

Cool Technology Protects Medication Shipments

It sounds like one of those complicated word problems from algebra class:

If a prescription requires a storage temperature of 40 degrees Fahrenheit and leaves St. Louis (where it is currently 94 degrees) at 4 p.m. Monday to be delivered to a patient in Los Angeles (where it is currently 90 degrees), how long will it take to get there and how much ice will need to be included in the package to keep the medication from spoiling?

For many, it appears impossible to solve, but a computer program developed by Express Scripts can do just that in a matter of seconds. So how does the system figure it out?

“It’s a trade secret,” said Charlie Eller, vice president, Pharmacy Technology. “There are only a few people in the entire company who know the science and magic behind how the program works.”



Charlie Eller, vice president, Pharmacy Technology, stands in a holding cooler full of temperature-controlled medication shipments waiting to be picked up for delivery to patients.

Developed Down to a Science

The program, which uses complex algorithms combined with National Weather Service data, is part of an overall process used in the Express Scripts and Accredo pharmacies to manage the shipment of temperature-sensitive medications.

At the home delivery pharmacies, all medications that require temperature controls — such as insulin, many specialty medications, hydrocortisone and various other creams and gels — are stored in open-air coolers similar

to those in the dairy department of a grocery store. When a prescription for one of these medications is pulled and sealed in a shipping bag, the automated process diverts the shipment to a clerk. The clerk scans a bar code on the outside of the bag, and that's when the computer program does its work.

“The software assigns the medication a ‘temperature path.’ The bar code on the package is used to retrieve the information — where the medication is, the temperature in the building, time of day, where it’s going and the average daily temperature forecasted in both locations for the next three days,” Charlie said. “Then it instantly computes what size cooler to pack the medication in, how many ice packs to include in the cooler, and the shipment method needed to make sure the medication arrives safely.” Depending on the needs of the specific package, delivery time ranges from the next morning to two days. If the program cannot ensure the shipment will arrive in a refrigerated state, it will not allow the order to be shipped. The coolers — which come in small, medium and large — are made of white, molded foam, and the ice packs are a gel material sealed in plastic. When scorching high temperatures plague certain parts of the country, some shipments require as many as nine ice packs.

“The way the heat transfer works, once that cooler is sealed, it maintains the right temperature throughout the package as long as the gel packs are still partially frozen,” Charlie said. “It’s really quite a science to make sure the temperature stays exactly where it needs to be for shipment.”

Engineered to Save

Charlie was among the engineers who developed the software and the overall process in 2006. Every part of the process is planned to ensure the safety of the medication while maintaining efficiency. For example, the coolers are white because they reflect light and heat, and the small cooler’s dimensions are precisely engineered to be within shipping companies’ size limits so that freight is charged by weight and not dimension. The software also recommends the precise amount of ice — not too much, not too little — so the medication stays at the right temperature while controlling the weight of the shipment.



Frozen gel packs keep medications that require temperature controls safe during shipment.

“We have saved tens of millions of dollars because of this program,” Charlie said. “And we’re continuously refining and improving the process while managing costs.” And that cost is noteworthy. Among traditional medications, temperature-controlled shipments account for less than 5% of the total shipments yet represent nearly one-third of the total postage cost. Up to 75% of some specialty pharmacy shipments are temperature-controlled. That adds up to a lot of ice packs.

“We will likely use 20 million pounds of ice packs this year to protect medications during shipment,” Charlie said. “It’s all part of what it takes to make sure patients receive their medications safely.”

By CATHY REGAZZI