

Medicines reconciliation

A toolkit for pharmacists

2021



FIP Development Goals



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Colophon

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Executive summary

A recent Cochrane review found that 55.9% of patients are at risk of having one or more medication discrepancies at transitions of care with standard health care.¹ This harm is avoidable and the appropriate processes need to be in place to minimise errors and optimise medicines use.

With the alarming incidence of medication discrepancies and errors worldwide that increase the global healthcare burden and deaths from preventable causes, medicines reconciliation should be practised in every healthcare setting.

In 2017, the World Health Organization (WHO) launched a global initiative to reduce severe, avoidable medication-associated harm in all countries by 50% by 2022 — the Global Patient Safety Challenge on Medication Safety.

FIP is aligned with the goals of this challenge and recognises the need for a standard and adequately structured protocol for pharmacist-led medicines reconciliation in outpatient and inpatient healthcare settings. Interprofessional communications, as well as communications with patients and their relatives and caregivers led and managed by pharmacists, are required to obtain accurate medication information. Such accuracy ensures the patient is being placed at an optimal medication regimen, which constitutes the basis of medicines reconciliation.

Patient safety

Medicines reconciliation is an intervention that promotes patient safety. FIP and other global organisations such as the WHO understand the importance of setting up structures that can be integrated in healthcare settings internationally to promote patient safety.

Medication discrepancies and errors which commonly occur at transitions of care can lead to avoidable secondary illnesses, hospitalisation and death. Medicines reconciliation serves to minimise and possibly eliminate medication discrepancies at transitions of care if the required resources are made available. This will improve patient safety throughout patients' journeys from one care setting or level to another.

Medicines reconciliation and its implementation

Medicines reconciliation is a formalised and standardised process that involves obtaining a patient's comprehensive current medication list and comparing it to any medication they request or are being given at any healthcare setting, in order to identify and resolve any discrepancies according to the standards of medication frequency, route, dose, combination and therapeutic purpose.

Medicines reconciliation has been implemented in many healthcare settings and it has notable impacts on patient, clinical and economic outcomes.

There are important processes that must be followed by pharmacists when implementing medicines reconciliation. This FIP toolkit outlines the principles and key steps of this valuable professional service.

This toolkit also summarises the definitions, impact and procedures for the implementation of pharmacist-led medicines reconciliation in both community-based and hospital health care settings, with a set of tools to support this practice. This toolkit can be used as a guide to inform practice models and influence decision-makers and pharmacy practitioners to set up or remodel medicines reconciliation processes.

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1 Introduction

“Over the years, I have spoken to many people who have lost loved ones to medication-related errors. Their stories, their quiet dignity and their acceptance of situations that should never have arisen have moved me deeply. It is to the memories of all those who have died due to incidents of unsafe care that the Global Patient Safety Challenge on Medication Safety should be dedicated.”

Sir Liam Donaldson, WHO Envoy for Patient Safety, 2017

According to the World Health Organization (WHO), medication errors cause at least one death every day and injure approximately 1.3 million people annually in the United States of America alone. While low- and middle-income countries are estimated to have similar rates of medication-related adverse events to high-income countries, the impact is about twice as much in terms of the number of years of healthy life lost. Globally, the cost associated with medication errors has been estimated at USD 42 billion annually or almost 1% of total global health expenditure. Considering these figures, the WHO launched in 2017 a global initiative to reduce severe, avoidable medication-associated harm in all countries by 50% by 2022 — the Global Patient Safety Challenge on Medication Safety.²

A Cochrane review from 2018 pooled 20 studies and found that 55.9% of patients are at risk of having one or more medication discrepancies at transitions of care with standard health care.¹ Another study found that more than 40% of medication errors are believed to result from inadequate reconciliation during transitions of care, particularly during admission, transfer between settings in hospital, and at discharge, with approximately 20% of these errors believed to result in harm.³ This harm is avoidable and the appropriate processes need to be in place to minimise errors and optimise medicines use. As such, medicines reconciliation is usually done at transitions of care. These usually occur in a hospital setting (admission, post-operative care, transfer between wards, discharge), but they also take place in the community setting (usually at discharge from hospital, but also addressing medication provided by different prescribers and the use of non-prescription medicines and other medicinal products). The target audience of this toolkit includes pharmacists in all patient-facing settings.

Medication errors can affect individuals' health and well-being and, ultimately, health systems, if medicines are taken or administered incorrectly or if their use is insufficiently monitored.²

Several definitions of a medication error have been proposed. 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 healthcare professional, patient, or consumer. Such events may be related to professional practice, healthcare products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring and use.”⁴

The International Pharmaceutical Federation (FIP) has continually emphasised and prioritised initiatives in the areas of patient safety and the responsible and safe use of medicines through the professional services of pharmacists in all settings.

Pharmacists are essential players in resolving medication errors. Due to their unique expertise in medicines, particularly in cases of polypharmacy, and to their key role within multidisciplinary teams, pharmacists are best suited to intervene and address medication errors promptly. Furthermore, due to the development of trust with patients, pharmacists are most adequately suited to provide education, reinforce compliance and dispel concerns about medicines use with their patients.

To address medication errors, structured approaches have been proposed and utilised. They include medicines use reviews, medication reconciliation, handover (sign outs) and multidisciplinary rounds. As medicines are involved in all treatment plans, it is essential that pharmacists participate in and lead such approaches.

In particular, transitions of care can potentially lead to patient harm due to unintentional changes in patient's medication therapy, often due to insufficient communication. Medicines reconciliation therefore represents a key service across all transitions of care and, when led by pharmacists, is effective in reducing potential medication-related harm.

