Supplemental Document:

Prioritizing Quality Over Quantity: Defining Optimal Pharmacist to Patient Ratios to Ensure Comprehensive Direct Patient Care in a Medical or Surgical Unit

<u>**Definitions**</u>

A: General Terms

- <u>Clinical pharmacist:</u> A pharmacist who provides patient care that optimizes medication therapy and promotes health, wellness and disease prevention. An expert in therapeutic use of medications who routinely provides medication therapy evaluations and recommendations to patients and healthcare professionals.[1]

- <u>Clinical Teaching Unit:</u> A designated Internal Medicine unit with a team-based approach to care, with team members from all levels of training, centred around teaching.[2]

- <u>Community Hospital:</u> An inpatient healthcare centre which provides a range of medical services to a local community and is led by community-based health professionals. Staff are not typically involved in research or medical training and do not usually have academic appointments.[3]

- <u>Hospitalist Unit</u>: An inpatient medical unit within which patients are under the care of a Hospitalist or a General Physician.

- <u>Internal Medicine Unit</u>: An inpatient medical unit within which patients are under the care of an Internist.
  - This may be further divided into Internal Medicine units within which there are daily interdisciplinary rounds and medical rounds, or units within which rounding is not common practice.

- <u>Medical Unit</u>: Includes internal medicine unit, clinical teaching unit, or hospitalist unit within an inpatient hospital.

- <u>Surgical Unit</u>: Includes general surgery, vascular surgery, gastrointestinal surgery, hepatobiliary surgery, surgical oncology and orthopaedic surgery services within an inpatient hospital. Does not include cardiothoracic surgery, solid organ transplant, stem cell transplant, neurosurgery, or day surgery.

- Teaching Hospital: Generally larger healthcare centres with an affiliation with a local medical school. Staff members often have ongoing research projects, clinical trials and provide care to patients with rare or complex conditions.[4]

B: Final List of Comprehensive Care Tasks

- Conducts patient interviews to gather Best Possible Medication History (BPMH):
  - The pharmacist performs a brief patient interview, or interviews the patient advocate, to collect specific information regarding the medications taken prior to admission for the purposes of completing the Best Possible Medication History.
  - The pharmacist interviews the patient to obtain an accurate allergy history.
  - The pharmacist interviews a family member, community provider, or patient advocate to obtain the BPMH.

- Conducts patient interviews to gather relevant subjective history and more detailed medical history:
  - The pharmacist conducts an admission patient interview during which they ask about symptoms, history of presenting illness and details regarding other medication conditions.
  - The pharmacist gathers a more detailed medication history including previously trialed medications.
  - The pharmacist interviews a family member, community provider, or patient advocate to obtain further subjective information.

- Documents complete list of medications, allergies, discrepancies:
  - The pharmacist documents and/or completes the admission medication reconciliation on the appropriate form or platform.
  - The pharmacist documents any allergies or adverse drug reactions within the patient chart and/or ActionADE (local adverse drug event reporting system).
  - The pharmacist documents an accurate medication history and describes any discrepancies in a History Note.

- Completes an initial pharmaceutical care plan:

