INTRODUCTION

The use of information technology (IT) to include electronic health records (EHRs), electronic medical records (EMRs), and health information exchange (HIE) has been touted as a means to improve the patient experience with the health care system, the quality and safety of medical care, and to reduce redundancy in tests and procedures thus saving costs in our system. Additionally, data and information acquired from this technology has become the basis for new payment methodologies sometimes called "value-based purchasing," which can align incentives to improve health and lower health costs over time. The recent Medicare Access and Children's Health Insurance Program Reauthorization Act (MACRA) passed by Congress will increase the value of this capacity, as there is a requirement to move rapidly away from fee for service payments into alternative methodologies that are not volume-based.

Though the concepts of HIE have been promoted for two decades, the major impetus came with the American Recovery and Reinvestment Act of 2009. Not only were incentives created for hospitals and physicians to purchase EMRs, but penalties by way of reduced payments in Medicare and Medicaid were legislated if this was not done. The Office of the National Coordinator (ONC) was assigned to develop the criteria for "meaningful use." With the pressure of the stimulus to "get the money out," and with vendor resistance to important but costly regulations, these rules became a ceiling instead of a floor. It is fair to say that we have not reached meaningful use nationally or in the Commonwealth.

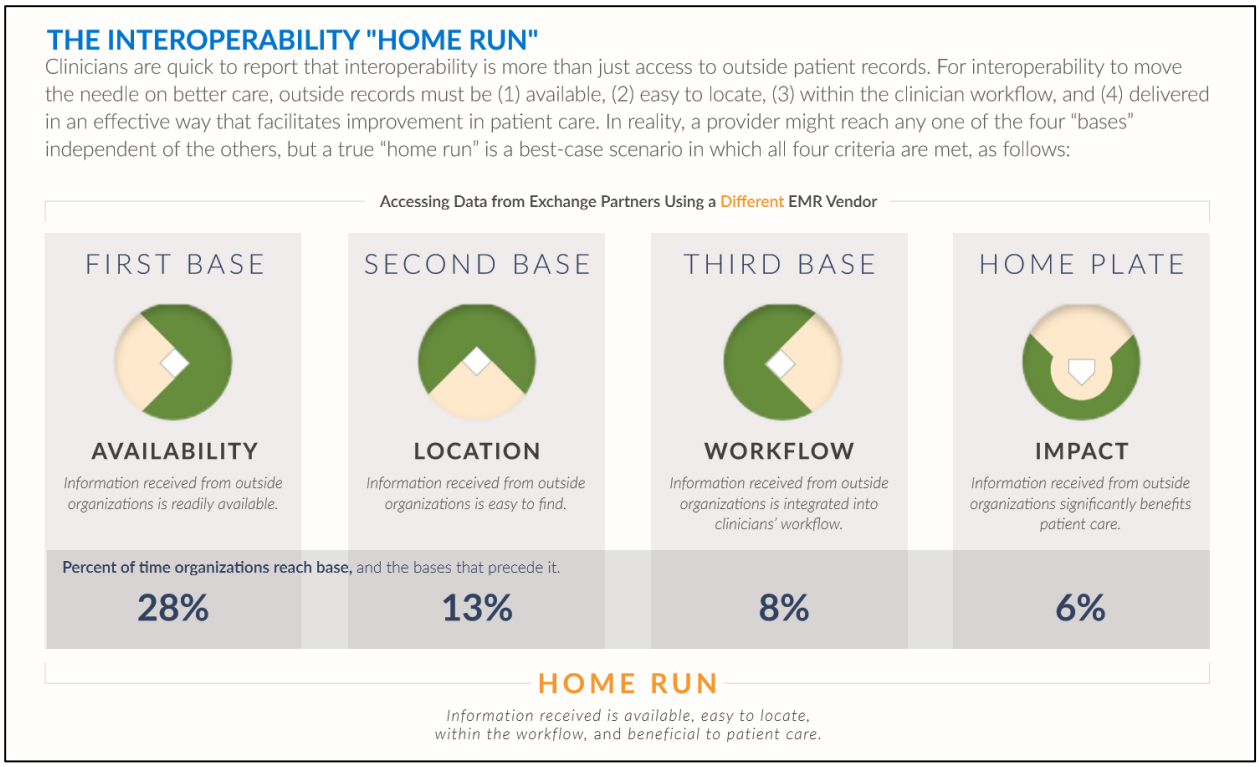
Though EMRs have now largely been adopted by physicians and health systems in the U.S. (see adoption rates by geography in appendix), there are a number of reasons that the vision has not been achieved.