In 2020, FIP published "[Patient safety: Pharmacists' role in 'Medication without harm'](#)" and, more recently, "[Medicines use review: A toolkit for pharmacists](#)". Both publications aim to support pharmacists in providing safer care and contribute towards WHO's Global Patient Safety Challenge on Medication Safety. The latter is a practical guide to support the implementation of medicines use reviews in all countries and settings, including low-resource settings and small pharmacies. The same principles underpin the present toolkit on medicines reconciliation. It includes service implementation tools which can be directly used or adapted for clinical practice at the patient level. The organisational topics featured in this toolkit can also be used in management and policy development contexts.

2 Understanding medicines reconciliation and its implementation around the world

Medicines reconciliation is critical in ensuring safe and effective patient care. While multiple definitions of this service exist, the common thread is that medicines reconciliation broadly consists of collecting comprehensive information of a patient's active prescription and non-prescription medication in addition to information regarding their medication history and management, adherence and lifestyle habits. Gathering these data in a comprehensive fashion allows clinicians to assess changes in pharmacotherapy across transitions of care, ultimately reducing the risk of medication errors and potential harm. More specifically, medicines reconciliation is a strategy that aims to reduce errors due to discrepancies, such as duplications, omissions, dosing errors and drug-drug interactions, which mostly occur at admission, transfer or discharge of patients.³

The WHO defines medicines reconciliation as “the formal process in which healthcare professionals partner with patients to ensure accurate and complete medication information transfer at interfaces of care”.⁵ Additional definitions have been proposed by different agencies, as detailed in Table 1.⁶

Table 1. Definitions of medicines reconciliations according to different organisations⁶

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Organisation	Region	Definition
Agency for Healthcare Research and Quality	Americas	The process of avoiding inadvertent inconsistencies across transitions in care by reviewing the patient's complete medication regimen at the time of admission, transfer and discharge, and comparing it with the regimen being considered for the new setting of care.
Australian Commission on Safety and Quality in Healthcare	Western Pacific	The process of ensuring that the medicines the patient should be prescribed match those that are prescribed. When a patient's care is transferred to another clinician, a current and accurate list of medicines, including reasons for change, is given to that clinician. Some transition points are more prone to error and require special attention, such as: <ul style="list-style-type: none"> • Admission to hospital • Transfer from the emergency department to other care areas (wards, intensive care, home) • Transfer from the intensive care unit to the ward from the hospital to home, aged care home or another hospital.
Institute for Healthcare Improvements	Americas	The process of creating the most accurate list possible of all medicines a patient is taking — including drug name, dosage, frequency and route — and comparing that list against the physician's admission, transfer and/ or discharge orders, with the goal of providing correct medicines to the patient at all transition points within the hospital.
Institute for Safe Medication Practices Canada	Americas	The process of creating the most accurate list possible of all medicines a patient is taking and comparing that list against the physician's admission, transfer and/or discharge orders, with the goal of providing correct medicines to the patient at all transition points within the hospital.

Organisation	Region	Definition
National Institute for Health and Care Excellence	Europe	The process of identifying an accurate list of a person's current medicines and comparing it with the current list in use. The information can be obtained from a variety of sources such as: medicines brought to hospital by the patient, general practitioner surgery patient records, repeat prescription slips, hospital case notes, community pharmacy patient medication records and care home medicines administration record. The list should include name, dosage, frequency and route of administration. Any discrepancies should be identified and any changes documented. The result is a complete list of medicines, accurately communicated to all health and social care professionals involved in the person's care, in which any issues with the medicines, such as wrong dosage or omission, have been addressed.
The Joint Commission	Americas	The process of comparing a patient's medication orders with all of the medicines that the patient has been taking. This reconciliation is done to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions. It should be done at every transition of care in which new medicines are ordered or existing orders are rewritten. Transitions in care include changes in setting, service, practitioner or level of care. This process comprises five steps: 1) develop a list of current medicines; 2) develop a list of medicines to be prescribed; 3) compare the medicines on the two lists; 4) make clinical decisions based on the comparison; and 5) communicate the new list to appropriate caregivers and to the patient.

An international panel of pharmacy experts was convened in 2019 to develop a broad definition of medicines reconciliation that would apply to all transitions of care and practice settings across health care. Consensus was reached for the following definition, which is supported by FIP: "Medicines reconciliation is the process of creating the most accurate list possible of all medications a patient is taking and comparing that list against the prescriber's orders. In addition, the patient's allergies, history of side effects from medications and medication aids are listed with the goal of providing correct medication to the patient at all transition points within the healthcare system."⁶

FIP defines medicines reconciliation as the systematic process of curating and compiling an accurate and up-to-date list of all kinds of medicines a patient is using at all transitions of care to eliminate medication discrepancies and control any existing or potential medication errors.

This list includes prescription medicines and non-prescription medicines, as well as herbal medicines, vitamins and mineral supplements, and every other complementary or alternative medicine, such as homeopathic products, with their respective route of administration, dose and frequency. Information on medication history and recent changes to medication therapy, on medication management, on adherence to treatments, and on lifestyle habits are also useful data to collect while conducting medicines reconciliation.

Medicines reconciliation is a responsibility shared by all members of the healthcare team. Clinicians should exercise caution when prescribing, administering, suggesting or dispensing medicines to a patient at all times, and particularly at transfers of care systems and sectors, especially with regard to medicines with a significant potential for harm. Nevertheless, given pharmacists' expertise in medicines, pharmacist-led medicines reconciliation should be recognised for its accuracy in completing patients' medication histories, determining and reconciling medication discrepancies and suggesting the necessary interventions.

