



Nova Scotia
College of
Pharmacists

STANDARDS OF PRACTICE: Non-Sterile Compounding

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Introduction

The art of pharmaceutical compounding has historically been an integral part of the profession of pharmacy. Although its prominence in pharmacy practice has diminished, it remains an essential component of the profession and plays a vital role in helping patients whose needs cannot be met with commercially available medications. In particular, the pediatric population relies on pharmacy practitioners' unique knowledge and skills to provide compounded medications to help ensure that they can access and attain benefit from needed medications. Pharmacy is the only profession authorized to provide compounded medications and, as such, pharmacy practitioners have a professional responsibility to provide compounding services to patients.

As the profession of pharmacy has evolved and its scope advanced, there is widespread recognition that relying solely on traditional or customary practices in the provision of patient care is inadequate. Appropriate policies, procedures, and documentation are necessary to ensure patient care is delivered safely. Errors in the preparation of compounded non-sterile preparations (CNSPs), including those that have resulted in patient harm and death, have demonstrated the need for robust standards for the preparation of compounded medications.

The *Standards of Practice: Non-Sterile Compounding* establish the responsibilities and minimum expected practice requirements of pharmacy practitioners for preparing CNSPs. They provide practitioners with criteria to evaluate their practice and develop and implement policies and procedures to help ensure the overall quality, safety, and accuracy of CNSPs. The incorporation of these Standards into routine practice will require thoughtful consideration and may necessitate the undertaking of additional education and professional development—a professional responsibility of all regulated health professionals.

With the exception of compounding with hazardous drugs, these Standards do not address worker safety. The safety of workers in Nova Scotia is protected by the Occupational Health and Safety (OHS) Act and its regulations, and the maintenance and enforcement of this legislation is the under the jurisdiction of the Nova Scotia Department of Labour and Advanced Education. These Standards underscore the need for employers to ensure that they have measures in place to protect workers that are consistent with occupational health and safety requirements.

While there are no specific occupational health and safety requirements in Nova Scotia for the handling of hazardous drugs in healthcare settings, there are generally accepted health industry best practices that have been established. In Canada, Section 9 of the [National Association of Pharmacy Regulators Model Standards for Pharmacy Compounding of Non-sterile Preparations](#) and [Guidance Document \(NAPRA Standards\)](#) sets out the requirements for compounding with hazardous drugs. The *Standards of Practice: Non-Sterile Compounding* require that practitioners who prepare CNSPs containing hazardous drugs do so in accordance with Section 9 of the NAPRA Standards.

The term *pharmacy practitioner* is used broadly throughout these Standards and can refer to pharmacists, pharmacy technicians, pharmacy students, pharmacy technician candidates, or pharmacy interns, depending on the context in which it is used. The use of this term does not imply that all pharmacy practitioners can take responsibility for all compounding activities. All pharmacy practitioners must ensure that they only undertake compounding activities that are within their scope of practice. Furthermore, these Standards do not preclude individuals other than pharmacy practitioners from participating in compounding activities (e.g., pharmacy assistants).

The *Standards of Practice: Non-Sterile Compounding* have been adapted from the NAPRA Standards and have been informed by the United States Pharmacopeia (USP) General Chapters 795¹ and 800². When pharmacy practitioners prepare CNSPs, they will do so in accordance with these Standards as well as existing legislation, regulations, other Standards of Practice, and policies relevant to pharmacy practice in Nova Scotia.

¹ United States Pharmacopeial Convention (USP). General Chapter <795> pharmaceutical compounding – non-sterile preparations in USP Compounding Compendium. Rockville, MD: USP;2019/2016

² United States Pharmacopeial Convention (USP). General Chapter <800> Hazardous Drugs – Handling in Healthcare Settings. USP 39. Rockville, MD; USP;2016.

Terminology

The following terms and definitions serve as a reference for these Standards.

Term	Definition
Active pharmaceutical ingredient (API)	Any substance or mixture of substances intended to be used in the compounding or manufacturing of a drug (medicinal) product that, when used in this manner, becomes an active ingredient of the drug product, where the drug product so created has pharmacological activity in the diagnosis, cure, mitigation, treatment, or prevention of disease or acts to affect the structure and function of the body. (See also inactive ingredient excipient.)
Beyond-use date (BUD)	Date after which a compounded preparation shall not be used; determined from the date when the preparation is compounded.
CAS	Chemical Abstract Service
CAS Number	A unique identifier number assigned by the CAS
CNSP	Compounded Non-Sterile Preparation
Component	Any ingredient used in the preparation of a CNSP, including active pharmaceutical ingredients, excipients, fillers, etc.
Compounding	The pharmaceutical preparation of two or more ingredients, at least one of which is a drug, into a drug product that is considered to be within the professional practice of pharmacy. ¹ Compounding excludes mixing, reconstituting or any other manipulation that is performed in accordance with the directions for use on the label of a drug approved by Health Canada within the normal practice of pharmacy.
Containment primary engineering control (C-PEC)	A ventilated device designed and operated to minimize worker and environmental exposures to hazardous components by controlling emissions of airborne contaminants. Examples of C-PECs include Class I, II, or III BSCs, CACIs and Containment ventilated enclosures (e.g., powder hood).
Containment secondary engineering control (C-SEC)	The room in which the C-PEC is placed. It incorporates specific design and operational parameters required to contain the potential hazard within the compounding room.
Cross-contamination	Inadvertent transfer of bacteria or other contaminants from one surface, substance, etc., to another.