1) The information in the records is of limited utility unless it is shared and is available when the patient is seen.
2) The proliferation of EMRs has come largely from the world of medical billing systems and not from clinical systems.
3) Exchange with other EMRs must be an integral component of each EMR, which in turn must easily work into the provider workflow.
4) The Health Insurance Portability and Accountability Act of 1996 was intended to provide assurance that health information could be exchanged with certain privacy and security restrictions. However, this has been interpreted to restrict instead of enable exchange.
5) Virtually every participant in the system has a proprietary interest in using the data for competitive advantage, and incentives have not been created to allow benefit from collaboration.
6) Because there are so few well-functioning HIEs, data analytic capacity – which could demonstrate value of collaborative data exchange to payers, providers, and patients alike – has been under-developed as well, except a few salient locations.

The 21st Century Cures Act of 2016 defined interoperability as "IT that enables the secure exchange of electronic health information" and blocking as "a practice that is likely to interfere with, prevent or discourage the practice of exchanging health information." The legislation places new requirements on developers of certified health IT products to improve certification and transparency and blocking is proscribed.

Additionally, the new law requires electronic verification of personal care and home health services funded by Medicaid by 2019.

In its 2016 report on interoperability, KLAS, a company dedicated to collecting health data and recommending best practices, graphically displays the situation and challenge:



To assess Virginia's progress toward interoperability, the 2016 General Assembly passed HB 352. This bill calls for the Secretary of Health and Human Resources to work with stakeholders to evaluate interoperability within the Commonwealth, review the capacity to share patient information among providers and payers, and provide recommendations for improving information sharing to make health care services more efficient.

> § 1. That the Secretary of Health and Human Resources shall work with stakeholders, which shall include representatives of hospitals and other health care providers in the Commonwealth, to (i) evaluate interoperability of electronic health records systems among health systems and health care providers and the ability of health systems and health care providers to share patient records in electronic format and (ii) develop recommendations for improving the ability of health systems and health care providers to share electronic health records with the goal of ensuring that all health care providers in the Commonwealth are able to share electronic health information to reduce the cost of health care and improve the efficiency of health care services. The Secretary shall report his findings and recommendations to the Chairmen of the House Committee on Health, Welfare and Institutions and the Senate Committee on Education and Health by December 1, 2016.

Although there are significant efforts underway in Virginia to improve interoperability and the exchange of information, many are "one-offs" that are not well coordinated nor do they follow any standard practice. Virginia has not fully achieved the goals of connectivity and interoperability to ensure access to

the right information in the right place at the right time. There are also various levels of understanding regarding services that are available through Virginia's health information exchange and how ConnectVirginia's governance and legal framework operate. While ConnectVirginia is not yet providing the functionality Virginia needs, it does offer a trust framework and local structure that can be used to coordinate and align interoperability efforts across Virginia.

Virginia is not alone in looking at strategies to move toward interoperability. The National Governors Association (NGA) recently published "Getting the Right Information to the Right Health Care Providers at the Right Time: A Road Map for States to Improve Health Information Flow Between Providers," [1] a guidance document for states. This document suggests a series of steps and eventual strategies for states will help to remove the significant legal and market barriers that currently impede providers' ability to efficiently share health information.