It is important to note that medicines reconciliation is only one component of a collection of steps which, taken together, are required to ensure patient safety. Often, a medicines use review to assess the appropriateness of pharmacotherapeutic treatment plans is performed simultaneously with medicines reconciliation, although both can be perceived as distinct concepts.⁶ For more information regarding medicines use review (MUR), an additional step for patient safety, you can refer to the [FIP Medicines Use Review toolkit](#).

2.1 Clinical impact of medicines reconciliation

Medication discrepancies at points of care transfers can be classified as intentional or unintentional. If discrepancies, in particular unintentional discrepancies, are not promptly or sufficiently assessed, they may lead to preventable medication errors and adverse events, which may ultimately lead to significant health implications and clinical burden. Since the 1990s, research has identified causes of and solutions to the management of unintentional discrepancies with medicines as patients move between care settings. Studies at that time also measured the impact of communicating between sectors and the impact on reducing discrepancies with a significant clinical effect.⁷⁻¹⁰ For the purposes of this report, while the references used are from the past decade or so, it is worth noting that the work has been in place for decades and has, indeed, been presented during that time at FIP World Congresses.

Medicines reconciliation is an important component of ensuring patient safety.¹¹ Medicines reconciliation has been found to effectively reduce medication irregularities and errors, thereby improving patient safety by reducing and correcting clinically relevant medication errors.¹²

Qu  nnelec and colleagues conducted a study on the potential clinical impacts of medicines discrepancies at hospital admission, with each discrepancy associated with a potential harm rating. The results showed that more than 25% of the identified medication errors had a potential clinical impact which could have been reduced by a medicines reconciliation process.¹² Another study found that, through medicines reconciliation, 83% of the discrepancies identified while conducting medicines history had potential harm.³ Benefits were seen with medicines reconciliation, with one study having identified a 75% harm reduction due to medicines reconciliation, while another demonstrated harm prevention in more than 80% of included patients.^{3,13}

Moreover, according to a review done by Cheema and colleagues, pharmacist-led medicines reconciliation effectively reduced medication discrepancies without a significant intervention in potential and avoidable adverse drug effects and healthcare utilisation.¹⁴ Ghatnekar and colleagues, using the Lund integrated medicines management model (LIMM) in elderly patients on hospital admission, discovered that medicines reconciliation improves the quality adjusted life years and minimises the risk posed to patients due to life threatening effects that could be the result of medication discrepancies.¹⁵ Researchers in the Netherlands found a significant reduction in the number of potential adverse effects after hospital discharge due to medicines reconciliation and patient education.¹⁶

Nevertheless, a review conducted by Guisado-Gil and colleagues stated that, according to the published literature, only a few systematic reviews have affirmed the improvement of healthcare utilisation and positive patient-related outcomes associated with medicines reconciliation. According to these authors, no substantial evidence has been shown that medicines reconciliation significantly improves healthcare parameters such as emergency department visits, unplanned readmissions, physician visits, length of stay, mortality and healthcare utilisation.¹⁷ However, demonstrating a causal link between such outcomes and medicines reconciliation as a sole service may be difficult to ascertain given a variety of potential confounding factors. Patient outcomes appear more favourable when medicines reconciliation is included in a bundle of medicines-related interventions, such as patient education.¹⁸ Medicines reconciliation thus remains an essential part of the process to ensure patient safety.

Medicines reconciliation at hospital transition points helps to resolve medication discrepancies and errors that might have been caused due to failure to prescribe, while in hospital, clinically important medicines previously prescribed to the patient, incorrect doses or dosage forms, missed or duplicated doses resulting from inaccurate medication records, inability to clearly specify which previously prescribed medicines should be resumed or discontinued at home after hospital discharge, and duplicate therapy at discharge as a result of brand/generic name combinations or hospital formulary substitutions.¹⁹

Prescriptions at hospital discharge pose a greater risk of medication discrepancies and subsequent medication errors if the medicines reconciliation is not adequately conducted at discharge. Other medication errors can also be caused due to the undocumented use of non-prescription medicines, herbal medicines, supplements, or vitamins that may interact with conventional prescription therapy and require clinical monitoring; resolving such discrepancies can be achieved through medicines reconciliation. It can also help to identify when patients continue to refill a medicine that should have been stopped or fail to refill a medicine that needs to be continued.

In the outpatient and community contexts, medicines reconciliation in settings, such as community pharmacies and primary healthcare centres, reduces medication discrepancies across prescription-only medicines from various prescribers, non-prescription medicines and other types of medicines and products used by the patient.²⁰

A study conducted in Switzerland demonstrated that pharmacist-led medicines reconciliation in community pharmacies led to the identification of multiple discrepancies, with close to half of discrepancies bearing a moderate to severe risk of clinical impact to the patient.²¹ In Wales, conducting medicines reconciliation in the community setting upon hospital discharge was associated with a reduction in the risk of hospital readmission.²²

2.2 Economic impact of medicines reconciliation

As highlighted above, the global cost associated with medication errors has been estimated at USD 42 billion annually or almost 1% of total global health expenditure.² Not only do these errors lead to harm and poor health outcomes, but they also represent an important source of waste for individuals and healthcare systems — a waste that could be used to finance further access to better care and to innovative treatments, for example, and to contribute towards universal health coverage. As such, interventions conducted to reduce the burden of medication errors, such as medicines reconciliation, are largely needed.

