2013 LHD of the Year Award

LHD NAME: Denver Public Health
LHD SIZE (population served): Large (500,000 and greater)
ESSAY THEME: Technology

LHD Overview

Denver Public Health (DPH) is a local health department that is committed to promoting, improving and protecting the health and well-being of the residents of Denver and beyond. DPH does this by partnering with Denver's diverse communities on education and health promotion activities, direct clinical care, and other disease prevention services. DPH serves the 634,265 residents of the City and County of Denver along with providing many services to a larger community of about 2.9 million residents within the seven-county Denver metro area. DPH, which has about 150 employees, offers services in the areas of sexually transmitted disease (STD) screening and treatment, family planning, immunizations, tuberculosis screening and treatment, tobacco cessation and education, health promotion and active living, worksite wellness, preconception health education, vital records, and HIV/AIDS primary care. DPH also has informatics, preparedness, an epidemiology and surveillance departments, and an STD/HIV Prevention Training Center. DPH is a department within the Denver Health (DH) organization. DH is an integrated, efficient, high-quality healthcare system that serves as a safety net institution for Denver County. DH consists of approximately 5,500 employees and provides care to around 150,000 Denver County residents annually, which is about 25 percent of the population.

Statement for LHD of the Year Award: Technology

Denver Public Health has a strong vision and commitment to use information technology to improve the health of Denver residents. During the recent past, DPH has instituted several technological initiatives to facilitate improved data capture and process flow, innovative communication strategies, enhanced patient care and medication adherence monitoring, structured data models for storing information, and business intelligence (BI)dashboards and reports to provide meaningful and useful epidemiologic and surveillance information. These initiatives can be summarized into three specific informatics efforts: (1) the HANDI (Hand-held Automated Notification for Drugs and Immunizations) system; (2) Patient Relationship Management (PRM); and (3) a public health data warehouse and BI reporting system. Each of these systems provides key technology enhancements that enable DPH to better serve and improve the population health of Denver.

HANDI

The HANDI system is a mobile device application developed to improve data capture and administer immunizations efficiently. During the H1N1 outbreak, DPH and other local health departments

immunized numerous individuals in a short time period. These efforts were all paper-based processes. After completing the vaccine campaign, a large data entry effort was needed to enter the information into an immunization registry. Processing paperwork documentation by the individuals and clinicians required significant amounts of costly labor. The HANDI system was developed to streamline this process and efficiently capture real-time the patient's information electronically using Apple iPhones or iPod Touches.

The HANDI system uses a three-step process to collect data: (1) patient registration; (2) medical contraindication; and (3) vaccination information. In the first step, the patient is registered using a "sled" scanner attached to the mobile device. The scanner reads the magnetic stripe or barcode that is found on driver's licenses, employee ID's, or other forms of identification and stores that information on the device. If the identification card is not readable or available, the information may be hand-entered into the device. Any additional information can be updated at this point too. An identification barcode is printed using a portable printer and the person is sent to the next station. At the next station, the healthcare worker scans the barcode, bringing up the patient record, and the app collects medical information. Next, the vaccination is administered and the app scans information identifying the lot number, dosage, and vaccination site. The process is fast, efficient, and effective at capturing all of the necessary vaccination information.

After vaccination administration, the encrypted information on the mobile device may be transmitted in real-time to an application server or can stored on the device and transmitted at a later time. The application server stores the information in a SQL-server database format and can transmit the data to an immunization registry in HL7 format or other designated formats. All data transfers are encrypted and compliant with all healthcare security regulations.