¹ [Pharmacy Act](#) of Nova Scotia, Chapter II of the Acts of 2011

Hazardous drug (HD)	<p>Any drug identified by at least one of the following criteria:</p> <ul style="list-style-type: none"> • Carcinogenicity, teratogenicity, or developmental toxicity • Reproductive toxicity in humans • Organ toxicity at low dose in humans or animals • Genotoxicity or new drugs that mimic existing HDs in structure or toxicity
HEPA	High-efficiency particulate air
Independent double check (IDC)	An independent double check is a process in which a second practitioner conducts a verification in the presence or absence of the first practitioner. The most critical aspect is to ensure that the first health care provider does NOT communicate what they expect the second practitioner to find. ¹
NIOSH	National Institute for Occupational Safety and Health (US)
Personal protective equipment (PPE)	All garb and accessories, such as masks, gloves, gown, and safety goggles, that protect the non-sterile preparation and the worker. It enables compliance with the expected specifications of a controlled environment and protects the worker from exposure to physical or chemical risks.
Pharmacy practitioner	Any person who is registered with the Nova Scotia College of Pharmacists, which can include pharmacists, pharmacy technicians, pharmacy interns, pharmacy students, and pharmacy technician candidates.
Purified water	Used as an excipient in the production of non-parenteral preparations and in other pharmaceutical applications, such as cleaning of certain equipment. Purified water must meet the requirements for ionic and organic chemical purity and must be protected from microbial contamination. The source water may be purified by deionization, distillation, ion exchange, reverse osmosis, filtration, or other suitable purification procedures. Distilled water is a form of purified water.
Quality related event (QRE)	Known, alleged or suspected medication errors that reach the patient, as well as medication errors that are intercepted prior to dispensing.
Safety data sheet (SDS)	Formerly known as a material safety data sheet, the safety data sheet is a summary document providing information about the hazards of a product and advice about safety precautions. It is usually written by the manufacturer or supplier of the product.
Spill kit	A container that includes supplies, warning signage, and related materials used to clean and contain a spill of chemicals or components.

¹ [Windsor Regional Hospital: Independent Double Check Policy for Medication Administration](#)

Standards of Practice

Pharmacy practitioners have been granted the privilege to compound medications under the *Pharmacy Act*. Compounding is an essential service provided by all pharmacies, and as such, the *Pharmacy Act* and its regulations requires that pharmacies have the requisite facilities, equipment, procedures, and competent personnel to ensure patients have access to medications that require compounding. These Standards which consist of nine sections and associated appendices specify the minimum practice requirements that apply to CNSPs.

1. Knowledge, Competency and Ethics

See *Appendix A - Appropriateness of Compounding* and *Appendix E - Product and Preparation Requirements* for further details of expected practice relevant to this section.

- 1.1. A pharmacy manager ensures the pharmacy fulfills its responsibility to compound basic non-sterile compounded drug products customary to community pharmacy practice.
- 1.2. A pharmacy practitioner maintains their competence¹ to provide compounded medications and services for patients.
- 1.3. A pharmacy practitioner evaluates the necessity and appropriateness for preparing a compound.
- 1.4. A pharmacy practitioner prepares a CNSP:
 - for a patient-specific prescription which has been reviewed and considered clinically appropriate by a pharmacist.
 - for a specific animal prescribed by a veterinarian.
 - to fulfill a prescriber order for office use.
 - in limited quantities in anticipation of prescriptions (note that compounding in bulk quantities is considered manufacturing and outside the jurisdiction of pharmacies).²
- 1.5. A pharmacy practitioner prepares a CNSPs in accordance with a master formulation record that:
 - includes the information necessary to prepare the CNSP.
 - is kept up to date.
 - includes supporting rationale and/or references.
 - is kept in a format that is easily accessible to compounding personnel.
- 1.6. In circumstances where the preparation of the CNSP requires specialized skills, equipment or facilities that are not available at the practice site, a pharmacy practitioner assists the patient in accessing these services from another provider in accordance with the NSCP *Code of Ethics*.

¹ [Model Compounding Competencies for Pharmacists and Pharmacy Technicians in Canada](#)

² Health Canada, Health Products and Food Branch Inspectorate. Policy on manufacturing and compounding drug products in Canada (POL-0051). Ottawa, ON: Health Canada; 2009. Available from: <https://www.canada.ca/en/health-canada/services/drugs-health-products/compliance-enforcement/good-manufacturing-practices/guidance-documents/policy-manufacturing-compounding-drug-products.html>

- 1.7. When a pharmacy uses another pharmacy to prepare compounds for patients on behalf, they do so in accordance with the NSCP *Standards of Practice: Centralized Prescription Processing*.

2. Roles and Responsibilities

See *Appendix B - Responsibilities of Compounding Personnel* for further details of expected practice relevant to this section.

- 2.1. The development, implementation, and oversight of a pharmacy's compounding services (see Sections 3 – 9 below) is the responsibility of the pharmacy manager. These responsibilities may be assigned to a pharmacist or pharmacy technician who is designated as the non-sterile compounding supervisor, but the overall accountability remains with the pharmacy manager.
- 2.2. All personnel involved in the preparation of CNSPs are responsible to understand their assigned roles and responsibilities and to perform compounding activities in accordance with these Standards.
- 2.3. Notwithstanding 2.1 above, a pharmacist on duty remains responsible for ensuring the appropriate level of supervision and direction for employees of the pharmacy under the pharmacist's authority (Pharmacy Act s 32 (1)(l)), including ensuring that the requirements as set out in these Standards are met when CNSPs are prepared.

