Evidence scan:

Improving safety in primary care

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Contents

Health Foundation evidence scans provide information to help those involved in improving the quality of healthcare understand what research is available on particular topics.

Evidence scans provide a rapid collation of empirical research about a topic relevant to the Health Foundation's work. Although all of the evidence is sourced and compiled systematically, they are not systematic reviews. They do not seek to summarise theoretical literature or to explore in any depth the concepts covered by the scan or those arising from it.

This evidence scan was prepared by The Evidence Centre on behalf of the Health Foundation.

Key messages

Throughout the world, teams are striving to improve safety in healthcare. Most efforts have focused on hospital care. This research scan examines what has been done to improve patient safety in primary care.

Every day, thousands of people in the UK visit their GP, practice nurse or pharmacist. Most receive safe, high quality care, but in 1-2% of consultations there may be an error, whether or not it is evident to patients. This research scan explores steps that have been taken to minimise such errors and improve patient safety in primary care.

Ten databases were searched and 83 studies were included, predominantly from North America.

Research quality and quantity

Compared with hospital care, there is relatively little research about improving patient safety in primary care. The evidence that does exist is of variable quality, with a large number of simple observational studies describing strategies implemented at single organisations. Randomised trials are beginning to emerge, and the most robust research focuses on electronic tools to improve prescribing in primary care.

A number of studies are underway in Europe and the US. National and regional campaigns and primary care improvement programmes are also underway in some areas, but most do not have publicly available evaluations. While researchers and policy makers tend to agree that improving patient safety in primary care should be a priority, few systematic programmes are in place to support this and there is little consensus about the best ways of doing so.

Improving patient safety

The main approaches that have been researched for improving patient safety in primary care include:

– awareness raising
– campaigns and education
– incident reporting
– audit and feedback
– Safety culture surveys.

Staffing

– Changing staff roles such as involving pharmacists and nurse-led care.
– Involving patients in care or planning.

Changes to care

– Electronic medical records and electronic prescribing systems.
– Hospital discharge planning.
– Training staff in communication skills and teamwork.

Many other approaches may have been tested but not reported on empirically.

The strategies that have shown most promise target the key causes of harm in primary care:

– clinical complexity (via computerised prescribing and alert systems)
– human factors (via pharmacist input)
– systems issues (using learning collaboratives, audit and feedback, and discharge planning to improve interfaces with secondary care)

1 Scope

Every day, hundreds of thousands of people in the UK visit a GP, practice nurse or pharmacist. Most visits are without incident, but there is always room for improvement. This research scan explores what is being done to improve patient safety in primary care.

1.1 Purpose

On any one day, more than one million people in the UK will use NHS services. Most consult primary care teams such as GPs, practice nurses or pharmacists. The majority of people using primary care services do not experience any harm or threats to their safety, but in 1–2% of consultations there will be some sort of adverse event.[1–3] Some estimate that levels of adverse events in primary care may even be as high as 8%[4] and more subjective reports from patients and professionals suggest that up to one-quarter of consultations may include an error.[5,6] Most errors are minor and do not impact on patients, though there is always potential for serious harm.[7–12]

Improving patient safety in healthcare is seen as a priority by governments and clinicians throughout the world. Many initiatives have been tested or are underway to reduce adverse events in hospital,[13–15] but far less is known about improving safety in primary care.

This research scan addresses this gap by summarising readily available research about strategies to improve patient safety in primary care.

The scan addresses the following questions:

– What initiatives have been implemented to improve safety in primary care and what are the impacts of these initiatives?

– How have patients, professionals, researchers and funders been involved?

– Are there ongoing studies or media stories about this topic?

The scan provides a rapid collation of empirical research about initiatives to improve safety in primary care. All of the evidence has been sourced and compiled systematically, but the scan is not a systematic review and does not seek to summarise every study on this topic.

This section outlines the definitions used to guide the scan and the methods used to collate information. The following sections address each of the questions of interest in turn.

1.2 Definitions

Primary care

Primary care is the first point of contact for people using health services. It involves generalist care rather than care from a specialist and may be a one-off visit or part of an ongoing series of care. About 90% of all contact with health services in the UK involves primary care.[16]

Different organisations run primary care services in each country in the UK – such as community health partnerships in Scotland,[17] health boards in Wales,[18] a joint health and social care board in Northern Ireland, and primary care trusts and developing GP consortia in England.[19]

Regardless of how primary care is managed and funded, the types of services on offer are similar. Examples include GPs (family doctors), practice nurses, walk-in centres, dentists, community pharmacists, community midwives, district nursing and general home care.

The NHS is funded through taxation so visits to GP surgeries and most other primary care services are free but there are charges for dentists. Medicine costs vary. England has a set prescription charge per item whereas Wales and Northern Ireland have abolished all charges and Scotland is phasing out charges.

In other countries, primary care is organised differently. For instance, in countries such as the USA, Australia and New Zealand, people pay to visit primary care or 'family practice' services. In the USA, this is mainly covered by private medical insurance or state-funded insurance, with co-payment by patients.

In the USA, some health systems provide 'integrated care' whereby the organisations offer both primary and secondary care with more seamless service. Primary care may also be part of larger 'ambulatory care' clinics, which merely means that people are treated on a day case basis, rather than spending time in hospital.

These organisational differences are important because when studies mention 'primary care' they are not necessarily describing exactly the same structures or services. However, the underlying principles are the same: care that is provided largely in local communities, does not involve a hospital stay, and is designed to be the first point of contact for general healthcare.

For this research scan, the focus is largely on general practice, community pharmacy and out-of-hours services as those are the areas in which most research has been published.

Patient safety

For the purposes of the research scan, 'improving patient safety' focuses on attempts to minimise or avoid errors, adverse events or harm to patients. The emphasis is on avoiding discrete and direct harms rather than the broader definition of patients being harmed by not receiving all of the care they are entitled to or would benefit from.[20,21]

The simplest definition of a healthcare adverse event or harm is a negative effect of care, whether or not it is evident to the patient or impacts on their wellbeing. Some studies differentiate between errors (mistakes or unintentional actions) and adverse events or harms (actions with some form of negative impact for processes, staff or patients). Some use these terms interchangeably and other studies have very specific definitions of what they are measuring in terms of error or harm.

The scan uses the definitions of patient safety, error and harm listed within individual studies.

Research about the contributing factors to patient harm in primary care is scarce, but generally mirrors the trends seen in hospital research. The three most common factors thought to contribute to adverse events in primary care are medical complexity, system failures and human factors.[22–24]

Issues related to clinical complexity that may impact on patient harm in primary care include:[25–31]

– taking multiple medications
– complex medical conditions
– managing multiple conditions
– frailty.

System failures and process issues that may contribute to patient harm include:[32–49]

– poor communication between professionals
– poor communication with patients
– lack of coordination, including between primary and secondary care
– unclear lines of authority
– thinking that action is being taken by other groups within the organisation
– drug names that look alike or sound alike
– environment and design factors
– infrastructure failure
– reliance on automated systems to prevent error
– fragmented reporting systems
– inadequate systems to share information about errors, which hampers analysis of causes

- increasing complications due to increasing patient demand
- cost-cutting measures.

Human factors that may impact on patient harm in primary care include:[50–57]

- variations in the training and experience of health professionals
- inadequate training
- fatigue
- depression and burnout, which impact on how team members cope with diverse patients, unfamiliar settings and time pressures
- failure to acknowledge the prevalence and seriousness of harm and take steps to do something about it.

Although studies vary in the weight that they place on each of these factors, the literature suggests that individual and team factors, systems issues and clinical complexity all play a part in causing harm in primary care.

This research scan therefore categorises interventions to improve patient safety according to whether they are focused on clinical complexity, human factors or systems issues. It is acknowledged that some interventions aim to address more than one factor and this typology is used for ease of presentation only.

1.3 Methods

To collate evidence, two reviewers independently searched bibliographic databases, reference lists of identified articles and the websites of relevant agencies. The databases included MEDLINE, Ovid, Embase, the Cochrane Library and Controlled Trials Register, PsychLit, Google Scholar, Web of Science, ScienceDirect, the World Health Organization (WHO) library and the Health Management Information Consortium. All databases were searched from 2000 until August 2011.

Search terms included combinations of primary care, primary healthcare, family practice, ambulatory care, pharmacy, walk-in centre, district nursing, home care, general practice, GP, practice nurse, midwife, patient safety, quality improvement, harm, risk, adverse event, incidents, error, medication errors, prevention, risk management, significant event and similes.

To be eligible for inclusion, studies had to be readily available primary research or reviews addressing one or more of the core questions of interest.

More than 12,000 pieces of potentially relevant research were scanned and the most relevant were selected to summarise. 83 studies with patient safety outcomes were synthesised. Data were extracted from all publications using a structured template and studies were grouped according to key questions and outcomes to provide a narrative summary of trends. Both published and unpublished research is synthesised together.

