Medication Errors

Technical Series on Safer Primary Care

World Health Organization

Medication Errors: Technical Series on Safer Primary Care
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Contents

Preface 1

1 Introduction 3
- 1.1 Scope 3
- 1.2 Approach 3
- 1.3 Defining medication errors 3

2 Medication errors 5

3 Causes of medication errors 7

4 Potential solutions 9
- 4.1 Reviews and reconciliation 9
- 4.2 Automated information systems 10
- 4.3 Education 10
- 4.4 Multicomponent interventions 10

5 Key issues 12
- 5.1 Injection use 12
- 5.2 Paediatrics 12
- 5.3 Care homes 13

6 Practical next steps 14

7 Concluding remarks 16

Contributors 22

References 24

Preface

Safer Primary Care

Health services throughout the world strive to provide care to people when they are unwell and assist them to stay well. Primary care services are increasingly at the heart of integrated people-centred health care in many countries. They provide an entry point into the health system, ongoing care coordination and a person-focused approach for people and their families. Accessible and safe primary care is essential to achieving universal health coverage and to supporting the United Nations Sustainable Development Goals, which prioritize healthy lives and promote well-being for all.

Health services work hard to provide safe and high quality care, but sometimes people are inadvertently harmed. Unsafe health care has been recognized as a global challenge and much has been done to understand the causes, consequences and potential solutions to this problem. However, the majority of this work up to now has focused on hospital care and there is, as a result, far less understanding about what can be done to improve safety in primary care.

Provision of safe primary care is a priority. Understanding the magnitude and nature of harm in primary care is important because most health care is now offered in this setting. Every day, millions of people across the world use primary care services. Therefore, the potential and necessity to reduce harm is very considerable. Good primary care may lead to fewer avoidable hospitalizations, but unsafe primary care can cause avoidable illness and injury, leading to unnecessary hospitalizations, and in some cases, disability and even death.

Implementing system changes and practices are crucial to improve safety at all levels of health care. Recognizing the paucity of accessible information on primary care, World Health Organization (WHO) set up a Safer Primary Care Expert Working Group. The Working Group reviewed the literature, prioritized areas in need of further research and compiled a set of nine monographs which cover selected priority technical topics. WHO is publishing this technical series to make the work of these distinguished experts available to everyone with an interest in *Safer Primary Care.*

The aim of this technical series is to provide a compendium of information on key issues that can impact safety in the provision of primary health care. It does not propose a "one-size-fits-all" approach, as primary care is organized in different ways across countries and also often in different ways within a given country. There can be a mix of larger primary care or group services with shared resources and small services with few staff and resources. Some countries have primary care services operating within strong national support systems, while in other countries it consists mainly of independent private practices that are not linked

or well-coordinated. The approach to improving safety in primary care, therefore, needs to consider applicability in each country and care setting.

This technical series covers the following topics:

Patients

- Patient engagement

Health workforce

- Education and training
- Human factors

Care processes

- Administrative errors
- Diagnostic errors
- Medication errors
- Multimorbidity
- Transitions of care

Tools and technology

- Electronic tools

WHO is committed to tackling the challenges of patient safety in primary care, and is looking at practical ways to address them. It is our hope that this technical series of monographs will make a valuable and timely contribution to the planning and delivery of safer primary care services in all WHO Member States.

1 Introduction

1.1 Scope

Medications are offered by health services throughout the world. However, with substantial and increasing medication use comes a growing risk of harm *(1).*This is compounded by the need to prescribe for an ageing population with increasingly complex medical needs and the introduction of many new medications. These issues are particularly relevant in primary care. In many cases, prescribing is initiated in primary care and those initiated in the hospital may also be continued in primary care.

A substantial amount of literature about medication errors is based in the hospital setting, but there are differences in the type of clinical problems encountered, classes of medications used and the organization of services in primary care. This means that the risks posed in primary care and the solutions required may differ from those in hospital settings.

This monograph aims to raise awareness among the World Health Organization (WHO) Member States about ways to reduce medication errors in primary care. After outlining the approach taken to compile information, the monograph describes the importance of investigating medication errors and their potential causes, including strategies to reduce them.

1.2 Approach

To compile information for this monograph, WHO sought the advice of experts in the field recommended by the Safer Primary Care Expert Working Group and reviewed the relevant research and published literature.