3. Training

See *Appendix C - Training* for further details of expected practice relevant to this section.

- 3.1. Compounding personnel and those involved in cleaning the compounding areas are appropriately trained and possess expertise commensurate with their responsibilities.
- 3.2. Compounding personnel participate in training as necessary to establish and maintain their continuing competence to provide compounded medications.

4. Policies and Procedures

See *Appendix D - Policies and Procedures* for further details of expected practice relevant to this section.

- 4.1. Policies and standard operating procedures (SOPs) are established, implemented, and documented for all activities and equipment (as appropriate) related to non-sterile compounding.
- 4.2. Policies and procedures are reviewed at least every three years, upon a change in practice or standards, or in the event of a quality related event (QRE).
- 4.3. A process for updating and reviewing policies and procedures is in place.

5. Product and Preparation Requirements

See *Appendix E - Product and Preparation Requirements* for further details of expected practice relevant to this section.

- 5.1. CNSPs are prepared in accordance with a Master Formulation Record (MFR) and established policies and procedures.
- 5.2. Verification steps are performed throughout the compounding process.
- 5.3. CNSPs are prepared in a manner that minimizes the risk of cross-contamination and errors in preparation (e.g., segregation of ingredients, preparing one CNSP at a time).
- 5.4. A beyond-use date is assigned for each CNSP. This information is documented as part of the prescription record and included in the labelling of the final preparation.
- 5.5. A compounding record is created and maintained as part of the patient record or batch preparation record.
- 5.6. Ingredients are obtained from recognized and reliable sources.
- 5.7. Compounds are labelled in accordance with the NSCP [Pharmacy Practice Policy: Prescription Labels](#).

6. Facilities and Equipment

See *Appendix F - Facilities and Equipment* for further details of expected practice relevant to this section.

- 6.1. CNSPs are prepared in a designated area that:
 - is equipped with any necessary environmental controls; and
 - may be a separate room if determined to be necessary.
- 6.2. Compounding areas are sufficient in size and configured to allow for the safe and proper preparation of compounds and storage of materials and equipment, taking into account the volume and nature of the CNSPs being prepared.
- 6.3. Compounding areas are kept in a state of repair and with the cleanliness necessary to maintain the quality and integrity of CNSPs.
- 6.4. Work surfaces are fabricated from materials that are smooth, impervious, free from cracks and crevices, non-shedding and designed to facilitate and withstand repeated cleaning/sanitizing.
- 6.5. Furniture and wall surfaces are fabricated from materials that are designed to facilitate and withstand repeated cleaning/sanitizing.
- 6.6. Floors are not carpeted and are fabricated from materials able to withstand repeated cleaning.
- 6.7. All equipment, instruments and accessories used for compounding are:
 - appropriate for the type of preparations being compounded.
 - maintained to ensure proper functioning and performance.

- 6.8. A spill kit is available and maintained in a manner that allows spills to be promptly and safely managed.

7. Evaluation of the Compounding Practice and Environment

See *Appendix G - Evaluation of the Compounding Practice Environment* for further details of expected practice relevant to this section.

- 7.1. The compounding practice is evaluated to ensure that the environment in which CNSPs are prepared is adequate for the complexity of the preparations. The results of this will determine which CNSP(s), if any, require a separate room and/or specialized equipment for their preparation.
- 7.2. The compounding practice is evaluated to ensure that activities are undertaken in a manner that is consistent with relevant occupational health and safety legislation and standards. The results of this evaluation are used to determine what actions may need to be taken and/or what measures must be in place to ensure appropriate protection from the risks associated with inappropriate exposure to components used in the preparation of CNSPs.

8. Hazardous Drugs

See *Appendix H - Hazardous Drugs* for further details of expected practice relevant to this section.

- 8.1. A list of hazardous drugs used in the preparation of CNSPs at a practice site is developed and maintained.
- 8.2. CNSPs containing hazardous drugs are prepared in accordance with Appendix H of these Standards.
- 8.3. All compounding and cleaning personnel are appropriately educated and trained in the handling of hazardous drugs.

9. Quality Assurance

- 9.1. A quality assurance program for compounding activities is included as part of the pharmacy's overall quality assurance program in accordance with the [*Standards of Practice: Continuous Quality Assurance Programs in Community Pharmacies*](#).
- 9.2. The quality assurance program monitors the compounding practice environment and the personnel undertaking compounding activities and includes:
- Adherence to policies and procedures by personnel
 - Maintenance and certification of facilities and equipment
 - Management of quality related events (QREs)
 - Management of product recalls
 - Training of personnel
 - Documentation of the above

- 9.3. In the event of a QRE at the pharmacy, or in the event of being notified of a compounding related QRE occurring elsewhere (e.g., a notice from Health Canada or the Institute of Safe Medication Practices (ISMP)), a review of relevant policies and procedures is undertaken to determine if any changes are necessary to either their content or application.

