



Strategies and Activities for Improving Medication Safety in the NHS Scotland: Narrative Review and Possible Adaptations for Sri Lankan System

H. M. K. Wickramanayake¹, D. Dharmagunawardene^{1,2*}, P. Amarasinghe¹, M. Eddleston³, P. Galappatthy⁴

¹Ministry of Health, Sri Lanka

²School of Applied Psychology, Griffith Health, Griffith University, Australia

³University of Edinburgh, United Kingdom

⁴Department of Pharmacology, Faculty of Medicine, University of Colombo, Sri Lanka

*Correspondence: dilanthadharma@gmail.com

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 <https://orcid.org/0000-0002-5457-3117>

Abstract

Background: Medication errors are the leading cause of preventable patient harm globally, and countries have adapted multiple strategies to prevent them.

Objective: To explore the systems, strategies, and activities of medication safety applied at the National Health Service (NHS) in Scotland to compare them and consider what could be adapted to improve medication safety in Sri Lanka.

Methods: The RAMESES (Realist And Meta-narrative Evidence Syntheses) was followed and literature search was conducted in Google, Google Scholar, and PubMed with the terms “Medication Errors,” “Medication Safety” and “strategy,” “interventions,” to identify studies and programs published from 2010 to 2022 that examined strategies and activities for improving medication safety in NHS Scotland.

Results: After screening, 45 sources were selected and an initial content analysis, followed by thematic analysis, was performed. The data were presented in nine broad themes: systems-based approaches to ensure safer use of medicines, strategies to promote reporting of medication incidents and adverse drug reactions, strategies to improve electronic prescribing, strategies to prevent medication harm due to high-risk medicines, providing clinical pharmacy services, strategies to improve information transfer, strategies to prevent medication harm due to polypharmacy, strategies to improve safe medication administration, and strategies to improve staff education.

Conclusions and Recommendations: NHS Scotland has implemented multiple, resource intensive strategies mainly utilizing information and communication technology (ICT) to improve medication safety. As a developing country, Sri Lanka can learn from these innovations but has implemented and planned to implement several strategies within resource constraints, which can be exemplary to any low- and middle-income country (LMIC).

Keywords: Medication Errors; Medication Systems; Patient Safety

Background

Patients receiving medications are exposed to potential hazards, errors, adverse or undesirable effects, or outcomes similar to any healthcare-related intervention associated with patient safety incidents. Medication errors are the leading cause of preventable

patient harm in healthcare, accounting for almost 50% of all preventable patient harm [1]. The common concept behind definitions of medication-related patient safety incidents is that medication errors are preventable patient safety incidents related to medication use that can happen at any stage of the process, from prescribing to consuming by the patient.

Medication-related errors have become a global issue, contributing to the unacceptably high number of preventable deaths and disabilities. A recent systematic review showed that the pooled prevalence of preventable medication-related harm (PMRM) was 1 in 20 patients [2]. One fourth of the harm was severe or potentially life-threatening. The prevalence of PMRM was 7% in 30 studies in LMICs and 4% (3–5%) in 70 studies in High Income Countries (HICs). The highest prevalence rates of PMRM were in the African (9%) and South-East Asian regions (9%), while geriatric (17%) specialized care units (9%), and intensive care units (7%) reported the highest setting prevalence of PMRM [2]. An updated systematic review involving 285,687 patients, indicated that the overall medication error rate was 9% and PMRM was 3% [3]. Medication errors occurring in LMICs lose twice as many disability-adjusted life-years than those in HICs [4].

Several studies done in Sri Lanka also highlighted high incidence of medication-related errors. Analysis of 400 prescriptions (2182 drugs) revealed one or more errors in 36.5% of prescriptions [5]. Another study using 1000 private sector prescriptions, revealed that only 26% of the prescriptions were legible [6]. A recent systematic review by Naseralallah et.al., (2023) reported that the prescribing errors were the commonest type of medication errors but reported wide variation between 0% - 91% [7]. The studies done in Sri Lanka focused more on prescription errors, and there was no estimation of consequences.