International experts in delivering safe primary care provided feedback, examples of strategies that have worked well around the world and practical suggestions about potential priorities for countries for improving the safety of primary care services.

1.3 Defining medication errors

There is no consensus about the definition of a medication error. A systematic literature review found 26 different terminologies employed for a medication error *(2).*

The United States National Coordinating Council for Medication Error Reporting and Prevention defines a medication error as:

> *"any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use" (3).*

This definition is broad and suggests that errors are preventable at different levels. Medication error has also been defined as a reduction in the probability of treatment being timely and effective, or an increase in the risk of harm relating to medicines and prescribing compared with generally accepted practice *(4).*

There are a number of different approaches to classifying medication errors (5). One approach is to base the classification on the stage in the sequence of medication use process, such as prescribing, transcribing, dispensing, administration or monitoring. Another approach is to consider the types of errors occurring, such as wrong medication, dose, frequency, administration route or patient. A further approach classifies errors according to whether they occur from mistakes made when planning actions (knowledge-based or rule-based mistakes) or errors in the execution of appropriately planned actions (action-based errors, known as "slips", or memory-based errors, known as "lapses").

Errors may also be classified according to their level of severity. These approaches are not mutually exclusive and there is no strong evidence to support particular methods of defining or classifying errors specifically in primary care. The approach taken will depend on the setting and the purpose of the classification.

2 Medication errors

Many studies have described medication error rates in hospital settings, but data for primary care is relatively scarce. This is particularly true of low- and middle-income countries, despite the increasing use of medications *(6).*

Estimating the prevalence of medication errors is difficult due to the varying definitions and classification systems employed. Rates can vary depending on the denominator used (e.g., patient, prescription or a specific medication). The challenge is compounded by variations in health care system organization and the availability and use of incident reporting systems *(7).*

These issues are reflected in the widely varying error prevalence rates reported in different parts of the world *(8).* For example, a United Kingdom study found that 12% of all primary care patients may be affected by a prescribing or monitoring error over the course of a year, increasing to 38% in those 75 years and older and 30% in patients receiving five or more drugs during a 12-month period. Overall, 5% of prescriptions had prescribing errors *(9).* A Swedish study found a medication error rate of 42%. However, two-thirds were related to a failure to state the purpose of the treatment on prescriptions and only 1% of errors resulted in an incorrect dose *(10).* A study from Saudi Arabia reported that just under one-fifth of primary care prescriptions contained errors, but only a small minority were considered serious *(11).* Another study in Mexico observed that 58% of prescriptions contained errors, with dosage regimen accounting for most cases (27.6%) *(12).* These examples are provided to show that medication errors are a global issue.

One systematic review employed an alternative approach to assessing error rates based on classifying medication usage processes. The review found error rates of 3% at the dispensing stage and failure to review repeat medications at least once at every sixth request in 72% of cases. Problems were also noted at the interface between primary and secondary care. Outpatient recommendations to general practitioners were associated with a 77% error rate and discrepancies in discharge medication following hospitalization affected 43% to 60% of items *(13)* indicating discrepancies during transitions of care.

Overall, it seems that the proportion of serious medication errors in primary care may be reasonably low. However, given the sheer number of prescriptions issued in primary care, there is still the potential to cause considerable harm in absolute terms.

Undesirable outcomes include adverse drug reactions, drug-drug interactions, lack of efficacy, suboptimal patient adherence and poor quality of life and patient experience. In turn, these may have significant health and economic consequences, including the increased use of health services, preventable medication-related hospital admissions and death *(14).* It has been estimated that in some countries

approximately 6-7% of hospital admissions appear to be medication related, with over two-thirds of these considered avoidable and thus, potentially due to errors *(15-17).* The problem is likely more pronounced in the elderly, because of multiple risk factors, one of which is polypharmacy *(18).*

3 Causes of medication errors

A number of studies have examined factors associated with medication errors. The Commonwealth Fund International Health Policy survey compared factors associated with patient-reported medication errors across seven countries. In 11% of patients experiencing a medication error, risk factors included poor coordination of care, cost-related barriers to medical services or medicines, multimorbidity and hospitalization *(19).*

Other studies have found that medication errors are associated with increasing number of medications, childhood and older age, and specific medications and medications for certain disease states (e.g., musculoskeletal, oncology and immunosuppression, dermatology, ophthalmology, otolaryngologic conditions, infections and cardiovascular) *(8,20,21).*

Box 1 summarizes some of the key factors associated with medication errors, including the provider, patient, care team, work environment, task, computer system and the primary-secondary care interface.