2 Targeting clinical complexity

The main sources of harm in primary care include clinical complexity, human factors and systems issues. This section summarises interventions aiming to reduce errors due to clinical complexity.

Most research about ways to reduce errors related to medical complexity in primary care has focused on reducing adverse drug events. A number of approaches have been tested.

A systematic review provides a good summary of primary care interventions to reduce medication-related adverse events that result in morbidity, hospital admission or mortality. 14 bibliographic databases were searched for published and unpublished data. 38 studies were included, focusing on pharmacist-led interventions (17), interventions led by other primary healthcare professionals (8), and complex interventions that included a component of medication review aimed at reducing falls in the elderly (13). Meta analysis found that pharmacist led interventions reduced hospital admissions, but this did not hold when only randomised trials were analysed. Meta analysis of other interventions did not find any significant effect. The authors concluded that there is weak evidence that pharmacist-led medication reviews are effective in reducing hospital admissions, and no evidence for the effectiveness of other interventions which aim to reduce admissions or preventable drug-related morbidity in primary care.[58]

Since this review was published in 2006, a number of other studies have also been published, many focusing on electronic tools to improve prescribing. Here, we summarise a range of interventions aiming to reduce medication errors.

2.1 Electronic tools for prescribing

The most common interventions targeting clinical complexity use tools such as electronic healthcare records, decision support tools or alert systems.

Computerised records

For example, one study assessed the quality of record-keeping among 134 general dental practices in England. Dental practices using computerised record systems were more likely to adhere to safety standards than those using paper record systems.[59] The authors concluded that electronic record systems might be a key component in improving safety in primary dental care. However, this was a correlational study and no cause and effect relationships were examined.

Using a similar correlational approach, researchers in the USA examined the relationship between electronic health records and settled malpractice claims. 1,140 doctors were surveyed about their use of electronic health records and data were compared with paid malpractice claims. Doctors using electronic health records were less likely to have paid malpractice claims.[60]

In an attempt to establish a more direct link, researchers in Spain tested the use of electronic clinical records to prevent problems related to drug interactions in primary care. 139 GPs took part in the study. Software was used to identify patients who had clinically important drug interactions and reports were provided regularly to each doctor. The reports included patient names, information about the drugs, possible consequences and recommendations about what to do. A pharmacist ran education sessions for GPs. Before and after analysis found reduced drug interactions.[61] The authors suggested that using electronic records proactively to examine clinical complexity and drug interactions could improve patient safety.

Personal digital assistants (PDAs)

Other technologies have also been tested. For example, a trial examined the impact of personal digital assistants (PDAs) on medication prescribing errors in primary care. 78 doctors from 31 primary care practices in the USA took part. The intervention group used a PDA-based clinical drug database during the prescribing process and printed prescriptions on a local printer via the PDA. The control group retained their usual prescribing practices. Voluntary use of the PDA resulted in substantial reductions in errors of legibility, omissions, and use of abbreviations and symbols. However, not all doctors chose to use the PDA.[62] This suggests that even when potentially worthwhile technologies are available to improve patient safety, there may not be widespread uptake by practitioners. The reasons for this remain uncertain.

Researchers in Switzerland also tested the value of PDAs. Drug databases were placed on PDAs to help detect adverse drug interactions at the point of care at a walk-in clinic. 1,801 prescriptions were reviewed. The drug interaction database correctly identified 81% of clinically relevant adverse drug interactions, but also flagged up several clinically non significant interactions.[63]

This emphasises a difficulty with technologies used to improve prescribing – though they may identify many potential errors, the value of this needs to be weighed against the potential loss of time needed to deal with all the spurious results and non-relevant interactions signposted.

Computerised prescribing

Computerised prescribing systems are popular in secondary care and are also gaining prevalence in primary care. Researchers in the USA examined the impact of computerised provider order entry in primary care. 5,016 prescriptions written by hand before using the system were compared with 5,153 electronically prescribed documents. Errors reduced from 18% to 8%. The largest improvements were in illegibility errors, use of inappropriate abbreviations, and missing information.[64]

Other researchers in the US compared the experiences of clinicians using e-prescribing systems and those not using such systems. 228 doctors were surveyed. E-prescribers were more likely to think they could identify clinically important drug interactions. They reported high satisfaction with their systems, but 17% had stopped using the system and another 46% said they sometimes reverted to handwriting prescriptions. The authors concluded that e-prescribing users reported patient safety benefits but had not always experienced the enhanced benefits expected from using advanced features of the system.[65]

Alert systems

A key component of many electronic systems involves alerting clinicians when they are about to prescribe a medication that may be contraindicated.

A systematic review has examined the efficacy of computerised drug alerts and prompts. Four bibliographic databases were searched to May 2007. 23 out of 27 studies of alerts and prompts (85%) found improved prescribing behaviour or reduced error rates. The impact varied based on the type of decision support tool. Most data came from hospitals, though some primary care data were available.[66]

Another systematic review examined the impact of computerised decision support systems on initiating, monitoring and stopping therapy in hospital and primary care. Three bibliographic databases were searched for studies published between 1990 and 2007, and 56 studies were included. 38 studies about initiating therapy mainly found that decision support systems appear to be more effective after, rather than before, drug selection. 23 studies about monitoring therapy mainly found decision support systems to be effective. None of the three studies about stopping therapy found benefits. Decision support systems performed better in hospital than primary care and when decision support was initiated automatically by the system rather than by user initiation. Decision support systems implemented alongside other strategies such as education were no more successful in improving prescribing than support systems alone.[67]

Investigations specifically targeting primary care are also available. For instance, one study examined using a computerised decision support system for managing opioid therapy for chronic non-cancer pain in primary care. The system was developed in partnership between a university and a health service and provided doctors with recommendations specific to individual patients at the point of care. It aimed to reduce patient risk by: identifying patients with comorbidities or concurrent prescriptions that increase the risk of overdose; identifying patients with mental health problems that increase risk of medication abuse; assisting doctors with complex pharmacologic calculations to reduce the risk of mistakes; and presenting information in an easy-to-use format. Outcomes data are currently being collected.[68]

Other studies have collected detailed outcomes data. For instance, researchers in the USA studied 279,476 prescriptions written by 2,321 primary care doctors. They concluded that it is likely that electronic drug alerts prevented 402 adverse drug events in a one year period, including 49 potentially serious and 125 significant errors. Alerts accepted by doctors may have prevented a death in 3 cases, permanent disability in 14 cases and temporary disability in 31 cases. Alerts potentially resulted in 39 fewer hospitalisations and 34 fewer A&E visits. 331 alerts were required to prevent 1 adverse drug event. Cost savings were more than US$400,000.[69]

In contrast, a UK study examined the experience of primary care professionals using computerised decision support based on a literature review, workshop and expert panel views. The study found that computerised decision support was routinely incorporated into primary care electronic patient record systems in the UK, but there did not appear to be an associated reduction in prescribing errors. Clinicians were frustrated with current systems and thought they were distracting to both professionals and patients due to too many clinically irrelevant alerts.[70]

Thus, computerised physician order entry systems may or may not improve patient safety, but doctors frequently override drug interaction and allergy alerts, so their value in primary care remains uncertain.

Improving usability

The quality of some of the electronic tools available may be questionable. Researchers from Italy used a 10-item tool to assess the quality of drug information provided by eight electronic record programmes to support the appropriateness of prescriptions. None of the programmes scored more than 55% of the maximum possible score. Information about drug safety, such as detecting interactions, monitoring laboratory parameters or getting updated information on drug safety was particularly limited.[71]

A number of strategies have been tested to improve the usability of alert systems in primary care.

In Australia, the features of e-prescribing software systems that support patient safety and quality of care in general practice were examined. 114 software features were identified using a literature review, key informant interviews and an expert panel. Most of the features relate to the recording and use of patient data, the medication selection process, prescribing decision support, monitoring drug therapy and clinical reports.[72]

In England, researchers examined how general practice computer systems could be improved to enhance safety in primary care. 31 clinicians, computer system and drug database suppliers, academics with interests in health informatics, and members of governmental, professional and patient representative bodies were interviewed. Participants identified deficiencies in current systems that pose threats to patient safety. They thought that safe, accurate and accessible information is needed for decision support. The researchers concluded that developers need to be aware of the importance of human ergonomics in the design of hazard alerts, consider the value of audit trails and develop mechanisms to allow information transfer between clinical computer systems. Individual practices may also need training about recording data accurately and using call, recall and reminders effectively.[73]

Another study examined alerts and reminders at the time of medication prescribing in primary care. Interviews found that clinicians prefer decision support alerts that are clear, concise, and easy to navigate, with minimal information in the alert text. Alerts were followed less often when they appear at inappropriate times in workflow, are difficult to read, add to time pressure or are cancelled before being fully read.[74]

Similarly, a US study described primary care clinicians' views of electronic prescribing drug alerts at the point of prescribing. 157 prescribers from 64 practices in six US states were surveyed and 276 prescribers and other clinic staff participated in focus groups. Prescribers thought that the software and the interaction alerts were beneficial to patient safety and valued seeing drug interactions for medications prescribed by others. However, they thought that alerts were too sensitive and often unnecessary. More than 40% of prescribers indicated that they override alerts about drug interactions most or all of the time.[75]

