

KARDIA REVOLUTIONIZES MANAGEMENT OF ECHOCARDIOGRAPHY LABORATORIES

Introduction

Heart disease is an enormous problem in the United States. It's the leading cause of death among men and women, as well as a major cause of disability, disease and hospitalization. More than 2,600 people die daily from heart disease. More than one million Americans have a heart attack every year, with a quarter of those dying before receiving treatment.

The most broadly used diagnostic tool to identify heart-related problems is echocardiography. This non-invasive method allows physicians to use ultrasound technology to view the heart and related blood vessels to produce echocardiograms captured on DVDs or videotapes for viewing by cardiologists. The system relies on training and sustaining cardiologists, sonographers and other trained specialists.

And therein lies a significant challenge: Cardiology faces a desperate shortage of practitioners. Slightly more than 24,000 cardiologists work in the United States, a number that has been flat for four years. Meanwhile, the nation's population is aging dramatically, with a baby boomer retiring every seven seconds and the demand for heart care at an all-time high.

With no easy option to move more cardiologists into the field, the best option many health providers have to handle patients and improve care lies in technology.

“Current information technology has the potential to enhance practitioner communication, to foster the guideline application, and to monitor other aspects of cardiovascular care for appropriateness and consistency,” wrote John Hirshfeld, Jr, MD, FACC and W. Bruce Fye, MD, MA, MACC, in a 2004 issue of the *Journal of the American College of Cardiology*.

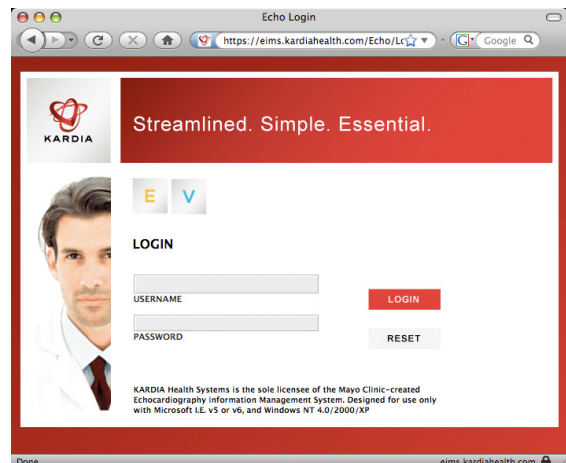


One approach that has emerged in information technology circles is called “Software as a Service,” or SaaS. Companies offering SaaS provide software, maintenance, automated updates, storage and ongoing support accessible by clients through an Internet connection. SaaS saves the time and money of managing software, servers, and networks while providing smaller entities an entrée to software applications they could otherwise not afford. For cardiologists and clinics, the SaaS model would allow them to re-design workflow to increase productivity and flexibility. Echocardiograms become accessible virtually anywhere a cardiologist can connect to the Internet.

A New SaaS-Style Cardiology Company Emerges Utilizing Technology Invented by Mayo Clinic

The SaaS model for cardiology has been developed by Kardia Health Systems, Inc. of Rochester, Minn. This web-based platform for managing, distributing and storing cardiographic examinations is now available throughout the country. The system offers clients a remote Picture Archiving and Communication System (PACS) that generates exam charts for capturing data, has the ability to send and receive highly secure cardio exam data, and provides cardiologists with a menu of diagnostic best practices developed by Mayo Clinic.

As one of the top caregivers in the country, Mayo Clinic streamlined its own operations by developing EIMS (Echo Information Management System). EIMS was licensed to Kardia and converted to a web-based application. Understanding the need for a comprehensive solution for reporting and imaging, Kardia acquired Freeland Systems, Inc., with decades of success with their own medical imaging and reporting solutions, in June, 2008. Kardia has taken the multi-modality imaging expertise developed by John Freeland and integrated it into a premier suite of web-based tools for cardiovascular health providers. With Freeland now part of Kardia, a synergy



exists to create a growing web-based suite of cardiology solutions that will remove manual processes and decrease information technology costs for clients.

The focus of this white paper will be the Kardia platform and its promise to revolutionize both the collection and distribution of cardiographic exams and the ability of cardiologists to employ a novel and innovative viewer to improve their diagnostic practices and outcomes.

The white paper will describe how the platform — Kardia E, Kardia V, and Kardia Image View — creates automated clinical diagnostic tools that speed diagnosis and increase productivity. A final section highlights the implementation of Kardia at Echo Vision, Inc., a Portland, OR-based cardio and vascular imaging service. The company has transformed its business model based on Kardia's tool set in an effort to boost its staff's productivity and efficiency.