Box 1: Factors that may influence medication errors *(9,22)*

Factors associated with health care professionals

- Lack of therapeutic training
- Inadequate drug knowledge and experience
- Inadequate knowledge of the patient
- Inadequate perception of risk
- Overworked or fatigued health care professionals
- Physical and emotional health issues
- Poor communication between health care professional and with patients

Factors associated with patients

- Patient characteristics (e.g., personality, literacy and language barriers)
- Complexity of clinical case, including multiple health conditions, polypharmacy and high-risk medications

Factors associated with the work environment

- Workload and time pressures
- Distractions and interruptions (by both primary care staff and patients)
- Lack of standardized protocols and procedures
- Insufficient resources
- Issues with the physical work environment (e.g., lighting, temperature and ventilation)

Factors associated with medicines

- Naming of medicines
- Labelling and packaging

Factors associated with tasks

- Repetitive systems for ordering, processing and authorization
- Patient monitoring (dependent on practice, patient, other health care settings, prescriber)

Factors associated with computerized information systems

- Difficult processes for generating first prescriptions (e.g. drug pick lists, default dose regimens and missed alerts)
- Difficult processes for generating correct repeat prescriptions
- Lack of accuracy of patient records
- Inadequate design that allows for human error

Primary-secondary care interface

- Limited quality of communication with secondary care
- Little justification of secondary care recommendations

4 Potential solutions

A number of studies have explored ways to improve the quality of prescribing in primary care. However, outcomes are heterogeneous and few studies have specifically focused on medication errors. Reducing medication errors and improving medication safety requires a systems approach. Examples described in this section relate to few key interventions that can support the health care professionals in primary care in reducing medication errors and improving patient safety.

Strategies employed include using clinical pharmacists, computer technology and educational programmes, often within multifaceted interventions. There is also an emphasis on the elderly population. Some interventions have targeted specific clinical areas, such as infectious diseases and appropriate antibiotic use.

Importantly, most interventions have been conducted in individual countries and may not be generalizable to countries where the health service structure is different, or there may be different levels of availability of services (e.g. pharmacists) or technology (e.g. computerized provider order entry).

4.1 Medication reviews and reconciliation

Medication review is a process of patients` medicines evaluation in order to improve the health outcomes and mitigate the drug-related problems *(23).* A systematic review of 38 studies of primary care interventions designed to reduce medication-related adverse events found that most successful interventions included a medication review conducted by a pharmacist or other clinicians, or focused on multicomponent interventions, which had a medication review by a primary care professional as one component. Studies showed that pharmacist-led medication reviews reduced hospital admissions *(24).*

A review of eight randomized trials examined interventions to improve prescribing for people aged 65 years or older living in care homes. The interventions included multidisciplinary care conferences, education and clinical decision support. Seven of the eight studies had a medication review component. Overall, interventions led to improved identification and resolution of medication-related problems, but there was limited evidence of cost-benefit and no evidence of a reduction in adverse drug events, hospitalization or mortality *(25).*

Medication reconciliation is the formal process of establishing and documenting a consistent, definitive list of medicines across transitions of care and then rectifying any discrepancies. Increased medication discrepancies at discharge are associated with an increased number of prescribed medications, underscoring the need to address polypharmacy as a multifaceted threat to patient health *(26).* The accuracy of medication information on discharge summaries is generally poor *(27).*

A number of medication reconciliation systems have been tested. These systems deal with new medication changes, deletions and additions following hospital admissions. A systematic review found that these systems reduced medication discrepancies, as well as potential and actual adverse drug events *(28).*

4.2 Automated information systems

A review of 10 randomized trials of computerized interventions found a reduction in medication errors in half of the studies. Computerized provider order entry (CPOE) with decision support may be effective if targeted at a limited number of potentially inappropriate medications and is designed to reduce the alert burden by focusing on clinically-relevant warnings *(29).*There is substantial evidence which supports the use of CPOE to decrease the frequency of medication errors in the in-patient setting. One study found that the likelihood of error occurrence was decreased by 48% when an order was processed via CPOE *(30,31).* However, there is additional research needed to link a decrease in medication errors to a decrease in patient harm.