Building on this point, a US study examined whether ambulatory care clinicians were more likely to accept the most important drug interaction alerts. 120 drug interaction alerts were rated by an expert panel. The researchers compared the relationship between alert acceptance rates and the expert panel's rating of importance. Clinicians were more likely to accept drug interaction alerts that the panel judged would result in an adverse drug event. The authors concluded that the value of electronic drug interaction alerts is heavily influenced by clinicians' judgements about the clinical value of the alert.[76]

Researchers in the USA aimed to improve clinician acceptance of drug alerts by only notifying doctors of high severity issues. 31 practices took part in the study. Of all the drug alerts generated over a six-month timeframe, 29% interrupted the workflow by signalling a high severity error. The rest of the alerts appeared on patient notes, but no pop-up screen was used. Of the 'high priority' alerts that interrupted workflow, 67% were accepted. The authors concluded that it is possible to design computerised prescribing decision support with high rates of alert acceptance by clinicians.[77]

2.2 Incident reports

A number of studies have attempted to measure error and harm in primary care using incident reporting. But rather than being an end in itself, incident reporting can also be used to develop programmes for change. This approach has been tested to reduce adverse drug events in primary care.

In the USA, an online incident reporting system was developed specifically for primary care. 220 staff from 24 practices tested the system for ten weeks. Evaluators concluded that it is feasible for primary care clinicians and office staff to report medication errors and adverse drug events online, but time pressures and a punitive culture are barriers to event reporting.[78]

In Germany, an online incident reporting system was developed for general practices. Incidents were fed into a database, analysed by experts and published in report form online and in journals. The system was well used and feasible.[79]

Researchers in the Netherlands assessed the feasibility of incident reporting in five primary healthcare centres. A committee at each centre analysed the reported incidents and initiated improvements when needed. The system was considered feasible. 62% of all incidents were reported in a dedicated 'reporting week' that encouraged staff to report minor incidents and near misses. Most errors were process-related. All centres initiated improvement projects as a result of reported incidents.[80]

Elsewhere in the Netherlands, researchers found that centralised incident reporting from a collaboration of nine out-of-hours services provided few incident reports. A local incident reporting process was therefore implemented. In one GP out-of-hours service, a local committee with peers analysed reported incidents fortnightly. In two other services, incidents were reported to a centralised advisory committee and assessed every two months. Data were analysed for two years before and two years after implementation of local incident reporting. The number of incidents reported in the local system increased. The type of incidents reported did not alter. Improvements were implemented in a shorter timeframe, but reports in the centralised incident reporting system led to general and recurring safety problems being addressed more systematically.[81]

Some studies describe the effects of using incident reports to motivate positive change. One health service in the USA implemented a voluntary reporting system which classified and tracked different types of errors. The system was originally tested in family medicine and then rolled out to all services. Evaluators suggested that by reporting errors, analysing error patterns and addressing them, practices became better able to identify faulty systems and error-prone areas.[82]

Based on incident reports from primary care, a programme in the USA identified laboratory errors and prescription errors as important areas for intervention. Expert panels of local stakeholders helped develop principles for process improvement. The intervention for laboratory tests involved using portable barcoding to support an electronic laboratory test tracking system. The intervention for prescriptions involved an electronic mechanism to ensure timely and accurate transmission of prescription data from practices to pharmacies. Initial evidence suggested improved safety processes.[83]

Another study aimed to decrease medical errors and improve care in US rural and frontier primary care clinics. Medical error reports were analysed and used to develop interventions to reduce errors. 14 practices with a total of 150 staff took part. Communication errors, diagnostic tests and medication errors were the most common incidents reported. Local stakeholders developed standards for improving medication, and diagnostic testing errors and safety alerts were issued to improve care. The authors concluded that a secure voluntary reporting system can be used to identify processes amenable to improvement.[84]

Other approaches have also been used to identify errors. One study examined the feasibility of detecting medication errors by asking staff to self-observe their medication management behaviours. 14 primary care doctors and 18 office staff at one US clinic reported all their medication management transactions during a four-hour study period. A researcher extracted further information from patient charts. Errors were identified in 34% of cases. These included not listing medication on the patient chart, prescribing the wrong dose, writing prescriptions incorrectly, not implementing medication across care settings, and prescribing contraindicated medication. None of these errors would have been detected by chart review alone. The authors concluded that self-reporting followed by chart review is feasible in primary care practices and discovers medication errors that might not have been detected by either method alone.[85]

An issue with many studies about incident reporting systems is that they outline feasibility or process changes made as a result, but do not follow through to report on the impacts on patient safety. Few studies in primary care quantify the impact of error reporting systems on reduced medication errors, improved patient wellbeing or reduced service use.

2.3 Analysis methods

Another approach to improving safety in primary care involves analysing routinely available data or mapping processes to identify and address errors.

For instance, researchers in Spain analysed a prescriptions database to determine the drugs most likely to cause severe interactions in primary care. The team analysed the drugs that each individual patient was taking, looking for severe interactions. A 'severe interaction hazard scale' was constructed to assess the probability that a patient may be taking a particular drug and the probability that a drug may produce a severe interaction. This was then used to estimate the risk of producing a severe interaction for each drug.[86]

Similarly, researchers in the USA assessed the feasibility of using health plan administrative data to measure potential drug interaction rates in ambulatory care. Administrative and pharmacy claims data were combined from two large health plans to calculate the rates at which people using selected medications were potentially exposed to another drug known to pose a risk of harmful interactions. Four years' worth of data were analysed. The authors found that drug interaction rates calculated from health plan data can help to measure and improve medication safety.[87]

Another study described systematically reviewing literature in order to map out primary care medicines management systems in the UK. The map illustrated that the proportion of errors is very high. Several stages of the process had error rates of 50% or more, including repeat prescribing reviews, interface prescribing and communication and patient adherence. The mapping exercise suggested ways to improve the system such as routine monitoring of adherence, clinical effectiveness and hospital admissions.[88]

Once again, studies of this nature tend to describe the processes used but not to provide information about the downstream impacts on patient safety outcomes such as morbidity or mortality.

2.4 Education and support

Studies have investigated educational approaches to support primary care practitioners to improve their prescribing.

For instance, a systematic review examined studies of educational programmes for GPs designed to improve prescribing in primary care. Four bibliographic databases were searched for articles published between 1988 and 1997, and 51 studies were included. The more personalised and active the education sessions were, the more likely they were to result in changed prescribing behaviours.[89]

Researchers in the USA examined whether structured support could increase the use of electronic health records and improvement plans to enhance quality in primary care. The intervention included network meetings, site visits and performance reports. Common strategies adopted to improve safety included enhancing medication reconciliation to improve the accuracy of medication lists, identifying patients meeting the criteria for preventable medication errors, and customising and applying electronic decision support tools for medication dosing, drug interactions and monitoring.[90] The education approach was found to be useful for motivating improvement initiatives, but the researchers did not report the impacts of those initiatives on patient outcomes.

Other researchers in the USA tested ways to reduce the use of potentially inappropriate medications in the elderly. 99 primary care practices took part in a four-year programme. Each practice received quarterly performance reports on the use of potentially inappropriate medications in their elderly patients. Some received biannual site visits and annual network meetings for performance review, academic detailing and quality improvement planning. Before and after analysis found improved prescribing.[91]

In Austria, 445 GPs took part in quality improvement peer review circles to increase the use of generic drugs and improve the quality of prescribing. The programme was associated with improved prescribing and the authors concluded that peer review groups could be rolled out more widely to improve GPs' prescribing behaviour.[92]

These studies suggest benefits from external education and support, but improvements largely relate to processes or GP behaviours. The impacts on patient outcomes have not been reported.

2.5 Medication reviews

Some proactive interventions to improve medication use have been tested.

A study in the USA examined whether trained undergraduate students working with pharmacists could provide in-home medication reviews as part of primary care for older people. 75 students were trained to complete an in-home medication inventory, assess the risk of falls in the home, and measure blood pressure. Medication inventories were reviewed by a pharmacist for medications that may heighten the risk of falls, major drug interactions and duplicate therapy. Changes to care were then recommended to the primary care provider if needed. Out of 118 patients visited, 86% were prescribed at least one medication that heightened the risk of falls, 14% had the potential for a major drug interaction and 7% were prescribed duplicate therapies. 48% had a change made to their medication following a review. The authors concluded that in-home outreach can be successfully performed by student volunteers.[93]

2.6 Other initiatives

Other innovative approaches have also been tested.

