PHARMACEUTICAL CARE SERVICES GUIDELINES 2019

INTRODUCTION

The aging population, rising prevalence of chronic diseases and increased demand for access to affordable medication have also resulted in unnecessary polypharmacy. In parallel, innovations in medication development have made more potent and costly medication available, thus raising patients' expectations of their standard of care, and potentially leading to rising healthcare costs. These factors have contributed to a greater demand for pharmacy service[1].

The National Pharmacy Landscape study[2] in 2014 revealed that there is an extension of pharmacy services outside public healthcare institutions into patients' homes, centre-based care, nursing homes etc. This shift of the provision of pharmacy services into the community is in line with the Ministry of Health's (MOH) mission of moving beyond hospital to home, to care for patients in the community. While these pharmacy services are person-centred, a standardised description and a basic scope of pharmacy services (Pharmaceutical Care Services) is crucial to ensure delivery of structured care pathways for patients across different settings and providers to achieve better health outcomes, as recommended in the National Pharmacy Strategy (NPS)[1].

The Pharmaceutical Care Services Guidelines was developed for pharmacists and pharmacy staff to provide Pharmaceutical Care Services (PCS) in Singapore. It was drafted by the National Pharmacy Programme Management Office (NPPMO) in collaboration with pharmacists working on the PCS proof of concept study in 2017. The NPPMO subsequently consulted different groups of healthcare professionals including doctors, nurses, pharmacists, and allied health professionals about the guidelines. To ensure operational feasibility, the guidelines have undergone "in-use" consultation in a 6-month study whereby providers of PCS were asked to use the guidelines and provide feedback to refine the guideline. This version of the guideline has incorporated feedback received to date.

CONTENTS

1. OBJECTIVES

This guideline is developed to outline the definition of Pharmaceutical Care Services (PCS) provided by pharmacists and pharmacy staff in Singapore, recommendations on the required service components, harmonisation of documentation and the roles and responsibilities of pharmacists and pharmacy staff providing the service. PCS would support continuity of care both within and between practice settings. For example, PCS would support continuity of care by healthcare professionals (HCPs) from different disciplines caring for a patient within an institution and when an inpatient is discharged to home or ambulatory care. Further, a harmonised method would establish consistent documentation so that patient-specific and medication-related information could be shared among HCPs to help ensure patient safety throughout the care continuum and empower patients to take charge of their health[3].

2. WHAT ARE PHARMACEUTICAL CARE SERVICES?

Pharmaceutical Care Services (PCS) are patient-centred services aimed at empowering patients and/or caregivers to take charge of their medication needs and achieve the best health outcome. PCS is meant to complement existing patient care practices to make medication therapy more effective and safe[4].

PCS comprises four service components i.e. medication reconciliation, adherence and knowledge assessments, medication optimisation and patient counselling to ensure that patients receive consistent structured care across care settings. The description for the service components can be found in **Table 1**. Designated staff may each perform different service components according to a pre-defined workflow to ensure seamless clinical handoffs.

Table 1. PCS Service Components

Service Components	Description
Medication Reconciliation	Create the most accurate possible list of medication (Patient's Medication List) that patient is taking at a particular point in time[5].
Adherence and Knowledge assessments	Assess patient's adherence and knowledge about medication that patient is taking.
Medication Optimisation	Review and optimise the medication regimen based on patient's condition. Resolve identified drug-related problems.
Patient Counselling	Counsel on medication management issues such as medication storage, administration, handling, disposal, changes in dose regimen, side effects, drug interactions. Advise on improving adherence, reminder aids, repackaging of medication, cost issues and appropriate disease, non-pharmacological or lifestyle management.

At the end of each PCS session, the PCS pharmacist will document the agreed pharmacotherapy approach to the patient's medical conditions in a Pharmaceutical Care Plan (PCP).

The PCP created as part of the PCS will serve to:

a) Inform the next HCP of the patient's list of medication, drug-related problem(s) and action plan, treatment goals, monitoring plan and education/counselling points;
b) Inform and educate patients and/or caregivers about their medication and promote adherence to their medication;

c) Enable patients and/or caregivers to discuss their medication history other HCPs

At the end of each service, the patient and/or caregiver will receive a PCP documenting the agreed pharmacotherapy approach to the patient's medical conditions, in accordance with the patient, caregiver and the care team.

3. WHO SHOULD RECEIVE PCS AND HOW OFTEN?

All patients on chronic medication will benefit from receiving a PCS session[4] at least annually. However, greater priority may be given to patients with risk factors for adverse drug events (ADEs). Risk factors predisposing patients to ADEs can be found in Appendix 1: Risk factors predisposing patients to adverse drug events. The frequency for follow up should be based on the clinical needs[4] of the patient, in agreement with the patient and in accordance to the relevant policies of the institutions.

4. HOW SHOULD PCS BE PERFORMED?

The pharmacist and/or pharmacy staff providing the service should interview the patient and/or caregiver via a direct consultation, unless direct communication with the patient and/or caregiver is not possible. Patient interviews are important for the pharmacist and/or pharmacy staff to:

a) establish a rapport with the patient and/or caregiver;
b) understand the patients' and/or caregivers' needs;
c) understand the patients' and/or caregivers' desired outcome;
d) obtain medication-related information;
e) clarify, augment other available information[3].