Appendix A – Appropriateness of Compounding

A pharmacy practitioner evaluates a prescription for a CNSP to determine the necessity and appropriateness for its preparation. The following questions may be used to help determine whether it is appropriate to prepare a CNSP:

- Is there a therapeutic reason to prepare the CNSP? Examples of some reasons may include:
 - The required dose cannot be accommodated with a commercially available product.
 - A commercial product is unavailable.
 - Patient factors such as allergies or physical limitations (e.g., inability to swallow solid dosage forms) make a commercially available product unsuitable.
- Are there reasonable therapeutic alternatives or delivery systems that are acceptable to the patient that can be used that do not require compounding?
- Is there a published/established formula available?
- If there is no published/established formula available, is there a reasonable body of evidence to support the creation/use of a formulation?
- If there is no published/established formula available, or if there is no generally accepted evidence to support its use, can the appropriateness for preparing the CNSP be determined based upon patient need and evidence of informed consent about the benefits and risks associated with the paucity of evidence?
- Are the necessary facilities and equipment available to prepare the CNSP?
- Do those preparing the CNSP have the necessary experience/knowledge/skills to prepare it properly?

Appendix B - Responsibilities of Compounding Personnel

All compounding personnel are responsible to know and understand their assigned roles and responsibilities and be satisfied that they have the appropriate skills/knowledge/experience to undertake compounding activities in accordance with these Standards and the pharmacy's established policies and procedures.

Non-sterile Compounding Supervisor

The responsibility for the development and implementation of a pharmacy's compounding services, and the organization and supervision of all activities related to the preparation of CNSPs, may be assigned by the pharmacy manager to a pharmacist or pharmacy technician who is designated as the non-sterile compounding supervisor. This individual ensures that:

- measures are in place to ensure that personnel are competent to undertake compounding activities.
- policies and procedures covering all compounding activities and equipment used are in place.
- personnel understand and fully comply with policies and procedures.
- the compounding process yields high-quality non-sterile preparations.
- appropriate measures are in place to mitigate the risks associated with the preparation of CNSPs.
- procedures for incident/accident reporting and follow-up, as well as recall procedures, are in place.
- the facilities and equipment used to compound non-sterile preparations are appropriate for the type of compounding occurring and are maintained, calibrated, or certified according to manufacturers' specifications or standards, as applicable.
- beyond-use dates (BUDs) are assigned for each CNSP.
- Master Formulation Records/Formulas are in place, regularly reviewed, and kept up to date.
- a quality assurance process is developed and implemented as part of the pharmacy's overall quality assurance program.
- current references appropriate to the CNSPs being prepared are available.
- current safety data sheets (SDS), where applicable, are readily accessible.
- records created in accordance with these Standards are retained in a readily retrievable format and in accordance with relevant regulations.

Appendix C- Training

All personnel involved in compounding and in the cleaning of compounding areas must possess expertise commensurate with their responsibilities. Therefore, before personnel undertake activities related to compounding, the non-sterile compounding supervisor must be satisfied that they are appropriately trained and have the necessary knowledge and skills.

Personnel involved in compounding are required to maintain continuing competence, including maintaining the competence necessary to perform calculations and undertake activities (double dilution, geometric dilution, etc.) involved in the preparation of basic non-sterile compounded drug products customary to community pharmacy practice.

The breadth and depth of training necessary is based upon the nature of the CNSPs being prepared. The following table provides a list of topics that may need to be covered; this table is not all-encompassing and not all topics listed will be relevant for all personnel or in all situations. Furthermore, there may be knowledge, skills or abilities not listed here that should be addressed as determined by the nature of the CNSPs being prepared.

Training Topics to Consider

FOR GENERAL COMPOUNDING

Relevant federal/provincial legislation related to pharmacy compounding, as well as other governing standards, policies, and guidelines

Policies and procedures related to the preparation of CNSPs (e.g., hand hygiene, personal protective equipment, facilities, material, equipment, personnel conduct, documentation, cleaning)

Knowledge of physical and chemical properties of CNSP components

Safety data sheets

Compounding techniques

The operation and correct use of equipment, materials, and automated instruments, including calibration of the equipment and instruments used

Pharmaceutical calculations required to prepare CNSPs

Principles of accurate measurement

Monitoring of controlled rooms (e.g., temperature, pressure) including documentation and corrective measures to be taken when irregularities are identified

Operation of ventilation systems (heating, ventilation, and air conditioning system) and the corrective measures to be taken when an irregularity is identified

Quality assurance measures

Verification processes and their application

Drug delivery systems

Assignment of beyond-use dates

Master Formulation Record development

FOR THE COMPOUNDING OF HAZARDOUS NON-STERILE PREPARATIONS

Identification of hazardous components

Deactivation and decontamination

Use of the protective measures necessary to limit exposure

Use of personal protective equipment

Handling (i.e., receive, unpack, store, and deliver) components

Emergency measures to be applied in the case of accidental exposure, accidents, or spills

Safe destruction of components and the materials used in their preparation

CLEANING/DISINFECTING THE COMPOUNDING AREA

Policies and procedures related to cleaning and decontaminating the equipment, furniture, and facilities

Use of personal protective equipment

Emergency measures to be applied in case of accidental exposure, accidents, or spills

Appendix D – Policies and Procedures

Preparing and dispensing a CNSP for a patient introduces risks not otherwise associated with dispensing commercially available products. Patient safety is dependent upon the accurate preparation of CNSPs. In turn, accurate preparation is dependent upon a pharmacy establishing and adhering to robust policies and procedures.

The non-sterile compounding supervisor ensures that the following topics are covered in a pharmacy's policies and standard operating procedures (SOPs). The extent of the detail contained in a policy or procedure is left to the professional judgment of the pharmacy practitioner responsible for its development, but it must be complete enough so that those following the policy or procedure have a clear understanding of the intent, requirements, and desired outcome.