While medicines reconciliation is conducted in many healthcare settings around the world, there is a paucity of evidence of its cost-effectiveness. Hammad and colleagues conducted a systematic review of studies evaluating pharmacy-led medicines reconciliation performed fully from admission till discharge. The literature search identified 4,065 citations, of which 13 implemented complete medicines reconciliation.²³ The authors' conclusion was that the lack of evidence precluded addressing the effects and costs of this intervention.²³ Nevertheless, an observational study demonstrated that savings associated with medicines reconciliation and review outweighed the labour costs to perform the service.²⁴

Although there is a lack of robust data demonstrating the exact economic impact of this service at global level, there is some evidence that pharmacist-led medicines reconciliation has been shown to be cost-effective. Karnon and colleagues analysed the economic impact of medicines reconciliation and related interventions by assessing their incremental cost and effects measured as quality adjusted life years (QALYs), using available evidence. They concluded that all five interventions for which evidence of effectiveness was identified are estimated to be extremely cost-effective when compared with the baseline scenario. In particular, pharmacist-led reconciliation interventions had the highest net benefits, and a probability of being cost-effective of more than 60% by a QALY value of GBP 10,000. The authors further conclude that conducting medicines reconciliation is a cost-effective way to utilise the resources of the national health system.²⁵

The acquired costs in medicines reconciliation interventions mainly consist of pharmacists' working hours to conduct and complete this service. Available studies have shown that for every additional cost of paying pharmacists to conduct medicines reconciliation interventions, more is saved in having to manage errors in hospital care, primary care, and also municipality care after discharge. Ghatnekar and colleagues, using the Lund integrated medicines management model (LIMM) in elderly patients on hospital admission, discovered that medicines reconciliation afforded higher utility and cost savings to patients. They found that investing EUR 39 in clinical pharmacist time could save EUR 340 in medical care at hospital and in primary care in addition to administrative costs for correcting medication list errors in primary and municipality care after discharge.¹⁵

Medicines reconciliation also offsets costs that could be incurred due to hospitalisations resulting from life-threatening medication discrepancies and errors.²⁶

Available studies have shown that medicines reconciliation represents a cost-effective way to utilise health systems and resources, reducing the financial burden on patients, healthcare systems, insurance providers and governments at large. Effective pharmacist-led medicines reconciliation will ultimately reduce global health expenditure by decreasing the costs related to avoidable hospital readmissions and health care.²⁷

3 Conducting medicines reconciliation

The basics of medicines reconciliation involve collecting comprehensive information about the medicines a patient is taking from the patient, family members and all care providers whom the patient has encountered during transitions and interfaces of care. Moreover, the growing complexity of health care, which includes a variety of prescribers, including non-physician prescribers, and tele-health care, scores the importance of effective communication for optimal medicines reconciliation.

The implementation of effective medicines reconciliation must involve the development, maintenance and communication of a complete and accurate medication list throughout the continuum of care.

3.1 Key elements for conducting medicines reconciliation

The principles for conducting medicines reconciliation involve identifying what needs to be done and the individuals involved. The process includes the following key elements:

1. An up-to-date, accurate and complete patient medicines list. This includes a comprehensive medicines list including prescription medicines, non-prescription medicines, herbal medicines, supplements, vitamins and other alternative or complementary therapies the patient might be using to serve as an essential guide to ensure safe and adequate prescribing in any care setting.²⁸
2. Information on medicines or food allergies, recent medication changes, medication management aids (such as pillboxes), perceived level of health literacy or medicines knowledge, adherence and lifestyle habits (such as smoking, alcohol or drug use).
3. A standardised and structured process for conducting medicines reconciliation.²⁸
4. Integration into processes that are already in place for medication management and patient flow.²⁸
5. Shared accountability between the pharmacist and other health practitioners.²⁸
6. Involvement of patients and their families.²⁸
7. Other allied health professionals, including nurses, physicians, or pharmacists in hospital or community settings, should be contactable to corroborate information.
8. Consent from patients, (or assent from their families), to obtain collateral information from the aforementioned sources.

3.2 Step-by-step process for conducting medicines reconciliation

The following steps represent a proposed process for medicines reconciliation which may be directly used or adapted to local practices. Medicines reconciliation consists of three main steps:²⁹

1. Creating the best possible medication history (BPMH);
2. Comparing the BPMH with medicines prescribed on admission, at in-patient transfer or at patient discharge and identifying discrepancies; and
3. Reconciling discrepancies by classifying them as intentional or unintentional and by taking the appropriate action and documenting interventions.

3.2.1 Creating the best possible medication history

The best possible medication history (BPMH) is an accurate, up-to-date and complete medication history that compiles information on all prescription and non-prescription medicines used by the patient, including the dose, frequency, formulation and route of administration.³⁰ The medicines information should also include any herbal medicines, supplements, vitamins and other alternative/complementary therapy the patient might be taking.

This information should be collected via at least two different sources.⁶ Ideally, the information should be collected by interviewing the patient and their relatives and/or caregivers. The information obtained should then be verified and clarified with other sources, such as other pharmacists, other allied health professionals, home care providers, and/or by inspecting medication containers, patient medication lists, government medication databases and previous patient health records.²⁸

Data on known allergies, previous medication changes, medication management, vaccination history, level of health literacy or medication knowledge, compliance and lifestyle habits may also be collected during the interview.

Open-ended questions, such as “What prescription medicines do you regularly take?”, allow for patients to elaborate and provide as much information as possible. Closed-ended questions, such as “Were you using any eye drops at home?” may be used to obtain precise information.