Before interviewing the patient and/or caregiver, the pharmacist and/or pharmacy staff providing the service should conduct a comprehensive review of the patient's medical conditions, comorbidities, medication records and monitored parameters from multiple sources of information such as the clinic's and institution's clinical records and the

National Electronic Health Records (NEHR). The patient and/or caregiver should be encouraged to present their physical medication during the consultation. When required, doctors, pharmacists, nurses and/or other HCPs involved in the care of the patient should be contacted. Suggested tips for interviewing patients and/or caregivers about patients' medication, including how to start the interview, sample questions and how to end the interview may be found in Appendix 2: Suggested tips for interviewing patients and caregivers about their medication.

The first step to managing a patient's medication is to elicit the patient's medication experience. During the interview, the pharmacist and/or pharmacy staff should attempt to understand[4] the following:

a) What is the patient's general attitude toward taking medication?
b) To what extent does the patient understand her medication?
c) What does the patient want/expect from her medication therapy?
d) What concerns does the patient have about her medication therapy?
e) Are there cultural, religious, or ethical issues that influence the patient's willingness to take medication?
f) What is the patient's medication taking behaviour?

4.1 PCS Service Components

4.1.1 Medication Reconciliation

When providing the service, the pharmacist and/or pharmacy staff should first perform medication reconciliation to best of his or her ability to create the most accurate possible list of medication that patient is taking, in accordance with the National Medication Reconciliation Guideline[5]. A Patient's Medication List (PML) is the most accurate list possible of prescribed and non-prescribed medication that a patient is taking at a particular point in time. It should include medication that are taken regularly, on an 'as needed' basis or temporarily withheld. The PML should also include vitamins, supplements, alternative medication (including herbal and traditional medication) recreational medication (including substances of abuse) and investigational therapeutic

products. The pharmacist and/or pharmacy staff providing the service should perform medication reconciliation and document in the PML[5] (Refer to Appendix 3: Example Pharmaceutical Care Plan and Patient's Medication List).

4.1.2 Adherence and Knowledge Assessments

The pharmacist and/or pharmacy staff providing the service should assess and document the patients' level of knowledge about their own medication and adherence level to medication regimens using the MedTake assessment[6] (Refer to Appendix 4: MedTake Assessment) or equivalent tool as a part of the patient interview.

4.1.3 Medication Optimisation

Based on the information gathered, the pharmacist should perform a structured and critical examination of the patient's medication with the objective of reaching an agreement with the patient about treatment, optimising the impact of medication, minimising the number of drug-related problems (DRPs) and reducing waste[7,8,9,10,11] (Refer to Appendix 5: Medication Optimisation Process).

Once identified, DRPs should be documented and categorised according to the harmonised categories (Refer to Appendix 6: Drug-Related Problems) in the patient's PCP and prioritised according to urgency[4]. This prioritisation depends on the extent of the potential harm each problem might inflict on the patient, the patient's perception of the potential harm, and the rate at which this harm is likely to occur. If multiple DRPs are to be dealt with sequentially, the patient should be involved in the decision as to the priority given to each DRP. If the patient does not have any DRP, the pharmacist should focus on assuring that the goals of therapy are being met and that the patient is not at high risk of developing any new problems[4].

When addressing any DRP, the patient's current medical and social support should be considered and the existing governance of verifying with the relevant prescribers shall apply.

4.1.4 Patient Counselling

The patient and/or caregiver should be counselled on medication management issues (medication storage, administration, handling, disposal, etc.), changes in dose regimen, side effects, drug interactions, advice on improving adherence, reminder aids, cost issues and appropriate disease, non-pharmacological or lifestyle management as necessary. The pharmacist and/or pharmacy staff should provide the patient with resources on medication information such as patient information leaflets and relevant contact details if necessary.

4.2 Contents of a Pharmaceutical Care Plan

At the end of the PCP session, the pharmacist and/or pharmacy staff providing the service should document the agreed approach to the patient's medication management and any other significant findings in a PCP (Refer to Appendix 3: Example Pharmaceutical Care Plan and Patient's Medication List for example of PCP) and a copy of the plan should be given to the patient and/or caregiver. The patient should be advised to bring a copy of the PCP to every healthcare encounter. The PCP given to the patient should be documented in a systematic manner that the patient and/or caregiver can understand, with minimal jargon.

The PCP document which should include the[4]

a) PML;
b) Indication and a brief summary of the patient's signs and symptoms;
c) Goals of therapy as agreed with the patient;
d) DRPs and action plans;
e) Changes in dose regimen;
f) Other non-medication interventions to support the pharmacotherapy (e.g. health advice, exercise, dietary changes, or instructions on the proper use of medication administration devices or monitoring devices);

g) Schedule for the next follow-up evaluation including effectiveness and safety parameters to be evaluated;
h) Other relevant information

The PCP is a dynamic handoff document that should be reviewed and updated during the follow-up PCS session.

4.3 Creation and Use of the PCP

The PCP may be handwritten or electronically recorded and is considered as a component of the patient's clinical records. As part of the clinical record, the PCP should be handled in the same manner as required under the Personal Data Protection Act 2012 and other relevant legislation. The pharmacist and/or pharmacy staff creating or updating the PCP should attempt to provide the information to the best of his or her ability[12]. The language used in the PCP copy intended for the patient and/or caregiver and should be in layman terms with minimal medical jargon.

Each organisation providing PCS should have a process for managing PCPs. Within the organisation, the PCP should be stored in a designated place in the patient's clinical records, where it is easily accessible by other HCPs involved in the care of the patient[13] especially when medication is being prescribed. A copy of the PCP should also be provided to the patient and/or caregiver for their reference and to be presented at the next healthcare encounter. To facilitate the transfer of updated PCP information, all healthcare institutions using systems with electronic interface to the NEHR should contribute the contents of the updated PCP to the NEHR.