A review of computerized advice on drug dosage included 42 studies in primary care and the hospital setting. Some studies found benefits with respect to specific medication groups, such as anticoagulants and aminoglycoside antibiotics, but not others, such as insulin, immunosuppressant transplant drugs or antidepressants. However, studies were generally of low quality *(32).*

4.3 Education

As outlined in another monograph in this Technical Series, educating health care providers is a key element to improve safety in primary care. This holds true in reducing medication errors where education is often part of multicomponent interventions. A review of 47 studies found that educational interventions to improve the prescription and dispensing of antibiotics may impact on clinician behaviour with improved adherence to guidelines *(33).*

Evidence regarding medication management education targeted at patients is lacking, but it is an important area for exploration. A review found some evidence that patient self-administration of medication can be as safe or safer than usual care following appropriate education and preparation. The same review found that patient-held personal health records often had a positive effect on health outcomes, although there was the potential for a negative impact on equity *(34).* A separate monograph in this Technical Series explores the importance of engaging and empowering patients more generally to support safer primary care.

4.4 Multicomponent interventions

Many studies include more than one intervention. Evidence supports the use of multifaceted approaches for improving medication practices. In a review of 10 studies on improving the appropriateness of polypharmacy in the elderly, nine

studies involved complex interventions (the remaining one employed computer decision support). Overall, there were reductions in inappropriate prescribing and the number of adverse drug events *(35).*

A study to assess progress in improving use of medicines reviewed the empirical evidence and examined ambulatory primary care practices in 104 low- and middle-income countries. One hundred and ten studies using adequate study design and evaluating interventions to improve medication use were identified. Among these, complex interventions employing education, provider supervision and community case management strategies appeared to be the most effective *(36).*

5 Key issues

This section outlines some special circumstances relevant to medication errors in primary care.

5.1 Injection use

The prevalence of injection use in primary care varies considerably between geographic regions, with 10% of patients in South-East Asia receiving injections in primary care compared with 28% in Africa *(36).* In upper-middle- and high-income countries, where much medication safety research is conducted, approximately 12% of patients receive injections compared with an average of 24% in low-income countries *(36).*

Injection use may be associated with errors not applicable to oral preparations. A primary concern is the risk of infectious disease transmission. Results from the WHO global burden of disease study estimated that unsafe medical injections led to 340,000 human immunodeficiency virus (HIV) infections, 15 million hepatitis B infections and three million cases of bacteraemia in 2008 *(37).*

Other errors associated with injection use include mistakes in weight-dependent dosing, incorrect reconstitution (including the wrong concentration or inappropriate diluent), wrong route of administration and problems with storage (e.g. inappropriate refrigeration). Other issues related to injection use include the need for hepatitis B vaccination of health workers, and adequate facilities and training for the safe disposal of used injection equipment.

5.2 Paediatrics

Medication use in children presents some additional challenges. The off-label and unlicensed use of medicines is widespread, which may increase the risk of avoidable medication-associated harm *(38).* A small error in dose of medication given to children has a greater risk of harm compared to the adult population. Paediatric prescribing also requires weight-related dose adjustment and other dosing calculations, which are less commonly encountered in adult prescribing. Primary care providers may feel that they do not have time to properly check doses in relation to a child's weight, which is subject to change over time and thus, has the potential to lead to inaccurate prescriptions being written and dispensed. Liquid medication in children is also likely to be required, yet reports suggest that over 40% of carers make errors when dosing liquid medication *(39).*

5.3 Care homes

The elderly population may also encounter special issues related to medication errors. For example, people living in care homes are often frail with multiple health conditions and take multiple medications. The administration of medication in this environment often differs to patients' own homes as it is provided by nursing staff or other personnel, thus raising particular issues around dispensing, administration and monitoring problems, as well as staff training.

A study estimated the prevalence of inappropriate medication use in 15 nursing homes. The study found that 46.5% of the patients received at least one inappropriate medication and 12.8% patients experienced at least one adverse health outcome *(40).*

Another study found that 9% of all prescribing events in care homes were subject to error, with 70% of care home residents affected by a medication error. Factors contributing to medication errors included patient factors, such as confusion and lack of knowledge about the medicines, as well as physical problems that made administration of medications difficult. There were also task factors, including a lack of prescribing technical support, such as computer aids and availability of medical records, lack of protocols, inadequate staff experience and monitored dose systems. Organizational factors contributing to medication errors included inaccurate medication administration record charts, poor communication, busy staff subject to interruptions and distractions and a lack of provider accountability *(41).*

A number of studies have tested interventions in the care home setting. Some, such as medication review led by pharmacists, appeared to reduce error rates, but they failed to demonstrate improvements in service utilization, morbidity or mortality *(25).*

6 Practical next steps

Safer primary care is an essential step in moving towards universal health coverage and person-centred care. Provision of primary care needs to be safe and of high quality in order to reduce reliance on hospital care. Addressing medication errors is a key component of improving the safety of primary care.