Researchers in Sweden examined the impact of incentives linking primary care funding payments with GP adherence to drug guidelines and self-reflection on prescribing patterns. 139 primary care centres participated in the project and 15 did not. Average adherence to guidelines increased among participating practices. The higher adherence equated to savings five times greater than the cost of running the programme, including the financial incentives.[94]

As part of the revalidation process for GPs in the UK, the safety of prescribing will be assessed. Researchers have been working to develop potential indicators to measure prescribing safety. 34 indicators have been put forward covering hazardous prescribing, hazardous drug combinations, prescribing with a history of allergy, and inadequate laboratory test monitoring.[95] The impact of these measures on patient outcomes has not yet been tested.

2.7 Summary

Clinical complexity is one of the key sources of adverse events in primary care. Interventions to improve patient safety in this area have focused largely on medication prescribing. Studies to improve the management of people with complex conditions and multiple conditions are available,[96–100] as are those to reduce the risk of falls and other conditions associated with frailty.[101–103] However, most of these studies focus on improving the broader notion of 'quality of care' rather than safety and errors per se.

In terms of research about approaches to reducing prescribing errors, few studies have been published about the impact of electronic medical records in primary care. Those that do exist suggest positive trends.

Studies are beginning to emerge about electronic prescribing systems in primary care. Electronic prescribing has been associated with reduced process errors such as illegible prescriptions.

A number of studies have examined systems that alert GPs about errors or prompt GPs to prescribe in a certain way for individual patients. Most studies have found improved prescribing behaviours and reduced errors, though GPs may ignore the alerts or think they are disruptive.

Some studies about using different technologies are available. Personal digital assistants (PDAs) have been found to be feasible for using alert systems and electronic prescribing at the point of care.

Incident reporting systems have been found to be feasible for identifying errors and areas for improvement in primary care. Few studies, however, have followed through to examine the downstream impacts on patient safety outcomes.

Database analysis and process mapping approaches have been used to identify potential patient harms and areas for improvement. Little has been published about the impacts of using these approaches on patient morbidity or mortality.

Education and support provided by external experts has been found to motivate primary care practices to undertake improvement initiatives and improve prescribing behaviour among GPs. The impact on patient outcomes has not been reported.

Other initiatives such as in-home medication reviews, financial incentives and revalidation criteria have some favourable findings, but the evidence base remains sparse.

3 Targeting human factors

Human factors such as skill levels, roles and fatigue all contribute to harm in primary care. This section summarises research about interventions designed to tackle human factors affecting patient safety.

The most common interventions to address human factors that contribute to patient harm in primary care relate to communication, teamwork and staff roles (though communication and teamwork are also seen as systems issues in some taxonomies).[104–106] This section focuses on adaptations to staff roles and team behaviours that have been tested to see if they improve patient safety in primary care.

3.1 Expanding roles

Pharmacist roles

The majority of research in this area focuses on enhancing pharmacist roles or helping pharmacists become more proactive components of the primary care team.

A US study examined the pharmacist's role in improving medication safety in primary care. Focus groups were conducted with pharmacists and patients. Patients were likely to see multiple doctors but only one pharmacist. They were more likely to report medication errors to the pharmacist than to their doctor. Pharmacists acted as the final interceptors, detecting medication errors before they reached patients.[107] The authors suggested that this highlights the valuable contribution that pharmacists could make to improving patient safety if their role was harnessed appropriately.

Pharmacists may contact doctors to clarify prescriptions or suggest changes. Researchers in the USA described the main reasons why pharmacies call primary care practices to clarify prescriptions. Callbacks from pharmacies to 22 primary care practices were logged over a two-week period. Calls were most frequently about prior authorisation issues (37%), formulary issues (26%) and unclear or missing prescription dosages (21%). This analysis approach helped practices develop interventions to reduce errors.[108]

Other researchers in the USA conducted 34 organisational case studies to examine strategies for safe medication use in ambulatory care settings. They found that integrating pharmacy services into primary care supported efforts to improve patient safety.[109]

More proactive approaches have also been tested. In Switzerland, six quality circles comprising doctors and pharmacists were set up whereby six community pharmacists reviewed the prescribing of 24 GPs. Key elements included continuous quality improvement and education, local networking, feedback of comparative data about costs and drug choices, and structured independent literature review. Analysis of nine years' worth of data found a 42% decrease in drug costs compared with a control group, representing savings of US$225,000 per GP per year. There was better compliance with clinical and pharmacovigilance guidelines, more use of generic drugs and a more balanced attitude toward marketing strategies.[110]

Healthcare assistants

Studies about other roles are sparse. Although much research has examined nurse-led care, physicians' assistants or the use of other staff in primary care, little of this focuses explicitly on improving patient safety.[111]

Some studies only really mention patient safety 'in passing'. For instance, more than half of general practices in England employ a healthcare assistant so a study examined the perceived impacts of this role based on interviews with six GPs and 13 practice nurses. Healthcare assistants were seen as a valuable addition to the primary care team. They were reported to accelerate rather than extend services, and allow more appropriate use of nurses' skills. However, it was thought to be time-consuming to train and supervise these staff. Patient safety was raised as a concern, but there were no reports of compromised safety.[112]

3.2 Team interactions

Teamwork and interactions are an important component of human factors approaches to improving patient safety.

A systematic review examined factors that inhibit or facilitate interprofessional teamworking in primary and community care settings. Team structure and team processes were found to have the greatest impact on teamwork. Six influential factors were identified: team premises; team size and composition; organisational support; team meetings; clear goals and objectives; audit.[113]

Another systematic review examined whether feeding back patient assessments of interpersonal care skills or brief training focused on improving interpersonal care were worthwhile. Three electronic databases were searched for randomised trials and nine studies were included. One of the two studies about feedback reported a positive effect and one of the seven studies about brief training found a positive effect. The reviewers concluded that brief training is not likely to be effective for improving interpersonal skills and that there is insufficient evidence about patient-based feedback.[114]

Researchers in Canada examined the impact of feedback about team performance for interdisciplinary primary care teams. Seven teams were offered a one-hour, facilitated performance feedback session presenting evaluation data. Surveys and interviews found that teams welcomed performance measurement and feedback and thought this would improve the safety culture and capacity for quality improvement. However, teams thought that existing performance indicators did not reflect the roles of different disciplines within interdisciplinary teams.[115]

3.3 Involving patients

There is an increasing trend towards involving service users in the planning and control of their healthcare. The field of patient safety is no exception. Patients are acknowledged as an important component of the healthcare team and in secondary care environments, steps have been taken to involve patients in identifying errors and reducing harm.[116,117] This has not been tested to the same extent in primary care, though some studies have moved in this direction.[118,119]

Some studies highlight the importance of developing relationships, both within professional teams and also between patients and professionals. For example, researchers in New Zealand assessed the perceived importance of different safety errors according to 83 patients and primary care professionals. Perceived ways to manage error included growing relationships, enabling patients and professionals to recognise and manage patient error, being responsive to shared capacity for change, and motivating patients and professionals to act together for patient safety.[120]

Some providers disseminate leaflets telling patients what they can do to avoid errors and harms in their care. Researchers in Scotland examined the content of five leading safety advisories for patients, reviewed published literature and interviewed 50 key informants. The study found that little is known about the effects of distributing safety advisory material to patients. There was a lack of attention to patients' perspectives during the development of advisory messages and patients were given little practical support to carry out the recommended actions. The researchers suggested that some messages suggest an inappropriate shifting of responsibility onto patients and that the role of health professionals is not emphasised. Advice that involves checking on or challenging health professionals' actions appears to be particularly problematic for patients.[121]

Patient complaints have also been tested as an improvement mechanism. Researchers in the USA described how patient complaints have been used to provide non-punitive feedback among teams and, if needed, interventions designed to improve safety and reduce the risk of lawsuits. Programmes run at more than 20 community and academic medical centres found that when comments and complaints were fed back to clinicians, there were fewer subsequent complaints.[122]

3.4 Summary

There is relatively little research evidence about ways to improve patient safety by targeting human factors such as fatigue, training or role functions in primary care. The best evidence in this regard focuses on reducing medication errors using expanded pharmacist roles.

There is emerging evidence to suggest that integrating pharmacist roles within primary care or using pharmacists to educate GPs and review prescriptions can reduce medication errors.

There is little evidence about the impacts on safety of other roles such as healthcare assistants or expanded nurse-led care. A number of studies exist about the value of such roles for improving care more generally, but few studies have directly explored the impact on safety in primary care.

There is growing interest in involving patients in improving safety, but few empirical studies are available. Some suggest that advisory leaflets to help get patients involved in safety have little impact, but feeding back patient complaints has been found to reduce subsequent complaints. The impact on patient wellbeing is uncertain.

4 Targeting systems issues

Systems issues such as information, infrastructure and links between services may impact on patient safety in primary care. This section summarises interventions that aim to improve systems issues.

The widest variety of studies about improving safety in primary care target systems issues. Approaches include national and local safety improvement campaigns, educational sessions, multifaceted quality improvement initiatives, raising awareness through surveys of safety culture and climate, data analysis to identify errors, and improvements to the interface between primary and secondary care.