When referring to a PCP created earlier, it is important to verify the information against the latest sources and/or with the patient and/or caregiver as there may be changes since the PCP was last created. If changes are discovered, the PCP should be updated.

5. ROLES AND RESPONSIBILITIES OF STAKEHOLDERS

5.1 Organisations Providing PCS

Based on internal processes and available resources, organisations providing PCS should:

a) Determine the criteria for the patients who should receive PCS;
b) Assign the roles and responsibilities of HCPs providing the PCS components;
c) Determine the workflow for PCS;
d) Monitor and track the evaluation measures for PCS

5.2 Healthcare Professionals

Pharmacists and/or pharmacy staff who are trained and competent may provide PCS. In some institutions, different PCS components may be performed by different designated staff according to a pre-defined workflow to ensure seamless clinical handoffs. However, pharmacists should complete the medication optimisation component and the PCP. Pharmacists by virtue of their training should provide guidance and oversight over the provision of the services. Pharmacists and/or pharmacy staff providing PCS should collaborate closely with all other key stakeholders caring for the patient such as the patient's primary care doctor, community care nurse and other HCPs.

Pharmacist and/or pharmacy staff involved in providing PCS should receive appropriate training to achieve the skills listed in Appendix 7. Key Skills Required for PCS. Pharmacists and/or pharmacy staff should attend regular, continuing education to keep updated about the latest available clinical practice guidelines and other regulations when providing the services.

5.3 Patients and Caregivers

Patients and/or caregivers should be encouraged to present the PCP at every healthcare encounter. They should also take responsibility to monitor and report any unexpected

changes in their condition after any change in their medication and ask their HCPs if they are unsure about their medication or think a mistake has occurred.

6. SERVICE EVALUATION

The following common service evaluation measures should be tracked over time:

a) Average time taken to provide the initial and follow up services;
b) Number of PCPs created;
c) Number of DRPs identified;
d) Number of identified DRPs resolved;
e) Number of identified DRPs directly resolved by pharmacist and/or pharmacy staff;
f) Number of patients with improved level of adherence and knowledge about own medication

GLOSSARY

Term	Term Description
Adverse Drug Event	An adverse drug event is defined as any untoward medical occurrence that may present during treatment with a drug but which does not necessarily have a causal relationship with this treatment.
Organisations providing PCS	Organisations providing PCS include providers such as hospitals, medical centres, community health centres, senior activity centres, eldercare centres, nursing homes, clinics and community pharmacy.
High Alert Medication	Medication which bear a heightened risk of causing significant patient harm when used inappropriately.
Medication Error	A medication error is 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.
Medication Reconciliation	Medication reconciliation is a structured and explicit process of creating the most accurate list possible of all medication a patient is taking, with the goal to ensure accurate and complete medication information transfer during transitions of care.

Term	Term Description
Patient's Medication List	A Patient's Medication List is the most accurate list possible of prescribed and non-prescribed medication that a patient is taking at a particular point in time. It should include medication that are taken regularly, on an 'as needed' basis, or temporarily withheld. Medication should also include vitamins, supplements, alternative medication (including herbal and traditional medications), recreational medication (including substances of abuse) and investigational therapeutic products.
Pharmaceutical Care Plan	A Pharmaceutical Care Plan (PCP) should include the PML; indications and a brief summary of the patient's signs and symptoms; goals of therapy as agreed with the patient; changes in dose regimen; other non-drug interventions to support the pharmacotherapy (e.g. health advice, exercise, dietary changes; or instructions on the proper use of medication administration devices or monitoring devices) and schedule for the next follow-up evaluation including the effectiveness and safety parameters to be evaluated.
Drug-related problem	This term may be used interchangeably with 'medication-related problem'.

ABBREVIATIONS

Abbreviations	Full Term
ADE	Adverse Drug Event
HCP	Healthcare Professional
ILTC	Intermediate and Long Term Care
MOH	Ministry of Health
NEHR	National Electronic Health Records
NPS	National Pharmacy Strategy
PML	Patient's Medication List
PCS	Pharmaceutical Care Services
PCP	Pharmaceutical Care Plan

APPENDIX 1: RISK FACTORS PREDISPOSING PATIENTS TO ADVERSE DRUG EVENTS

Organisations with different healthcare settings may give different priority to patients with risk factors for adverse drug events (ADEs) when providing PCS. Some of the risk factors pre-disposing patients to ADEs (but not limited to) are listed below[14,15,16]:

a) Patient-related factors

   i) Age > 65 years' old
   ii) Has medication management issues or need of assistance with taking medication
   iii) Suspected or reported non-adherence
   iv) Following up with three or more doctors for multiple co-morbidities

b) Disease / health status related factors

   i) Patient has cognitive impairment
   ii) Patient has multiple co-morbidities
   iii) Patient has renal or hepatic impairment or transplant
   iv) Patient has had multiple hospital admissions
   v) Patient has been recently discharged from hospital

c) Medication-related factors

   i) Patient is on five or more chronic medication
   ii) Patient is taking 12 or more doses per day
   iii) Patient is on high alert medication or drugs with narrow therapeutic index
   iv) Patient is on medication requiring therapeutic drug monitoring
   v) Patient has a history of significant changes to medication regimen in the last 30 days
   vi) Patient has a history of medication-related problem or adverse drug event
   vii) Patient on medication with complex dosing regimen

APPENDIX 2: SUGGESTED TIPS FOR INTERVIEWING PATIENTS AND CAREGIVERS ABOUT THEIR MEDICATION

Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation[17]

1. Introduce yourself to the patient and/or caregiver, and explain the purpose of the visit/consultation.

2. Use both open-ended questions (e.g. “What do you take for your high cholesterol?”) and closed-ended questions (e.g. “Do you take medication for your high cholesterol?”) during the interview.