Objective

This narrative review explores the systems, strategies, and activities of medication safety practices applied at NHS Scotland to compare them, and to consider what could be adapted to improve medication safety in Sri Lanka.

Methods

The RAMESES (Realist And Meta-narrative Evidence Syntheses) was followed during the process [8, 9]. A literature search was conducted to identify studies and programs that examined strategies and activities for improving medication safety in NHS Scotland using Google®, Google Scholar, and PubMed with the terms “Medication Errors,” “Medication Safety” and “strategy,” “interventions.” Publications describing medication safety strategies and activities in NHS

Scotland between 2010 and 2022 were included for the review. Conversely, any publications describing non-medication safety interventions, published outside NHS Scotland, and publications before 2022, were excluded. The search was supplemented with a review of relevant reports, letters, and other resources on the Scottish Patient Safety Programme (SPSP) website [10]. Additionally, NHS Scotland and UK websites were searched, and 45 sources were selected. Initial content analysis to identify broad themes, followed by thematic analysis was performed. Subsequently, comparable themes were explored in the Sri Lankan publications and reports, which was supplemented with authors’ personal reflections to document the adaptability of the interventions in NHS Scotland to the Sri Lankan context, in the discussion section. Quality of the sources were not assessed, as they were mainly from the government sources and as the objective was to map the strategies and activities. Ethics approval was not required as this was a literature review.

Results

The data were compiled, analysed, and presented in the following nine broad themes:

1. Systems-based approaches to ensure safer use of medicines

Scottish Patient Safety Programme Medicines Collaborative (SPSPMC) is a core program of the SPSP, which overlooks the overall aspects of medication safety [10]. SPSPMC promote safer prescribing across care settings, minimize harm to patients from high-risk medicines, support teams in rational use of medicines through polypharmacy reviews, shares improvement initiatives and conducts regional and national learning sessions to share outputs and resources, with multi-disciplinary teams [10].

2. Strategies to promote reporting of medication incidents and adverse drug reactions

The SPSPMC is responsible for developing and maintaining pharmacovigilance systems and processes to support managing adverse events, including DATIX® patient-safety software, which is an online, electronic, integrated risk management information system used to collect and manage data on adverse events and complaints, claims, and risks. It is used in all stages to record related information, communications, outcomes,

and actions of the audit of adverse events [11, 12]. These data are stored and collated at a single site for monitoring purposes [13]. The application is used in >80% of NHS to report clinical incidents. Staff are trained in using DATIX® as part of mandatory and statutory NHS training [12].

The Yellow Card Scheme is voluntary pharmacovigilance system to report suspected adverse reactions to the Medicines and Healthcare Products Regulatory Agency (MHRA), which can be submitted by healthcare professionals or the public [14]. It was expanded in February 2008 to allow patients to report ADRs directly to the MHRA, and analysis proved that patients' reports are of value in identifying ADRs [15].

communication errors between GPs and pharmacists [19]. ETP allows a common, standardized approach to use prescription data [20], makes the processing of payment more efficient, and improves the quality and availability of prescribing data, with trend and analysis reporting [21].

4. Strategies to prevent medication harm due to high-risk medicines (HAMs)

Health services must identify HAMs used within the organization and ensure they are stored, prescribed, dispensed, and administered safely [22, 23]. Following strategies are employed by NHS Scotland to prevent medication harm due to HAMs [24].

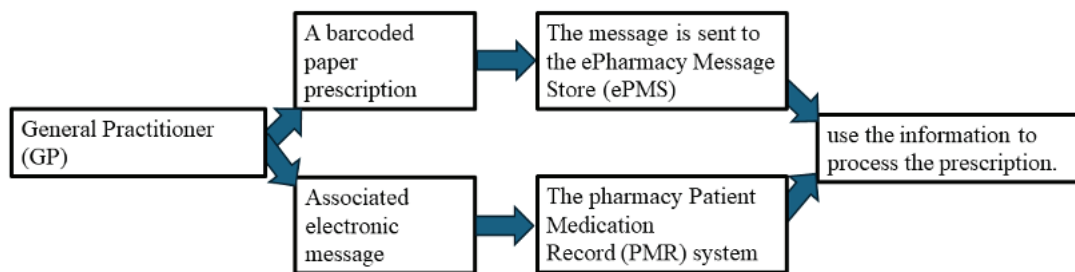


Figure 1: The Process of ETP [76].