Note: Although the following are the minimum requirements, there may be instances in which a given topic can be demonstrated to not be relevant to the compounding practice at a pharmacy site (e.g., a policy regarding access to a controlled room is not applicable if no controlled room exists). Similarly, there may be additional policies or procedures that are not captured in the list below that are deemed necessary by the pharmacy manager and/or non-sterile compounding supervisor, depending upon the specific nature of the compounding practice.

Documentation of SOPs and policies is maintained in a readily retrievable format and is available to all personnel involved in the preparation of CNSPs and the maintenance of the areas used for their preparation.

Policies and Procedures

PERSONNEL AND FACILITIES

Attire and dress code (e.g., personal clothing, jewelry)

Health conditions (reasons for temporary withdrawal from compounding activities)

Personnel hygiene and garbing

Expected behaviour in compounding areas (e.g., no drinking, eating or other activities not related to compounding; expectation that procedures will be followed; avoidance of unnecessary conversations)

Training of personnel

Delegation and appropriate supervision of activities

Access to controlled area or room

Maintenance of facilities and equipment (e.g., certification of rooms and instruments, calibration, maintenance of pre-filters and high-efficiency particulate air filters, verification of pressure)

Cleaning activities for facilities and equipment

Spill kits (contents and procedures for use)

COMPOUNDED NON-STERILE PREPARATIONS

Routine compounding procedures / SOPs

Development/creation of Master Formulation Records

Personal protective equipment in compounding areas and for compounding (including hazardous compounding, if appropriate)

Deactivation, decontamination, and cleaning of the equipment (including, if appropriate, those used in hazardous compounding)

Receipt, unpacking, and storage of hazardous components

Verification of the compounding process (including verification of calculations) and of final preparations

Recall procedures

Storage of products used and final preparations

Hazardous waste management

The following is provided as an example of a template that can be used to develop policies or procedures for compounding activities. It is available as a [fillable PDF](#) on the NSCP website. Please note that this template is intended for procedures other than preparing individual compounds. The procedures necessary to prepare individual CNSPs are included as part of the Master Formulation Record.

Policy and Procedure Template	
Pharmacy Name	Policy/Procedure Name: _____ New <input type="checkbox"/> Revised <input type="checkbox"/> Prepared by: _____ Approved by: _____ Effective Date: _____
Objective/Purpose: Describe the purpose of the SOP	
Target Personnel: Use this section to describe the who will be impacted by the procedure. (Choose all that apply) <input type="checkbox"/> Non-Sterile Compounding Supervisor <input type="checkbox"/> Pharmacist <input type="checkbox"/> Compounding Personnel <input type="checkbox"/> Cleaning Personnel <input type="checkbox"/> Other _____	
Required facilities, equipment, and material: (e.g., PPE, materials, instruments, necessary logs)	
Procedures: Describe in detail what must be done by each person affected by the procedure, for each step or part of the procedure. Include examples of labels, symbols, logs, etc. that are to be used. Attach any relevant documents.	
List of logs required for the procedure as necessary (e.g., calibration, temp monitoring)	
List of specific competencies necessary to perform the procedure (as appropriate)	
Procedure History: Created by: _____ Date: _____ Revised by: _____ Date: _____ Revised by: _____ Date: _____	

Appendix E – Product and Preparation Requirements

Master Formulation Record

A Master Formulation Record (MFR) is a detailed record of components and procedures that describes how the CNSP is to be prepared and is created for each unique formulation. CNSPs are prepared according to the MFR.

Historically, pharmacy practitioners have prepared many CNSPs in accordance with “recipes” or formulas where the rationale for their use is based upon long-time use and tradition rather than robust clinical evidence or published literature (e.g., various “magic mouthwashes”). CNSPs are also often used by practitioners and patients to address issues or treat conditions that have not responded to conventional, commercially available products, or in situations where a commercially available product is not available or appropriate for the needs of the patient. These Standards do not preclude the continued use of these formulations; however, their use must be based upon a consideration of the appropriateness of their preparation as described in *Appendix A – Appropriateness of Compounding*.

Similarly, the development of a new MFR is done in consideration of *Appendix A – Appropriateness of Compounding*.

MFRs are kept current and are readily available for each CNSP. If an MFR has not been updated within the previous twelve months, it must be reviewed and updated prior to the preparation of the CNSP. An MFR may need to be updated more frequently if information that impacts the formulation becomes available.

An MFR includes the following information *as required and appropriate* for the specific CNSP:

- date created
- date of last update
- special precautions to be observed by compounding personnel (e.g., PPE, environmental controls, etc.)
- official or assigned name, strength, and dosage form of the preparation
- expected yield
- any unique calculations specific to the CNSP
- description of all ingredients, along with their quantities and sources
- unique identifier for each ingredient, if available (e.g., DIN#, CAS#, NPN#, etc.)
- source or origin of the formula
- if developing a formula, references used
- compatibility and stability data (if developing or modifying a formula)
- equipment needed to compound the preparation
- mixing instructions, which may include order of mixing, mixing temperatures or other environment controls (e.g., pH), and duration of mixing
- assigned BUD
- storage conditions
- type of container
- description of final preparation

- quality control procedures and expected results
- if there is a commercially available product, the rationale for creating the MFR

