

TECHNOLOGY INTEGRATION AT LEADING HEALTH SYSTEMS VENDOR NEUTRAL ARCHIVES AT INDIANA UNIVERSITY HEALTH

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ENVIRONMENT FOR LEADING HEALTH SYSTEMS AND VNAs

The continued transformation of the healthcare landscape has resulted in the rapid evolution of health systems, with networks growing in both in scale and complexity. Since 2010, healthcare mergers and acquisitions have increased 55% as hospitals and health systems combine to form ever larger integrated delivery networks (1). Currently, two-thirds of community hospitals nationwide are owned or operated by a health system (2).

This rapid growth rate presents unique challenges for health systems, one of which is the coordination and integration of newly acquired entities. As additional hospitals, ambulatory centers, physician groups and outpatient clinics are absorbed into larger health networks, they bring legacy systems, technologies and applications which may not always function within the health system's existing platforms.

Additionally, as healthcare becomes more consumer-centric, creating a seamless and coordinated care experience as well as a true sense of system-ness is a priority for the Leading Health Systems. However, traditional operational silos within the health system pose similar integration difficulties. This interoperability challenge is one of the foremost issues for Leading Health Systems, as it can impact a system's operational efficiency, as well as quality of care and care management (3).

As Leading Health Systems work to increase efficiency while improving quality of care, organizations are implementing technological solutions, such as Vendor Neutral Archives (VNAs), to improve interoperability and care coordination.

STUDY BACKGROUND & INTRODUCTION

Through exploratory interviews with executives from four Leading Health Systems, The Health Management Academy (The Academy) examined the process and impact of implementing and utilizing a VNA at large integrated delivery networks. The Academy then conducted site visits, involving in-depth interviews with C-suite executives and key stakeholders, at two health systems that have successfully implemented a VNA. The purpose of this study is to identify successful methods of adoption and integration of a VNA, and highlight the challenges and successes experienced by the participating health systems.

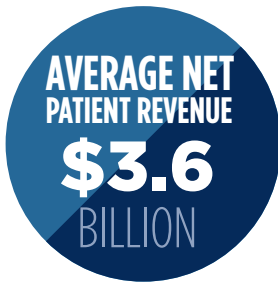
This report reviews the overall findings of the exploratory interviews and presents a case study describing the process and impact of VNA implementation at Indiana University Health (IU Health).

KEY FINDINGS FROM INDIANA UNIVERSITY HEALTH

- IU Health developed an enterprise governance model for the VNA – comprised of committees for workflow, credentials, and finance – which was crucial in successfully implementing the technology. An executive steering committee oversees the activities of these working groups.
- With the implementation of the VNA for point-of-care ultrasound, IU Health has been able to begin billing for these services and has established a new revenue stream for the health system.
- IU Health expects to see increased cost reduction and cost avoidance as a result of the VNA implementation, through increased efficiency in clinical care and reduced duplication of services.
 - Beyond the financial benefits, increased efficiency and reduced duplication of services is expected to result in greater patient, staff, and physician satisfaction.

VENDOR NEUTRAL ARCHIVES AT LEADING HEALTH SYSTEMS

PROFILE OF PARTICIPATING HEALTH SYSTEMS



LEADING HEALTH SYSTEMS AND VNAs

As Leading Health Systems work to improve interoperability and care coordination, a new focus has been placed on utilizing medical images. Technological evolution has resulted in an explosion of diagnostic image collection, reaching over 600 million medical images produced annually by healthcare providers in the U.S. (4). With increased image production also comes increased storage requirements, leading to medical image archives growing 40% each year (4). As the volume of medical imaging continues to grow, health systems are looking at new solutions that can archive and store vast amounts of data that is generated by a variety of sources and technologies and stored in multiple formats.

In order to better manage the volume of medical imaging data, health systems are developing and adopting enterprise imaging strategies to govern the management, storage, and access of medical images (5). One strategy employed by some Leading Health Systems is the adoption of a VNA, which can archive and store medical images from multiple sources in a standard format and in a single location. A VNA allows users to view all medical images regardless of format or origin, eliminating traditional imaging storage and viewing silos (5). VNAs have been gaining popularity among health systems – with over one-third of US hospitals having already implemented a VNA – for their ability to store both DICOM and non-DICOM (e.g., JPEG, PDF, MP4, etc.) images, and utilize a universal viewer to allow providers to access images generated from different applications in the same viewer (5, 6).