NGA Suggested Steps

1. Assemble Core Team
2. Conduct Legal and Market Analyses
3. Determine Primary Barriers
4. Select Strategies
5. Implement and Evaluate

[1] https://www.nga.org/cms/home/col2-content/content-list/publication-list/content-reference-3@/getting-the-right-information-to.html

NGA State Strategies to Address Legal Barriers	NGA State Strategies to Address Market Barriers
Fully Align State Privacy Laws With HIPAA Pass a law that supersedes all more restrictive state privacy laws to allow providers and hospitals to exchange information in accordance with HIPAA. Partially Align State Privacy Laws With HIPAA Amend select statutes to allow certain types of information, such as information exchanged electronically, to be exchanged in accordance with HIPAA. Create Standardized Consent Forms Create a standardized consent form that provides a "one stop" approach to gaining patient permission for sharing information. State Guidance and Education Issue guidance and provide education to providers about how to comply with state and federal law, including clarifying legal intent and addressing common misconceptions.	Create Meaningful Economic Interests That Encourage Exchange of Health Information Create or adjust payments to incentivize exchange of health information or penalize lack of exchange. Use Legislative, Regulatory and Contracting Authority to Bolster Exchange of Information Pass laws or issue regulations that expressly prohibit information blocking or require information exchange. Set the Vision and Hold People Accountable Set statewide vision for interoperable exchange of health information and use bully pulpit to elevate best practices and place pressure on those lagging behind. Serve as Convener Bring key stakeholders to the table to work together toward interoperable exchange of health information.

STAKEHOLDER FEEDBACK

To evaluate the current information sharing environment among vendors, hospital systems, health plans, and providers, several stakeholder groups, listed below, met during the summer of 2016.

Electronic Medical Record Vendors
Hospital Systems CIOs and CMIOs
Virginia Association of Health Plans (VAHP)
Community Service Boards (CSB)
Federally Qualified Health Centers (FQHC)/Community Health Centers
ConnectVirginia HIE Inc. Board
Virginia Hospitals and Health Care Association (VHHA)
State Agencies (Department of Health, Department of Behavioral Health and Developmental Services and Department of Health Professions
Medical Society of Virginia (MSV)
Emergency Department Care Coordination Committee

The following summarizes the various stakeholder groups' overarching priorities:

- **VAHP**: Health plans have an interest in real-time alerting and clinical information for analysis to permit better case management. There are varying degrees of understanding among health plans

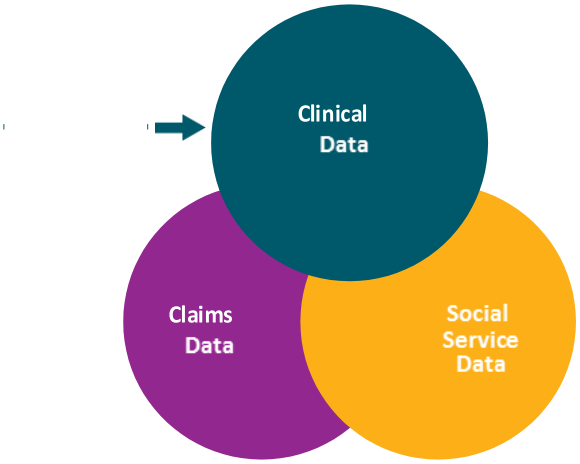
and the VAHP regarding current information exchange capabilities and services through the health information exchange. The plans do not want to pay for the exchange of health information based on their current view of its potential value added for them.

- **Hospital Systems CIOs**: Hospitals are subject to significant quality reporting. They also are subject to penalties for readmissions. Cost management remains a concern. They want access to lab results and imaging studies as well as physician records from outside of the hospital. They have a special interest in medication management, e-prescribing, and access to the Prescription Monitoring Program (PMP) through their electronic medical records (EMR) workflow. They have borne the majority of the expense in creating the existing HIE capacity in Virginia.
- **CSBs**: CSBs are evolving into mental health homes, based on the certified clinical behavioral health home model that has been promoted nationally and in Virginia. CSBs would benefit from having case management templates for physical and mental health conditions embedded in their EMRs. Also, integration with the PMP to address the opiate issue is desired.
- **FQHCs**: Standardization among EMRs and connectivity to hospitals and CSBs (and consulting specialists) for community health centers remains a priority.
- **Physicians**: Need the right data at the right time regardless of the setting to enhance patient care. Workflow must be simplified to increase productivity and access to the PMP needs to be part of physician workflow. Physicians also need ready access to quality metrics and data reporting to meet new payment requirements.
- **Vendors**: See HIEs as an impediment in many states. They believe that they can do more and do it faster by working system to system. They also see HIEs as threatening some of their individual business opportunities.

