Chapter 20

Handling Sterile Commercial Products and Compounded Sterile Preparations Within the Pharmacy

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Introduction

This chapter covers pharmacy's responsibility for sterile commercial products and compounded sterile preparations beginning when products are first received and continuing through compounding, internal storage and waste disposal. To ensure preparation quality, employee and public safety, correct storage and handling procedures are necessary every step of the way.

This chapter does not cover selection and quality control of nonsterile components and raw materials (Chapter 4); nor does it discuss the compounding and dispensing of hazardous drugs (HDs; Chapter 12). And it does not cover the delivery of compounded preparations either within the institution or outside the institution, for example in home care (Chapter 21).

Receipt of Sterile Commercial Products

Sterile Components

Components are comprised of active and inactive ingredients, intermediate containers (e.g., a syringe used to transfer a drug from one container to another), final containers, closures and seals. When sterile commercial products are received at loading docks or other receiving areas, sterile commercial products should be transferred to their manufacturer-designated storage environment as quickly as possible, or within a time period that is consistent with the risk and exposure of the product in the receiving area.[1] This is particularly important for temperature-sensitive products that can reach temperature equilibrium within minutes to hours depending on product, packaging, and ambient conditions. Delivery documents should be reviewed at the receiving area to ensure that the commercial sterile products have

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not been subjected to any delays during shipment, which could result in exposure of the article to extreme temperatures or to any other extreme or undesirable conditions. For products that require special handling or refrigerator temperature storage conditions, suppliers should provide documented evidence to show that the required temperature range has been maintained during transport.[1] Personnel receiving sterile commercial products should contact the product manufacturer to determine the significance of deviations from the required temperature range during shipment.

A standard operating procedure (SOP) should specify the visual inspection of sterile commercial products, sterile ready-to-use containers, and devices (e.g., syringes and needles) when they are received in the pharmacy. All items must be free from defects, within the manufacturer's expiration dating, and appropriate for their intended use. Suitable records should be maintained in the pharmacy to explain the reason for deviation from required storage conditions and the resulting action taken.[1] Defective drugs and devices should be promptly reported via the MedWatch program to the Food and Drug Administration (FDA).[2]

USP Chapter <800> Hazardous Drugs—Handling in Healthcare Settings specifies conditions for receipt of HDs.[3] Shipping containers for HD sterile products should be marked as such and handled separately from non-HD-containing containers. The unpacking area must be negative or neutral pressure relative to the adjoining spaces. All sterile HD components should be shipped in sealed plastic containers, and appropriate personal protective equipment (PPE) must be available and be used when unpacking. See Chapter 12 for more requirements of handling HDs. For handling of nonsterile components and raw materials see Chapter 4.

USP Storage Conditions

Intravenous solutions, sterile commercial products, and sterile supplies should be stored according to manufacturer labeling or USP product monographs to preserve stability of ingredients.[4] Most sterile commercial products are aqueous solutions for which hydrolysis is the most common chemical degradation reaction. The rate of a chemical reaction generally increases exponentially for each 10 °C increase in temperature.[5] Thus, a hydrolysable drug that is exposed to a 20 °C increase in storage temperature, such as being stored at room temperature rather than in a refrigerator, would have a shelf-life decrease to one fourth to one twenty-fifth of its shelf life under refrigeration.[5] Conversely, cold temperatures may harm drugs that should be stored at room temperature. For example, refrigeration may cause precipitates, and freezing may break an emulsion or denature proteins.[5]

USP limits for storage temperatures are listed in **Table 20-1**. Recommended storage conditions are usually stated on the product label and may include a specified temperature range or a designated place (e.g., "refrigerate"). Supplemental instructions (e.g., "protect from light") should also be followed carefully. If a commercial sterile product must be protected from light and is in a clear or translucent container enclosed in an opaque outer covering, this covering should not be removed until the contents are to be used.

In the absence of specific labeling, a sterile commercial product should be stored at controlled room temperature away from excessive or variable heat, cold, and light (e.g., away from heating pipes and lighting fixtures).[4] Regardless of labeled storage conditions, pharmacy personnel are responsible for ensuring that sterile commercial products under their control meet acceptable criteria of stability by (1) storing products under the environmental conditions stated in USP product monographs and FDA-approved labeling, (2) using oldest stock first, (3) observing labeled expiration dates, and (4) observing sterile commercial products for evidence of instability or package defects.[5]

Clarifying Controlled Room Temperature

Because controlled room temperature may range from 15 °C to 30 °C, these storage conditions may not be adequate for certain temperature-sensitive drugs.[6] Clinically important changes can result from only a 5 °C variation in room temperature over the shelf life of a preparation.[7] Alterations in temperature-related drug stability could potentially compromise the assignment of beyond-use dates (BUDs) to sterile compounded prepara-