3. Ask patients and/or caregivers about routes of administration other than oral medication (e.g. “Do you put any medication on your skin?”). Patients often forget to mention creams, ointments, lotions, patches, eye drops, ear drops, nebulisers, and inhalers.

4. Ask patients and/or caregivers about what medication they take for their medical conditions (e.g. “What do you take for your diabetes?”).

5. Ask patient and/or caregivers about vitamins, supplements, alternative medication (including herbal and traditional medication) that they are taking. Patients and/or caregivers may exclude these from the medications that they are prescribe by their doctor.

6. Ask patients and/or caregivers about the types of doctors that prescribe medication for them (e.g. “Does your ‘arthritis doctor’ prescribe any medication for you?”).

7. Ask patients and/or caregivers about when they take their medication (e.g. time of day, week, month, as needed, etc.). Patients often forget to mention infrequent dosing regimens, such as medication taken once a month.

8. Ask patients and/or caregivers if their doctor recently started them on any new medication, stopped medication they were taking, or made any changes to their medication.

9. Asking patients and/or caregivers to describe their medication by colour, size, shape, etc., may help to determine the dosage strength and formulation. Calling patients' pharmacists or prescribers may be helpful to determine the exact medication, dosage strength, and/or directions for use.

10. For inquiring about non-prescription medications, prompts may be helpful such as:

    a) What do you take when you get a headache?

    b) What do you take for allergies?

    c) Do you take anything to help you fall asleep?

    d) What do you take when you get a cold?

    e) Do you take anything for heartburn?

11. On rare occasions whereby it may not be possible to get a full history from an unwell or uncooperative patient who may still require a prescription to be written, every effort should be made to ensure such a prescription is safe and appropriate to the needs of the patient and that a full history is obtained at the earliest opportunity. Details of the exceptional circumstances and subsequent decision to treat must be recorded in the patient's clinical records.

APPENDIX 3: EXAMPLE PHARMACEUTICAL CARE PLAN AND PATIENT'S MEDICATION LIST[5]

Name:	XXX	Gender:	Male
Patient ID:	S1234567A	Date of Birth:	DD-MMM-YYYY
Allergies:	Penicillin		
G6PD Deficiency:	NA		

Patient's Medication List (Healthcare Professional Copy)

Reviewed by: HCP name (Healthcare institution) on 18 Apr 2018 13:28

Reviewed upon: Admission/ Discharge/ Transfer/ Outpatient (Pre-consultation)/ Outpatient / Home Visit

Source of Medication List: Patient and/or caregiver Interview/ Clinical Records/ Physical Medication/ Other HCPs

	Route	Medication Name	Instructions	Indication*	Other Instructions
1.	Oral	Caltrate 600mg + D3 500IU	2 tablet - OM	Osteoporosis	Adherence- Cannot afford drug
2.	Oral	HydroxyCHLOROquine Sulfate Tablet	400 mg - OM	Rheumatoid Arthritis	
3.	Oral	Lisinopril Tablet	5 mg - BD	Hypertension	
4.	Oral	Omeprazole Capsule	40 mg - OM		No indication for drug ordered
5.	Oral	Metformin HCl Tablet	250 mg - BD	Diabetes mellitus	Contraindication
6	Inhalation	SERETIDE 25/125 [Salmeterol 25 microgram/ dose + Fluticasone Propionate 125 microgram/ dose] EVOHALER	2 puff - BD	Asthma	

Notes for Patient:

1. Please remember to take Calcium and Vitamin D supplement 2 tablets every morning as prescribed by private doctor.

2. Please handover this document to the SOC doctor on the next visit.

Notes for HCP:

PHARMACEUTICAL CARE PLAN:

Clinical Measurements:

BP: 135/70 mmHg

HbA1c: 6%

Renal function (Creatinine Clearance): 28ml/min (April 2018)

Subjective:

1. Patient claimed that he has been taking Caltrate 600mg +D3 500IU 1 tab OM instead of 2 tabs OM due to financial issues.
2. Patient queried that he no longer had epigastric symptoms and is keen to stop Omeprazole to reduce pill burden and treatment cost. He requested for a review of his medication this visit.

Objective:

1. Decline of renal function from 30ml/min (January 2018) to 28ml/min (April 2018) due to unknown cause; pending investigation
2. BP readings at Centre: 130-140/60-80 mmHg
3. Pain score at Centre: Zero over the past 3 months
4. Asthmatic attacks: None over the past 3 months
5. Meditate score: 96%

Assessment:

1. Adherence – Cannot afford drug: Caltrate 600mg +D3 500IU: Patient has been taking 1 tab OM instead of 2 tabs OM due to financial issues.
2. Contraindication: Patient's renal function has progressively deteriorated and latest estimated creatinine clearance is 28ml/min. Metformin use in elderly patients with renal impairment may increase risk of lactic acidosis.
3. No indication for drug ordered: Patient denies epigastric symptoms and no documented recent active GI bleed. Patient was prescribed with Omeprazole for GI protection as he was prescribed with a short course of Prednisolone for rheumatoid arthritis flare. Prednisolone therapy has been completed 2 months ago.