4.1 Education and campaigns

Information campaigns

Most national or regional safety improvement programmes evaluated to date have focused on improving care in hospital. However, one example of a primary care campaign is available from Canada. One health region launched the 'It's Safe to Ask' campaign to improve communication and health literacy among vulnerable populations and their primary care providers. The campaign included a poster and brochure for patients and a toolkit for clinicians and organisations. Tools included three key questions for patients and family members to ask in healthcare interactions, tips on how to ask questions, and room for notes and medication lists. A formal evaluation is underway.[123]

Safety bulletins

Another approach is to disseminate safety bulletins or 'alerts' to organisations about patient safety issues or key guidance. Researchers from the UK examined the impact of safety information bulletins in 20 acute, two mental health, four ambulance and 15 primary care provider organisations. The authors found that healthcare providers have succeeded in setting up successful systems to disseminate alerts to middle management level, but implementation of recommendations by nurses is sub-optimal.[124] The impact on patient outcomes was not assessed.

Education programmes

Courses and ongoing training for primary care staff have been developed specific to patient safety.

For instance, in the USA, a continuing medical education course was developed to improve safety in primary care. There were seven modules, each of which included clinical cases. A 'train the trainer' model was used. Having a trusted colleague conveying patient safety messages via clinical scenarios was feasible and allowed widespread roll-out. Before and after analysis found improved attitudes towards patient safety but this was not maintained at six-month follow-up.[125]

Another study examined the value of simulations of patient scenarios to improve safety in ambulatory care. Staff from 21 US primary care clinics and five urgent care clinics took part. Key components included easy-to-use documentation, interactive learning stations with expert faculty, on-site education, and scenarios based on real-life situations with immediate debriefings. Clinic staff reported increased knowledge, confidence and skills that translated into better patient management.[126]

4.2 Collaboratives and support

A number of general quality improvement programmes have been set up to target various aspects of patient safety in primary care. Many of these remain unreported, but some observational studies are available both from Europe and North America.

Researchers in the USA evaluated a programme to help small primary care practices improve quality and safety. 30 practices received two site visits from quality improvement experts, a practice assessment, weekly email tips and ongoing guidance about improvement efforts. The first session involved helping practices think about which areas they wished to improve. This was more effective in engaging practices than didactic presentation.[127]

Evaluation found improvements in patient education, staff communication and patient safety. The intervention was associated with significant positive change on over 70% of the 21 safety issues measured. Effects were largest regarding how practices managed sharps, hazardous materials, medications and vaccines. The evaluators concluded that with concrete recommendations, small practices can make significant changes in a short period of time and at relatively low cost. Having a strong doctor champion and an office manager determined to make changes was important for successful change. Practices with greater stability of staff and strong finances were more likely to improve.[128]

Another US study described using a learning collaborative to implement a toolkit of best practices to improve safety in primary care. There were improvements in the accuracy of medication lists, policies and the education of medical and nursing staff. Improvements were sustained after one year. The authors suggested that the collaborative model worked well to improve patient safety in small group practices.[129]

Other researchers described safety improvement programmes among large primary care groups in the USA. The most commonly targeted problems included diagnosis issues, follow-up of abnormal tests, referral patterns and continuity of care. Implementation of improvement efforts varied according to whether or not the demand for safety came from external factors such as legal, market and professional issues. Organisational responses depended on internal factors such as group size, scope and integration, leadership and governance, professional culture, IT, and financial and intellectual capital. The authors concluded that the biggest improvement would come from boosting the demand for quality and safety from both private and public larger group purchasers.[130]

4.3 Benchmarking and guidelines

In the USA, data from 78 practices were analysed to assess the effects of organisational culture and structure on medication errors in primary care. The use of benchmarking and practice guidelines was associated with decreased error rates in group practices that encouraged 'patient emphasis' and 'collegiality.' The authors concluded that organisational structures do not exist in a vacuum. Instead, their effect on patient safety is moderated by the organisational culture.[131]

Other researchers in the US developed a medication safety framework for primary care practices. Domains in the framework included the medication use process, technology and safety, the office environment, error management, workplace conditions, safety education, safety perceptions and patient education. 31 primary care practices were surveyed and direct observation and an on-site technology readiness survey were conducted. The study found that such frameworks could be used to identify areas in need of improvement.[132]

4.4 Audit and feedback

Audit and feedback is a popular quality improvement tool and has been found to be useful when implemented as part of broader initiatives. This model has also been tested for improving patient safety in primary care, with mixed results.

A systematic review examined the impact of different models of audit and clinical governance on the quality and safety of primary care. 25 bibliographic databases were searched and 19 high quality studies that assessed outcomes were included. The review found that most studies support governance models which use targeted, peer-led feedback about a clinician's own practice. The most common strategies included audit, performance against indicators and peer-led reflection on evidence or performance. Few publications examined impacts on safety, efficiency or sustainability.[133]

However, not all research is positive. A US study examined whether providing customised clinical information to patients and doctors improved the safety or quality of diabetes care. 123 primary care doctors and 3,703 adults with diabetes took part. Participants were randomised to four groups receiving no feedback or customised feedback of clinical information for patients only, for doctors only, or for both the patient and the doctor. There was no impact on test ordering, clinical outcomes or risky prescribing. The authors concluded that providing customised decision support to doctors or patients did not improve the quality or safety of diabetes care.[134]

4.5 Analysis approaches

Mapping and root cause analysis

A number of analysis approaches have been used to highlight the potential for improving systems issues that may affect safety in primary care. For instance, researchers in the USA developed a visual model to help identify patient safety issues using a 'systems engineering' approach.[135] The impact on patient outcomes was not reported.

One US team diagrammed 22 primary care patients' views of the causes of adverse drug events using a root cause analysis approach. Diagrams derived from interviews were synthesised into a composite interactive causal diagram. Patient-reported causes were compared with published evidence. Patients suggested 164 causes of adverse drug events in the categories of medication non-adherence, prescriber-patient miscommunication, patient medication error, failure to read medication label/insert, polypharmacy, patient characteristics, pharmacist-patient miscommunication, and self-medication. The authors concluded that conducting root cause analysis with patients may help identify areas for improvement.[136] The impact on patient outcomes was not reported.

In Australia, a safety improvement programme was set up with a system-wide approach. The programme involved two-day courses to train health professionals to monitor and report incidents and analyse adverse events using root cause analysis. More than 300 doctors, nurses and allied health staff were surveyed some time after taking part in courses. Professional groups had conducted similar numbers of root cause analyses. Nurses were most positive and doctors were least positive about benefits.[137]

Event analysis

A study in England examined how a health authority promoted interventions to improve risk management in primary care using practices' own initiatives, significant event audit (SEA) and Medical Defence Union workshops. Before and after analysis found improved competence in risk management, particularly through widening the range of staff involved and increasing use of formal recording systems. There was little evidence that improvements were mediated by organisational culture. The authors concluded that interventions should target systems for recording adverse events and root cause analysis and emphasise tangible personal and organisational benefits for staff.[138]

Another study described improving out-of-hours primary care offered at home on weekends and bank holidays in Spain. A SWOT analysis highlighted a number of problems with the out-of-hours process. The project improvement plan involved using failure mode and effect analysis (FMEA) to improve the process and give errors priority. The efficiency of the service, level of automation and nurse satisfaction improved. Complaints from patients and nurses decreased.[139]

Researchers in the USA also tested an approach to prioritising safety issues in rural primary care using FMEA. Staff in two rural primary care practices in the USA were surveyed. Responses were converted to quantitative hazard scores, which were used to rank safety issues. The authors concluded that FMEA based on staff perceptions can be used to estimate the greatest threats to patient safety in an individual practice to help target limited resources appropriately.[140]

Applying data

A systematic review examined using mortality data for quality and safety improvement in general practice. Three bibliographic databases were searched and 53 studies were included, addressing methods of monitoring mortality and the role of audit and death registers in quality and safety improvement. The reviewers found that GPs were interested in using mortality data, but reported difficulties in obtaining complete information. There were no experimental studies about the impact of using mortality data.[141]

Another study described how a simple information system was implemented in 14 primary care clinics in Egypt. Clinicians could use the system to examine practice patterns and variations between themselves and other doctors or other practices. This enabled clinicians to identify quality and safety issues and take action. Several of the clinics used this feature to identify gaps in service use.[142]

Assessing safety culture

There has been an increasing focus on assessing safety culture in the hospital environment[143–147] and this is also building momentum in primary care. Rather than being seen as an end in itself, measurement of safety culture or climate can be used to spark development initiatives.

Researchers in New Zealand tested the value of the Manchester Patient Safety Framework (MaPSaF) for assessing safety culture in primary care. 12 general practices used the tool at baseline and again after three months. Participants rated their practice individually on each of the nine MaPSaF dimensions of safety culture, then discussed the dimensions and their scores and chose a consensus score. Discussion took about an hour each time. Most participants found the process useful. The framework helped to facilitate team discussion about patient safety issues and prompted some practices to make changes.[148]

4.6 Interface with secondary care

While the focus of this research scan is on improving safety in primary care, the impact of transitions between hospital and primary care cannot be overlooked. A number of studies have explored initiatives to improve safety during the transition period.

