Drug Monitoring in Community Oncology: Smart Monitoring & Backup Power for Safety and Savings

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Introduction

Maintaining precise temperature control is critical for preserving the efficacy and safety of pharmaceutical drugs. Many medications, vaccines, biologics, and other temperature-sensitive products, can degrade or lose potency when exposed to temperature fluctuations outside their required storage conditions. Continuous temperature monitoring with real-time alerts ensures that deviations are detected and addressed promptly, preventing costly product losses and ensuring regulatory compliance. However, power outages, system failures, inclement weather or failing assets can disrupt monitoring, creating risks for drug storage facilities. Implementing an Uninterruptible Power Supply (UPS) as a backup power source ensures that temperature sensors remain operational, safeguarding both data integrity and drug quality. By integrating temperature monitoring along with UPS support, pharmaceutical facilities can enhance reliability, minimize risks, and maintain patient safety.

Method

Utilizing Drug Temperature Monitoring Devices

Temperature sensors were installed in pharmaceutical storage areas to continuously monitor environmental conditions. These sensors were programmed to send real-time alerts via SMS when temperature deviations occurred. Data was logged automatically to ensure compliance with regulatory standards. To enhance reliability, a UPS was integrated as a backup power source, ensuring continuous operation of the monitoring system during power outages. The effectiveness of either system independently or combined allowed an approach assessed based on alert accuracy, data, inventory retention, and system uptime during disruptions.

Breakdown

Importance of Temperature Monitoring

Continuous monitoring ensures drugs remain within safe temperature ranges, preventing degradation. Even slight temperature fluctuations can impact drug potency and patient safety.

Real Time Sensor Alerts

Temperature sensors provide instant alerts for deviations, enabling quick corrective actions. Automated notifications via SMS help ensure rapid response before temperature-sensitive products are compromised

Data Logging and Compliance

Continuous data logging ensures a documented history of temperature conditions, reducing liability and streamlining quality assurance processes. Automated records support regulatory compliance required by FDA, GMP and USP.

UPS Backup Power

Uninterruptible Power Supply (UPS) ensures refrigerated assets remain operational during power outages. This prevents gaps in temperature monitoring, maintaining real time alerts and data integrity even during unexpected power failures

Drug Excursions

MKT (Mean Kinetic Temperature) reflects the overall impact of temperature changes on a drug's stability, helping assess if excursions affect product quality. In the event of a potential drug excursion, MKT value is assessed, determining the safety and efficacy if the drug in question.

Optimizing Drug Safety

A combined approach of sensors and UPS minimizes risks, ensuring drug efficacy and patient safety. This dual-layered system enhances operational reliability, providing peace of mind to patients, providers and healthcare facilities across the nation.

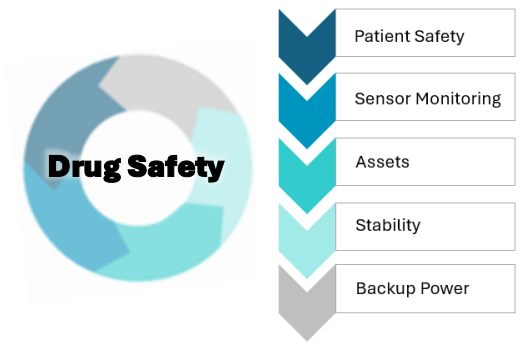

Figure 1

Figure 1: Key Aspects of Drug Safety steps utilized in AON

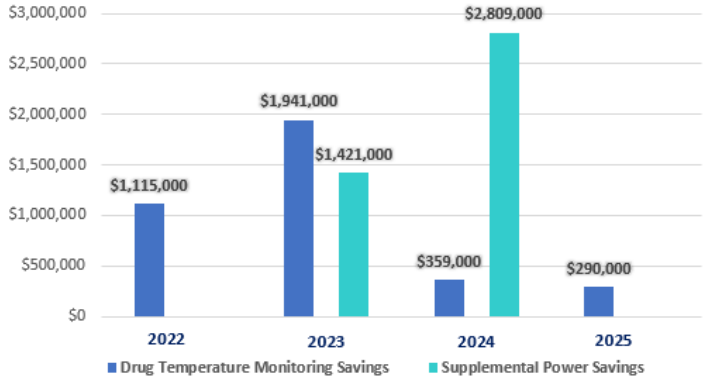

Table 1

Table 1: Recorded yearly data of saved products monitoring sensor notifications and supplemental power utilization

No Financial Disclosures To State

AON Statistics

- Number of Clinics: **140**
- Active Drug Monitor Sensors: **300**
- Supplemental Power Supply: **32**

Figure 2: **American Oncology Network Locations**

Results

- **Temperature Monitoring Saves (Savings): $3,705,000**
- **Supplemental Power Saves (Savings): $4,230,000**
- **Combined Total Saved Products: $7,935,000**

Conclusion

Investing in both systems leads to substantial cost avoidance, ensuring pharmaceutical product integrity and enhancing patient safety and reliability.

References

1. USP. USP 39–NF 34. <1079> Good Storage and Distribution Practices for Drug Products, Rockville, MD: United States Pharmacopeial Convention; 2016
2. International Council for Harmonisation. Stability testing of new drug substances and products Q1A(R2). Dated 6 February 2003. Accessed 06 March 2025. https://database.ich.org/sites/default/files/Q1A%28R2%29%20Guideline.pdf