

Aurora Health Care Improves Patient Outcomes through Business Intelligence



Aurora Health Care
Milwaukee, WI
www.aurorahealthcare.org

Industry:
Healthcare

Annual Revenue:
US\$3.5 billion

Employees:
26,000

Oracle Products & Services:

Oracle Database
Oracle Discoverer
Oracle Warehouse Builder
Oracle Application Server
Oracle Forms
Oracle Reports
Oracle University

“Our executive management is extremely happy about how the world-class results from our Oracle data warehouse have helped improve patient care outcomes. Our user community is pleased with the solution and eagerly advocates more data to be added to the data warehouse.” – Patrick Falvey, Vice President of Care Management and Clinical Research, Aurora Health Care

In an era when U.S. healthcare providers struggle to cut costs without compromising care, Aurora Health Care has achieved national recognition for improving patient outcomes. Serving more than 90 communities in Wisconsin, Aurora is one of only 49 U.S. hospitals to ever have received “top performer” awards from Premier, Inc., a leading national healthcare alliance that provides tools to measure best practices, consulting and group purchasing. Indeed, Aurora received eight of those awards for 2007—the highest number any single health care system ever received in a single year. In 2008 Aurora was named the number one performing health system in the country based on the third-year results of the national Centers for Medicare & Medicaid Services (CMS), Premier healthcare alliance pay-for-performance project. This recognition, followed by the study by Benefit Services Group, concluded that Aurora is the most cost efficient hospital system in the Milwaukee area and was delivering on its promise to provide the best care, improve the health of Wisconsin, and be an excellent steward of health care dollars.

Aurora also rates in the top 20% for healthcare excellence benchmarks set by the Centers for Medicare and Medicaid Services (CMS), which rewards additional Medicare funding to providers who participate in the CMS study and perform in the top 20% of the five clinical areas.

Aurora’s progress began in 1996, with an initiative to improve patient outcomes. Teams of Aurora clinicians met to determine best treatment practices. The teams later included IT professionals for guidance on how to gather and mine reliable patient data to support those practices. As a result of careful analysis, Aurora selected an Oracle data warehouse as the heart of the system to

Key Benefits:

- Provided ability to report top performance in national outcomes databases, leading to top performance ratings and additional Medicare compensation awards
- Improved accuracy of data and ensured enterprisewide data sharing
- Incorporated chart review elements into reports for increased physician acceptance.
- Improved patient experience by allowing the doctor to prepare before the patient visits and review the results at the time of visit
- Ensured HIPAA Compliant Data Marts
- Provided dashboards with near-real-time data that enabled workflow automation
- Consolidated departmental systems and processes
- Eliminated additional vendor systems, saving \$200,000 in one year

help it improve patient outcomes. Today, Aurora's practitioners update their knowledge through continuous research on the finest medical and nursing science proven practices. The Oracle system constantly tracks their progress, so the Aurora can set even higher goals. Access to the organized information has also allowed Aurora to change institutional behavior by rewarding physicians for improving their patients' health.

One example of how having access to better data improves health is how Aurora ensures diabetic patients are routinely tested for renal function and other potential issues that can arise from the disease. "Diabetes can cause kidney failure, so it's important that each diabetic be tested. By delivering kidney function data to our doctors using the Oracle data warehouse and reporting tools, we've doubled compliance for kidney function testing within a year," said Chris Hurst, IS director Data Warehousing, Aurora Health Care. "We are able to list all patients who have diabetes and note the last time their renal function was tested, including vital signs recorded at the time of the test. Practitioners see at a glance everything that should be done for that patient, and the system allows for doctors to conveniently update the record as each activity is completed."

Aurora's 13 hospitals, more than 100 clinics, and over 130 community pharmacies, rely on information from its Oracle data warehouse, which also provides data to organizations that measure provider performance. Having the Oracle data warehouse allows Aurora and its patient community to see how various Aurora facilities compare and how Aurora measures up with the wider healthcare community.

Improved Patient Outcomes Benefits Bottom Line

In 2003, CMS, in partnership with Premier, invited Aurora and approximately 500 other hospitals to participate in a demonstration project to see if rewarding quality healthcare with additional compensation would improve the quality of care for Medicare patients. The results showed CMS that increasing Medicare payments to top-performing providers indeed improved the quality of the care. Hurst said Aurora's participation in the project would not have been possible without having its Oracle data warehouse.

"Aurora strives to be in the top 20% for these benchmarks in any one of the five clinical areas, such as for successfully treating

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Chris Hurst
IS Director Data
Warehousing
Aurora Health Care

pneumonia and diabetes, and that’s what our Oracle solution helped us to do,” Hurst said. “As a result of our high benchmarks, we’ve gotten CMS awards of US\$876,000 over a three year period in additional Medicare payments since Aurora began participating in the CMS pilot study.”