The stakeholders also identified the following commonalities and obstacles during the course of their meetings.

1. Health information technology initiatives are underway to help transform health care in the Commonwealth, including the creation of ConnectVirginia, Virginia's Health Information Exchange and the All Payer Claims Database. These changes are driven by payment reforms that include incentives for improvements in patient outcomes, cost and patient experience. There is no plan to coordinate these efforts. The NGA report above stresses the need for coordination.

Future State: Seamless Data Flow and Aggregation for Improved Population Health



2. Meaningful exchange of patient information must be supported by robust and integrated information systems that include patient-level information and supports population-level information and analysis. This could be a utility model.
3. Integrating information sharing into the EMR workflow for providers and hospital systems is crucial. This includes access to information contained in the Prescription Monitoring Program, the Virginia Immunization Information System, medication management, images and labs and basic demographic information about the patient. It also entails creating interfaces so that information from one EMR can be imported into another without separate logins or maintaining a separate information system.
4. Use of the health information exchange must be enhanced so that patient information is available more readily at the point of care and alerting of primary care providers and insurers is “real-time”.
5. Providers of Behavioral Health (BH) and Long Term Care (LTC) have lagged behind others in the adoption of EMRs and other health information technology tools. As such, sharing of clinical data with BH and LTC providers also lags.
6. Social determinants of health (behavioral health, for example) are not shared readily across Virginia, partially due to privacy concerns and partially due to lack of interoperability with social services platforms.
7. Enhanced information sharing across all platforms would greatly improve the coordination of care and care transitions and the analytics to support payment reform, especially multi-payer payment reform.
8. Small provider practices not affiliated with a hospital system are struggling with exchanging information and are still using fax machines and other more “low tech” means of sharing documents. They are particularly disadvantaged in the post-MACRA world.
9. There are opportunities for enhanced interoperability between the hospital systems and the state. For example, the state maintains many registries that the hospitals would benefit from accessing including registries used for immunization and advanced directives.

10. Cross-functional integration and collaboration between and among systems is needed to build richer information and data. For example, access to clinical information through the HIE and claims data from the All Payer Claims Database, along with the right analytics tools, could lend itself to better patient care and more robust incentives to economize on resource use.
11. As Virginia moves forward with genomics and precision medicine, adopted data standards are necessary for data to be shared and exchanged accurately. Virginia has already recognized the power of health data standards through the work of the Health Information Technology Standards Advisory Committee.
12. Key stakeholders in the health care ecosystem have not fully participated or shared in the benefits of information exchange and interoperability.

CONNECTVIRGINIA HIE (CVHIE)

Funding of $11.5 million provided by the American Recovery and Reinvestment Act (ARRA) resulted in the establishment of ConnectVirginia which is a health information exchange designed to encourage the exchange of patient information for better patient outcomes. As Virginia's HIE, ConnectVirginia provides the following services:

