes.

Our analyses, which focused on seven data sources, indicated that the Clinical Incident database, the main database used by many trusts to monitor patient safety incidents, identifies relatively few incidents overall. This finding is in line with previous studies.[4, 7, 21] In addition, each source picked up its own unique collection of incidents both in terms of type and levels of harm, with minimal overlap between sources. From the mapping exercise it is clear that there are many other data sources found within the hospital setting which have the potential to provide useful information on patient safety, particularly if use is tailored to the investigation of specific problems. Triangulating information from a wider range of data sources presents an opportunity to gain a greater understanding of key patient safety issues, including a better understanding of the common types of incidents, the healthcare professional groups and types of patients involved, and important contributory factors. It offers the opportunity to

learn from events that cover the spectrum of patient harm. Using information from a range of sources can enhance investigations of key risk areas such as medication errors, diagnostic testing, infection control or treatments and procedures. (see Figure 1 for an example) It offers both a mechanism for ongoing monitoring and an opportunity to better focus clinical governance activities such as audit or targeted case note review. The future development of validated patient safety indicators, similar to those employed by the Agency for Healthcare Research and Quality (AHRQ) in the US will increase the utility of information derived from administrative data such as PAS.[22] Collaborative working between clinical staff, clinical risk teams and information technology is essential to make the most of all the data sources available. Staff cooperation, in turn, depends on the presence of an open and fair culture, with an emphasis on learning from incidents rather than apportioning blame.

Information plays a vital role in identifying, monitoring and investigating levels of risk, promoting safer healthcare within organizations and enabling delivery of the continuous quality improvement that underpins the clinical governance agenda in the UK. Chief executives and directors of Trusts are now accountable for organization-wide assessment of patient safety risks. This study highlights the advantages of triangulating information from a range of sources when making such assessments. Leadership from senior managers is vital to promote a culture that promotes the sharing of information derived from these sources among different departments. The directors are also in a position, based on the findings

from local investigations or intelligence received from external sources, to identify key risk areas requiring further investigation anywhere in the hospital and to provide the resources needed to ensure that the methodology and findings from such investigations are disseminated and further in depth work such as audit is commissioned if necessary. Such a targeted approach to improving patient safety would allow for the most efficient use of scarce resources. Clinical governance teams could provide technical support to departmental staff, helping them to identify and exploit information sources that are relevant for a particular investigation, along with advice on search strategies, collation and analysis of these data. Work to overcome the limitations of some data sources, such as improvement of the quality and consistency of electronically coded information or institution of new data collection systems to address key knowledge gaps could be part of this support. Such an approach need not be restricted to acute hospitals although the challenges relating to sharing information across the primary-secondary care interface are likely to be more significant.

The NPSA's National Reporting and Learning System draws the majority of the incident reports it uses for monitoring national trends from LRMS. The agency acknowledges that incident reporting systems alone can never be relied upon to provide a comprehensive picture of patient safety.[1] At a national level, the NPSA draws more widely on intelligence from a range of sources both within and external to the NHS via its Patient Safety Observatory to better characterize patient safety issues. At the local level ,data from a broader range of local

sources would also seem to offer valuable supplementary information to the NPSA. Such findings could reach the agency via its network of Patient Safety Managers who currently work closely with individual Trusts.

In Conclusion, gaining intelligence on patient safety incidents from a broader range of information sources has the potential to provide healthcare organizations with a better picture of key patient safety risks facilitating targeting of scare resources on appropriate interventions with the potential to improve patient safety.

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Contributors: HH, SO, SS, JC, MM, CV and RT devised and designed the study. RT and MM supervised the research. JC and HH recruited staff for interviews. JC, and RS ensured access to hospital databases. HH undertook interviews, collected and analysed data and wrote the first draft of the paper. All authors contributed to writing the paper. HH and RT are guarantors.

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