- o The pharmacist works up a newly admitted patient by reviewing all relevant objective data, then uses the information gathered to identify therapeutic issues.
  - o Note the patient work-up process includes information gathering and formation of a list of medication-related problems or DTPs only. The process of resolving these DTPs is described below.
  - o If the patient work-up involves gathering *subjective* information from the patient, this step should be categorised as task #2 (conducts patient interview to obtain relevant subjective information)
- ▪ Resolves Drug Therapy Problems (DTPs) identified by others or by targeted drug reports or worklists:
  - o The pharmacist makes a therapeutic recommendation in person, during rounds, over the phone, or in writing in order to resolve a therapeutic issue.
  - o The pharmacist writes an order and uses their own authority to adjust a dose or clarify an order in order to resolve a DTP (eg. renal dose adjustments).
  - o Note: please record the total number of DTPs you actively resolve or discuss with the team, not the total number identified.
  - o Note: if resolving a DTP involves paging a member of the team, document the amount of time spent discussing the DTP with the team member once they call you back only, do not include the amount of time spent waiting for a returned call.
  - o Examples: a) Resolves a therapeutic issue brought to the attention of the pharmacist by any of the following means: flag from a dispensary pharmacist, target drug list, specific drug information request, specific pharmacy consult or page, therapeutic issue identified by another member of the healthcare team. b) Makes this therapeutic recommendations in person or over the phone. c) Writes order for recommendation
- ▪ Resolves DTPs identified proactively and independently:
  - o The pharmacist makes a therapeutic recommendation in person, during rounds, over the phone, or in writing in order to resolve a therapeutic issue.
  - o The pharmacist writes an order and uses their own authority to adjust a dose or clarify an order in order to resolve a DTP (eg. renal dose adjustments).

- o Note: please record the total number of DTPs you actively resolve or discuss with the team, not the total number identified.
- o Note: if resolving a DTP involves paging a member of the team, document the amount of time spent discussing the DTP with the team member once they call you back only, do not include the amount of time spent waiting for a returned call.
- o Examples: a) Resolves a therapeutic issue discovered during your independent pharmacotherapeutic assessment of the patient. b) Makes this therapeutic recommendations in person, during rounds, or over the phone. c) Writes the order for your recommendation
  - ▪ Establishes and documents patient-specific and measurable outcomes:
    - o The pharmacist documents their monitoring plan within an initial admission note or progress note.
    - o The pharmacist establishes a clear monitoring plan including the duration of treatment, timing of medication onset, which lab results to follow, which cultures to repeat
    - o Note: if writing a note is your sole way of communicating a therapeutic recommendation, then this should be classified as "Resolves DTPs" rather than establishing and documenting patient-specific outcomes.
  - ▪ Performs Therapeutic Drug Monitoring (TDM):
    - o Coordinates the timing and collection of drug concentration samples, interprets results, adjusts medication doses or makes recommendations regarding adjustments.
    - o This includes ordering a drug level, interpreting a drug level, entering the order to change or hold the medication and/or writing a note
  - ▪ Monitors patients for ADRs and drug interactions:
    - o Drug interactions include drug-drug, drug-food, drug-device, drug-disease, drug-lab
    - o Monitor patients subjectively and/or objectively (labs, vital signs, diagnostics).
    - o Examples of monitoring patients include: The pharmacist orders and assessed the appropriate laboratory tests in order to monitor for adverse drug reactions, the

pharmacist speaks with the RN or patient to obtain subjective information as a way to monitor for adverse reactions.

- Advocates for cost effective use of tests:
  - this includes lab tests, cultures and sensitivities, pharmacogenomics, radiology
  - Examples: a) Justifies frequency of therapeutic drug monitoring. b) Advocates for reducing frequency of bloodwork or blood cultures based on the patient's clinical picture.

- Makes cost-effective drug-related decisions:
  - Examples: a) Participates in antimicrobial stewardship. b) Assesses non-formulary medication requests.
  - Note: If you are stepping down a patient's antibiotics, you may choose to classify this as either "Resolves a DTP" or as "Cost-effective drug-related decision making" depending on your primarily rationale for doing so.

- Participates in medical or bedside rounds:
  - The pharmacist joins the medical team or surgical team on bedside rounds.
  - The pharmacist rounds with the team or runs the list with the team. Medical issues are discussed and the pharmacist brings up any therapeutic issues identified.

- Participates in interdisciplinary disposition planning rounds:
  - The pharmacist attends "iCare" or "Team Care" rounds during with members of the interdisciplinary team meets to discuss patient barriers to discharge. This may include discussing the need for home care, any occupational therapy or physiotherapy plans, and/or social or economic barriers.