Good communication between hospitals and primary care is essential at the time of discharge. A systematic review examined the extent and frequency of drug-related problems after hospital discharge and the efficacy of interventions to reduce them. 20 studies were included. Drug problems after discharge were common and complex. Improvement initiatives had varied and sometimes contradictory results. Combining hospital discharge measures with home follow-up strategies was found to be valuable.[149]

Researchers in the USA aimed to improve quality and safety using a brief educational intervention to enhance the inpatient discharge summary. 64 first-year paediatric residents took part in a group teaching session and a small group reminder. Six key components of discharge summaries were identified: diagnosis, timely completion, discharge weight, pending laboratory work, medications, and being three pages or fewer. Discharge summaries prepared by participants before and after the sessions were objectively scored by blinded reviewers and scores were compared with historical controls. The brief sessions were associated with improved discharge summaries.[150]

Another team in the USA tested a 'transitions journal' for improving communication and safety between secondary and primary care. The tool was developed using the SBAR format (situation, background, assessment, recommendation). It was tested at a 183 bed community hospital and its associated primary care centre. Doctors and nurses testing the tool thought it was feasible and useful as a checklist to verify appropriate communication at both the sending and receiving ends.[151]

An organisation in the USA improved hospital discharge information in order to enhance communication with primary care teams. An interdisciplinary team of stakeholders evaluated the discharge process using a fishbone diagram to identify potential causes of sub-optimal communication. Opportunities for improvement were identified using tally sheets and Pareto charts. Quality improvement strategies included training, an electronic discharge order and instruction system, and autofaxing discharge information to primary care. The impact of the new process was evaluated using data from 2,530 discharges over a 34-week period. The content and timeliness of communication improved.[152]

Other researchers in the USA assessed an electronic referral tool to improve communication between primary care doctors and specialists. One practice that used the tool was compared with one practice that did not. The tool helped improve information sharing between primary care and specialists.[153]

Similarly, teams in the US have set up IT systems to share information between primary care and hospital. Three US hospitals and three clinics took part in one study. The technology was intuitive to learn, easy to use, easy to navigate and helpful in clinical care.[154]

Researchers have also used approaches such as Lean Six Sigma to improve the efficiency of referrals between primary care and specialty ambulatory care clinics in the USA.[155]

4.7 Other initiatives

A number of safety issues surround diagnostic tests, including not interpreting results correctly or not passing on details to patients.

Missed test results may compromise patient safety. A US study assessed provider interest in direct reporting, whereby testing centres systematically notify both patients and providers of important test results. Clinicians supported direct provision of results for tests with low emotional impact, but not high impact (such as cancer biopsies).[156] Impacts on patient outcomes have not been empirically tested.

4.8 Summary

While many studies have explored ways to improve systems issues to enhance patient safety in primary care, few definitive conclusions can be drawn in this area.

Surprisingly, relatively little has been written about the impact of awareness raising campaigns, information briefings and educational courses on improving safety in primary care. There is some evidence that educational sessions improve clinicians' knowledge, but the impact on patient outcomes has not been measured fully.

Multifaceted improvement programmes have been associated with improved clinician behaviour, processes and communication. Some also suggest reduced errors or improved patient wellbeing. It is difficult to draw conclusions about effective strategies from these studies because they tend to involve widely varying initiatives, each with multiple components.

There is mixed evidence about the value of audit and feedback to improve safety in primary care. While research suggests that peer feedback can be valuable for improving quality generally, few studies examine the impact on patient outcomes. Those that do have found limited safety improvements.

One of the most commonly studied interventions for improving safety in primary care involves testing approaches to identify issues and their causes. Root cause analysis, event mapping, failure modes and effects analysis, SWOT analysis, significant event analysis, safety culture surveys and other approaches have all been tested. Studies suggest that these methods can help identify areas for improvement, but most research has not examined the longitudinal effects on patient outcomes.

A number of studies have examined tools for improving transitions between hospital and primary care such as enhanced discharge planning, training in discharge planning, and checklists to ensure that information is shared appropriately. These studies tend to suggest improvements in processes, but there is little empirical data about the impact on patient wellbeing or service use.

5 Ongoing work and media stories

As well as the published evidence base, there are also some ongoing studies and media stories about improving patient safety in primary care.

5.1 Ongoing work

The Health Foundation's ongoing work about improving safety in primary care acknowledges that this may involve addressing issues that occur when patients move between primary and secondary care because poor communication or unreliable systems can compromise safety during the transition period. Working in parallel with the Scottish Quality and Safety Improvement in Primary Care Closing the Gap project, the Health Foundation is developing and testing change packages in four areas:

- medication reconciliation at discharge from hospital
- medication reconciliation after attendance at outpatient appointments
- clinical communication between specialist outpatient clinics and primary care
- systems for managing results.

While other organisations are examining patient safety in primary care, there are few overlaps with the Health Foundation's plans.

The World Health Organization (WHO) has stated that quantifying errors in primary care is a priority as part of its broader safety initiatives.[157] Organisations such as the US Agency for Healthcare Research and Quality, Institute for Healthcare Improvement, Institute for Safe Medication Practices, Institute of Medicine, Veterans Affairs health system, WHO, NHS Scotland, Canadian Patient Safety Institute and the Australian Patient Safety Foundation all acknowledge the importance of improving safety in primary care, but few have ongoing research programmes in this area.

Most ongoing research or evaluation about error rates and patient safety by organisations such as the National Patient Safety Agency (NPSA), The King's Fund, the Nuffield Trust and the Department of Health focuses on secondary care.

While these agencies support improving patient safety in primary care, programmes tend to be minimal. For instance, the NPSA published a best practice guide describing seven steps that primary care teams can use to improve patient safety. The focus is on staff responsible for clinical governance and risk management rather than care providers.[158] While this guide has been widely disseminated, its impacts have not been assessed in any depth.

England's national Patient Safety First campaign included resources about improving safety in primary care. An evaluation of the campaign was undertaken internally but this did not extend to examining impacts on safety in primary care or interventions that had been particularly useful.[159]

One component of the NHS Institute for Innovation and Improvement's programme on safer care focuses on primary care. No detailed research is currently underway, but the NHS Institute team has contributed to a review of quality and safety in primary care undertaken by The King's Fund,[160] promoted use of the primary care trigger tool and provided practices with the opportunity to attend 'Leading Improvement in Patient Safety' (LIPS) courses.[161] Evaluations specific to primary care have not been undertaken.

Although concrete descriptions of ongoing or unpublished research are rare, a number of researchers have published research protocols outlining plans for further research in this area. For example, the LINNAEUS collaboration is an international group of researchers investigating medical error in general practice in Australia, Canada, England, the Netherlands, New Zealand and the USA. The group has published some of their findings but further research and analysis is underway.[162] Work is ongoing to develop a taxonomy of errors for primary care (Germany), explore medication errors in primary care (Austria), explore diagnostic errors in primary care (England) and understand how patient involvement may improve safety in primary care (Denmark).

A team from the Netherlands is examining patient safety issues in general practices, out-of-hours primary care centres, dental practices, midwifery services and allied healthcare practices. The focus is on determining the frequency, type, impact and causes of incidents found in the records of 1,000 primary care patients and the type, impact and causes of incidents reported by healthcare professionals.[163]

Other researchers in the Netherlands are testing whether audit, feedback, educational materials, and peer group discussion moderated by local opinion leaders will improve prescribing in general practice. A randomised trial is underway with about 50 groups of GPs.[164]

Also in the Netherlands, a randomised trial is being conducted to examine whether medication review can prevent hospital admissions. More than 14,000 patients with a high risk of a medication related hospital admission are being recruited from over 140 practices. The intervention involves medication review over several patient visits and development and monitoring of a pharmaceutical care plan for each patient. The patient's own pharmacist and GP will carry out the intervention. The researchers will examine hospitalisations over a one-year period.[165]

In the USA, the Aetna Foundation has made grants totalling US$1m to four studies being undertaken by various universities. These studies are focusing on the impact of integrated care and medical home models. There is evidence that well-integrated and well-coordinated care can have many benefits such as improved patient safety, better health outcomes, better patient experiences, lower costs and fewer medical errors. However, the reasons why good coordination is linked to good outcomes are not well understood, nor are the best pathways to achieving strong care coordination known. These four studies are exploring these issues.[166]

Another example comes from the Veterans Affairs health system in the USA where researchers are examining the use of electronic communication to improve patient safety.[167]

Researchers in Spain are currently assessing whether a registry of adverse events can be used as an educational tool to improve patient safety culture and outcomes in primary care. A randomised trial is underway. The intervention group is receiving training about recording adverse events and gaining subsequent feedback. The control group is receiving no intervention.[168]

