

Management of refrigerated medications during and after a hospital-wide power outage

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Background

Access to uninterrupted and/or essential power is a critical requirement for hospital processes, including temperature controlled medication storage. Fiona Stanley Hospital, Western Australia's largest hospital has 90 refrigerators and freezers located across clinical areas, all of which are continuously monitored using a centralised computer-based system, iELVS.

Description

An unexpected, prolonged hospital-wide power outage and resulting medication refrigerator/freezer failures led to hundreds of temperature-exposed medications requiring quarantine and review for suitability for future use.

Action

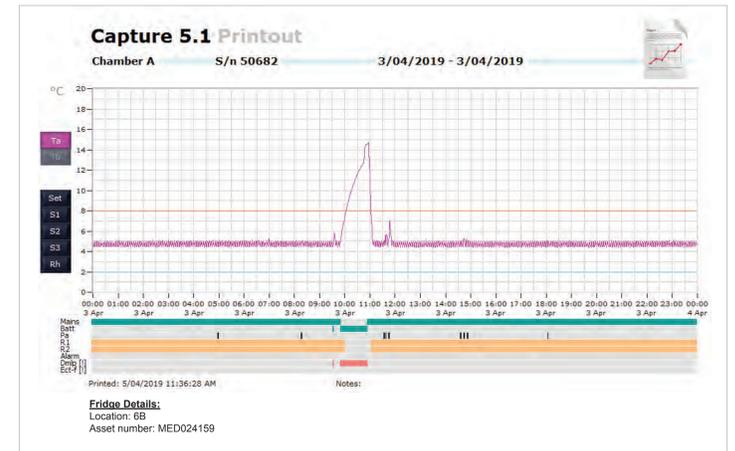
The need to co-ordinate a rapid response to a variety of temperature excursions due to compromised power supply was promptly identified by pharmacy. The responses included:

- Immediate review of medication refrigerators and freezers, delegated to clinical pharmacists and ancillary staff. This included assessment of the occurrence and extent of any temperature excursion and assessment of medication stability using in-house data from the hospital's Medicines Information Centre (MIC).
- Immediate quarantine and replacement of all potentially affected medications to functional refrigerators and freezers (Figure 1).
- Follow up review of iELVS data and refrigerator/freezer SD card data to confirm the occurrence and extent of any temperature excursion (Figure 2).
- Follow up review of drug stability for each medication conducted by the Medicines Information Pharmacist. This included review of product information for each drug, followed by interaction with the relevant drug company if required. Stability outcomes were documented in an Excel spreadsheet specific to each area.

Figure 1: Quarantined Medication Stored in the Main Pharmacy Cool Room



Figure 2: SD Card Temperature Excursion Data



Evaluation

As a result of the power outage,

- Forty seven fridges experienced a temperature excursion, reaching temperatures above 8°C for at least 15 minutes. Further details are outlined in Table 1.
- Medication stability review identified:
 - » Medications valued at \$164,816 were unsuitable for use. This included approximately \$150,000 worth of stock where lack of new stability information resulted in incorrect quarantine storage and subsequent loss.
 - » Medications valued at \$215,610 were suitable for use. These have been recirculated with identifying stickers noting the product experienced a temperature excursion and where necessary, modified expiry conditions.

Table 1: Temperature Excursion and Medication Details

Area	Location	Number fridges/freezers which experienced a temperature excursion	Temperature excursion duration mean (min,max); maximum temperature	Number of medications in fridge / freezer	Number of medications reviewed and determined as suitable to use on the day of event	Number of medications quarantined for follow up assessment	Number of medications unsuitable for use	Cost of medications unsuitable for use
Pharmacy	Pharmacy Dispensary	5	69 (60,80) minutes; 14.3°C	148	71	77	37	\$150,506.95
	Investigational Drugs	0						
	Pharmacy Compounding	1	90 minutes; 15°C	15	0	15	7	\$1,324.67
	Main Pharmacy Cool Room	0						
Hospital	Wards and Outpatient Clinics	41	56 (7,140) minutes; 22°C	726	533	193	14	\$12,984.67
							TOTAL	\$164,816.29

A number of improvement strategies were determined:

- Failure of iELVS delayed identification of temperature excursions. Awareness of SD card data allows for a more rapid identification of temperature excursions.
- There was no disaster management response specifically for refrigerated medications. A co-ordinated plan for pharmacy has been prepared for future reference.
- A need was identified for quick reference guides noting the location of all medication refrigerators/freezers in the hospital, connections to essential or uninterrupted power supplies, and information regarding medication stability for pharmacy staff.
- Recorded air temperature is often higher than product temperature, resulting in a higher wastage of stock. Stand-alone temperature devices have been purchased for pharmacy cold storage areas (Figure 3).
- Addition of essential or uninterrupted power supply to the main pharmacy cool room to provide uninterrupted cold storage for medications throughout the hospital.
- Information on how medications should be stored after a temperature excursion can change with time. If unsure, the drug company should be contacted promptly for clarification.
- Organisational skills and clear documentation are essential to keep track of communication with other pharmacy staff and drug companies contacted during the review of medications.

Figure 3: New Temperature Monitoring Devices



Implications

While hospital-wide power outages are rare, unforeseen events do occur. Having a co-ordinated, planned response for the management of refrigerated and frozen medication exposed to a temperature excursion ensures all relevant areas are checked and each staff member knows their role.