3. Strategies to improve Electronic Prescribing

Hospital Electronic Prescribing and Medicines Administration (HEPMA) is a web-based application, which replaced paper prescribing and medication administration systems, improving legibility, uniform prescription formats, and electronic prescriptions [16]. A study revealed that prescribing error quantity and severity were reduced, with errors reduced from 99% to 23% ($p < 0.001$) and only 22% of identified errors likely to cause harm [17]. Exploration of views of hospital staff indicated that complete prescription and Immediate Discharge Letter (IDL) legibility and accuracy, and enhanced communication between secondary and primary care were achieved [18]. HEPMA increased clinical decision support information, reduced the need for transcription, and provided remote access to patients' prescription and medicines administration records [18].

The Electronic Transfer of Prescriptions (ETP) supports the electronic generation, transmission, dispensing, and processing of prescriptions, as depicted in Figure 1.

ETP benefits patients, GPs, community pharmacists, and the Practitioner Services Division (PSD) at NHS [19]. From a patient perspective, ETP will reduce the

- **The NSAIDs Dispensing GP Practices toolkit** includes the NSAIDs Communication Care Bundle and resources to support implementation.
- **Medicines Sick Day Rules Card** support conversations between healthcare professionals and patients about their medicines and medications that should be avoided in dehydration.
- **NSAIDs Pharmacy Bundles** support pharmacy teams to provide safety messages to patients whenever NSAIDs are dispensed or purchased. This tool includes the **NSAIDs Safer Care Bundle** and the **NSAIDs Communication Care Bundle**.
- **HAM discussion framework** supports teams in identifying, prioritizing improvement activities and taking potential interventions to improve the prevention, recognition, and response to harms.
- **The Warfarin Care Bundle** supports prescribing and monitoring Warfarin, as the number one drug that causes harm to patients in Scotland.
- **The Valproate Pregnancy Prevention Programme** includes a Patient Information Leaflet and education materials for professionals and patients.

5. Providing clinical pharmacy services

The clinical pharmacists are directly involved in the medication reconciliation process, screening medication charts, double-checking patients' medical history in making decisions on the choice and suitability of medication for a particular illness condition, and discussing medication details with medical doctors and microbiologists to determine the suitability of certain antibiotics for specific situations [25]. The pharmacy technician's role is invaluable in screening Medication Record Charts (MRCs) for appropriate dispensing, storing patients' medication, and making patients' medicines ready when discharged [25].

6. Strategies to improve information transfer

Medication reconciliation (MR) is an important tool to communicate with the patient, carer, and within healthcare teams across the primary and secondary care interface and has shown to prevent medication errors [26]. This was accomplished by working with the patient to create an up-to-date and accurate medication list, which is then compared with current records to identify and document any discrepancies, changes, additions, or removals [27]. A study in UK, found that 5% of medicines prescribed at outpatient appointments were not added to GP records and also found an 18-60% discrepancy in medication with 1.5-9.2% prescribing errors and 11% discrepancy in discharge medication in the hospital [28]. A population database analysis in GP practices in Scotland revealed that 13.9% received at least one high risk prescription in 2010 [29], and 58% of the GPs in Scotland were not satisfied with the hospital discharge information on medications, highlighting the importance of MR [30].

ETP, (Section 3), also facilitates this information transfer, and SPSPMC created the General Practice Medicines Reconciliation Care Bundle, which includes standardized systems and processes for MR [31]. Accordingly, NHS Boards are required to [27, 32]:

Implement a system where patients and the public can be involved and contribute to both NHS Board steering groups for MR.