Verification and Release Inspection

Given the patient safety risks associated with inaccurate preparation of CNSPs, it is critical that verification takes place not solely at the end of the compounding process, but at the various steps throughout as well. Independent double checks should be performed whenever possible. Verification steps are documented on the compounding record and include verification of the:

- master formulation record/compounding record
- calculations
- identity of all ingredients (prior to preparing the CNSP)
- volume, weight, or quantity of all ingredients (prior to preparing the CNSP)
- accuracy of labelling (and in accordance with the NSCP Pharmacy Practice Policy: Prescription Labels)
- appropriateness of the container
- final characteristics/appearance of the CNSP

Compounding Procedures

Separate and apart from the requirements described in the MFR to prepare an individual CNSP, CNSPs are prepared according to established policies and procedures that include, *but are not limited to*:

- the routine steps to be followed regardless of the CNSP being prepared (e.g., printing of worksheets, weighing of components, and verification procedures)
- conduct of personnel in the compounding area(s)
 - performing hand hygiene before and after compounding using appropriate agents
 - use of appropriate garbing and PPE (at a minimum, powder-free nitrile gloves and a clean or disposable lab coat)
 - avoidance of sources of contamination (e.g., loose hair, long or false nails, jewellery on hands and wrists, chewing gum, or consuming food or drink in the compounding area(s))
- situations which may preclude personnel from preparing CNSPs (e.g., health conditions, hand lesions, pregnancy).

Beyond-Use Dating (BUD)

A beyond-use date (BUD) is the date after which a CNSP shall not be used and is determined from the date when the CNSP is prepared. BUDs for CNSPs are established conservatively to ensure the preparation maintains its required characteristics to minimize the risk of contamination or degradation.

Historically, pharmacy practitioners have prepared CNSPs in accordance with “recipes” or formulas that may not include BUDs or that have BUDs based upon traditional pharmacy practice rather than published stability data or data relating to the potential for microbial contamination. BUDs for all CNSPs must be assigned in accordance with available published literature or referenced formulas when available.

Establishing BUDs in the Absence of Stability Information

In the absence of any stability data for a specific CNSP, the following table presents the maximum BUDs recommended by the United States Pharmacopeia for non-sterile compounded preparations that are packaged in air-tight, light-resistant containers and stored at controlled room temperature (unless otherwise indicated). Prior to using the BUDs in this table, pharmacy practitioners should determine if there is any information available about a specific CNSP that would indicate that the BUD suggested in the table is not appropriate.

Beyond-use date (BUD) by type of formulation*¹
Non-aqueous formulations – The BUD is not later than the time remaining until the earliest expiry date of any ingredient or 6 months, whichever is earlier.
Water-containing oral formulations – The BUD is not later than 14 days with storage in the refrigerator
Water-containing topical/dermal, mucosal liquid and semi-solid formulations – The BUD is not later than 30 days.

* These maximum BUDs are recommended for non-sterile compounded drug preparations in the absence of stability information that is applicable to a specific drug or preparation. The BUD shall not be later than the expiration date on the container or any component.

CNSPs That May Require a Shorter BUD

The table above provides recommended BUDs for CNSPs in the absence of stability information that is applicable to a specific drug and preparation. However, there may be other factors that must be considered by pharmacy practitioners when establishing or assigning a BUD that may necessitate a shorter BUD than what the above table indicates. These include:

- the available literature and documentation regarding the chemical and physical stability properties of the API and any added substances in the preparation (e.g., if the API and added substances in the preparation are known to degrade over time and/or under certain storage conditions, which would reduce the strength of the preparation and/or produce harmful impurities).
- information that has been published or communicated that indicates that a formulation is not stable for the time indicated in the table.
- the expected storage conditions.
- the compatibility of the container-closure system with the finished preparation.
- the potential for microbial proliferation.
- if the API or any other components in the CNSP have an expiration date that is earlier than the BUD that could be assigned from the table, the expiration date supersedes the BUD and must be the assigned shortest date.

¹ United States Pharmacopeial Convention (USP). General Chapter <795> pharmaceutical compounding – non-sterile preparations in USP Compounding Compendium. Rockville, MD: USP:20192016

- if the CNSP includes components from conventionally manufactured product(s), the BUD of the CNSP must not exceed the shortest remaining expiration date of any of those conventionally manufactured product(s).
- if the CNSP includes components from other compounded preparations, the BUD of the final CNSP must not exceed the shortest remaining BUD of any of those compounded preparations.

Extending BUDs for CNSPs

- BUDs for CNSPs may be able to be extended for up to a maximum of 180 days if results of a stability study that uses a stability-indicating assay for the API(s), CNSP, and the type of container-closure used, supports an extended BUD.

Compounding Record

Each time a CNSP is prepared, either pursuant to an individual prescription or as a batch in anticipation of a prescription, a compounding record/worksheet that contains, at a minimum, the following information is created:

- name, strength, and dosage form of the CNSP
- date of preparation
- reference to the Master Formulation Record (if prepared without the use of pharmacy software-generated worksheets)
- assigned control/internal identification number (e.g., prescription, batch, or lot number)
- identification and quantities of all ingredients
- source, lot number, and expiration date of all ingredients
- weight or measurement of each ingredient
- total quantity
- assigned BUD and storage requirements
- if applicable, a record of the calculations completed to determine and verify quantities and/or concentrations of ingredients
- results of any quality control procedures, if applicable (e.g., pH, visual inspection)
- a method to identify the people involved in the compounding of the CNSP, including the person preparing the compound, the person performing verification steps, and the person approving the final preparation
- the rationale for preparing the CNSP if there is a commercially available product

If the CNSP is prepared pursuant to an individual prescription/order, the compounding record is retained as part of the patient record.