Plan:

1. Counselling has been performed to reinforce the importance of taking bone supplement for osteoporosis. Recommendation to obtain a prescription for Calcium Carb 450mg, Vitamin D 200 unit tablet at subsidised rate.
2. Recommend to discontinue Metformin to avoid metformin-related lactic acidosis and optimise DM control, suggest a trial of diet modification and close glucose monitoring as patient's latest HbA1c is 6%. Please consider performing HbA1c in 3 months' time if the recommendation is accepted.
3. Recommend to discontinue Omeprazole as patient denies epigastric symptoms and has completed Prednisolone therapy 2 months ago.

Mr XXX's caregiver was contacted and a memo was provided for him to bring to Mr XXX's scheduled appointment with the polyclinic doctor in 2 days' time (20 Apr 2018). The memo details included the above recommendations.

Goals of therapy:

1. Maintain BP target of 140/80mmHg
2. Maintain HbA1c target of <8%
3. Maintain renal function
4. Lessen RA associated symptoms and function
5. Achieve and maintain control of symptoms of asthma

Follow-up:

1. To follow up the outcome of the interventions.
2. To follow up on the adherence of calcium and vitamin D next visit at day care centre in 1-2 weeks' time.
3. To monitor HbA1c in 3 months' time.

APPENDIX 4: MEDTAKE ASSESSMENT

MedTake[4] assesses a patient's adherence and knowledge to the dose, dosage, indication, food or water co-ingestion, and regimen.

A composite MedTake test score (0–100%) summarizes patient's overall ability to take their medication safely. A composite score of < than 100% indicates presence of adherence and knowledge gaps. The healthcare professional may prioritize addressing the gaps according to the clinical significance resulting from the gaps.

Instructions: Ask the patient or caregiver to describe how he or she takes each medication, including dose, indication, co-ingestion of food and/or water, and regimen. If physical medication is available and patient is self-administering medication, check patient's ability to open bottle caps or Ziploc bags. The interviewer assesses the patient's adherence and knowledge accordingly.

An example of a completed MedTake assessment is as follows:

Medication Name	Patient's description of how he/she takes the medication	Dose (25%=correct, 0=incorrect)	Indication (25%=correct, 0=incorrect)	Food, water co-ingestion (25%=correct, 0=incorrect)	Regimen (25%=correct, 0=incorrect)	MedTake score for each medication 0-100%	Ability to open bottle caps or Ziploc bags	Comment
Caltrate 600mg +D3 500IU	1 tablet - OM	0	25	25	25	75	Yes	Patient not adherent due to financial constraints
HydroxyCHLOROquine Sulfate Tablet	400 mg - OM	25	25	25	25	100	Yes	
Lisinopril Tablet	5 mg - BD	25	25	25	25	100	Yes	
Omeprazole Capsule	40 mg - OM	25	25	25	25	100	Yes	Patient queried that he no longer had epigastric symptoms and is keen to stop Omeprazole to reduce pill burden and treatment cost. He requested for a review of his medication this visit.
Metformin HCl Tablet	250 mg - BD	25	25	25	25	100	Yes	
SERETIDE 25/125 EVOHALER	2 puff - BD	25	25	25	25	100	Yes	
			Mean MedTake score			**96**		

APPENDIX 5: MEDICATION OPTIMISATION PROCESS

Medication review is “a structured, critical examination of a patient’s medication with the objective of reaching an agreement with the patient about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste” [7,8,9,10,11].

Therefore, an effective medication review will require the availability of the patient’s full clinical record (including information on the current medication, medication history, patient’s medication list (PML), relevant laboratory test results as well as immunisation status when appropriate) and should ideally be conducted with the patient.

The process involves the following steps:

Check that

a) the medication is still indicated and appropriate for the indication(s) by taking into account therapeutic goal(s) and patient specific considerations e.g. pregnancy, nil by mouth etc.
b) the patient is not allergic, hypersensitive or intolerant to the medication based on patient’s most up-to-date allergy and sensitivity status
c) the dose, frequency, and formulation of the medication is appropriate with respect to age, renal function, liver function as well as other factors e.g. food, other medicines, procedures
d) the duration of therapy is appropriate e.g. for antibiotics, analgesics
e) there is no contraindication to the medication
f) there is no clinically significant interaction or incompatibilities (drug-drug, drug-food, drug-disease) with the medication
g) any actual or potential adverse effects are addressed
h) there is no untreated indication or duplication of medication
i) the medication regimen has been simplified
j) patient understands the medication therapy and the medication is administered as prescribed
k) there is no issue with patient’s adherence to the medication regimen
l) the medication is a cost effective choice
m) any required monitoring has been done or arrangements are in place

Document

a) information pertinent to any decisions made with prioritisation of patient problems and medication-related needs
b) proposed follow-up

Follow-up

a) by revisiting the medical record to obtain updates on the clinical status of the patient
b) by monitoring, modifying, documenting, and managing the plan of care to ensure that individual goals are achieved
c) to ensure that appropriate therapy monitoring is implemented
d) to evaluate the patient's response to therapy to identify any medication-related problems e.g. inappropriate medication selection, sub-therapeutic dosage, over-dosage
e) to monitor for potential and existing drug interactions

APPENDIX 6: DRUG-RELATED PROBLEMS

National Core Metrics Workgroup (2019) Drug-related Problem categories and definitions (under consultation)[18]