The Kardia Approach

For small and medium-sized hospitals and clinics without easy access to a PACS, Kardia offers a PACS-style solution that eliminates the need for a significant capital expenditure on equipment and software. For a health care provider, regardless of size, that already has a PACS, the Kardia approach offers both a secure method of transporting examinations on the web and the capacity for incorporating that data into that existing PACS, as well as electronic health records (EHRs) or electronic medical records (EMRs).

Kardia E was designed with assistance from cardiologists, sonographers, administrators and IT professionals. It provides a case-based, procedure-driven, clinical workflow architecture that has a growing number of modules. Benefits of the Kardia E system include:

- *Improved workflow.* An approach to cardiographic management employing one workflow application combined with an image-viewing software solution and an image viewer.

- *Collective intelligence.* Cardiologists can compare severity scales and normal values based on a cardiovascular disease knowledge base developed at Mayo Clinic.
- *Structured reporting.* A comprehensive solution with ready-structured reports compliant with ICAEL (Intersocietal Commission For the Accreditation of Echocardiography Laboratories) standards and HIPAA (Health Insurance Portability and Accountability Act) guidelines.
- *Easy Report Access.* Reports can be reviewed by sonographers, cardiovascular technologists, referring and reading physicians, sonographers, allied secretarial, health and lab management staff and other approved parties that have secured access.
- *Centralized server management.* Users get 24/7 access with keyword security protection.
- *Easy calendaring.* Appointment calendars allow physicians, staff and cardiologists to assign tasks as desired, eliminating staff time once devoted to emailing and phone calling for scheduling and confirmations.
- *Template-guided entry of echocardiographic data.* The software can provide automated suggestions for every aspect of an exam and capture data such as procedure components, staffing, measurements, impressions and billing. Templates and suggestions are based on 30 years of evidence-based research at Mayo Clinic.
- *Online training always available.* A library of training videos allows for sonographers and cardiovascular technologists unfamiliar with less-common tests to watch e-training sessions.
- *Automated diagnostic and billing reporting.* The software generates an interpretive diagnostic statement that's automatically sent, along with billing information, to insurers and patients.
- *Scalability.* The solution fits all sizes of hospitals and clinics.
- *EMR/EHR integration.* Data can be incorporated into all major electronic health-record applications.

- *Paperless Tracking.* Kardia tracks and reports procedure counts, staffing requirements and detailed analyses of patient numbers – data useful for improving productivity and for ICAEL accreditation.
- *Standardized reporting:* Laboratories can draw their own reports based on information held in the Kardia E database. This supports research protocols while maintaining confidentiality of patient data.

In addition, Kardia offers two associated solutions:

Kardia V provides labs with a seamless approach to viewing and moving images, workflow data and reports on such common vascular procedures as carotid duplex, aorta-Iliac duplex, renal, lower extremity venous and upper and lower arterial. It also allows for pediatric congenital echocardiography.

The Image View module, meanwhile, gives end-to-end management of multiple imaging modalities in a web-based, clinical solution that provides storage, retrieval, distribution and presentation options.

Kardia In Action: Oregon-Based Clinic and Mobile Practice Saves Time and Money

Based in Portland, Echo Vision, Inc. offers cardio and vascular diagnostic services to hospitals, clinics and physician offices throughout Oregon. Founded in 1995, the company has grown to 17 employees, most of them cardiovascular technologists and ultrasound sonographers who conduct both in-house exams at the company's diagnostic center and remote exams in the field in settings ranging from two-person clinics to 600-bed hospitals.

“Now we can send exams [to physicians] in minutes,” Schork says, “as opposed to hours or days.”

Echo Vision completes studies for a wide variety of healthcare ultrasound diagnostics, among them stroke, aortic aneurysms, heart disease and osteoporosis in children and adults. A great deal of its workflow involves conducting

echocardiograms for the evaluation of CHF, murmur, dyspnea, chest pain, syncope, HTN, valve disease, and cardiomyopathy. Vascular exams include cerebral vascular, arterial, venous, renal, and post-stent follow-up.

As explained by founder and chief executive officer Peter Schork, prior to implementing Kardia's web-based system in autumn of 2008, Echo Vision worked with dozens of clinics, many without an ultrasound laboratory. In those cases, Echo Vision employed a mobile ultrasound unit that provided diagnostic imaging services to 26 locations.

Those studies were transferred to videotapes or DVDs and then couriered by Echo Vision to the offices of cardiologists it had under contract to review the echos. Those physicians – who specialized in reading either adult or pediatric echos – were located in different offices around metro Portland and southern Washington State.

Transporting the media to those physicians took time and cost money. In some cases, the physicians could read the echo and report back on a diagnosis within 48 hours, the industry standard. In other cases, the physician's schedule might change, making him unavailable and forcing Echo Vision to retrieve the tapes or DVDs and transport them to another location for reading.

