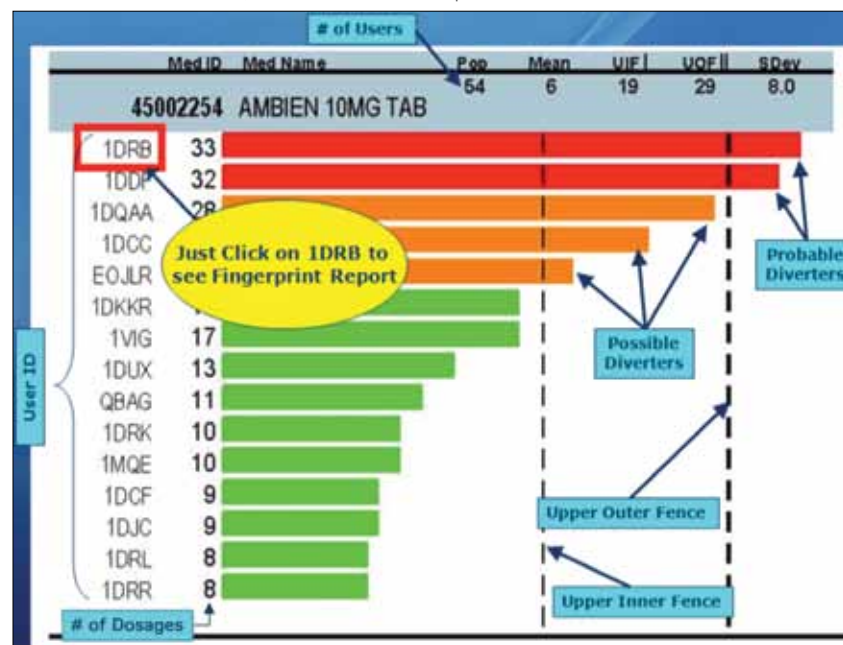By Carla J Maslakowski*, MS, MEd, RPh

Comparing **Diversion Monitoring Software Options**

Given health-system professionals' often easy access to controlled substances, it is not surprising that approximately 15% of health-care staff struggle with drug dependence at some point in their career, according to a 2010 study by the National Council of State Boards of Nursing.[1] With many pharmacies using a decentralized drug distribution method driven by automated dispensing cabinets (ADCs) to increase turnaround time and provide secure storage for medications, hospitals can be lulled into a false sense of security regarding employees' ability to divert medications. The use of ADC technology, while helpful, is insufficient by itself to prevent diversion; thus the challenge remains for pharmacy to develop systems around ADC technology that will ensure drug control, identify potential drug diversion, optimize workflow, and allow for effective inventory management.

Tenet Healthcare Corporation comprises 50 acute care hospitals and 90 outpatient centers in 13 states, an extensive system wherein we use Pyxis, Omnicell, AcuDose-Rx, and RxStation ADCs. Approximately 85% of controlled and non-controlled medications are stored in profiled ADCs that must serve many functions: accurate and responsive drug storage, efficient distribution, precise inventory control, error-free billing, and extensive reporting. While ADCs are extremely useful in managing medication dispensing and tracking data, we found that one system tool in particular—utilization reports—did not provide sufficient detail to comply with current regulatory requirements.

FIGURE 1.
Sample Report of Anomalous Usage by Station

Using a color code, Pandora identifies those users over the UIF (possible diverters) and those over the UOF, who are considered probable diverters.
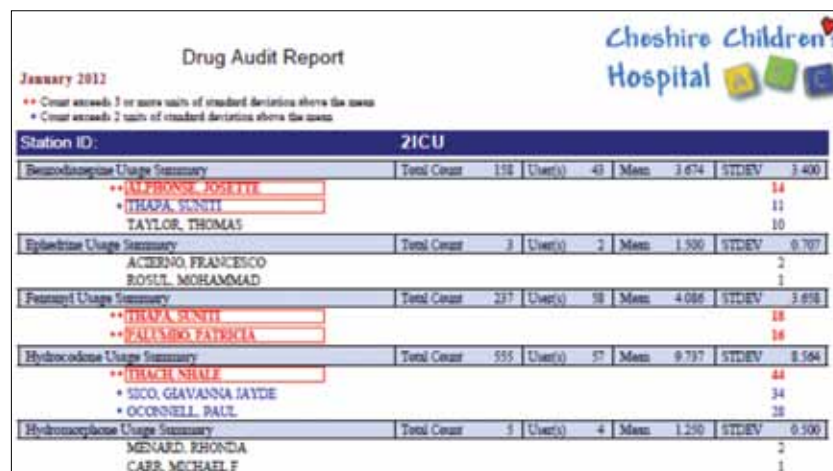

