Putting Big Data to Work: Opportunities for Enterprises

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For Kaiser Permanente and its more than 8 million members, big data is about improving the quality of care and reducing costs. Kaiser standardized an electronic health record (EHR) system for all of its 36 hospitals and more than 400 medical offices. Kaiser's data architecture includes:

- Electronic health care records software from Epic Systems
- SAP BusinessObjects and Crystal Enterprise reporting
- SOA-based application and service development
- Data warehouses and marts including Oracle 9i/10g, SQL Server and Teradata
- Informatica PowerCenter for data integration
- Data center outsourcing services from IBM

Kaiser's big data is multidimensional: Inpatient, outpatient, pharmacy, finance, cost management and other groups at Kaiser use decision-support software to improve the quality of care and reduce costs. These departments need to analyze many factors at the same time: treatment; demographics, such as age and sex; lab test results; prescriptions; diagnosis; medical plan; and payment records. Integrating all this disparate information together, Kaiser's decision-support software helps doctors and nurses understand the patient's complete history and choose the best course of care.
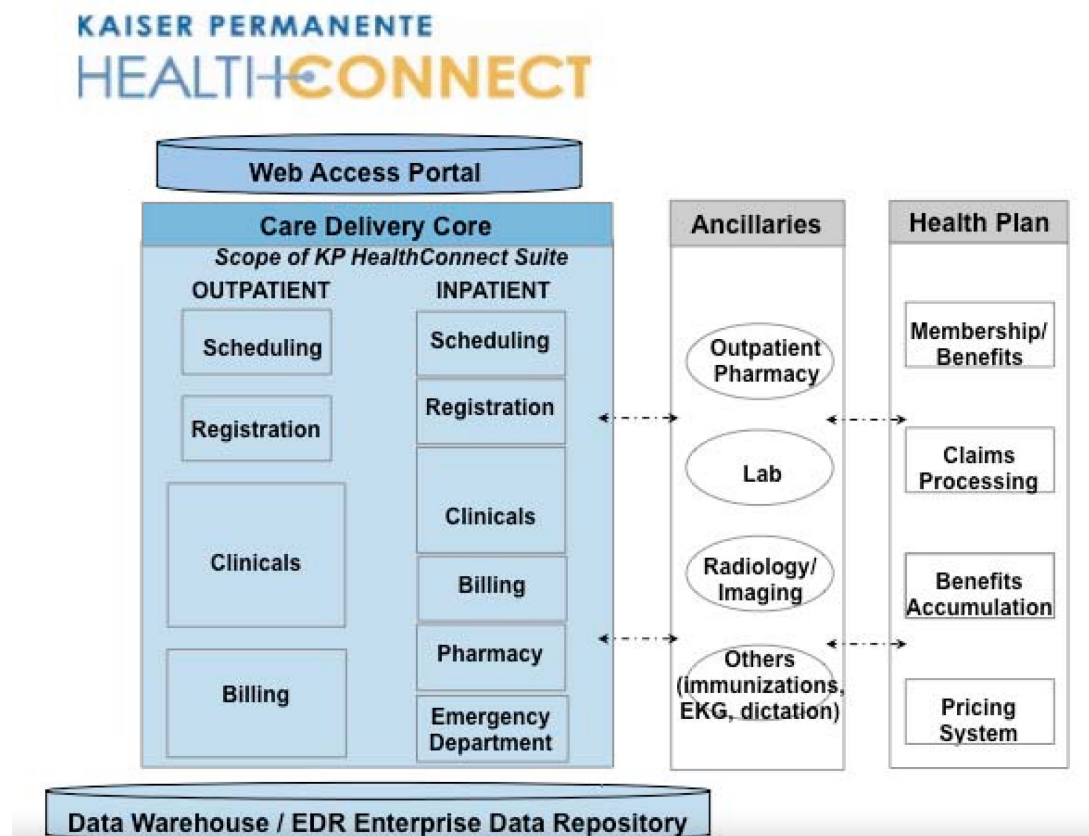
Source: presentation by Robert Crane, Institute for Health Policy, Kaiser Permanente

Large, complex data sets are becoming the norm in health care organizations. Some drivers of this data growth include the advent of electronic medical records, advances in medical imaging, genetic research and the use of huge databases in pharmaceutical studies. By applying data mining tools to data sets from a large number of patients, medical researchers are pinpointing causes of diseases and options for prevention, diagnosis and treatment.

The U.S. Health Insurance Portability and Accountability Act (HIPAA), first passed in 1996, requires health insurance portability for workers and their families following a change or loss of job. In addition, the law has important impacts for data management: It requires the establishment of national standards for electronic health care transactions and sets standards for the security and privacy of health data.

Electronic health care records are designed to include the patient's complete medical history, going back years and, in some cases, decades. These records may include a whole range of data in comprehensive or summary form, such as medical history, medications and allergies, immunization status, test results, radiology images, demographics and, of course, billing information.

Within appropriate group- and role-based security to maintain the privacy of patient records, leading health care organizations are enabling rapid access to a patient's medical records, including digital imagery such as x-rays and CAT scans, within a distributed network comprising large urban hospitals and remote medical clinics.

The Kaiser Permanente Center for Health Research maintains a virtual data warehouse with a series of standardized files. Content areas and data elements that are commonly required for research studies are available. Data dictionaries, meanwhile, are created for each of the content areas, specifying the format of each of the elements, such as variable name, variable label, extended definition, code values and value labels.

The results today of the Kaiser electronic health care implementation come after many years of investments, perseverance and, at times, missteps and restarts. While technology has been part of the challenge, people processes across multiple hospitals and clinics were a major factor in the ultimate success of the EHR implementation organization-wide.