- Advocates for patient access to medications:
  - The pharmacist applies for Special Authority for a newly prescribed medication.
  - The pharmacist educates the patient about the process of applying for Fair Pharmacare.
  - The pharmacist assists with applying for medication funding through a compassionate access program.

- Provides disease and medication education to patients:
  - The pharmacist counsels a patient on a new medication.

- o The pharmacist educates the patient, or patient's family, on any medication changes made in hospital.
  - o The pharmacist educates the patient on their newly diagnosed atrial fibrillation and discusses the need for anticoagulation.
- ▪ Performs discharge medication reconciliation:
  - o The pharmacist reviews the discharge medication list or prescription and compares it to the list of medications taken while hospitalized and prior to admission in order to catch discrepancies and prevent therapeutic issues.
- ▪ Performs discharge planning, liaises with the community pharmacist:
  - o The pharmacist liaises with the community pharmacy and faxes the prescription and/or provides verbal handover to discuss medication changes.
  - o The pharmacist sets up blister-packing, delivery, or daily dispensing of medications after discharge

References

1. American College of Clinical Pharmacy. The Definition of Clinical Pharmacy. *Pharmacotherapy*. 2008;28(6):817-818

2. Maudsley RF. The clinical teaching unit in transition. *CMAJ*. 1993 May 1;148(9):1564.

3. Gehrke P, Binnie A, Chan SP, Cook DJ, Burns KE, Rewa OG, Herridge M, Tsang JL. Fostering community hospital research. *CMAJ*. 2019 Sep 3;191(35):E962-6.

4. Liu JB, Kelz RR. Types of hospitals in the United States. *JAMA*. 2018 Sep 11;320(10):1074-.

Table S1: Pharmacist Ratio Calculation

WHO's WISN[1]	**Staff resource** = [Time to perform role for full patient population] / [Available working time]
Clinical Pharmacy Workforce Calculator	**Time Per Patient**= [frequency of $Task_1$ x minutes spent on $Task_1$] + [frequency of $Task_2$ x minutes spent on $Task_2$] + ... [frequency of $Task_n$ x minutes spent on $Task_n$] **Pharmacist Time**= [minutes per LOS[*]] – [breaks] – [time spent on other tasks] – [time spent rounding[**]] **Pharmacist to Patient ratio**= [Pharmacist time] / [Time per Patient]

WHO: World Health Organization; WISN: Workload Indicator's of Staffing Needs; LOS= length of stay

*excluding weekends and statutory holidays

**medical rounds modified by 50% to reflect the percentage of time spent performing comprehensive care tasks. No such modifier was applied for disposition planning rounds.

Table S2: Baseline Completion of Comprehensive Pharmaceutical Care Tasks in Medical or Surgical Units

Comprehensive Care Task	Amount of patients who receive each task with current working conditions (%)	
	Medicine	*Surgery*
Conducts patient interviews to gather BPMH	55	60
Conducts patient interviews to gather relevant subjective history and more detailed medical history	40	40
Documents complete list of medications, allergies, discrepancies	55	50
Completes an initial pharmaceutical care plan	90	95
Resolves DTPs identified by others or by targeted drug reports or worklists	60	55
Resolves DTPs identified proactively and independently	80	80
Establishes and documents patient-specific and measurable outcomes	55	40
Performs TDM	65	45
Monitors patients for ADRs and interactions	85	75
Advocates for cost effective use of tests	45	40
Makes cost-effective drug-related decisions	60	60
Advocates for patient access to medications	70	65
Provides disease and medication education to patients	50	40
Performs discharge medication reconciliation	80	55
Performs discharge planning, liaises with the community pharmacist	60	45

BPMH: Best possible medication history; DTP: drug therapy problem; TDM: therapeutic drug monitoring; ADR: adverse drug reaction

Reference

1. World Health Organization. WISN-Workload Indicators of Staffing Need User Manual. Geneva: 2010 [cited 2022 Sep 1]. Available from: https://www.who.int/publications/i/item/9789241500197