Establishment of multi-professional leads for MR (doctor, pharmacist, and nurse) to drive improvement, supported by medical clinical champions.

Mandatory training for doctors, pharmacists, nurses, and pharmacy technicians, including induction and e-learning modules by NHS Education.

Establish local mechanisms to coordinate quality improvement work around MR, which reports to the local Area Drugs and Therapeutics Committee (DTC).

7. Strategies to prevent medication harm due to polypharmacy

Patients are more prone to medication errors due to polypharmacy (33, 34). It is estimated that mismanaged polypharmacy contributed to 4% of the world's total avoidable costs due to suboptimal use. Appropriate polypharmacy management could save US\$ 18 billion, 0.3% of the global total health expenditure [35].

Polypharmacy, which is defined as the routine use of five or more drugs (31). Prescribing more drugs than the patient needs without considering the need and side effects indicates inappropriate polypharmacy (32).

Figure 2: Definition of Polypharmacy

A community-dispensed prescribing data of 310,000 adults in Scotland found that the increased number of dispensed medications was strongly associated with potentially serious drug-drug interactions; 81% of patients receiving ≥ 15 drugs were exposed to potentially serious interactions compared with 11% of those dispensed two to four drugs [36]. It is estimated that up to 11% of unplanned hospital admissions are attributable to medication-related adverse events in the United Kingdom, of which 70% occur in elderly patients on multiple medicines and 50% were estimated preventable [37].

Accordingly, NHS Scotland has developed "NHS Scotland Polypharmacy Guidance: Realistic Prescribing" since 2012 to address the medication-related problems arising from multimorbidity, to prevent inappropriate polypharmacy [38]. It contains a clear structure for both the initiation of new treatments and the review of existing treatments [39].

Managing Multiple Medicines app [40], is a web resource to help healthcare professionals, patients, and carers make decisions about multiple medicines [41]. In the first month, it was downloaded almost 6,000 times, and three-quarters of users revisited the app more than once, indicating the usefulness and usability

of the intervention [40]. It contains two toolkits [41]:

1. A toolkit for healthcare professionals: provides quick and easy access on critical recommendations from the National Polypharmacy Guidance: Realistic Prescribing, including the 7-Step process for medicines review.
2. A toolkit for patients and carers taking multiple medicines: provides tools and information to support self-management and shared decision-making by patients and professionals during consultation and medicines review.

Additionally, polypharmacy is now included in undergraduate pharmacy courses. Further, pharmacists have been funded since 2013 to work in GP [39] to support the delivery of appropriate polypharmacy management.

8. Strategies to improve safe medication administration

The estimates of the prevalence of Look Alike Sound Alike (LASA) medicine errors range from 0.00003 to 0.0022% of all prescriptions and 6.2 to 14.7% of all medication error events [42]. MHRA prepared an information leaflet with LASA items with the National Reporting and Learning System (NRLS), the Medication Safety Officer in England, and the National Pharmacy Association (NPA) [43].

Changing the typography of medicinal product names was used in many hospital pharmacies in the UK. It is relatively easy to implement, both on physical packaging and electronically [42]. Additionally, the responsibility of the manufacturer, regulators, and procurement authority is broader and more significant in preventing the confusion with LASA names. MHRA issued best practice guidance on the labeling and packaging medicines in December 2020 to expand a set of principles agreed upon by the Committee on Safety of Medicines and to support more self-regulation by the pharmaceutical industry [44].

Distractions, lack of focus, poor communication, and failure to follow standard protocols have been identified as contributing factors for medication administration errors [45]. Studies have recognized distraction and interruptions occurring during the drug round as a significant contributing factor to medication errors

[46]. To reduce unnecessary interruptions during the drug round new practices such as the use of tabards, which have written “Do not interrupt Drug round in progress” (special vests to alert other team members and visitors not to distract nurses from their task) and “no interruption” zones, with varying degrees of success have been introduced and widely practiced [25, 46].