Testing Monitoring Software Tools

Using a manual approach, our pharmacists were spending more than 15 hours a week reviewing ADC reports to comply with numerous federal and state controlled substance regulations, including those of the Drug Enforcement
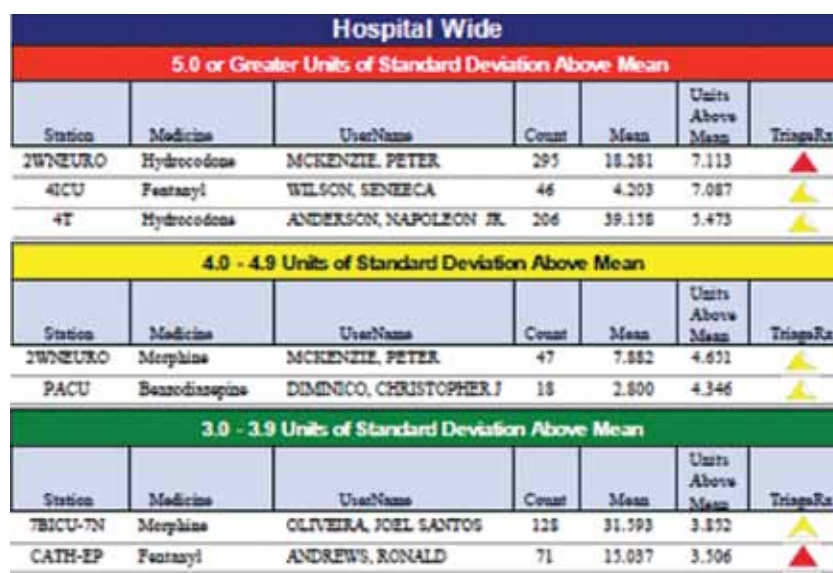
FIGURE 2A.
Sample Report of a Drug Audit by Station

RxAuditor's view of transactions by class or a group of line items allows monitoring of diverters who are more likely to divert across a variety of line items, such as all strengths of morphine.

FIGURE 2B.
Sample Diversion Index

RxAuditor uses a diversion index broken down into a red-yellow-green report that summarizes risk.

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Administration's Office of Diversion Control, specifically Title 21 CFR Part 1300, which addresses security, records, orders, prescriptions, disposal, and wasting and return of controlled substances, and requires hospitals to effectively monitor, detect, and prevent diversion.[2] In addition, the ADCs must be monitored for inventory control, data analysis, and medical billing audits. Cabinet inventory management, including all loading and unloading activities, quantities of stock in the cabinet, medication override criteria, and discrepancy resolution, all require reviews for compliance. In February of this year, as part of the Tenet Healthcare's Taskforce on Pharmacy Compliance/Medication Management/Information Technology, a system-wide directive was given both to improve controls and to reduce the frequency of issues identified during internal audits. Thus, we began a search for a software tool that could automate cabinet monitoring and provide enhanced reporting capabilities, while simultaneously reducing pharmacy's workload.

Product Comparison: Pandora vs RxAuditor

We conducted an evaluation of the available software from two vendors: Pandora Analytics from Omnicell, which was already being used at some facilities within the system, and RxAuditor from Medacist, which was selected based on a search of the literature.

Pandora Analytics is a pharmacy-specific analytical tool that searches for patterns of medication diversion in Pyxis, Omnicell, and AcuDose-Rx ADC systems. ADC usage data is imported daily into the Pandora system, which allows for on-demand access of information, as well as automatic e-mail distribution and alerts. Product licenses are based on cabinet count. Based on an SQL database, Pandora's software is installed on hardware purchased for each individual facility.

RxAuditor is a Web-based diversion detection and economic reporting product. The local hospital facility uploads data to the Medacist server and a series of reports are then available within hours for download by facility personnel from the customer Web site. RxAuditor uses an Oracle database, and requires no hardware investment to use the product. See Table 1 for a comparison of product features.