Medication errors are particularly important given the large and growing global volume of medication use. This is especially critical in primary care where a significant proportion of prescribing occurs. Differing definitions and approaches to the classification of medication errors lead to widely varying estimates of prevalence. Nonetheless, it is clear that medication errors can occur at a number of different stages of the medication prescription and use process. Although serious errors are relatively rare, the absolute number is sizeable, with the potential for considerable adverse health consequences.

A number of factors may contribute to errors in primary care, including those pertinent to the health care professionals, patient, work environment, medicines as a product, tasks, computerized information systems and primary-secondary care interface. This presents a range of opportunities for interventions. In terms of reducing error rates, those provided by clinical pharmacists are promising approaches.

In addition to health systems strengthening, Member States could consider prioritizing the following strategies to reduce medication errors in primary care:

1. Educating health care providers and patients

- Educating primary care providers about common causes of medication errors;
- Providing simple tools to assist primary care providers in safe medication prescribing and use process;
- Considering how patients can be actively involved in medicine management;
- Providing patient engagement tools to address non-adherence.

2. Implementing medication reviews and reconciliation

- Ensuring that pharmacists actively review prescriptions;
- Encouraging and supporting use of medication reconciliation by clinicians.

3. Using computerized systems

- Strengthening electronic prescribing and alert systems. Computerized provider order entry with decision support may be particularly effective when targeted at a limited number of potentially inappropriate medications and when designed to reduce the alert burden by focusing on clinically-relevant warnings.

4. Prioritizing areas for quick wins

- Target use of injections as a key source of errors;
- Target interventions related to the care of children and the elderly;
- Implement multicomponent interventions with a mix of education, health informatics, medication reviews and involvement of community pharmacists;
- Consider specialist outpatient clinics for the prescription of selected medications that require routine monitoring, such as warfarin;
- Conduct further research on medication errors to develop a better understanding of the causes, generate evidence for interventions impacting on adverse outcomes, and to help bridge knowledge gaps in low- and middle-income countries on injection use and the specificities of the paediatric population.

7 Concluding remarks

Primary care services are at the heart of health care in many countries. They provide an entry point into the health system and directly impact on people's well-being and their use of other health care resources. Unsafe or ineffective primary care may increase morbidity and preventable mortality, and may lead to the unnecessary use of scarce hospital and specialist resources. Thus, improving safety in primary care is essential when striving to ensure universal health coverage and the sustainability of health care. Safer primary care is fundamental to the United Nations Sustainable Development Goals, particularly to ensure healthy lives and promote well-being for all at every age.

Understanding the magnitude and nature of harm in primary care is important because a significant proportion of health care is offered in this setting, yet there is little clarity about the most effective ways to address safety issues at this level.

This monograph summarizes the evidence and experience to understand and address medication errors in order to improve patient safety in primary care. However, interventions to prevent medication errors would need to be implemented in conjunction with other important aspects covered in this series.

The *Technical Series on Safer Primary Care* addresses selected priority areas that WHO Member States could prioritize, according to local needs. This section summarizes the key messages from all of the monographs and provides a list of 10 key actions that are likely to have the most impact on improving safety in primary care. Links to online toolkits and manuals are also referenced in order to provide practical suggestions for countries and organizations committed to moving forward this agenda.

1. Set local priorities

Countries and regions differ and a strategy that works well in one area may not transfer well to another. Similarly, issues in need of improvement in some regions may not be a priority for others. In seeking to improve safety in primary care, countries could use local information about their safety issues to identify key priorities at the national or regional level. Priority setting could be accomplished by drawing on input from patients and professionals, sourcing local statistics on safety issues and comparing key themes from the literature with local circumstances *(42).*

Checklists are also available to help identify potential patient safety issues such as environmental risks in primary care services *(43).*

One practical way to move forward is creating mechanisms for bringing together key stakeholders to consider the local information available and develop strategic and operational plans for improving safety in primary care. Communicating proposed priorities widely and amending them based on feedback from health

care professionals and patients would help to obtain their buy-in, as well as raise awareness of the importance of improving patient safety in primary care.