1. **Exchange governance and legal framework** – ConnectVirginia brings providers into the health information exchange using its governance and legal framework. This framework is built on the federal DURSA (data use and reciprocal support agreement) trust framework. Once a provider meets the legal requirements for data sharing through these agreements and governance, is approved by the ConnectVirginia Board, and undergoes the testing and onboarding process of eHealth Exchange, the provider uses health information exchange capabilities to share information with other Participants on eHealth Exchange, including the Veterans Administration and Department of Defense healthcare facilities.
2. **Public Health Reporting Pathway** – a portal through which all mandated public health reporting is sent to the Virginia Department of Health from providers and hospital systems. This includes syndromic surveillance, cancer information, immunizations and labs. Many providers use this portal to attest to Meaningful Use stages 1 and 2. In October 2016, more than 2.7 million records were provided to VDH via this pathway. VDH is currently working with ConnectVirginia to enable bi-directional exchange through this portal so information can be queried and retrieved by providers as well.
3. **Advance Health Care Directives Registry** – partnering with US Living Wills, ConnectVirginia provides access to this registry which affords Virginians a secure location to store end of life and advance planning documents.
4. **Encounter Alerts** – a service that provides information through an alerting platform on patient admissions, discharges and transfers. This service is currently in production at INOVA, Valley Health and Sentara Health Systems. Virginia is also sending and receiving alerts across state boundaries through the CRISP (Chesapeake Regional Information System for Patients) system, connecting with dozens of hospitals in Maryland and Washington, DC. ConnectVirginia is on track to implement the encounter alerts service at the majority of health systems in Virginia by the end of 2017.
5. **Provider Portal** – a free, secure portal available to all authorized providers allowing a one to one search for patient information.

EMR Challenges – A Case Study

A Virginia consortium, the Heart of Virginia Healthcare (HVH), is one of seven collaboratives funded by a national Agency for Health Research and Quality (AHRQ) project, Evidence Now, which is designed to improve the ability of small primary care practices to manage patients with heart conditions. There are 202 practices are participating in Virginia, more than 1,300 nationwide, all with fewer than 10 clinicians.

By helping small practices extract metrics for the project from their EHRs, technical assistance and evaluation teams have learned that the vast majority cannot produce clinically actionable reports on their own for a variety of reasons, the most important of which are:

1) EHR vendors "own" or control the data and want to charge practices extensive fees for using the data even if 3rd parties write and are willing to run the reports for free;
2) Some EHRs don't have capacities required for ONC certification. Vendors promise to fix these issues, but delays for small practices can be 6-12 months;
3) Most EHRs can generate only a few meaningful use metrics (e.g., 6-9 of the 200 to choose from for Merit Based Incentive Payments [MIPS] reporting under MACRA), and often only for all Medicare or all Medicaid patients. They often cannot create additional metrics for for clinically meaningful population subgroups, such as women over 50, female Medicare patients, etc., nor for any time period other than calendar year. This means metrics are not done in real time to improve patient care.

In short, Electronic Clinical Quality Metric (eCQM) reporting out of EHRs is more of a burden for small practices than a clinical aid. Solutions should allow the data to be extracted seamlessly and analyzed for practices, rather than depending upon the software programming skills of clinicians, which are understandably and practically non-existent in the real world

Challenges with the Current HIE in Virginia

Soon after formation of the HIE, changes in federal requirements redirected resources from the original plan to the creation of a direct messaging function, which has not been useful. Funding for the CVHIE has come from hospital systems and from VDH to support mandatory electronic reporting of public health conditions.

The payer community was invited to participate from the beginning but declined to do so in a meaningful way.

Most providers' access to HIE-based information is not integrated with the EHR workflow. This crucial functionality must be implemented going forward for the HIE to remain sustainable and productive in support of overarching goals like incentive realignment and continuous quality and outcomes improvement.

Sustainable funding models continue to be a challenge for the current health information exchange (ConnectVirginia) and for most HIEs across the country. Other limitations include lack of perceived value, poor marketing for existing services and lack of stakeholder engagement.

To address these limitations, the ConnectVirginia Governing Board recently hired a third party consultant to help create a business plan for the HIE that will include value and ensure the HIE is providing services to Virginia's health care providers that are viewed as accurate, timely and reliable.

The Board has also agreed upon a new governance framework that expands the Board's membership to ensure appropriate representation is included. This governance structure has been shared with the Emergency Department Care Coordination Workgroup, consisting of representation from VAHP, VHHA, Family Physicians, DMAS, VDH, and others. The workgroup has agreed on this framework as well.

Limitations in HIE and interoperability in Virginia are commonplace across the country. There are a number of promising initiatives occurring nationally and in certain states such as Oklahoma, Michigan and Maryland that may well impact the options available for providers and other stakeholders in Virginia. These systems allow clinical and financial data to be combined to enable better and more efficient patient care management to occur in real time. Virginia is very well represented in these national discussions and the recommendations contained herein will be refined as needed based on progress and opportunities more broadly.