A table identifying key points to discuss during a patient interview to obtain the BPMH can be found in Chapter 5, “Medicines reconciliation implementation tools”.

3.2.2 Comparing the BPMH and identifying discrepancies

The BPMH is used as a guide to inform prescribing of new medicines by physicians or to compare new medicines prescribed on admission, during transfers, at discharge or across various prescribers in the outpatient setting. Any discrepancy or change in medicines is identified. Examples of medication discrepancies include:³¹

- Medicine omission
- Medicine addition
- Medicine duplication
- Therapeutic class substitution (medication change within a medication class)
- Allergy or intolerance
- Unclear/wrong/omission of strength
- Unclear/wrong/omission of frequency
- Unclear/wrong/omission of units
- Unclear/wrong/omission of dosage form
- Unclear/wrong/omission of route of administration
- Unclear/wrong/different time of administration
- Unclear/wrong duration of therapy

3.2.3 Reconciling discrepancies and taking appropriate action

The identified discrepancies are analysed in the clinical context and are classified as being either intentional or unintentional. To resolve such errors, appropriate action should be taken, such as communicating with prescribers to change medication therapy as well as documenting the changes and necessary follow-up. Any changes made to medication therapy should thereafter be communicated to the patient.

Finally, a medicines reconciliation should ideally be completed with a medicines use review (MUR) to assess indications, contraindications and dosages as well as to assess for medicine-medicine or medicine-disease interactions with regards to the information obtained through the medicines reconciliation.

3.3 Medicines reconciliation at hospital-based transitions of care

Transitions of care, such as at admission, transfer or discharge, bear the potential for medication errors and therefore benefit from medicines reconciliation.

3.3.1 Upon admitting a patient to hospital

1. An accurate and complete list of all medicines the patient has taken prior to being admitted should be created. This information can be obtained by interviewing the patient, relatives and healthcare providers and should ideally be in addition to a secondary source, such as a medication list. This information is best gathered within 24 hours of hospital admission.
2. Admission medication orders should be created based on this BPMH. In acute care settings or emergency situations, there may not be sufficient time to conduct a BPMH prior to prescribing medicines on admission. The BPMH should therefore be conducted as soon as possible following admission, and it should be used to compare the medicines ordered on admission and identify discrepancies.²⁸
3. All discrepancies identified should be reconciled and the necessary interventions and suggestions made should be adequately documented and communicated to the rest of the healthcare team as well as to the patient and/or their caregivers.²⁸

3.3.2 For inpatient transfers

1. An accurate and complete list of all medicines the patient has taken before admission and during admission should be created.
2. The medicines orders on admission to the new unit should be created based on the BPMH of medicines taken during the current hospital stay. The BPMH of medicines taken prior to admission (at home) should also be compared with current medicines.
3. If any discrepancies are identified on transfer, they should be reconciled.
4. The necessary interventions and suggestions made should be adequately documented and communicated to the rest of the healthcare team as well as to the patient and/or their caregivers.

The procedure for inpatient transfers also applies to transitions of care within an institution, such as in the perioperative context.

3.3.3 Upon discharge of a patient from hospital

1. The BPMH obtained at discharge involves not just medicines the patient was taking prior to admission, but also the changes made to patients' treatment plan during their hospital stay. It is expected that, at the moment of discharge, all this information has already been collected. If not, it should be gathered by interviewing the patients, relatives and clinicians in charge and by consulting the patient's health record.
2. The BPMH should be compared with the medicines ordered at discharge and any discrepancy or changes made to the medicines should be identified.
3. The discrepancies or changes identified should be documented and communicated to the attending physician or prescriber. Any changes made to the medicines should be communicated to the patient so they may comprehend the reasoning behind the changes.³² Examples of changes the patient should be made aware of include discontinuing a medicine that the patient was taking prior to admission, continuing new medicines that were initiated during the hospital stay, and restarting a medicine that had been prescribed previously and that was temporarily stopped during the current hospital stay.

3.4 Medicines reconciliation in outpatient and community settings

Medicines reconciliation can also be performed in the outpatient setting to obtain a thorough and accurate depiction of the patient's current medication therapy. For example, in community pharmacies or in outpatient clinics, pharmacists can conduct medicines reconciliation to gather information and subsequently proceed to a medicines use review.

The process includes the following steps:

1. The pharmacist should obtain the patient's BPMH by interviewing the patient or their caregivers, communicating with the patient's healthcare providers, reviewing the community pharmacy records, checking the patient's medical history, or asking to see their medication packages or pillboxes. Since many patients refill their regular prescriptions at a single pharmacy, data on current medicines may be readily available through software or updated documentation for that specific pharmacy. In regions where shared electronic medical records are available, access to such data is valuable to complete the BPMH.
2. The BPMH should be compared with any prescription medicines the patient takes differently from prescribed in addition to any non-prescription medicines, herbal medicines, supplements, vitamins and other alternative or complementary therapies the patient might be using. Any discrepancies should be identified.
3. The discrepancies or changes identified should be documented. Prescribers and other healthcare professionals should be contacted to reconcile the discrepancies.
4. After making the necessary changes to a patient's medication therapy following the medicines reconciliation, the pharmacist should communicate these changes to the patient or their caregivers with the necessary counselling and education.

3.5 Timing and prioritisation of medicines reconciliation

The timing of medicines reconciliation is critical in ensuring medicines discrepancies are identified and reconciled in a timely manner. Furthermore, medicines reconciliation should ideally be performed for all patients under the care of the pharmacist. It therefore becomes important to identify target timeframes and priority patient groups for medicines reconciliation. This is particularly important in situations of limited workforce capacity or resources. Examples are given below.