The Academy conducted initial exploratory phone calls with stakeholders at four Leading Health Systems at various stages of VNA implementation. Discovered during The Academy's exploratory interviews, health systems commonly elected to implement a VNA as a response to rapidly increasing storage requirements, as well as a desire to archive images in an intelligent manner. As health systems are confronted with aging PACS requiring upgrades, they must undertake massive data migrations to move image data from one PACS system to another. (7) Participating health systems noted that this moment was ideal for VNA implementation, as a VNA would require the health systems to migrate imaging data only once. Additionally, health systems opted to implement a VNA in order to facilitate the easy access and sharing of images throughout the health system and streamline IT operations.

“We live in a digital world where any given patient has a number of digital objects associated with them and we needed a place with standards to be able to store and retrieve objects – we needed some universal filing for digital objects.” (Clinical Leader)

Across participating health systems, VNA adoption was primarily championed by informatics and positioned as an IT project. However, multiple systems noted the importance of involving clinical stakeholders in the process as well, especially regarding designing workflows when integrating the VNA into the electronic health record (EHR).

Most health systems emphasized benefits delivered from the VNA, such as streamlined IT image management and consolidated storage. While one health system viewed the VNA as purely an IT project with no clear benefits beyond a storage solution, others reported additional benefits such as improved workflow, increased care coordination and standardization of care practices, and efficiency gained from storing data in one consolidated location. Many health systems noted the benefit of being able to share and view images easily across traditional PACS storage silos.

“For us the system replaced mainly tape backups and some disk backups, so from a staff point of view it's definitely saved a lot of effort because all archives are in one location in a readable format. It has dramatically improved our workflow.”
(Clinical Leader)

INDIANA UNIVERSITY HEALTH | GOVERNANCE AND IMPLEMENTATION OF A VNA

Headquartered in Indianapolis, Indiana and operating throughout the state of Indiana, Indiana University Health (IU Health) is one of the largest health systems in the nation. With over \$5.5 billion in Net Patient Revenue (NPR) in 2016, IU Health is comprised of 18 hospitals and dozens of outpatient centers, urgent care centers, physicians' offices, and other clinical locations that conduct over 117,000 admissions and over 2.6 million outpatient visits annually (8, 9). IU Health's partnership with Indiana University School of Medicine results in a strong focus on innovation and education, and the system's hospitals are consistently ranked among the top in the nation (10).

Like many of the nation's Leading Health Systems, IU Health has experienced rapid growth in recent years leading to challenges around data and image storage. Recognizing a need for an overarching storage solution to manage image volume, leaders at IU Health looked to implement a VNA to allow for consolidated storage and archiving that could be scaled across the health system as it continues to grow. Beginning in 2016 as a primarily IT project, the decision regarding the initial implementation of a VNA mainly involved IT and administrative input and stakeholders.



Championed from an IS/administrative perspective rather than a clinical perspective. Physicians have high confidence in the IS team – trust has been established via a long history of collaboration. IS has learned what is important to physicians and what they want to see.”

– Kenneth Buckwalter, M.D., IU Health Physicians Chief Informatics and Innovation Officer, IU Health

When purchasing a VNA solution, IU Health elected to work with its existing PACS vendor who had a good VNA offering. This relationship allowed for easy transition and ensured the right technical and cultural fit between the vendor and the health system. A crucial aspect, as the implementation of the VNA involved significant customization, which benefited from a strong working relationship with the vendor.

Leaders at IU Health decided to pilot the VNA using point-of-care ultrasound, largely driven by physician engagement and a desire for an image archive in that service area. As part of the pilot, IU Health developed a governance structure for the project, comprised of committees focused on clinical workflow, credentials, and finance. Additionally, a survey was distributed to obtain physician input on workflow, storage locations, and credentialing before the pilot launched which allowed the IS team to establish a set-point and manage expectations before implementing the VNA project. This governance structure has proved to be highly effective in the successful implementation of point of care US at IU Health, especially as they look to expand beyond US into a more comprehensive Enterprise Imaging solution.