Pilot Studies

Three sites within the system were chosen to conduct 90-day pilot studies to review RxAuditor individually (as it was a new product to us), and to evaluate RxAuditor software against the existing Pandora Analytics software. We looked

TABLE 1.
Software Comparison

Software	Pandora	RxAuditor
Components reviewed	Pandora Clinicals	RxAuditor Basic, RxAuditor On Demand, RxAuditor 360
Database	Oracle	SQL
Deployment	Facility hardware	Web-based
ADC types	Omnicell, Pyxis, AcuDose-Rx	Any ADC
Reconciliation of removals to charting of administration	Not available	Integration available using optional RxAuditor 360 module
Economic reports	Par optimization, other info is available in the optional financial module	Workload performance, stock out, refill summary, inventory shrinkage, and par analysis available in base module
System reports	Individual hospital only	System, region, and hospital based comparison reports available
Price	Based on number of ADCs	Based on licensed beds per facility
Report display	Uses graphical display of data and red, orange, and green colors to identify possible areas of concern	Displays data on reports in red, blue, or black font to indicate level of concern; uses red triangle to indicate users with the greatest diversion risk
Report characteristics	Trend by hours worked and uses statistical analysis	Trend by hours worked and uses statistical analysis
Override, discrepancy, and waste reports	Yes	Yes

for reports that enabled users to drill down by class and drug by various strengths and diversion methodology that identified quality issues and provided user-specific drug audit reports. Additionally, we evaluated the companies' customer support and implementation assistance—key items for a product roll out.

We began with a review of the displays for each product and found both to be thorough and clear. Figure 1 shows information from a sample Pandora report, including employee IDs in the left hand column, the number of dosages withdrawn, the medication ID, and the medication name. The data analysis is based on the number of users (or population), and it delivers the resultant mean, standard deviation, and quartile fences. UIF is the upper inner fence (19 in this example) and it indicates possible diverters. UOF is the upper outer fence (29 in this example), and anyone in this category is considered a probable diverter.

Figure 2A shows a sample RxAuditor report that identifies the top five users with the most transactions relative to his or her peers. The fictitious users with two diamonds next to their names have transaction volumes that were three standard deviations beyond the mean. The view of transactions by class (eg, benzodiazepines) or a group of line items (eg, all morphine-containing products) allows monitoring

of diverters who are more likely to divert across a variety of line items, such as all strengths of morphine.

The diversion index (see Figure 2B) is broken down into a red-yellow-green report to demonstrate diversion risk among ADC users. Red indicated 5.0 or more units of standard deviation above the mean for the month. Given the high probability of diversion risk, an internal audit should be conducted for each of user in this group. Yellow indicates 4.0-4.9 units of standard deviation above the mean for the month. Because many diverters fall into this statistical range, this list of users should not be ignored. Finally, green indicates outliers anywhere between 3.0−3.9 units above the mean for the month. Although diversion remains possible within this statistical range, it is more likely that these users have a unique set of responsibilities that justify the unusual activity.

In addition to the statistical risk categories, RxAuditor indicates the users with the greatest diversion risk for the calendar month based on the three primary diversion reports:

1. Number of doses dispensed for a specific drug category at the station and/or unit level
2. Number of doses dispensed for a specific drug category hospital-wide
3. Number of doses dispensed for a specific drug category per day worked at the station and/or unit

Pilot Study Results

The results of our in-depth pilot studies revealed that employing either software product tested would prove to be valuable to our institution, as each delivers enhanced monitoring and reporting capabilities and would save staff hours in compliance tasks. Given that both products were capable of meeting our primary goals, we then evaluated how each product would best integrate with our system's existing equipment and current practices. We reviewed compatibility to the many different ADCs that are in place across our facilities as well as the ability to integrate into our Cerner Millennium healthcare information applications to support closed loop monitoring from medication removal to administration and documentation. Finally, we considered the installation costs and the availability of dashboard reports based on system, region, and individual facilities.

Ultimately, the product your facility chooses must be the best fit for the existing structure and culture of your facility. Nonetheless, it is quite clear that employing diversion monitoring software to augment the security of your ADCs is a key element in ensuring safe practices and meeting TJC requirements for medication security. ■

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