Figure 1. Target moments for medicines reconciliation⁶

Adapted with permission

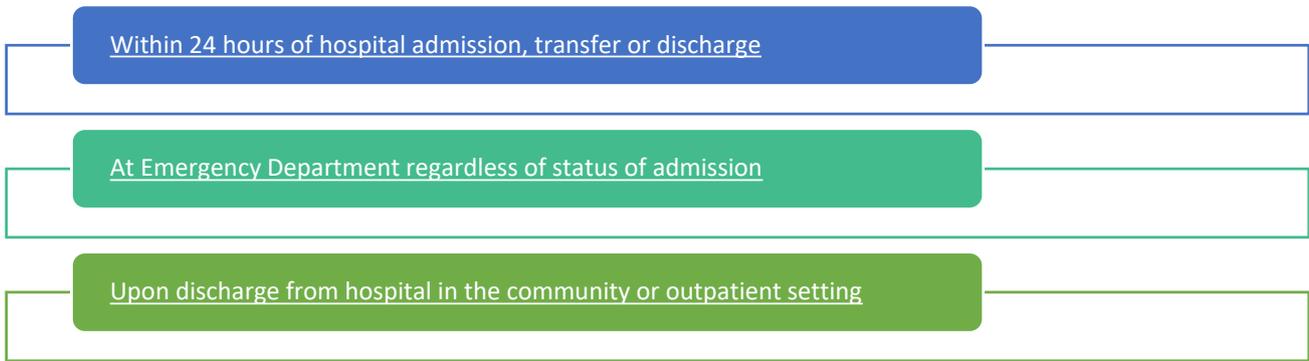
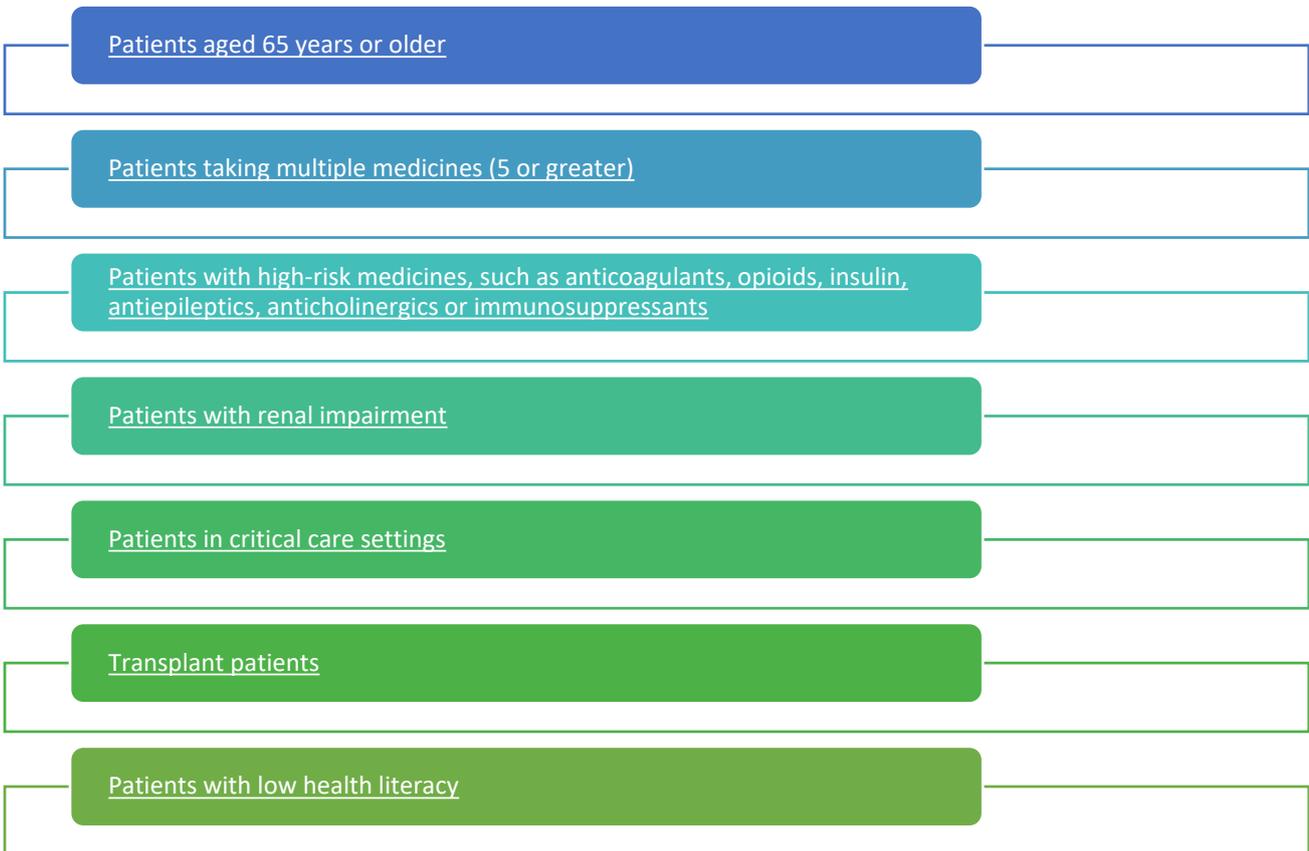


Figure 2. Priority patient groups for medicines reconciliation⁶

Adapted with permission



3.6 Medicines reconciliation in low-resource settings

Health care in low-resource settings, such as in developing regions or in smaller scale establishments or pharmacies, is often characterised by inadequate coverage of healthcare costs due to low funds on behalf of the individual patient or of the health system, or low access to infrastructure, technology or workforce.