NHS Scotland has put double safety checks while administering intravenous (IV) medication. IV drug preparation, administration, and checks should be completed by two competent nurses who have had IV therapy competency training. In the following cases, a second registered practitioner or suitably trained unregistered professional must check all aspects of administration: Controlled drugs, calculation of dose, administration to children under 16, and weight-related dose. Keeping the patients’ medications locked in individual patients’ bedside lockers also improves the safety of medication administration practices [25, 47].

Clinical stakeholders are central to all procurement activities at National Procurement in Scotland, and Clinical Advisory Panels (CAP) are set up as an expert body to assess products’ fitness for purpose and any potential for errors. CAPs must ensure that the suppliers and products chosen by them have been thoroughly tested to meet the needs of the patients and quality standards. The role of the Quality Assurance representative of the CAP is to provide technical information/assessment of product aspects, including product quality specification, product package design/layout, and product/package labeling, which are essential in medication safety [48].

9. Strategies to improve Staff Education

Inexperienced personnel such as interns are more liable to make errors. Studies have shown an increase in mortality rates due to medication errors in the starting month of new interns [49]. The success of the prescriber depends on their knowledge, skills, resilience, and ability to navigate the challenges and supports within a stressful working environment. [50].

Prescribing Safety Assessment (PSA) was developed with eLearning resources for prescribers, such as Health Education England’s eLearning Programmes in clinical pharmacology, [51, 52]. The UK Medical Schools Council and British Pharmacological Society (BPS) implemented the PSA in 2014, which includes sections on prescribing and reviewing medicines, communicating

about medicines, anticipating and managing adverse drug reactions, monitoring medicines, and interpreting data [53, 54]. The successful completion of PSA is a compulsory requirement for all final-year medical students and all overseas entrants to the first year postgraduate training (54). The first external review highlights that the PSA enables candidates to show their competencies in the safe and effective use of medicines [55, 56].

Adhikari et. al., stated the need for compulsory medication safety modules in nurses' training. Nurses do not receive holistic medication safety knowledge, despite being taught the basic 'five rights' principles during pre-registration education [25]. It was further suggested that a multi-disciplinary approach, nurses' involvement in MR, a compulsory medication safety module into the pre-registration curriculum, and continuing professional development (CPD) opportunities for qualified nurses, are required [25].

Discussion

This review has identified several essential systems, strategies, and activities of medication safety applied in the NHS Scotland, which are themed into nine areas. Although these are implemented in a developed country, some of these could be adapted to the Sri Lankan health system within the existing resource and contextual constraints. Accordingly, exploration of Sri Lankan publications and personal reflections were combined to document the adaptability of NHS Scotland strategies to Sri Lankan setting. The Sri Lankan health system has positive strengths towards adapting such initiatives, such as having a long-standing network of health facility infrastructure and an established quality management system.

The Directorate of Healthcare Quality and Safety (DHQS) is the responsible governing body for overseeing patient safety in Sri Lanka [57]. It can be considered as the counterpart organization for the SPSP. Quality Management Units (QMU) in healthcare institutions carry out operational activities of patient safety and capacity building for the staff with technical guidance and facilitation of DHQS [57]. There are several approaches implemented in relation to medication safety in Sri Lanka.

The DHQS has taken a pragmatic approach to formulating

the National Action Plan on Medication Safety (NAPMS) for Sri Lanka in 2021, identifying issues through systematic review of studies on medication safety and stakeholder consultation [58]. The NAPMS was based on the WHO global patient safety challenge on "Medication without harm." It covers the four main domains (systems and practices, healthcare persons, medicines as products, and patients) and the three key action areas (polypharmacy, high-risk situations, and care transitions) and sub activities, time frames for implementation and key performance indicators [59]. Despite the existing policy, the ground-level implementation needs to be addressed in Sri Lanka, which would be the main focus in the next 5-year plan.

The DHQS introduced national policy and guidelines on adverse event reporting in 2016. This is a paper-based system, which included reporting related to medication safety events and errors [60], and multiple steps are proposed in alignment with the NAPMS [59]. A new medication incident reporting form has been introduced with a two-step process, which is available on the DHQS website, with the circular [61].