Category	Drug-Related Problems (DRPs)	Definitions
Indication	Omission of drug therapy / Untreated Indication	Patient has a medical problem that requires drug therapy, but is not receiving a drug for that indication, or is not adequately controlled with drugs at optimal doses, and requires additional drugs.
	No indication for drug ordered	Patient is taking a drug without a medically valid indication.
	Therapeutic duplication	Patient is taking more drugs than required, usually from the same therapeutic class, for the same indication
Drug selection	Ineffective drug	Patient has a drug indication but is taking an inappropriate drug, e.g. drug contraindication, drug unable to reach target site, inadequate response to the drug at optimal dose and require switch to alternative drug or evidence to support use of one drug over another. Includes cost issues and drug unavailability, IV to PO switch, inappropriate formulation/dosage form, inappropriate change in brand.
	Contraindication	
	More affordable drug available	
	Inappropriate drug formulation/ dosage form	
	Inappropriate change in brand	

Category	Drug-Related Problems (DRPs)	Definitions
Dosing regimen	Dosage too low	Patient has a medical problem that is not treated with an optimal regimen of the correct drug, e.g. disease state not responding or experiencing signs of toxicity, low or elevated serum drug level, inadequate or excessive duration of therapy, and patient with unusual dosage requirements. Includes dosage adjustments for renal and hepatic failure. Patient is on an exemption drug (that is no longer available to a discharged patient) that has to be substituted.
	Dosage too high	
	Inappropriate frequency/ route/site (without change in daily dose)	
	Duration too short	
	Duration too long	
	Therapeutic substitution	
Adherence	Adherence - Drug administration issues	Patient does not follow the recommendations for prescribed treatments, and reasons for deviating from the (agreed) treatment plan may be intentional or unintentional. It includes using/ taking more or less than the prescribed treatment or using drug at the wrong time. Patient may face problems in administering drug e.g. inappropriate crushing of tablets, wrong insulin injection technique, difficulty in swallowing tablet/capsule. Patient may decide not to fill his/her prescriptions in the pharmacy and not start treatment at all. Patient may also discontinue treatment prematurely.
	Adherence - Cannot afford drug	
	Adherence - Forgets to take	
	Adherence - Prefers not to take as instructed	
	Adherence - Lacks understanding/awareness of drug use	
Adverse drug reaction	Adverse drug event	Patient may have a medical problem that is the result of an adverse drug event, which can be an extension of the drug's pharmacological effects or an allergic/ idiopathic reaction.

Category	Drug-Related Problems (DRPs)	Definitions
Drug interactions	Drug-drug Drug-food Drug-lab Drug-disease	Patient may have or potentially have a medical problem that is the result of a drug-drug, drug-food, drug-laboratory or drug-disease interaction.
Monitoring	Monitoring parameters required	There is an issue relating to investigations or parameters for monitoring therapeutic or adverse effects of drug therapy.
Storage issues	Inappropriate storage conditions	Patient may face problems in proper storage of drugs, or taking drugs beyond expiry date.
	Expired meds	

APPENDIX 7: KEY SKILLS REQUIRED FOR PCS

The following are key skills required for medication reconciliation[19,20,21]:

a) Effective communication skills

This skill is important for pharmacists and/or pharmacy staff involved in medication reconciliation which relies on the accurate transfer of information about a patient's medication.

b) Technical knowledge of relevant medication management processes

This may include local medication documentation policies (e.g. discharge prescriptions, case note entries, allergy status recording etc.); the local procedures for patients bringing their own medication into hospital with them; how repeat prescriptions work; monitored dosage systems; and other forms of documenting medication use.

c) Therapeutic knowledge

Some steps in the medication reconciliation process might require detailed therapeutic and clinical knowledge. This may include:

i) An up-to-date knowledge of brand and generic names of commonly used medication; the form in which they are available
ii) Their indications and common dosing instructions
iii) An ability to correctly interpret a prescription, including dosage
iv) A basic understanding of what the medication is intended to do and how it works

d) Skill to interview patients and/or caregivers about their medication

Patient and/or caregiver interview is the most valuable source of information to confirm the actual medication taken by the patient at the point in time. As such, pharmacists and/or pharmacy staff should master the skill to interview patients and/or caregivers. Tips for interviewing patients and/or caregivers about their medication outlined in Appendix 2: Suggested tips for interviewing patients and caregivers about their medication.

e) Critical thinking process to identify and clarify discrepancies

In the course of performing medication reconciliation, pharmacists and/or pharmacy staff may encounter discrepancies when comparing medication lists. They should apply critical thinking process to determine whether clarification with prescribing doctor is required. Examples of critical thinking can be found in the **Table 2**.

Table 2. Critical Thinking Process to Identify and Clarify Discrepancies during medication reconciliation (adapted from Medications at Transitions and Clinical Handoffs (MATCH) Toolkit for Medication Reconciliation)

Category	Description	Example	Action Required? (Yes/No)
No discrepancy	Medication ordered for the patient during the episode of care or upon discharge match what the patient was taking prior to admission.	• Patient takes frusemide 40 mg by mouth twice daily at home, which is ordered upon admission. • Patient's pre-admission dose of simvastatin by mouth every evening is continued during the hospital stay and at discharge.	No
Undocumented Intentional Discrepancy (i.e., purposeful)	Discrepancies exist but are appropriate based on the patient's plan of care (e.g. based on information gathered on rounds, based on a review of the medication history and physical and progress notes, based on communication/ handoffs in preparation for discharge).	• Antibiotics started for infection. • "As needed" medication ordered for pain/fever. • Pre-admission doses of patient's blood pressure medication were changed due to hypotensive episodes. • Warfarin and aspirin withheld for a procedure.	No clarification with prescriber needed. Document information supporting the intentional discrepancy.
Unintentional Discrepancy	Discrepancies exist and require clarification of intent because there is no supporting documentation of explanation based on the patient's current clinical condition or care plan.	• Patient takes her blood pressure medication twice daily at home but ordered only once daily in the hospital. No indication for frequency change and patient's current blood pressure slightly elevated. • Patient's simvastatin was omitted from their discharge instructions without any clear indication for why.	Yes—discrepancy should be highlighted to prescriber for resolution and documentation.