During the implementation of the VNA, stakeholders quickly realized the importance of physician involvement in developing the workflows within the EHR. A significant challenge in the early stages of VNA implementation, it was crucial for the IT team to work with physicians to standardize workflow, storage and data integrity. Additionally, leaders at IU Health recognized the necessity and benefit of a universal viewer with the VNA to improve efficiency and maximize physicians' ability to view images across service lines.



We have approximately 40,000 workstations – we simply cannot support 25 different viewers for each service line. The use of a universal viewer allows us to display images for those workstations without conflicting with the other programs already installed on the workstations. It's a huge win in terms of efficiency.”

– Kenneth Buckwalter, M.D., IU Health Physicians Chief Informatics and Innovation Officer, IU Health

With the implementation of the VNA in point-of-care ultrasound, IU Health has been able to begin billing for these services and has established a new revenue stream for the health system. Previously, point-of-care ultrasound images were not centrally archived and therefore the hospitals were unable to bill for the service. With a significant volume of point-of-care ultrasounds conducted per physician per year, opportunity for revenue is substantial once the VNA is scaled across the health system. Additionally, previous studies have found the implementation of a billing mechanism for point-of-care ultrasound can result in a significant net profit (11).

Currently IU Health has not expanded the VNA beyond point-of-care ultrasound; however, the system is working towards ultimately getting all clinical images – both DICOM and non-DICOM – into the VNA to create a cohesive longitudinal patient record. Utilizing the success of the VNA in point-of-care ultrasound as an example, IU Health plans to employ a grassroots strategy involving physician champions who are highly engaged to diffuse the VNA to other service lines. This grassroots method will allow the VNA to gain a foothold in additional service lines, while physician champions will contribute expertise around workflow and increase overall physician engagement and acceptance.

“If we can get physicians for each service line to come together to create a workflow that everyone can agree on it would make the world of difference. Otherwise it’s a VNA of dirty data where nothing will be in the right place and we won’t be able to find anything. An early success in point of care US was critical in our institution for overall development and confidence in the VNA technology.” – Kenneth Buckwalter, M.D., IU Health Physicians Chief Informatics and Innovation Officer.

While still in the early stages of VNA implementation and integration, IU Health expects to see significant benefits across the health system as a result of the VNA. Consolidated and archived storage will allow for cost savings in image storage, as well as reduced complexity and improved efficiency. Additionally, IU Health expects to leverage the VNA utilizing economies of scale in purchasing or updating systems, while standardizing models across the system is expected to make clinical engineering as a service easier and more efficient.

The ability to view images across service lines will improve care coordination and communication between physicians, which IU Health expects to result in cost reduction and cost avoidance, through increased efficiency in clinical care and reduced duplication of services. Beyond cost reduction, increased efficiency and reduced duplication is also expected to result in greater patient and physician satisfaction. As improving physician engagement and preventing burnout become top priorities for Leading Health Systems, efforts to improve efficiency for physicians are a primary focus. Furthermore, correlation of images across modalities will increase transparency and allow physicians the ability to be more powerful diagnosticians, enabling them to coordinate images with other clinical data and improve the overall quality of care.

IU Health is hopeful that, once fully deployed and integrated, the VNA will also allow for increased correlative imaging and machine learning opportunities across the health system. IU Health anticipates benefits around telemedicine and virtual care as well, as images become easier to view and share through the VNA.

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METHODOLOGY

Beginning in September, 2016, The Academy conducted exploratory interviews with executives at four Leading Health Systems around the process and impact of implementing and utilizing a VNA. Organizations participating in the exploratory interviews included Inova Health System (Falls Church, VA), University of Texas MD Anderson Cancer Center (Houston, TX), Duke Health (Durham, NC), and Indiana University Health (Indianapolis, IN).

In January, 2017, The Academy conducted site visits at two health systems that have successfully implemented a VNA. Site visits were conducted at Duke Health and Indiana University Health. Site visits involved in-depth interviews with C-suite executives and key stakeholders at each health system.

The purpose of this study is to identify successful methods of adoption and integration of a VNA, and highlight the challenges and successes experienced by the participating health systems.

THE HEALTH MANAGEMENT ACADEMY

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