The National Medicines Regulatory Authority (NMRA) Act No. 05 of 2015 provides legal provisions for pharmacovigilance. ADR reports through Individual Case Safety Report forms (ICSR) available on the NMRA website [62]. The existing system consists of informing any adverse event through NMRA, the Medical Supplies Division, and the Adverse Drug Reaction Monitoring Unit of the Department of Pharmacology, Faculty of Medicine, University of Colombo, through the head of the institution [62]. There is a separate surveillance system for Adverse Events Following Immunization (AEFI), mediated by the Epidemiology Unit. [63].

Despite the above interventions, medication errors and ADRs reporting rates are low, and lacking digitalized and integrated ICT systems for ADR monitoring, as Scotland, although having multiple sources for pharmacovigilance. This lack of reliability with limited integration is a recognized feature of LMICs, and review by Kiguba, et.al. have identified number of contributory factors such as inadequate numbers of health professionals, poor collaboration between regulatory authorities and/or public health programs and high rates of using self-medications and traditional medicines [64]. However, the main reasons for low rates of reporting include poor safety culture and reluctance for reporting errors due to

fear of blame.

Sri Lanka has made some initiatives for the electronic prescribing with the isolated implementations of Hospital Health Information Management System (HHIMS) [65], but there are limitations for nation-wide or more integrated implementation [66].

A national list of 250 LASA medicines and 140 HAMs, has been identified through stakeholder consultations and error prevention strategies are being developed for dissemination through a circular. These strategies are being piloted in two tertiary care hospitals which will provide training for other institutions. Some initiatives are taken to minimize introducing the LASA medicines at the procurement levels through NMRA by reviewing medicine names and labels.

Training of trainer (TOT) programs are conducted by DHQS for health staff with a medication safety component. The Faculty of Medicine University of Colombo conducts a Diploma in Healthcare Quality and Safety which includes a module on medication safety. Awareness of medication errors, is also conducted by Directorate of Medical Services before and after the commencement of internship with the collaboration or

professional colleges. Discussions are also going on to introduce PSA similar to the UK collaborating with the BPS. The Sri Lanka Association of Clinical Pharmacology and Therapeutics is liaising with BPS to introduce this through the Sri Lanka Medical Council, which has agreed in principle to introduce this prior to full registration of medical graduates.

Improving medication literacy of patients is a very important as many patients are not aware of the medicines they are prescribed and providing information in local languages was shown to improve patients knowledge [67]. Patient information leaflets are also given to patients on selected HAMs with counselling desks at OPDs. Initiatives are now taken to attach a dispensing label with information on the medicine given in Sinhala, Tamil and English with pictograms showing the times to be taken (Figure 3 and 4). This is piloted in a tertiary care hospital using the hospital resources successfully. Other hospitals and the primary healthcare strengthening project are encouraged to use similar methods and will be included into the next phase of the medication safety action plan.

නම பெயர் name		වයස වයස age.....	
Drug name and strength/ in 3 languages (English,Sinhala,Tamil)			
 උදේ காலை morning	 දවල් மதியம் noon	 කවක மதியம் evening	 රාත්‍රී இரவு night
කෑමට පෙර / පසු / සමඟ		உணவுக்கு முன் / பின் / உணவுடன்	
		before / after/ with meals	

Sample Label

නම பெயர் name		වයස වයස age...	
Metformin මෙට්‌ෆෝමින් 500 mg			
 උදේ காலை morning	 දවල් மதியம் noon	 රාත්‍රී இரவு night	
කෑමට පෙර / පසු / සමඟ		உணவுடன்	
		with meals	

Label-Metformin

Figure 3: Sample labels giving names and instructions in all 3 languages with pictograms



Figure 4: Labelled prepacked medicines kept ready for dispensing in a tertiary care hospital

Development of a uniform prescription chart and clinical guidelines for the use of high-cost medicines Tenecteplase, Immunoglobulins, Albumin Solution and Concentrated Factor VIII and commonly used eight medicines have been initiated through the intercollegiate committee of the Sri Lanka Medical Association. Monitoring mechanisms are planned through clinical audits to implement the guidelines. These local initiatives would be somewhat analogous to the care bundles in Scotland. However, the success of these initiatives remains to be seen, as despite having many guidelines, implementing has been a challenge.