BARRIERS TO INTEROPERABILITY

In summary, there are many barriers to achieving the state of interoperability that Virginia needs to provide timely, accurate and useful health care to its citizens. Much of the work being done across the state is done in "silos", restricting interoperability accomplishments to within a certain hospital system or EMR application, rather than across providers. There is no plan to coordinate the various health information technology initiatives underway. Key stakeholders in the health care ecosystem have not fully participated nor shared in the benefits of information exchange and interoperability. Behavioral Health (BH) and Long Term Care (LTC) have lagged behind others in the adoption of EMRs and other health information technology tools. As such, the sharing of clinical data with BH and LTC providers also lags, despite consensus that these components are crucial to providing excellent health care.

Proprietary interests among stakeholder groups have been a significant barrier to providing the right information at the right time regardless of the provider setting. The work performed by the Emergency Department (ED) Care Coordination Committee, a separate committee that is examining ways to improve care coordination and treatment for Medicaid patients who overuse the emergency room, is helping move toward adopting a standard governance framework, although there is much work to be done in this area. Stakeholders are beginning to convene around this topic, but the proprietary interests remain. With these key groups failing to reach consensus and coordination on many key issues, interoperability is hindered. This can be addressed with the following recommendations.

MAJOR OPPORTUNITIES IDENTIFIED

1) Virginia should build an infrastructure that reduces the burden on patients as they seek medical care by reducing paperwork and delays in communicating pertinent information to their providers.
2) Virginia should support the development of a more robust HIE with ability to support data analytics to permit continuous quality in health care. This would require connectivity to the All Payer Claims Database. Maryland has established one model for this.

3) Virginia should avoid funding a series of projects in Health IT that do not interoperate.
4) Virginia should improve patient safety by ensuring that a patient's medication history is available via provider EMR's. One immediate need is to embed access to the Prescription Monitoring Program to assist prescribers as they address the addiction epidemic.
5) Virginia should build upon ConnectVirginia's governance and trust framework as the foundation for interoperability across Virginia. Other initiatives, such as the Emergency Department Care Coordination Project, would fall under this framework. This framework provides a sound and secure mechanism for exchanging and sharing information that protects patient privacy and confidentiality, and should be used as a systematic, aligned approach across other health settings rather than creating "one-offs". Using existing health IT standards, as defined by the Health Information Technology Committee, is recommended to provide a mechanism for interoperability and data analytics.
6) Virginia should expand Medicaid payment model improvements to private payers. HITECH (90-10) funding is available to add the functionality that is required by the Commonwealth. The Department of Medical Assistance Services (DMAS) is in the process of transforming service delivery to the Medicaid population through its value-based payment model. This should be extended to private payers, including commercial insurance. DMAS is currently modernizing the Medicaid Management Information System and it should be connected to the HIE,
7) Virginia should encourage health plans to use the infrastructure that is provided by the health information exchange. The health plans are very interested in receiving alert information on admissions, discharges and transfers (ADT) for covered members. The health information exchange can offer this functionality, and ADT feeds have already been established to provide this service. The first step is the implementation of the ED Care Coordination project. The health plans should contribute a fair share for the service.
8) Virginia should develop some capacity for data analytics and predictive analytics to support multi-payer payment reform, so providers have standardized reporting requirements and incentive structures. Other locales, such as Oklahoma, have proven this can be win-win-win for providers, payers, and patients.
9) Virginia should connect state registries to the health information exchange. This includes the immunization and death registries currently managed by VDH.
10) Virginia should enhance ambulatory connectivity with bidirectional information exchange. Physician practices are far more capable of receiving data than sending data. However, much of the clinical information needed for sound decision-making resides in ambulatory-based EMRs where data is not easily shared.
11) Eliminate the existing prohibition of sharing of HIV test results. A bill will be introduced in the 2017 General Assembly to do this.
12) Require CVHIE, VHI, and the APCD to report to the General Assembly on the items outlined in the NGA report referenced above. That report was released in December 2016, which was too recent for all of these issues to be addressed here.