Eliminating Third-Party Applications Saves \$200,000 in One Year

Hurst’s team hadn’t intended to write applications, but once they realized how easy it was to use Oracle tools based on PL/SQL data structures they’ve replaced third-party reporting applications at a rate of two each year. One application that was eliminated was used to alert managers about time allocations, and this saved Aurora US\$100,000 in maintenance costs. “Replacement was simple using Oracle tools,” Hurst said. “Similarly, we’ve eliminated an HBOC product used for generating simple reports that also cost about \$100,000 a year in annual maintenance. Unlike Oracle, the previous tools didn’t allow distributing reports through the intranet, so we also eliminated that inconvenience and expense.”

Aurora uses PL/SQL and Oracle Warehouse Builder to build the functions and procedures when loading more complex data marts. The team appreciates Oracle Warehouse Builder’s GUI interface. “Oracle Warehouse Builder does a lot of the translation of dates and the data mapping making it easier for the developer to use,” Hurst said.

Data marts for care management, clinical, marketing, philanthropy, financial, collaborative, and metrics, are updated on a monthly basis, while laboratory data is updated weekly, and inpatient census information is updated each night. Data comes from legacy systems into data stores for the electronic medical records, hospital, clinic, pharmacy, lab, general ledger purchases, and other data.

Hurst said his team appreciates that the flexibility of Oracle’s solution allows archiving data in its original state. “Historical data might be needed for future studies, Hurst said. “Yet, even before we’re able to put data into a clean data mart, the IT team can generate quick reports directly from the data store or off the operational data store system and extract good business information before it’s even uploaded into the data mart. If we find a mistake in the data mart we can still go back and repopulate

the data mart information from the data store without revisiting the legacy system.”

For the simplest reports, Aurora uses PL/SQL, while more complex reports are run using Oracle Discoverer. “It was easy to train staff to run reports because a lot of the new people, just out of school, have done PL/SQL or at least SQL. Prior to Oracle, we used PowerHouse 4/GL, which required special training. Or we downloaded data into Microsoft Access and used its query tool function, which wasn’t advanced enough and didn’t allow us to deal with the volume of data that we now have with all our operational data stores,” Hurst said.

“The value of the data warehouse is seen through improved patient outcomes; improved patient encounters, reduced work load, greater satisfaction for the physicians, and top performance in national benchmarking,” Hurst said. “As an added bonus, the data warehouse support infrastructure is economical to maintain, consuming but a small fraction of overall IT infrastructure costs.”

Why Oracle?

When Aurora started its initiative to improve patient outcomes, teams of clinicians determined which best practices would be implemented at Aurora, but they needed IT’s help in identifying the patients that matched best-practice initiatives. At that time, most information was accessible one patient at a time. The data came from disparate operational systems, and each system had its own provider identifiers and patient identifiers. There were many departmental sources for patient information including medical charts, Excel worksheets, MS Access databases, and core operational systems. Producing reports was resource intensive, and we could not trust that the data was accurate.

Eventually, Aurora chose Cerner for the electronic medical record repository, but it still had to tie separate operational systems for its pharmacies, clinics, Aurora’s home care unit, teleservices, and for new facilities. It was decided to deploy a data warehouse for collecting, cleaning, organizing, and analyzing data across the enterprise.

“We evaluated Microsoft SQL Server and Oracle,” Hurst said. “Our success in improving care management was directly related to the decision to use Oracle for our enterprise data warehouse. After months of research and ROI calculations we determined that Oracle would be the best solution to manage processing time,

report requests and distributions, create interfaces, deal with data volume, develop applications rapidly, scale and control growth, and create standard report templates.”

Aurora also liked the fact that with Oracle’s suite of database administration and reporting tools, it could discontinue buying and maintaining third party packages.

“We wanted to use the intranet to distribute the reports, which was a huge savings in time and money in getting the reports in the doctors’ hands,” Hurst said. “Oracle allowed us to build intranet applications that generated near-real-time reports that matched various best practices and initiatives. It was an important step.”

Over time, additional business benefits emerged from the Oracle data warehouse environment, such as having HIPAA-compliant data marts, workflow automation for clinical trials, behavioral health and medical management, and easy access to philanthropy information. Incorporating chart review elements into reports facilitated physician acceptance of the system, and it improved the patient experience by allowing the doctor to prepare the patient for hospitalization by reviewing test results with them ahead of time. With the ability to display near-real-time data in dashboards for provider report cards and nurse-to-bed ratios, the system improved workflow efficiency. In addition, having accurate data to share with national benchmarking databases led to receiving national recognition for top performance. And the enterprisewide data warehouse saved money with the ability to replace and consolidate existing departmental systems and processes without need for additional third-party systems.

Implementation Process

The Oracle implementation began in 2000, when Aurora converted flat files into the Oracle infrastructure and began reporting from the new system. By 2002, the system was in full production, with reports, including those for care management, being distributed through the intranet.

Hurst notes that Oracle University was important to the success of the Oracle deployment. “We took care to send the people who most wanted to learn to Oracle University, and each time they came back able to accomplish something they couldn’t do before. Those who attended Oracle University appreciated the opportunity to meet with their peers, and they reported back that the instructors were excellent,” he said.

Aurora Health Care is a not-for-profit Wisconsin health care provider and home to Aurora St. Luke's Medical Center.