In addition, pharmacists providing PCS should demonstrate at least the following competency standards in the respective domains to at least an intermediate performance level [22] (adapted from MOH Singapore Competency Standards for Pharmacists in Advanced Practice 2017):

	Competency Standard	Intermediate Competency Level	Evidence	Evidence Examples
Domain 1: Expert Professional Practice				
1.1	Demonstrates Expert Skills and Knowledge	Demonstrates general pharmaceutical knowledge in core areas.	1. Able to provide relevant information for consultation requests. 2. Able to identify drug-related problems and develop therapeutic plans for patients in core areas.	1. Records of consultation requests from healthcare professionals (HCPs) within the hospital. 2. Documentation of pharmacy interventions and enquiries e.g. requests from other HCPs or patients.
1.2	Manages patient care responsibilities/ delivery of professional activities	Is accountable for the delivery of a pharmacy service to patients to whom they themselves directly provide pharmaceutical care.	Able to provide safe, effective and timely pharmaceutical care to each patient independently	1. Documented pharmacy interventions done. 2. Documented case-based discussions conducted. 3. Feedback from patients, peers/colleagues, clinical heads.
1.3	Exhibits reasoning and judgement including analytical skills, judgemental skills, interpersonal skills and appraisal of option	Demonstrates ability to use skills in a range of routine situations requiring analysis or comparison of a range of options. Recognises priorities when problem-solving and identifies deviations from the normal pattern.	1. Able to interpret and adhere to institutional policies and protocols. 2. Able to identify and fully describe (verbally or in writing) the nature of a problem and probable causes or causative factors. 3. Able to document the identified problem(s), causative factor(s) and options for resolving the problem. 4. Able to make practical and effective decisions in a timely fashion, in day-to-day activities, prioritising	1. Feedback from: a. Peers/colleagues b. Team members c. Supervisors/tutors d. Learner/trainees 2. Examples of documented interventions done 3. Documented evidence of problem/ feedback management when handling difficult customers.

	Competency Standard	Intermediate Competency Level	Evidence	Evidence Examples
1.4	Uses professional autonomy	Is able to follow legal, ethical, professional and organisational policies/ procedures and codes of conduct.	Able to understand and apply the codes of ethics and conduct; and the legal framework which governs practice.	Feedback on day to day work from: a. Peers/colleagues b. Supervisor c. Team members
Domain 2: Building Working Relationships				
2.1	Ability to communicate effectively (Communication)	Demonstrates use of appropriate communication to gain the co-operation of individual patients, colleagues and clinicians. Demonstrates ability to communicate where the content of the discussion is explicitly defined.	1. Able to communicate with patients, caregivers and colleagues within the department and show the ability to persuade, motivate and collaborate. 2. Able to actively listen, empathise and engage with patients, caregivers and colleagues and understand their positions/needs. 3. Able to communicate effectively with small groups within the department through presentation/ talk/ meeting. 4. Able to present accurate information in a concise, coherent and confident manner appropriate to the target audience	1. Feedback from: a) 360 degree evaluation. b) Observational feedback from colleagues both within and outside department. c) Patients d) Trainees' evaluation. 2. Written communication by the individual e.g. correspondences, articles. 3. Presentation materials and audience feedback. 4. Evidence of collaboration with colleagues from other departments through projects/ workgroups, etc.

	Competency Standard	Intermediate Competency Level	Evidence	Evidence Examples
2.2	Collaborates with members of the health care team and offer consultations (Teamwork and Consultation)	Demonstrates ability to work as a member of the multi-disciplinary team. Recognises personal limitations and is able to refer to more appropriate colleague.	1. Able to actively contribute to the department's daily operations. 2. Able to demonstrate a positive attitude to working collaboratively with others. 3. Able to provide feedback, encouragement and support to team members. 4. Able to identify the types of circumstances where assistance should be sought.	1. Peer review through 360-degree feedback. 2. Observational feedback from colleagues both within and outside department. 3. Achievement of team-based outcomes. 4. Contribution as a member in workgroups/ committees, at departmental level.
Domain 3: Leadership				
3.4	Motivates individual (Motivational)	Demonstrates ability to motivate self to achieve goals.	1. Has a positive attitude and is determined to change negative experiences into growing experiences in order to lift his/her morale. 2. Is highly driven in a cause(s). 3. Possesses high energy levels, is able to create task excitement for oneself.	1. Achievement of the objectives set for each appraisal period. 2. Feedback from pharmacy colleagues, workgroup lead and clinical leaders 3. Description of purpose, goals and targets set for oneself.
Domain 4: Management				
4.3	Establishing standards of practice	Demonstrates understanding of, and conforms to relevant standards of practice.	Able to personally comply with relevant standards of practice.	No feedback or report of regulatory, policy or procedural breaches.