SUMMARY AND CONCLUSIONS

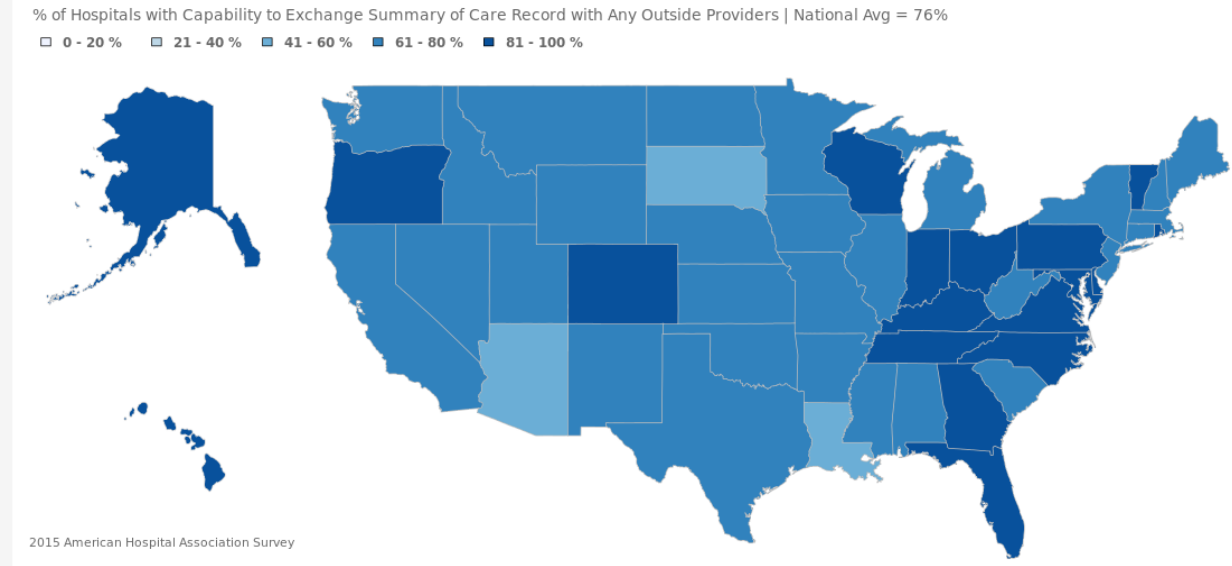
Much progress has been made in the adoption of advanced health IT in Virginia. Yet results are poor due to a lack of ubiquitous health information exchange and interoperability. This report provides guidance on

the importance of interoperability for any meaningful transformation of our current health system performance; barriers to achieving such interoperability; and strategies to address those barriers.