Regular measurement of safety related performance indicators could be considered as one of the priorities. Policy-makers can use measurements to help identify local issues where performance is suboptimal and then evaluate different types of interventions for improvements. Priorities could be reviewed every few years to ensure that they remain in line with local needs and good practice.

2. Take a wider systems approach to improving safety

Although the series has described specific technical areas, each monograph refers to interlinkages with other areas. Focusing on improving just one factor may not have a large or sustainable impact on patient safety overall. It may be important to simultaneously improve communication with patients, train health care professionals and introduce new tools to support more streamlined care.

Taking a systems approach to safer primary care means looking at how different components relate to one another and considering various factors which could influence safety. These include factors such as workforce availability and capability.

A practical systems level initiative is to focus on increased communication and coordination across different types of care including primary, secondary and also social care. This may include strengthening technical systems for sharing records and communicating what is happening.

It is also important to build relationships between care professionals. At a policy level, this may involve considering how to develop supportive infrastructure, such as having a directory of services to help build networks of professionals and align resources. If hospital, primary care and social care professionals are able to meet and discuss safety issues, this could foster supportive relationships and increase understanding of each other's roles. Regional forums or meetings could be set up so that professionals from different organizations can get to know each other and share their successes and challenges in improving patient safety.

Manuals and reference lists are available with further ideas for improving coordination and reducing fragmentation across systems *(44,45)*.

3. Communicate the importance of safety in primary care

Policy-makers, health care professionals, patients and families may not always be aware that there are important safety issues to consider in primary care. Raising awareness of this as a priority area will help stakeholders to understand why safety in primary care is essential to improve people's well-being and for safeguarding scarce health care resources.

Serious consequences due to the lack of safety in primary care, particularity relating to poor transitions of care between primary and other levels, and administrative, diagnostic and medication errors could be highlighted to raise awareness on the need to improve patient safety in primary care.

Practical ways to increase awareness include incorporating safety-related information into the training of health professionals, communicating effectively to professionals and patients through channels that would be most appropriate for them and spreading key messages through media campaigns. A communications plan could be developed in tandem with local priority setting discussed earlier.

4. Focus on building a positive safety culture

Effective leadership and supportive culture are essential for improving safety in primary care.This means creating an environment where professionals and patients feel able to speak up about safety issues that they are concerned about, without fear of blame or retribution. It means promoting an environment where people want to report risks and safety incidents in order to learn from them and reduce their recurrence, and where incidents are seen as caused largely by system failures rather than individuals. This also includes the importance of having feedback mechanisms in place to explain any improvements made after safety issues have been raised. Promoting transparency is key to building a strong safety culture.

A number of tools are available describing approaches to support the development and measurement of a positive safety culture *(46,47).*

Practical steps that could be taken to strengthen safety culture include: leadership walkrounds, whereby senior managerial and clinical leaders "walk the floor" (in this case, leaders visiting clinics and speaking with staff and patients about what is working well and not so well); starting team meetings with a patient story; using reflective practice to focus on safety issues, such as audits and having mechanisms for reporting safety issues, such as through regular team meetings. Such approaches may need to be adapted for use in smaller primary care clinics. Regardless of the specific method, the focus should be on raising awareness, encouraging safety discussions and taking concrete follow-up actions to build a safety culture.

5. Strengthen ways of measuring and monitoring patient safety

It is important to measure and monitor patient safety improvements over time. This may include having clear definitions of patient safety incidents and indicators to be measured annually, setting up national or local incident reporting systems where data is compiled regularly, or using tools to assess patient experiences and measure improvements in patient safety.

Using checklists in individual practices can both improve the quality of care and act as a structured form of record keeping. A number of examples of checklists to improve safety monitoring are available *(48).*

Data quality is fundamental to measuring improvements in patient safety. If accurate and comprehensive medical records are not kept, then errors and omissions are more likely to occur. As health systems mature, clinical governance processes tend to strengthen. This includes having processes for managing risks and identifying strategies for improvement.