HANDI was first piloted at a Colorado State University meningococcal vaccination campaign shadowing 42 patients. The entire process from registration to vaccination completion was about five minutes per person. Subsequently, it was piloted during the DH annual employee flu vaccination campaign and 242 employees were registered and processed using HANDI. The processing time continued to improve. In the fall of 2012, the system was used to capture all flu vaccinations given during the DH flu vaccination campaign, which vaccinated about 3,000 employees. The electronic capture of the patient and vaccination information is now a minimal portion of the three to four minutes during the patient immunization process. The total cost of staff time for this flu vaccination campaign decreased 55 percent while immunizing 28 percent more employees compared to the previous year, in which HANDI was not used. All of these influenza immunizations were electronically sent to the state immunization registry, making the process completely paperless. Recently, the HANDI system was used to help immunize workers at on-site childcare centers throughout Denver County with the Tdap vaccine to combat an ongoing pertussis outbreak. HANDI is an excellent tool to collect vaccination information and send it on to immunization registries. Data from these registries may then be analyzed to determine geographic pockets of need for additional immunization efforts. By recording immunizations in a timely manner, DPH can more effectively target communities for immunization activities and reduce the spread of disease.

Patient Relationship Management

Patient Relationship Management (PRM) is an application developed through a partnership among DH, EMC, and Microsoft. The application is based upon the Microsoft Dynamics Customer Relationship Management (CRM) system and is customized to focus on improving patient care in the healthcare setting. DPH utilizes PRM in two unique settings: one for communicating with teens in a youth experimental learning program called TOP4ME (Teen Outreach Program for Media Enhancement)and one for improving the health and medication adherence of HIV/AIDS patients called ROCC (Retention of Clients in Care). Through the use of PRM, patients received better health education and patient care.

TOP4ME is an evidence-based youth development program that engages young people in experiential learning activities with the purpose of preparing them for successful adulthood and helping them avoid problem behaviors. This youth program is made possible through a cooperative agreement with the Department of Health and Human Services' Office of Adolescent Health and uses the Wyman's Teen Outreach Program (TOP®) with a supplemental text messaging component. The program is designed for youth ages 14–18 and focuses on reducing rates of school failure, school suspension, and teen pregnancy. The curriculum addresses topics as relationships, peer pressure, decision-making, values clarification, goal-setting, adolescent development, and sexual health. The program is enhanced through the use of PRM as a communication and reinforcement tool. PRM sends text messages to emphasize key lessons from the program and provides health service referrals, increasing opportunities for young people to access contraceptive care. The program targets approximately 800 low-income and minority youth at four Boys and Girls Clubs of Metro Denver (BGCMD). This partnership between DPH and BGCMD allows DPH the opportunity to work directly with youth within the community using a primary communication tool that youth now embrace. The text messages consist of informational messages, questions based on recent learning sessions, links to various services, and reminders about classes and events. Text messages and responses from the youth are stored in PRM and analyzed for program participation and responsiveness. During the first year of implementation, 15,726 messages were successfully sent to the participants. Responses from the participating youth and staff have been very positive regarding this innovative learning program. One research objective of this program that will be studied over time is to determine how text messages enhance the program's effectiveness with youth.

PRM is used in the ROCC program to help HIV-infected patients adhere to medication regimens and facilitate consistent follow-up with primary care providers. The ROCC program integrates data from several sources, including a registry of HIV patients seen in the DPH Infectious Diseases Clinic, the appointment scheduling system, DH visit histories, lab data of viral load and CD4 test results, and pharmacy data.

The purpose of the ROCC system is to follow up with patients who inconsistently take their medications or see their medical provider less frequently than recommended. The ROCC system evaluates pharmacy data and flags anyone who has not picked up refill prescriptions of their HIV medications within 10 days of their previous prescription ending. A pharmacist reviews flagged records to ensure the patient's medications have not changed and that the patient needs a medication refill. The pharmacist then sends the action to contact the patient to a case manager.

The ROCC system also looks at the schedule of upcoming primary care visits, visit history, and lab test results to determine if a patient needs a primary care visit scheduled. The visit frequency is based upon the most recent HIV lab test values. If, for instance, a patient has a CD4 lab test value of under 200 (an AIDS diagnosis), the PRM system reviews to see if the patient has been seen or has an upcoming scheduled visit within a two month window. Other lab values may suggest four- or six-month visit increments. The system flags patients who have not been seen in the determined time period and have either not made an appointment or missed a recent appointment. Case managers review the flagged patients in the ROCC system and contact them to schedule an appointment. The appointment and pharmacy information are combined together so that the case manager can reach out for multiple purposes when making contact with the patient. The system tracks when a patient was contacted, if it was successful, and if not successful, it puts the information in a timed queue that reminds case managers to reach out again (e.g., if the patient does not call back after leaving a voice mail). After several unsuccessful attempts, the case manager may send letters or visit the patient.