	Competency Standard	Intermediate Competency Level	Evidence	Evidence Examples
4.4	Managing risk	Demonstrates ability to identify and resolve risk management issues according to policy/ protocol.	1. Able to effectively manage risk to reduce the potential for patient harm. 2. Able to comply with existing workflow protocols to manage operational risks.	Efforts towards reducing risk of near misses and errors in medication review and dispensing through compliance to policies and protocols.
4.5	Managing performance	Follows professional and organisational policies/ procedures relating to performance management. Refers appropriately to colleagues for guidance.	1. Able to comply with operational standards/ policies and fully meet the respective job description/ duty requirements. 2. Able to review own performance against specified objectives set by supervisors.	1. Feedback from supervisors and peers. 2. Objective evidence to support achievements of targets set.
Domain 6: Research and Evaluation				
6.1	Evaluating literature critically and identifying evidence gaps	Demonstrates ability to critically evaluate and review medical literature as well as suggest changes to practice.	1. Able to systematically evaluate a research paper and derive an appropriate conclusion based on methodology's strengths and weaknesses. 2. Able to decide if study results can be applied in a local setting. 3. Able to suggest solutions/ changes to practice	1. Presentations made in journal club. 2. CE sessions on topics to fellow healthcare professionals provided. 3. Contribution as a facilitator for evidence-based medicine workshops. 4. Publication of journal review article within the institution / department. 5. Descriptions of instances where pharmacist has evaluated and applied published data to improve practice (e.g. projects on near-misses, waiting times, Quality Improvement).

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REFERENCES

1 Ministry of Health Singapore. National Pharmacy Strategy Approval Paper.2015.

2 Ministry of Health Singapore. National Pharmacy Landscape Report. 2014.

3 American Society of Health-System Pharmacists. ASHP guidelines on a standardized method for pharmaceutical care. Am J Health-Syst Pharm. 1996; 53:1713–6. Available at https://www.ashp.org/-/media/assets/policy-guidelines/docs/guidelines-standardized-method-pharmaceutical-care.ashx?la=en

4 Cipolle, Robert J.; Strand, Linda; Morley, Peter. Pharmaceutical Care Practice: The Patient-Centered Approach to Medication Management, Third Edition: The Patient-Centered Approach to Medication Management, Third Edition. McGraw-Hill Education.

5 Ministry of Health Singapore. The National Medication Reconciliation Guidelines. 2018.

6 Raehl, C.L., Bond, C.A., Woods, T., Patry, R.A. and Sleeper, R.B., 2002. Individualized drug use assessment in the elderly. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy, 22(10), pp.1239-1248

7 NHS Cumbria Medicines Management Team. Clinical Medication Review – A Practice Guide. February 2013. Available at http://www.cumbria.nhs.uk/ProfessionalZone/MedicinesManagement/Guidelines/MedicationReview-PracticeGuide2011.pdf

8 Medication Review. Prescribing Practice Review. No 7 2000. Available at http://www.nps.org.au/__data/assets/pdf_file/0019/16921/ppr07.pdf

9 Northern Ireland Clinical Pharmacy Standards. 2013. Available at http://www.dhsspsni.gov.uk/northern_ireland_clinical_pharmacy_standards_2013.pdf

10 Standards of Practice for Clinical Pharmacists by American College of Clinical Pharmacy. March 2014. Available at http://www.accp.com/docs/positions/guidelines/standardsofpractice.pdf

11 ACCP Guideline. Standards of Practice for Clinical Pharmacists by American College of Clinical Pharmacy. 2014. Available at https://www.accp.com/docs/positions/guidelines/StndrsPracClinPharm_Pharmaco 8-14.pdf

12 The Joint Commission. Ambulatory Health Care National Patient Safety Goals. Jan 2014.

13 World Health Organisation. The High 5s Project Standard Operating Protocol. Assuring Medication Accuracy at Transitions of Care. Available at http://www.who.int/patientsafety/implementation/solutions/high5s/en/

14 Australian Commission on Safety and Quality in Health Care. Australian Safety and Quality in Health Care: Medication Safety Action Guide. 2012.

15 The Society of Hospital Pharmacists of Australia. SHPA Fact Sheet: Risk factors for medication related problems. June 2015. Available at http://www.shpa.org.au/lib/pdf/fact_sheets/SHPA_fact_sheet_Risk_factors_for_m edication_related_problems_June2015.pdf

16 Society of Hospital Medicine. MARQUIS Implementation Manual. Section B: MARQUIS Intervention Components. Part VI Risk Stratification p55-57. Available at http://tools.hospitalmedicine.org/resource_rooms/imp_guides/MARQUIS/Marquis_ Manual2011.pdf

17 Agency for Healthcare Research and Quality. Medications at Transitions and Clinical Handoffs(MATCH) Toolkit for Medication Reconciliation. 2012. Available at http://www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/match/

18 Ministry of Health Singapore. National Core Metrics Workgroup (2019) Drug-related Problem categories and definitions (under consultation)

19 NHS Cumbria Medicines Management Team. Medicines reconciliation. A practice guide. January 2011. Available at http://www.cumbria.nhs.uk/ProfessionalZone/MedicinesManagement/Guidelines/ MedicinesReconciliation-PracticeGuide2011.pdf

20 Medication Reconciliation Blueprint Workgroup, Chief Pharmacist's Office, Ministry of Health. Medication Reconciliation Blueprint: Foundation to Safe Medication Management (Unpublished reference). 2013.

21 Agency for Healthcare Research and Quality. Medications at Transitions and Clinical Handoffs(MATCH) Toolkit for Medication Reconciliation. 2012. Available at http://www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/match/

22 Ministry of Health Singapore. Competency Standards for Pharmacists in Advanced Practice. Sep 2017.