A number of tools are available to measure and monitor different aspects of safety in primary care and countries could examine what is currently available and adapt materials based on local priorities *(49,50).*

6. Strengthen the use of electronic tools

The adoption of electronic tools will be critical to improving safety in many ways. Examples include the use of electronic health records for more accurate and complete patient records; timely and reliable sharing of health data; supporting the diagnosis, monitoring and management of diseases and conditions; effecting behaviour change and reduction of health risk, and empowering and engaging patients and families in their own care. eHealth can help structure communication between professionals in a way that reduces errors and improves coordination. It can reduce unnecessary consultations and hospitalizations and improve access to knowledge about health conditions and their management for both professionals and patients. However, to achieve their full potential, electronic tools need to be integrated with other parts of service delivery and adapted to the local context.

It takes time and resources to implement electronic tools, and requires the capacity to use and maintain them. It is therefore important to be strategic and to understand the foundations and design of systems in order to ensure the best return on investment. Linking the implementation of electronic tools in local settings to a national eHealth strategy is essential as it provides the foundation, justification and support needed to go forward in a coordinated way.

Irrespective of the status of the health system, it is important to strengthen the use of electronic systems to improve patient safety. For some countries, this may involve the introduction of electronic health records to replace paper records. For others, it may mean having integrated electronic systems between primary care and hospital and social care, or making the tools easier for professionals and patients to use. Countries could draw on lessons learned from other countries about implementing electronic health records, including the challenges faced and how these were overcome, and what best practices could be applicable to their own setting.

7. Involve patients and family members

Empowering and encouraging patients to speak up, for example when something does not seem right or when a symptom is inadequately explained, can be fundamental to improving patient safety. Family members play a key role as advocates and informal carers and therefore supporting and educating them can help to improve safety.

Proactive engagement of patients and families can help to accelerate the implementation of health care safety initiatives. When systems open themselves up to patients rather than being reactive, this is likely to improve system efficiency and the quality of care.

A number of tools have been evaluated to enhance patient and family involvement and awareness, including those with limited or low literacy skills *(51-54).*

8. Strengthen workforce capacity and capability to improve safety

There is a need to strengthen the primary care workforce in many settings by training a large pool of generalist workers, including doctors, nurses and those with supporting roles.

Strengthening the workforce also involves focusing on recruitment and retention, including taking steps to enhance the physical and physiological safety of health care workers. Professional burnout, fatigue and stress can all adversely affect patient safety.

The education and training of health care professionals to manage and minimize potential risks and harm that can occur in primary care are central to improving safety at all levels of care. This includes providing training on patient safety for students (including students who may not be training to work in primary care to ensure understanding across the different care pathways), multidisciplinary and inter-professional education, as well as continuing professional development. A number of free training course materials are available to help with this *(55-57)*. As a further step, consideration could be given to making involvement in safety and quality improvement a requirement for ongoing training and professional licensure.

In addition to formal education, informal approaches could also be applied to build the capacity of health workforce to improve safety. This may include holding regional meetings and coaching sessions to review patient safety incidents and areas for improvement, and holding small team meetings to upskill staff.

9. Focus on those at higher risk of safety incidents

Some people are at greater risk of safety incidents in primary care. These include children, older people, those living in residential care or nursing homes and people with multiple health conditions. People with simultaneous mental health and physical health issues are also at increased risk of safety incidents.

Focusing on groups at higher risk may improve the quality and safety of care by providing more personalized care and ensuring smoother transitions between and within services. For instance, upskilling professionals in how to identify and treat depression may have an impact given the high rate of adverse events among those with combined mental and physical health issues.

Across the world, most systems were not designed to care for people with multiple health conditions. Systems may thus need to focus more on what can be done to improve care for people with multiple conditions, including whether social interventions would be more worthwhile than increasing medicalization.

A number of guidelines and toolkits suggest practical steps to better support people at higher risk of safety incidents *(58-62).*

10. Celebrate successes and share learning with others

Local teams, regions and countries should celebrate their successes and share learning with others. Hearing what has worked well can spark ideas in others and help to continue the momentum towards safer primary care.

Ongoing research plays a key role in identifying what works best to improve safety and how to implement best practices and success stories across diverse care settings. Although the technical series has drawn together a wide range of evidence and expertise, it has also highlighted a number of gaps about what works best to improve patient safety in the primary care context. By continuing to promote learning through research, and publishing and disseminating findings, countries could contribute to knowledge in this area.

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