If a prescription/order is filled with a CNSP prepared as a batch in anticipation of a prescription/order, then reference to the assigned control/internal identification number of the batch (e.g., batch or lot number) is included as part of the patient record.

Ingredients Used for CNSPs

Source and Quality of Ingredients

Reasonable measures are taken to determine the purity and safety of the ingredients used for compounding.

Ingredients used for compounding:

- are obtained from recognized and reliable sources.
- consist of products approved for use in Canada or APIs and other ingredients that meet the requirements of monographs in a current version of a recognized pharmacopoeia (United States Pharmacopoeia, European Pharmacopoeia, French Pharmacopoeia, International Pharmacopoeia, British Pharmacopoeia, Canadian Formulary, National Formulary of the United States or Schedule B of the *Food and Drugs Act*, in keeping with the recommendations of Health Canada's Policy 0051).¹
- if an API, has a certificate of analysis available (COA).
- if an ingredient other than an API, is suitable for the intended use.
- have not been withdrawn from the Canadian market for safety reasons (unless its use has been authorized in specific circumstances).
- include purified water (e.g., distilled, deionized, or sterile) for use in preparing CNSPs whenever a formula specifies water as an ingredient.

¹ Health Canada, Health Products and Food Branch Inspectorate. Policy on manufacturing and compounding drug products in Canada (POL-0051). Ottawa, ON: Health Canada; 2009. Available from: <https://www.canada.ca/en/health-canada/services/drugs-health-products/compliance-enforcement/good-manufacturing-practices/guidance-documents/policy-manufacturing-compounding-drug-products.html>

Appendix F – Facilities and Equipment

Compounding activities take place in a space specifically designated for this activity. An area used for *non-hazardous* compounding is designed for compounding but may also be used for other pharmacy-related services when compounding is not occurring, provided it is maintained in a manner that allows compounding to be performed in accordance with these Standards. Any containment primary engineering control (C-PEC) device used for compounding and area used for hazardous compounding are reserved for activities related to compounding only.

Facilities

The environment in which CNSP must be prepared is based upon an evaluation of the compounding practice and environment (see Section 7 and Appendix G). The results of the evaluation will determine whether the complexity of the compounding practice requires that CNSPs are prepared in a separate room away from the rest of the pharmacy and/or whether environmental controls suitable for the preparation of CNSPs containing hazardous drugs or substances are necessary.

Non-Hazardous CNSPs

The area designated for the preparation of non-hazardous CNSPs:

- is located away from high traffic areas in the pharmacy and ideally not directly below HVAC vents.
- is sufficient in size to allow compounding personnel to work comfortably with minimal interruption.
- is designed, arranged, and used in a manner that minimizes the risk of cross-contamination.
- allows for the orderly placement of equipment and materials off the floor in a manner that prevents confusion among ingredients, containers, labels, in-process materials, and finished preparations.
- has a sink and a water supply that provides both hot and cold potable running water either in, or near, the compounding area.
- contains an eyewash station either in, or near, the compounding area.
- is kept at a temperature and humidity that is appropriate for the storage of materials and for the comfort of compounding personnel.
- is conducive to necessary cleaning and contains no areas that are difficult to clean (special attention is paid to areas liable to collect dust such as rarely used horizontal surfaces, window frames, ceiling fixtures, etc.).
- has furniture and equipment placed in a manner that facilitates thorough cleaning.
- may include a containment primary engineering control (C-PEC) device either ventilated through HEPA filtration or to the outside. Whether or not the C-PEC is in a room separate from the rest of the pharmacy is based up the nature and complexity of the CNSPs being prepared as determined by evaluation of the practice as described in Section 7 and Appendix G.

Hazardous Compounded Non-Sterile Preparations

In addition to the requirements above, an area designated for the preparation of hazardous CNSPs includes:

- a C-PEC located in a containment secondary engineering control (C-SEC) under negative pressure that satisfies the requirements as described in Section 9 of the [NAPRA Standards](#) and [guidance document](#).

Equipment

The equipment used for compounding:

- is appropriate for the specific compounding process and is of suitable composition such that the surfaces that contact ingredients/components do not adversely affect or alter the quality of the compounded product or preparation.
- is stored in a manner that facilitates its use and is kept clean.
- is inspected for integrity prior to use, and if appropriate, calibrated or verified for accuracy and at the frequency as recommended by the manufacturer or as necessary (e.g., prescription balance or analytical balance calibration).
- undergoes routine maintenance (if applicable) as required by the manufacturer.

A record that describes the date and type of maintenance and the person performing it is documented and retained at the pharmacy for a minimum of two years.

Cleaning

The area designated for compounding is cleaned/sanitized on a regular basis in a manner that maintains the cleanliness needed to ensure the quality and integrity of CNSPs.

Equipment and products required to clean and sanitize are readily available (e.g., hot and cold water, soap or detergent, disinfectant, disposable towels in a dispenser, floor cleaning supplies, personal protective equipment). Items used for cleaning are either disposable or are washed and disinfected between use.

Products used for cleaning and sanitizing are selected and used in consideration of compatibilities, effectiveness, and their potential to leave residue.

Waste is collected in plastic bags and removed with minimal agitation at a time when compounding is not occurring.