In the UK, a team from the Bradford Royal Infirmary is undertaking a randomised trial of patient-led training of junior doctors regarding patient safety. Although the focus is on the hospital context in the first instance, the researchers acknowledge that education of trainees spans the boundaries of primary and secondary care. Patients who have experienced a safety incident in the NHS are being recruited to receive training and then talk to small groups of junior doctors and medical trainees about their experiences. The aims are to increase awareness of patient safety issues among doctors, enhance reporting of errors and improve practice.[169]

The National Primary Care Research and Development Centre (NPCRDC) in England also has ongoing projects examining quality and safety. Work is underway to link the outputs of research on patient safety with studies of quality improvement. The Centre notes that research about improving patient safety is relatively underdeveloped within primary care, so the strategy has involved identifying researchers who have an interest in improving patient safety from a variety of backgrounds and building alliances. It is suggested that this is important in the field of patient safety research because of the complex interaction between human factors, organisations and technology as causes of adverse events. The work programme focuses on understanding and implementing solutions related to patient safety using input from many different disciplines.[170]

The NHS in Scotland is also undertaking various initiatives to improve patient safety in primary care. A national action plan was launched in August 2010 setting out the Scottish government's strategies for improving quality and safety in primary and community care.[171] The Scottish Patient Safety Programme, which has been running within acute hospitals since 2006, is now being extended into primary care. An advisory group has been set up to advise on the scope, definition, delivery, monitoring and control of all aspects of this programme and evaluation is planned.[172,173] The Health Foundation is partnering to fund some of this work.

These examples provide a flavour of the range of studies underway. They also emphasise the lack of research explicitly examining improving safety in primary care. Although numerous authors and organisations suggest this is important, there seem to be few ongoing studies to address gaps in the knowledge base.

5.2 Media stories

A search of online news archives suggested that there has been little reporting about improving safety in primary care. Most of the media coverage is US based, but available to UK readers online.

A number of articles have reported on the findings of various research studies into error rates in primary care[174–184] or ways to measure error in primary care.[185–188]

Some of the health-related press has featured stories about potential ways to improve safety in primary care.[189–195]

There have been newspaper articles about how individual primary care clinics have implemented changes which reportedly resulted in improved safety. The most common interventions involve computer systems such as electronic medical records and computerised medication applications.[196]

In the USA, there have been reports about joint work between primary and secondary care to improve patient safety, including the role of joint appointments or primary care staff operating in a hospital context.[197,198]

Articles have also been published about developing networks. However, while a number of press articles suggest that interventions aim to improve safety, they tend to be published in advance of any empirical results being available.[199,200]

Few media reports in the UK have focused on ways to improve patient safety in primary care or reduce harm in primary care more generally. Stories are more commonly about safety in hospital or in the transition between hospital and community care.

This section is not meant to provide an exhaustive overview of ongoing work and media stories, merely to illustrate the relative lack of focus on this topic to date.

6 Involvement

Clinical teams, policy makers and funders have all been involved in research about improving patient safety in primary care. This section briefly looks at the form of such involvement.

There is somewhat limited information about the types of involvement that researchers, clinicians, policy makers, healthcare managers, funders and others have had in developing programmes to improve patient safety in primary care.

It is possible to quantify the organisations and personnel that have published research on this topic, but this is not likely to be representative of the wider range of improvement initiatives undertaken in healthcare on a daily basis. A small minority of projects are written about and only certain types of reports are published.

Bearing this caveat in mind, of the 83 studies that explicitly examined patient safety outcomes included in the research scan:

– 58% were written or led by an academic institution
– 15% were written or led by an academic institution in partnership with a clinical team
– 14% were written or led by a clinical team
– 12% were written by government or independent research organisations
– 31% acknowledged input from funding bodies other than academic institutions.

There are few reports of patients or patient advocacy groups taking a leading role in initiatives to improve safety in primary care.

This information, however, says little about the involvement of different groups in research – just the lead organisations in articles most likely to be published.

Most studies either do not report their funding sources or state that no specific funding was granted for the study.

Where known, funding for published studies of improving safety in primary care tends to come from academic research grants. In some cases, national research organisations are involved, predominantly in the USA where programmes have been run or sponsored by federal and state government organisations or improvement organisations such as AHRQ (Agency for Healthcare Research and Quality) and IHI (Institute for Healthcare Improvement).

In England, anecdotal evidence suggests that a number of primary care trusts (PCTs) and practice-based commissioning groups are funding projects to improve patient safety in primary care, but these projects are not well documented publicly.

Similarly, UK organisations such as the National Association of Primary Care,[201] General Medical Council,[202] National Patient Safety Agency,[203] Royal Pharmaceutical Society,[204] NHS Institute for Improvement and Innovation,[205] Department of Health,[206] National Audit Office,[207] Collingham Healthcare Education Centre (CHEC),[208] the Association of Surgeons in Primary Care,[209] the National Association of Primary Care Educators,[210] the Primary Care Neurology Society[211] and the Primary Care Dermatology Society[212] have all developed resources, issued statements or promoted the value of improving safety in primary care. However, evaluations of resources or projects run by these groups are not publicly available.

7   Summary

7.1 Key points

Most people who use healthcare services will receive high quality care. However, some care actually has the potential to be harmful, so identifying and reducing harm in healthcare has become a major priority. In the NHS, the drivers for improving patient safety have sometimes resulted from highly publicised adverse events in hospital care, but there is now an increased focus on the potential to improve primary care too.

The potential for improving safety in primary care is significant, not least because of the volume of consultations taking place, the complexity of the interactions involved and the uncertainty associated with providing care in the community.

Around 90% of all healthcare appointments take place in primary care and around 1–2% of primary care consultations may experience an adverse event. The rate of prescribing errors is thought to be about 11%.[213–217] Communication, diagnostic and prescribing errors are thought to be most common.

Although the proportion of harm is lower than the 10% commonly attributed to hospital care, the number of people seen in primary care is much greater, so the absolute number of people harmed may be just as large or greater than in secondary care.

What initiatives have been implemented to improve safety in primary care and what are their impacts?

A number of systematic reviews have examined strategies to improve patient safety, but most focus on the hospital context. One review that examined strategies for improving patient safety in primary and secondary care identified 79 approaches. Most studies focused on hospitals, but some nursing homes and ambulatory care services were included. Few definitive conclusions could be drawn about the most effective strategies for improving safety in primary care. The reviewers suggested that processes drawn primarily from non-medical fields, such as the use of simulators, barcoding, computerised physician order entry and crew resource management, need further research.[218]

The sources of harm in primary care typically relate to clinical complexity (medications), human factors (roles and fatigue) and systems issues (communication and infrastructure).

Research into clinical complexity in primary care has tested computerised decision support systems, electronic health records and other tools to improve prescribing. These studies have found that alert systems can reduce drug interactions and improve the appropriateness of prescribing. Data about the impact on morbidity, mortality or hospital admissions are rare.

Research about human factors in primary care has focused on the role of pharmacists, team interactions and the potential for involving patients. The most robust studies have investigated joint work between pharmacists and GPs to improve prescribing and reduce medication errors. These studies have found that integrating the skills of pharmacists can improve prescribing behaviours. The impact on patient outcomes remains uncertain.

Studies targeting systems issues have examined using data to identify areas for improvement, education and learning collaboratives, and the interface between primary and secondary care. These studies generally suggest that targeted improvement programmes can enhance communication and processes. Studies of discharge planning and systems to improve transitions have found improved timeliness and quality (see Table 1).

Some suggest that, despite limited published research, interventions to improve patient safety in primary care are relatively well known. What is less-known is why these interventions are not universally implemented and what the barriers and facilitators might be.

An online survey of 58 clinicians and researchers from eight countries with a strong primary care system included 38 strategies to improve patient safety. Respondents were asked whether these strategies were currently used in their own country and whether they felt them to be important. Most of the strategies were seen as important by the majority of participants, but use of the strategies in daily practice varied widely. The most highly perceived strategies included a good medical record system, easy telephone access, standards for record-keeping, learning culture, vocational training about patient safety for GPs, and the presence of a patient safety guideline. Highly important strategies with poor implementation included a positive safety culture, education about patient safety for GPs, and the presence of a patient safety guideline.[219]