Although these can represent barriers or challenges to offering optimal professional services by pharmacists, medicines reconciliation can be implemented in low-resource settings despite low access to technology.

Conducting an interview with patients and their caregivers remains one of the primary sources of information regarding medication history, and it can be performed in more or less any type of setting. Moreover, paper records, instead of digital records, that are adequately organised and kept up to date also contain important data for medicines reconciliation.

Once the BPMH has been taken, the medicines reconciliation can be transcribed onto a paper document which can be kept in a visible location among the patient's paper charts. A copy can and should be given to the patient, who may show it to other healthcare providers. By doing so, the medicines reconciliation is readily available for consultation. In settings without access to specific software, widely available computer programmes such as Microsoft Word or Excel may be used to create documents to facilitate medicines reconciliation. Although specific software may exist in more fully resourced settings, including medicines reconciliation applications linked to the patients' electronic health record, the tools described in Chapter 4 can be easily adapted and used with generic computer software for conducting medicines reconciliation and deliver improved patient care and clinical outcomes from medicines use.

Where it is not feasible to complete medicines reconciliation for all patients due to low resources, patient groups can be prioritised, as previously discussed, to ensure the service is available for those at greater risk of harm due to medication discrepancies.

4 Implementing medicines reconciliation

As with all pharmacy services, implementing medicines reconciliation as a valuable and sustainable service requires involvement from all concerned stakeholders as well as a thorough plan to effectively conceptualise, test and establish the service.

4.1 Potential challenges encountered in medicines reconciliation

There are various people, processes and tools involved in medicines reconciliation. This multi-interaction between people, tools and processes may lead to certain challenges in conducting optimal medicines reconciliation. Some of those challenges are described below so that they can be taken into consideration in implementing this service and resolved adequately.

4.1.1 Incomplete BPMH

A patient might not provide an accurate account of their medication history. This can be seen in acute care settings, where a patient is admitted during an emergency or if the patient's memory and cognition are affected by their current health issues. Some patients may also not have adequate knowledge of their own personal medicines. This is problematic because the patient is the primary information provider for obtaining the BPMH, and information from other sources may be difficult to obtain if the patient is not able to provide sufficient information. For example, a patient may be taking herbal remedies or other non-prescription products at home that are not recorded in any electronic database. The patient's relatives may not be aware of this consumption. It is therefore critical to always use at least two different sources to complete the BPMH, including the community or hospital pharmacist, relatives or caregivers. If a patient is unable to be consulted, then a preliminary version can be conducted using the available information. The BPMH can then be re-assessed once the patient is capable.³

4.1.2 Interprofessional communication

Pharmacists might encounter a certain degree of push back when interacting with other healthcare professionals during the reconciliation process. Pharmacists may face resistance when reconciling unintentional discrepancies and as such are encouraged to develop relationships of trust and collaboration with their team members as well as to ensure the reasons behind the advice are established.

4.1.3 Lack of resources

In some healthcare settings, time constraints due to understaffing of pharmacists may not give room for effective medicines reconciliation process. Limited access to technology in certain settings may make the process of obtaining information and documentation more lengthy and complex. Pharmacy technicians and assistants may conduct the BPMH following training through a standardised operating procedure.³³ The pharmacist would then review the work of the pharmacy technician and complete the medicines reconciliation.

4.1.4 Additional challenges

In addition to the above, other challenges have been described as potentially hindering or impeding the service. These include lack of access to relevant information (discharge or hospitalisation information), lack of appropriate remuneration, and lack of intuitive or easy-to-use documentation systems.³⁴

4.2 Considerations for successful implementation

Data have been published regarding steps for successful implementation of pharmacy services, which notably includes service discovery and design, preparation and testing, implementing as well as monitoring and evaluation.³⁵ To successfully implement medicines reconciliation, the following practical points may be considered:

- Review of practices of medicines reconciliation in other regions, countries or territories
- Review of the clinical and economic impact of medicines reconciliation
- Development of policies and procedures pertaining to medicines reconciliation, which include directions on:
 - Individuals involved in conducting medicines reconciliation (pharmacists, pharmacy technicians or aides, other allied health professionals)
 - Target moments to conduct medicines reconciliation
 - Sources of information to be consulted
 - Forms or documentation systems
 - Situations to prioritise
 - Remuneration models
- Action plan for testing (for example, in which wards or for which patients will the service be tested on first?)
- Establishment of a committee to monitor the service
- Development of data to collect to monitor and evaluate the service, which may include number of medicines reconciliation (for example, by unit or by type of patient) or number of discrepancies found at each medicines reconciliation.

This toolkit includes several elements, references and tools that may be useful in implementing a pharmacist-led medicines reconciliation service.

5 Medicines reconciliation implementation tools

Medicines reconciliation is a multi-step process requiring the intervention and collaboration of multiple parties. It relies on effective communication among different healthcare professionals as well as patients and their caregivers.

Several tools exist to facilitate the implementation of medicines reconciliation. Depending on the availability of resources, these tools can be paper-based or electronic.

5.1 Electronic tools for medicines reconciliation

5.1.1 Computerised physician order entry

A computerised physician order entry system ensures that the pharmacist is updated with the patient's prescription medicines in real-time, which hastens the process of obtaining the most accurate information on current medicines.³⁶

5.1.2 Personal health records

A personal health record (PHR) is a set of computer-based tools whereby patients can access and coordinate their lifelong health information and render parts of it available to those who require access.³⁶ A PHR enables the patient to share some or all parts of their medication history as demanded during medicines reconciliation.

