Supply and Demand: Shortages During COVID-19

Milena Murray, PharmD, MSc, BCIDP, AAHIVP
Associate Professor of Pharmacy Practice
Midwestern University – Chicago College of Pharmacy
HIV/ID Clinical Pharmacist
Northwestern Memorial Hospital

Disclosures

• The speaker has no conflicts of interest in relation to this presentation

Objectives

1. Outline a drug shortage mitigation process.

2. Describe the interruptions in the pharmaceutical supply chain due to COVID-19.

3. Review appropriate messaging to patients regarding drug shortages.
The virus is novel...

drug shortages are not.

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<th>Non-injectable</th>
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Note: Each column represents the number of new shortages identified during that year. Slide courtesy of the University of Utah Drug Information Service, Erin.Fox@hsc.utah.edu.
National Drug Shortages – Active Shortages by Quarter

Note: Each point represents the number of active shortages at the end of each quarter.

Reasons for Shortages as Reported by Manufacturers

Have you dealt with shortages related to COVID-19?
A. Yes
B. No
But what is different this time around?

Outline a drug shortage mitigation process.
Objective #1

Before COVID-19
Management Strategy – Assessing Inventory

Prospectively Review Drug Shortage Websites

- Potential / Impending Shortage
- Ongoing Shortage
- Zero Inventory

Assessment of therapeutic options (e.g., guidelines, antibiogram, cost benefit analysis)

Communicate shortage with clinical leadership

Impose restrictions where necessary and consider creating an emergency cache

Clinician Education

Continue prospective inventory review and ongoing communication with clinicians with follow-up communication for shortage resolution or change in related management

Prospective Inventory Management System

- Pharmacy Purchaser sends list to managers
- Items of concern identified
- Balance on hand of items of concern noted

Address solutions for actionable items

Meet with Informatics to implement plan

COVID-19
Drug Supplies

• Allocation models and usual inventory breakdown
• Surge 150-600%
• Use calculator to estimate drug usage
• Justify needs to wholesaler
• Set up account directly with manufacturer
• Standing orders as needed to get through surges
• Healthcare Distribution Alliance (HDA)
  • Shortage = demand going beyond traditional needs

Protocols

• Alternative agents should have an alternative agent
  • Third- and fourth-line options
  • IT on standby for constant changes
• Policy for dispensing of COVID drugs for non-COVID patients
• Designate Principal Investigator for investigational protocols

Inventory

• Sequester supplies of medication used to “treat” COVID
  • Hydroxychloroquine
  • Dexamethasone
  • Famotidine
• Where will medications be stored?
• Returned medications from COVID+ or patients under investigation
• Prepare for needs of surge facilities
• Inventory management for places there is not usually inventory
FDA Guidance

• Combining propofol products
• Compounding of medications by pharmacy compounders not registered as outsourcing facilities

Products that are aqueous solutions for injection:

- Cisatracurium besylate
- Ketamine hydrochloride
- Dexamethasone sodium phosphate
- Lorazepam
- Dexmedetomidine hydrochloride
- Midazolam hydrochloride
- Epinephrine
- Morphine sulfate
- Etomidate
- Norepinephrine bitartrate
- Fentanyl citrate
- Rocuronium bromide
- Furosemide
- Vancomycin hydrochloride
- Hydromorphone hydrochloride
- Vecuronium bromide

Ethical Considerations

• Ethical dilemma – limited inventory
  • Critical
  • Irreplaceable

Ethical Considerations

• Utilitarianism
  • Priority is placed on patients who have the highest probability of success

• Egalitarianism
  • Priority is placed on patients who come first
What was the largest increase in drug usage for one specific medication that you encountered?

A. 150%
B. 200%
C. 300%
D. >300%

Describe the interruptions in the pharmaceutical supply chain due to COVID-19.