Improving information transfer through MR may be more challenging due to lack of ICT systems, electronic patient records and electronic prescribing. Similarly, polypharmacy prevention initiatives may be the most challenging strategy to initiate in the cultural and organizational context of Sri Lanka. Lack of updated clinical guidelines and poor attitude towards adherence to clinical guidelines combined with poor empowerment of patients towards their treatment decisions significantly impact the implementation of polypharmacy strategies.

As clinical pharmacist service is nonexistent, pharmacists are not a part of the multi-disciplinary clinical care team in hospitals. This is viewed as a missed opportunity for optimizing clinical care services [26, 68]. Studies have demonstrated that the extended role of pharmacists in delivering cost-effective, optimal patient care [68]. A study done in Sri Lanka has shown that clinical pharmacists are capable of identifying drug related problems and there is acceptance of such service by medical staff although

acceptance by nursing staff needs improvement [69, 70]. Medication reconciliation, prescription reviewing, and monitoring of ADRs, medication error rates were improved in a Bangladesh private hospital [71] with clinical pharmacists. Furthermore, a study done in USA (data from 2,836,991 patients in 885 hospitals), indicated that clinical pharmacy services, had reduced the mortality rates [72], and a review of 16 studies, mentioned high economic benefits of using clinical pharmacy services [73]. The Ministry of Health has identified the importance of the clinical pharmacist service and following activities have been included in the NAPMS: employ graduate pharmacists as clinical pharmacists, build consensus through training and workshops, increase training of graduate pharmacists, and introduce a post-graduate degrees in “Clinical Pharmacy” [59].

Literature reviews have identified common challenges for medication safety across many LMICs, i.e., high rates of medication errors [74, 75]. Lack of electronic prescribing leading to prescription errors (Pakistan and Bangladesh), poor implementation of regulatory mechanisms (Pakistan), inadequate staff (Pakistan), under-reporting of medication errors (Bangladesh and India), due to punitive culture and fear of litigation (India), and lack of drug and therapeutic committees (Bhutan) [74]. Accordingly, reviews recommended strategies such as establishment of electronic prescribing systems, improving awareness of patients and healthcare professionals, establishing robust mechanisms to detect medication errors, ensuring effective medication

reconciliation practices, and inculcate culture of safety [64, 74, 75].

The review only focused on publications from 2010 to 2022, as we wanted to explore the most updated strategies employed in NHS Scotland, and related evidence of effectiveness, which can be a limitation, since it may have missed some studies reflecting historical development of interventions.

Conclusions and Recommendations

NHS Scotland has implemented multiple strategies and activities to ensure medication safety through SPSPMC. These strategies are implemented system-wide and are

supported mainly by using ICT. Sri Lanka has taken steps to develop the NAPMS, and implemented many related activities, at various stages despite the resource limitations compared to Scotland. DHQS, as the focal point, is attempting to address the issues through QMU network, adapt feasible strategies, and benchmark and disseminate already implemented but isolated best practices in a coordinated manner. Strengthening QMU and assigning a medication safety liaison pharmacist for initiating and monitoring activities to improve medication safety in Sri Lanka, as per the NAPMS is likely to be helpful. Some of the initiatives can be used as a model for implementing activities in other LMICs to improve medication safety.

Author declaration

Author contributions: HMKW contributed to the conceptualization, design, acquisition of data, data analysis, data interpretation, and drafting of the manuscript. DD contributed to the data analysis and data interpretation. PA contributed to the acquisition of data, data analysis, and drafting of the manuscript. ME contributed to the conceptualization, design, and critical revision of the manuscript for important intellectual content. PG contributed to the data interpretation and critical revision of the manuscript for important intellectual content.

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