Equipment, instruments, and accessories used for compounding are:

- inspected for cleanliness prior to use and cleaned as required (Note: alcohol is not sufficient to be used as a cleaning agent).
- free from any residue left behind from the cleaning process.
- cleaned between compounding preparations containing different ingredients and/or excipients.

C-PECs used for compounding are cleaned/sanitized:

- at the beginning and end of each shift (when in use), after spills, and when surface contamination is known or suspected.
- between compounding products or preparations with different components.

Spill kits

Cleaning supplies include a spill kit which provides readily accessible instructions and supplies for appropriately dealing with spillage of API's, chemicals, and excipients.

Appendix G - Evaluation of the Compounding Practice Environment

The Non-sterile Compounding Supervisor is responsible for the oversight of a pharmacy's compounding services, and the organization and supervision of all activities related to the preparation of CNSPs in the pharmacy. This includes evaluating the compounding practice environment to ensure that:

- the facilities are adequate for the complexity of the CNSPs being prepared; and
- they are satisfied that the compounding practice environment meets relevant occupational health and safety legislation and standards.

Complexity

The chance of an error occurring in the preparation of a CNSP increases as the number and complexity of steps involved increases. The complexity of a CNSP determines whether the environmental requirements listed in Section 6 and Appendix F are adequate for its preparation or whether its preparation requires a separate room to ensure it is prepared properly and accurately. Things to consider in determining the complexity of a CNSP include *but are not limited to*:

- the degree of uninterrupted workflow necessary to complete the required calculations.
- the number and complexity of steps involved in the preparation and the need for uninterrupted workflow.
- the number of different components used.
- the space required to prepare the CNSP safely.
- the need for specialized equipment.

Worker Safety

The health and safety of workers in Nova Scotia is protected by the Occupational Health and Safety Act (OHSA) and its Regulations. The maintenance and enforcement of this legislation is under the jurisdiction of the Nova Scotia Department of Labour and Advanced Education.

In Nova Scotia, the requirements that are in place for occupational health and safety are well established. All pharmacy employers are responsible for meeting the requirements set out in OHS legislation, including when their employees undertake activities related to compounding.

The Non-sterile Compounding Supervisor must be satisfied that measures and actions consistent with relevant occupational health and safety regulations are in place to protect employees from the risks associated with inappropriate exposure to components used in the preparation of CNSPs. These may include, *but are not limited to*:

- consultation with provincial Occupational Health and Safety.
- the implementation of risk mitigation strategies such as:
 - the use of:
 - personal protective equipment (PPE)
 - a containment primary engineering control (C-PEC)

- a separate room with specific engineering controls
- strategic assignment of compounding activities to appropriate personnel (e.g., activities that present risk to females are undertaken only by males or females not at risk)
- a combination of the above

A document and visual algorithm entitled [*Considerations for Evaluation of the Compounding Practice Environment*](#) has been created to provide further information for pharmacy practitioners. Please note that this document is intended as a brief overview of relevant factors and legislation to consider during an evaluation of the practice environment. It is not all-encompassing and there may be further details or factors that must be considered that are not addressed in this document. This document can be found in the [Compounding section](#) of the [NSCP website](#).

Appendix H - Hazardous Drugs

Chapter 800 of The United States Pharmacopeia (USP 800) defines hazardous drugs as “any drug identified by at least one of the following criteria:¹

- Carcinogenicity, teratogenicity, or developmental toxicity
- Reproductive toxicity in humans
- Organ toxicity at low dose in humans or animals
- Genotoxicity or new drugs that mimic existing hazardous drugs in structure or toxicity

The [National Institute for Occupational Safety and Health](#) (NIOSH) in the United States maintains a list (the [NIOSH list](#)) of antineoplastic and other hazardous drugs in healthcare settings. Many, if not most, healthcare institutions use the information contained in NIOSH as the basis for their policies for identifying and handling hazardous drugs. Pharmacy practitioners are encouraged to consult this document in its entirety to help gain an understanding of both its content and its intended use.

For the purposes of these Standards, hazardous drugs are those that appear in the tables of the [NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings, 2016](#) (or most recent). However, there may be other drugs not listed by NIOSH that meet criteria for being considered hazardous because of the nature of the drug, the quantities being handled, or a combination of these factors. In addition, newly marketed drugs that either meet the criteria for NIOSH or mimic drugs contained in the lists may need to be considered hazardous.

The Non-sterile Compounding Supervisor will ensure that hazardous drugs used in the preparation of CNSPs are identified and that a list of these is developed for the pharmacy practice site. There are several resources available to consult to help identify and handle drugs that are included in this list. These include, *but are not limited to*:

[NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings, 2016](#) (or most recent)

[Worksafe BC Best Practices for the Safe Handling of Hazardous Drugs](#)

[BC Cancer Safe Handling Standards Manual](#)

CNSPs containing hazardous drugs are prepared and handled in accordance with [Section 9 of NAPRA Standards and guidance document](#) unless:

- the Non-sterile Compounding Supervisor is satisfied that the risks associated with their preparation can be otherwise mitigated and that appropriate mitigation strategies are in place.
- mitigation strategies are documented in the MFR.
- for drugs listed in table 1 of NIOSH, they are prepared only occasionally and in small quantities.

¹ United States Pharmacopeial Convention (USP). General Chapter <800> Hazardous Drugs – Handling in Healthcare Settings. USP 39. Rockville, MD: USP;2016.