Table 1: Summary of key themes in studies of improving safety in primary care

Factor	Study	Findings
Interventions targeting clinical complexity		
Electronic medical records	Record review of dental practices in England[220]	Electronic medical records associated with improved adherence to safety standards
	Record review of family practices in the USA[221]	Using electronic medical records was associated with fewer paid malpractice claims
	Cross-sectional study of GP clinics in Spain[222]	Proactive analysis of electronic medical records reduced adverse drug interactions
Computerised prescribing	Before and after study in US family practices[223]	Electronic system reduced prescribing errors, particularly illegibility
	Survey of US doctors[224]	Those using electronic prescribing systems were more likely to think they could detect prescribing errors
Alert systems	Systematic reviews of hospital and primary care[225,226]	Alert systems and prompts improve prescribing behaviours
	Cross-sectional study in US family practice[227]	Decision support system is feasible for helping GPs manage pain medication
	Record review of US family practice[228]	Alert systems saved lives, reduced hospitalisations and saved money
	Cross-sectional study with UK GPs[229]	Decision support systems are not associated with reduced prescribing errors
PDAs	Trial with family doctors in the USA[230]	Use of PDAs reduced prescribing errors by improving legibility and accuracy
	Cross-sectional study of walk in clinic in Switzerland[231]	PDA databases were feasible for identifying adverse drug interactions but also flagged up spurious results
Incident reporting	Cross-sectional study in German general practice[232]	Incident reporting systems are feasible for identifying errors and motivating change
	Cross-sectional studies in general practice in the Netherlands[233,234]	Incident reporting systems are feasible for identifying errors and motivating change
	Cross-sectional studies in US family practice[235–238]	Incident reporting systems are feasible for identifying errors and motivating change
	Cross sectional study in US family practice[239]	Self-report and chart review is feasible and identifies errors that would not be picked up by either method used alone

Factor	Study	Findings
Analysis approaches	Record review of general practice in Spain[240]	Database analysis and hazard scales can be used to estimate the risk of drug interactions
	Record review of US family practice[241]	Database analysis is feasible for identifying adverse drug interactions
	Literature review of UK primary care medicines management[242]	Mapping identified error rates and areas for improvement
Education and support	Systematic review of GP education[243]	Education sessions can improve GP prescribing behaviours, especially active sessions
	Cross-sectional study in US family practice[244]	External education and support helped practices develop improvement initiatives
	Before and after study in US family practice[245]	Education and feedback improved GP prescribing behaviours
	Before and after study with GPs in Austria[246]	Peer review with GPs and pharmacists improved GP prescribing behaviours
Other initiatives targeting clinical complexity	Before and after study in US home care[247]	Medication reviews can reduce problematic prescribing
	Before and after study with Swedish GPs[248]	Linking financial incentives to medication guidelines adherence improves prescribing
	Cross-sectional study in UK general practice[249]	It is feasible to use indicators to measure prescribing safety in primary care
Interventions targeting human factors		
Expanding professional roles	Cross-sectional study in US ambulatory care[250]	Integrating pharmacists into teams improved prescribing
	Cross-sectional study in US family practice[251]	Patients are more likely to report drug issues to pharmacists than GPs
	Record review in US family practice[252]	Analysing reasons that pharmacists seek clarification from GPs can improve processes
	Before and after study with GPs in Switzerland[253]	Peer review and education by pharmacists can substantially improve GP prescribing errors
	Interviews in UK primary care[254]	GPs and practice nurses may be concerned about the impacts of healthcare assistants on patient safety, but no tangible evidence of detriment is available

Factor	Study	Findings
Teamwork and interpersonal skills	Review of primary care[255]	Brief training and feeding back patient assessments may not improve interpersonal skills
	Interviews in family practice in Canada[256]	Feedback about multidisciplinary team performance was thought to be worthwhile
Involving patients	Literature review and interviews in Scotland[257]	Leaflets advising patients how to improve safety are of limited use
	Cross-sectional study in US family practice[258]	Feeding back patient complaints in a non-punitive manner reduces the number of subsequent complaints
Interventions targeting systems issues		
Education programmes	Before and after study in US family practice[259]	Course improved safety attitudes among professionals but this improvement did not last
	Cross-sectional study in US ambulatory care[260]	Simulations of patient scenarios improved staff knowledge and reported behaviours
Collaboratives and support	Before and after study in US family practice[261]	Expert support and targeted improvement initiatives enhanced clinician behaviour
	Before and after study in US family practice[262]	Learning collaborative approach improved the accuracy of medication lists, policies and the education of medical and nursing staff
Benchmarking and guidelines	Record review in US family practice[263]	Benchmarking and practice guidelines were associated with decreased error rates in patient-centred practices
	Survey of US primary care[264]	Medicines framework useful for identifying areas for improvement
Audit and feedback	Systematic review of primary care studies[265]	Peer-led feedback improves processes but few studies report the impacts on clinical outcomes
	Before and after study in US family practice[266]	Feedback to GPs and patients did not change risky prescribing or clinical outcomes for people with diabetes

Factor	Study	Findings
Analysis approaches	Before and after study in UK general practice[267]	Significant event analysis and local initiatives improved staff competence in risk management
	Before and after analysis in out-of-hours home care in Spain[268]	Failure mode and effect analysis improved processes, efficiency, automation and nurse satisfaction and reduced complaints from patients and nurses
	Survey in US family practice[269]	Failure mode and effects analysis can be used to help teams identify and prioritise patient safety issues
	Cross-sectional study in US family practice[270]	Diagrams based on patient feedback and root cause analysis can be used to identify areas for improvement
	Longitudinal study in Australian general practice[271]	GPs and practice nurses think that training in root cause analysis is useful
	Cross sectional study in family practice in Egypt[272]	Doctors used a simple clinical system to make comparisons with other doctors and clinics and identify areas for improvement
	Longitudinal study in New Zealand general practice[273]	Measuring safety culture helped to facilitate team discussion about patient safety issues and prompted some practices to make changes
Interface with hospitals	Systematic review spanning primary and secondary care[274]	There are mixed results from improvement initiatives. Combining hospital discharge measures with home follow-up strategies is most valuable
	Cross-sectional study in US hospitals[275]	Brief training improved the quality of hospital discharge summaries
	Cross-sectional studies spanning US primary and secondary care[276,277]	Tools to improve discharge planning and information sharing improved the content and timeliness of information
	Cross-sectional studies spanning US primary and specialist care[278–280]	Referral and information-sharing tools can improve communication between primary and specialist care

Note: only studies listing explicit patient safety outcomes are listed above.

How have patients, professionals, researchers and funders been involved?

Empirical research has been undertaken by a wide range of academics, clinicians, research organisations and government departments. University departments are most highly represented in published studies, but this does not mean that many other interventions are not being tested day-to-day by primary care teams. Many improvement initiatives are not written about by clinicians.

There is little evidence that patients have been involved in planning or evaluating initiatives to improve safety in primary care.

The funding of research tends to come from academic grants or healthcare funds set aside for evaluation. Some federal and regional funds have been used for this purpose in the USA. In the UK, the NHS in Scotland is funding a developmental programme to improve safety in primary care and evaluations are planned. There are few other examples of large safety improvement initiatives in UK primary care.

Are others researching this topic?

Despite the high prevalence and importance of patient safety in primary care, there has been relatively little empirical research in this field.[281]

'Primary care organisations are under-represented in research on quality improvement and risk management, yet the potential for improving patient safety is possibly greater given the extent that clinical judgement is required to achieve a service tailored to the individual's personal health and lifestyle.'[282]

The research that is available tends to focus on the epidemiology and frequency of medical errors from a doctor's point of view.

A small number of trials and observational studies are currently underway to examine ways to improve safety in primary care, but this topic appears to remain less of a priority for large-scale research programmes compared with hospital care.

Seminal organisations state that reducing harm in primary care is a key priority, but there are few large-scale programmes being implemented to address this priority.

7.2 Caveats

When interpreting the findings of the research scan, it is important to bear in mind several caveats.

First, the research scan is not exhaustive. It presents examples of studies but does not purport to represent every study about improving patient safety in primary care. T he purpose is to give a flavour of available research rather than to summarise every existing study in detail.

It is also important to note that only studies explicitly aiming to improve patient safety are summarised. A number of other studies focus on improving quality more generally, but these are not included. Nor are studies which may have identified unintended safety outcomes as part of a broader initiative.

Second, it is difficult to make comparisons between studies because the research uses various definitions of primary care, patient safety, adverse events and harms.[283]

Furthermore, there are differences in the healthcare context in which studies took place. It may not be useful to compare US primary care with primary care in the UK, for example, because the systems and processes used are quite distinct.

Even where comparable definitions are used and geographic contexts can be compared, the level of detail reported is sometimes insufficient to provide a meaningful summary or to extract the exact impacts of interventions.

There are also some issues with the quality of the studies included. A number of studies are small and observational, and subject to potential bias.

Many of the studies about improvements in primary care present process outcomes such as changes in education, awareness or behaviours rather than the impact on patients themselves. In other words, most studies do not report the impact of interventions on patient mortality, morbidity, admission rates or use of health services.

There is a lack of evidence about improving patient safety in several primary care settings such as dentistry and out-of-hours services. This means that the research scan focused primarily on general practice care. A lack of evidence about other settings does not mean that harm is more frequent in general practice or that improvement initiatives are more successful in this context, just that more research is available in this arena.

Despite these caveats, it is clear that while there is no consensus about the best ways to improve patient safety in primary care, there is agreement that this is an important issue requiring further investigation.

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We are here to inspire and create the space for people, teams, organisations and systems to make lasting improvements to health services.

Working at every level of the healthcare system, we aim to develop the technical skills, leadership, capacity, knowledge, and the will for change, that are essential for real and lasting improvement.