Once a physician had read an echo, his diagnosis was sent back to Echo Vision, who in turn transported it to the referring physician. "The time was unbearably long and it was a logistical nightmare," says Schork. "It was fraught with time and distance issues, not to mention the risk of HIPAA violations because the media was just sitting on a disk or tape in an office."

When Schork first learned of Kardia, he immediately liked the approach. While other applications had some of the same attributes, none of them offered Kardia's complete solution of a knowledge base, training modules and other advantages. "Now we can send exams in minutes, as opposed to hours or days," he says. "The question was always 'how do we get a report back to a referring physician in minutes or hours, as opposed to days or weeks?' Until Kardia came along, no one could answer that."

Kardia's web-based system now allows Echo Vision sonographers to upload exams via high-speed Internet connections. There are no longer any limitations to where cardiologists working with Echo Vision can practice or live – they could conceivably reside in another state, or even country. "There's no need for a full blown PACS with hardware when we use Kardia's PACS server system," says Schork. "There are no upfront costs, IT costs, server costs, recurring maintenance costs or licensing fees."

Kardia E and Kardia V offer other attractions as well. Sonographers who see a pathology they do not normally measure, or are not sure how to measure, can take a step-by-step refresher course, with illustrations, from the Kardia website. If cardiologists reading an exam want to re-measure parts of the exam, they can do so simply by using modules within Kardia's software.

***There are no longer any
limitations to where cardiologists
can practice or live.***

For Schork, the Internet became his transportation system for studies and reports. Changes in physician schedules are now electronically completed. Exams, once transported by vehicle, are now transmitted securely over the Internet. Download times are commonly 10 to 20 minutes, far less than the hours it used to take to get field exams to Portland and then on a courier to an interpreting physician.

Schork also likes Kardia's ability to centralize scheduling so referring physicians can make appointments for ultrasounds after seeing Echo Vision's calendar for site visits and available times. Interpreting physicians can see when they are needed and when they need to return diagnoses to sonographers. "This eliminates the need for a lot of manpower," he says.

In addition, interpreting physicians have the ability to see data from not only the most recent ultrasound, but from past exams as well. Exam results and data are automatically fed into patient charts and EMRs. Data-mining tools built into Kardia will also assist Echo Vision in maintaining accreditation standards that it must renew every three years. (Accrediting agencies require submitting data on correlations,

exams-read-per-physician and dozens of other data points that once took a great deal of staff time – often weeks – to bring together. Now those measurements can be pulled together in minutes and hours, rather than days, he says.)

Billing, of course, is just as important to a small health care business. Kardia’s system generates corresponding CPT codes to the procedures performed and easily interfaces with different billing systems.

In the end, Schork says, two things sold him on Kardia. One was its association with Mayo Clinic and its evidence-based research approach. The other was the company’s focus on customers. Rather than tell Schork his business must adapt to the software application, Kardia went out of its way to customize a solution for Echo Vision’s needs. The company made several changes to its reporting modules based on his input, he says, an unusual trait in a time when many technology providers prefer clients change their business procedures to fit the requirement of the software.

Finally, Schork believes the days of self-contained PACS are numbered. With pressures to cut costs, a PACS may seem like a luxury in the future. “Kardia offers total versatility,” he says. “It can sell this system into small physician offices, medium-sized offices, small hospitals and, ultimately, large hospitals. It’s scalable to any size. We have a large client who laid \$250,000 down for a Heartlab system, and cardiology PACS system. In three to five years it will be obsolete. Are they going to do that again? You won’t see major manufacturers or independent heart labs doing it anymore. I think Kardia is going to have the market out there in the future.”

Conclusion

As the example of Echo Vision illustrates, Kardia’s solution has a number of advantages for providers: It offers a scalable approach to providers of any size, from small clinics to large hospitals. It offers a secure, web-based platform with 24/7 access to those – and only those – who need to see patient data. It offers an evidence-based host of diagnostic tools based on collective intelligence captured by Mayo Clinic. And it offers providers a platform to expand their network of reading

cardiologists and an opportunity to respond to patient needs more efficiently and effectively.

Kardia believes the Kardia E system, like other revolutionary software applications, will reduce paperwork by digitizing it, and increase productivity by eliminating dictation and removing the need for a PACS system. With growing numbers of patients and flat growth in cardiology graduates, laboratories and clients will continue to look for productivity gains from existing physicians and staff. Kardia offers an affordable approach to the pressures felt by echocardiography laboratories and cardiologists.

(For more information about Kardia, go to www.kardiahealth.com or call toll free 877-4KARDIA.)