Objective #2
Supply Chain Issues

• Disruption in supply chain of active pharmaceutical ingredients (APIs)
• Downstream issues for just-in-time inventory practices
• Manufacturing details are proprietary
  • Source of API
  • Factory location
  • Products produced at each location
  • Actual manufacturer producing a product

Supply Chain Issues

• Supplies needed during process may be sourced from China/India
• Manufacturers cycle through products
  • Product may not be on shortage in the short term but may be on shortage later
  • This creates a “waiting period”

Safe, Effective, and Accessible High-Quality Medicines as a Matter of National Security

• Relationship between product sourcing and national security
• Production and quality challenges
• International partnerships for regulating, understanding, and managing supply chain
Safe, Effective, and Accessible High-Quality Medicines as a Matter of National Security

- Major issue is lack of transparency surrounding product and ingredient sources
  - Creates a barrier to investigating and averting supply chain issues and ensuring quality products
- FDA encourages manufacturers to adopt continuous vs batch manufacturing
- New technologies will allow for faster detection of quality issues (downside = startup $$$)
- Establish and update a list of essential medications for the US

https://www.ashp.org/news/2020/08/10/ASHP

Expected Shortages

- Continuous renal replacement therapy supplies
- Sedatives and paralytics for ventilation
- Albuterol inhalers
- Injectable opioids
  - DEA has increased production quotas to meet demand

Unexpected Shortages

- Sertraline prescribing increased secondary to anxiety from pandemic
  - Most manufacturers cite lack of API and increased demand as reasons
- Clinical trial using famotidine as COVID treatment led to product flying off shelves
  - Exacerbated by previous removal of ranitidine due to contamination
- Hydroxychloroquine for the treatment of lupus
  - Used in combination with azithromycin as COVID treatment

Review appropriate messaging to patients regarding drug shortages.

Objective #3

Patient Messaging

Patient hears about drug shortage issue in media
- Follow regular shortage protocol

Patient calls clinic with inquiry about medication
- If shortage does occur, alternatives will be identified and discussed with patient

Clinic staff unable to find source of medication
- Due to proprietary information, impossible to predict exact timeline of medication going on shortage
Case

A patient heard on the news that hospitals are unable to get many medications to treat COVID-19 patients. The patient has already had his famotidine switched to omeprazole because his pharmacy was unable to get famotidine tablets in stock and he did not want to switch to famotidine liquid. He is worried about his other maintenance medications.

What do you tell the patient?

Medical Glass, Vaccines, and Shortages

• Majority of all glass is silicon dioxide
• Pharmaceutical glassware is borosilicate glass
  • Higher levels of aluminum and boron
  • Decreases reactivity to chemicals inside
• Domestic surge capacity for vials over the next three years
• SiO2 and Corning scaling up production by millions of vials
• Corning’s Pyrex glass was used for polio vaccine in 1950s
  • New Valor vial will help to minimize breakage
  • Stable at any temperature

Resources

ASHP Drug Shortages: https://www.ashp.org/Drug-Shortages
FOA Drug Shortages: https://www.econdata.fda.gov/scripts/drugshortages/default.cfm
ASHP COVID-19: https://www.ashp.org/COVID-19
ICHP COVID-19: https://ichpnet.org/resources/covid-19/
Summary

- Drug shortages have been a regular presence since the early 2000s
- A consistent mitigation plan and knowledge of the supply chain are key to minimize the effects on patient care
- Patient messaging should be similar to “regular” shortages

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1. Which of the following drug shortage mitigation plans would be the most likely to result in drug allocation meeting demands?
   a. Continue to request drug supply based upon previous need from distributor
   b. Calculate drug supply needed based upon current daily needs for most used medications
   c. Keep one central inventory of all medications to be able to count all medications
   d. Order enough drug supply for six months to ensure inventory for all possible surges

2. Which of the following reasons most accurately describes the breakdowns in the pharmaceutical supply chain due to COVID-19?
   a. Many active pharmaceutical ingredients are made in the US and transport was difficult
   b. Manufacturing details are proprietary and it is difficult to investigate issues and ensure quality
   c. Manufacturers continuously produce one agent which causes issues with production lines
   d. Institutions have weeks of product on hand which creates a back-up of inventory

3. Which of the following messages would be the most appropriate to provide to a patient who is concerned regarding their specific oral medication going on shortage?
   a. It is difficult to predict which medications will go on shortage. If there is an issue with the supply of your medication, we will work with you to find an alternative.
   b. It is unlikely that your medication will go on shortage. Shortages usually affect generic, injectable medications and not oral medications.
   c. It is difficult to predict which medications will go on shortage. We should proactively change your medication in case it goes on shortage.
   d. It is unlikely that your medication will go on shortage. There is an extensive list of medications manufactured in the US and this medication will not be an issue.