5.1.3 Shared electronic medical record

Shared medical records are implemented by storing patient's personal health records, which may include medicines, laboratory investigations and imaging results in a centralised system. With their consent, this information becomes readily accessible to healthcare professionals within a given jurisdiction.³⁷

5.1.4 Electronic health records

An electronic health record (EHR) is a patient's electronic medical history that is maintained by a healthcare provider or several providers.³⁸ It is a comprehensive record of the patient's clinical data which includes, but is not limited to, the patient's medication history. An EHR is resourceful in medicines reconciliation in an inpatient or outpatient healthcare setting, including community pharmacies.

5.1.5 Smart electronic discharge summary

A smart electronic discharge summary is used to produce and transmit a patient's discharge summary based on both the patient's medicines prior to admission and during their hospital stay. A pharmacist uses the information on a patient's electronic discharge summary in medicines reconciliation.

Although various health and medicines records stored electronically are valuable for obtaining a patient's medication history, the primary source of a patient's medication history should be the patient or the caregiver.

5.2 Medicines reconciliation form templates

The following form templates can be used directly or adapted to local settings to conduct medicines reconciliation in paper or electronic format.

PERSONAL INFORMATION	
Date of interview	
Patient's name	
Date of birth	
Gender	
Height and weight	
Health insurance information	
Patient's telephone number	
Name of pharmacy	
Pharmacy contact details	
Name of primary care physician	
Contact details of primary care physician	
Allergies	
Intolerances	
Medication management (<i>by patient or by caregiver</i>)	
Organisation of medication (<i>Pre-packaged or pillboxes; prepared by patient or by pharmacy</i>)	
Perceived level of health literacy	
Perceived adherence to previously prescribed medicines	
Vaccination history	
Lifestyle habits (<i>smoking, drugs, alcohol</i>)	
Recent medication changes (<i>within previous 1–6 months</i>)	

The table below provides an example of how these forms may be used.

BEST POSSIBLE MEDICATION LIST: PRESCRIPTION MEDICINES, NON-PRESCRIPTION MEDICINES AND OTHER MEDICINAL PRODUCTS

Medicine (non-proprietary name or brand name)	Formulation	Dose	Frequency	Route of administ.	Indication	Status on orders	Action to take	Comments
Amlodipine	Tablets	5 mg	Daily in the morning	PO	Hypertension	<input type="checkbox"/> Continued <input type="checkbox"/> Modified <input checked="" type="checkbox"/> Suspended/discontinued/not reordered	Held, continue holding due to hypotension	Reassess vital signs in 48 hours
Atorvastatin	Tablets	10 mg	Daily at bedtime	PO	Dyslipidaemia	<input checked="" type="checkbox"/> Continued <input type="checkbox"/> Modified <input type="checkbox"/> Suspended/discontinued/not reordered	Continue	
Pantoprazole	Capsules	40 mg	Daily in the morning	PO	Gastro-oesophageal reflux disease	<input type="checkbox"/> Continued <input type="checkbox"/> Modified <input checked="" type="checkbox"/> Suspended/discontinued/not reordered	Not reordered, will suggest to resume	
Vitamin B12	Tablets	1200 mcg	Daily in the morning	PO	Unknown by patient	<input type="checkbox"/> Continued <input type="checkbox"/> Modified <input checked="" type="checkbox"/> Suspended/discontinued/not reordered	Not reordered, will suggest to hold and will reassess	CBC within normal limits, will suggest vitamin B12 level
Valerian root	Infusion	Unknown by patient (one "tea bag")	Daily at bedtime	PO	Sleeping aid	<input type="checkbox"/> Continued <input type="checkbox"/> Modified <input checked="" type="checkbox"/> Suspended/discontinued/not reordered	Not reordered, not available at hospital, will suggest to discontinue	Reassess if patient has insomnia in 24-48 hours
						<input type="checkbox"/> Continued <input type="checkbox"/> Modified <input type="checkbox"/> Suspended/discontinued/not reordered		
						<input type="checkbox"/> Continued <input type="checkbox"/> Modified <input type="checkbox"/> Suspended/discontinued/not reordered		
						<input type="checkbox"/> Continued <input type="checkbox"/> Modified <input type="checkbox"/> Suspended/discontinued/not reordered		

6 Conclusion

Medicines reconciliation is a critical component of ensuring patient safety by identifying intentional and unintentional medication discrepancies at transitions of care. While many health professionals are equipped to conduct medicines reconciliation, pharmacists possess the required expertise and experience to promptly and effectively resolve any inappropriate medication changes and ultimately prevent medication errors.

This toolkit aims to provide a framework for implementing medicines reconciliation as a structured process to minimise medication-related errors and harm. Its implementation tools are ready to be directly used or adapted to local practices. Regarding policy and practice development, this toolkit is also intended to support national and local development of optimal pharmacist-led medicines reconciliation.

Data over decades have demonstrated the multiple benefits of medicines reconciliation, and pharmacists are called upon to take on leading roles in implementing, conducting and advocating this service. The necessary resources, frameworks and conditions, including appropriate remuneration models by third-party payers, should also be set in place in the community and hospital pharmacy settings to provide the optimal conditions to set up effective medicines reconciliation services and further contribute to the knowledge on their clinical benefits and cost-effectiveness.

Medicines reconciliation represents a compelling component in improving health outcomes, and an essential component in reducing medication errors and ensuring patient safety.

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