The ROCC system, which is just a different adaptation of the PRM system, uses a Microsoft SQL server database platform to receive real-time ADT (admission, discharge, and transfer) messages from the DH clinical system, and loads nightly data files from pharmacy, scheduling, laboratory, and patient visit information systems.

The ROCC system provides many benefits. Improving medication adherence, improves patient health and reduces the risk of HIV transmission to others. Regular primary care visits allow health issues to be addressed before they become situations that require expensive emergency or inpatient hospital care. The percentage of patients who did not have a primary care visit within a six-month time period has decreased from 18.3 percent before implementing ROCC to 9.9 percent after implementing ROCC. Regular contact identifies patients who have moved, changed care providers, or had other circumstances that may impact their healthcare. Each month, staff identify one to two dozen patient phone numbers that are either wrong numbers or have been disconnected. Through the use of PRM, healthcare costs are reduced by lowering the number of hospital admissions and healthcare complications due to HIV infection.

Data Warehouse and Business Intelligence

DPH has developed a data warehouse as a foundation for BI reporting, surveillance monitoring, and sharing data for research purposes with collaborating organizations. The data warehouse uses a standardized data model based upon the HL7 Reference Information Model (RIM) so that all data are loaded into one standard format that can be queried for many different needs. The data warehouse includes patient-level data (e.g., visit history, demographics, communicable disease case reports, PRM, laboratory results, healthcare utilization, procedures, and immunizations) and population-level information (e.g., outbreak investigations, census data, and social determinants of health).

These data are extracted, transformed, and loaded into the warehouse and provide summary information, graphs, maps, and drill-down capability using Microsoft BI tools such as SQL Server Reporting Services and SQL Server Analysis Services. Customized reports can be generated using Excel

pivot tables. BI dashboards (using SharePoint) have been developed for DPH and DH immunizations, communicable disease surveillance, and HIV treatment, surveillance, and prevention assessment.

The communicable disease dashboards for Denver County reportable diseases use data transmitted from the state health department twice daily and outbreak investigation information collected by DPH. These data are displayed on BI dashboards, which facilitate the reporting, surveillance, and administration of the Denver County communicable disease program. Diseases that have frequencies that exceed historical thresholds are flagged and identified on the main page of the dashboard. These high-threshold diseases (and all others) may be “drilled down” to individual patient demographic and contact information. Trend lines are displayed along with geographical information system-generated maps showing where infected patients reside. A database captures all outbreak investigation information so that epidemiologic analyses conducted on foodborne illnesses can rapidly assess pertinent investigative information and point to transmission risks.

The BI HIV treatment, surveillance, and prevention assessment tools monitor the HIV community viral load for Denver County along with HIV and AIDS incidence and prevalence rates. The dashboards also monitor HIV linkage to care information, geographic information, treatment information, and medication adherence and primary care visit data captured by PRM.

This system provides DPH with a powerful framework for developing community health assessment reports, enhancing surveillance activities, and improving HIV surveillance and monitoring. These tools enable DPH to look at population health statistics and trends using more efficient methods than were previously available. DPH staff and administrators now have near real-time tools that provide meaningful information that used to take days or weeks to get from analysts. This framework provides the opportunity for DPH to acquire and incorporate other health information into the BI environment to further enhance DPH’s capacity to monitor future public health activities.

In summary, DPH is using several new technologies to collect, organize, transmit, and analyze information for improving population health within the Denver metro area. At DPH, the informatics department actively engages with many program areas to develop flexible systems and infrastructure to support public health efforts. These technology improvements are being applied throughout DPH to improve productivity, increase capabilities, and enhance the health of the community they serve.