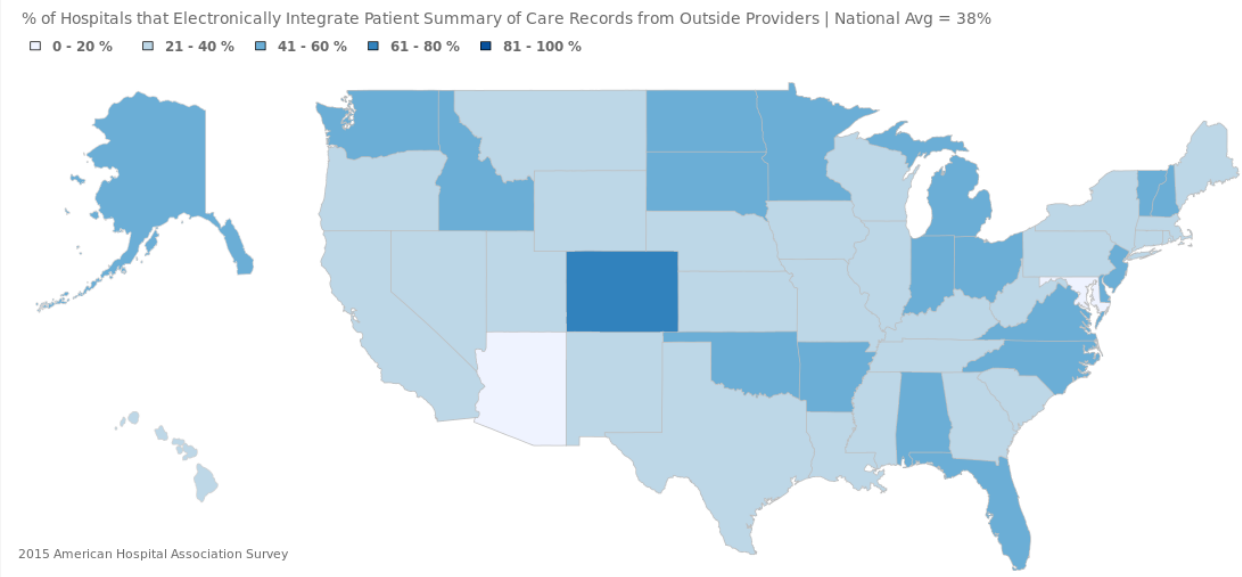
The ability to provide more complete and timely information to providers for their patients would undoubtedly support better quality of care and lower overall costs. There is a clear complementary relationship between more robust health information exchange and the ability of providers to adopt and succeed under value-based payment incentives. There remains, however, an economic reality among the many health care actors operating in Virginia today. While many stand to benefit from the development of an infrastructure for reliable, ubiquitous interoperability/exchange, no one sector or stakeholder wishes to bear the full costs for this.

Appendix

% of Hospitals with Capability to Exchange Summary of Care Records with Any Outside Providers

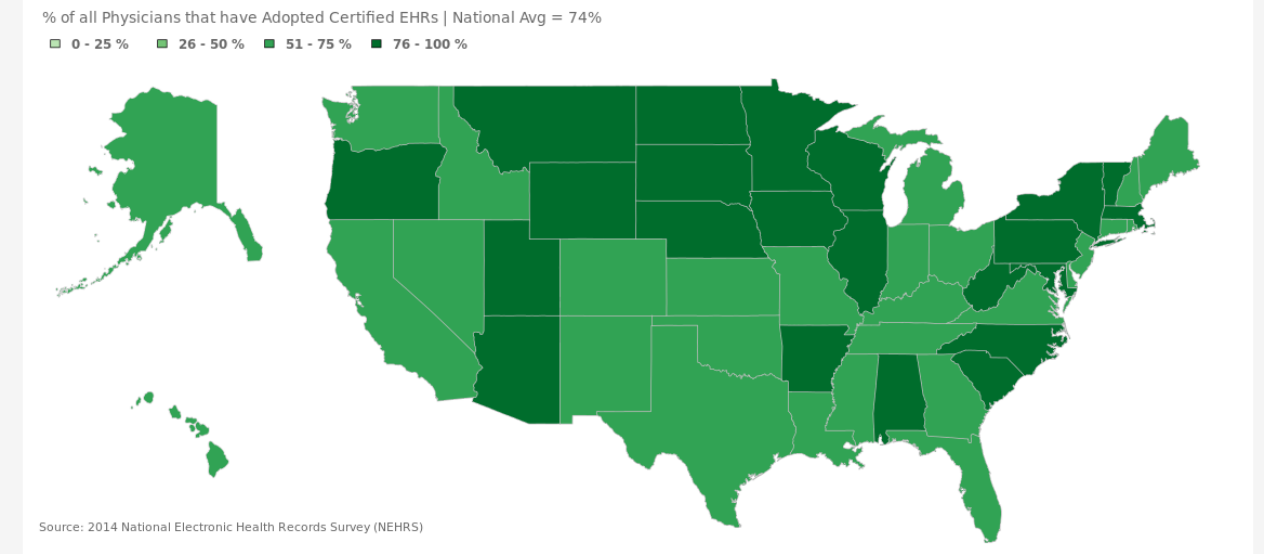


% of Hospitals that Electronically Integrate Patient Summary of Care Records from Outside Providers

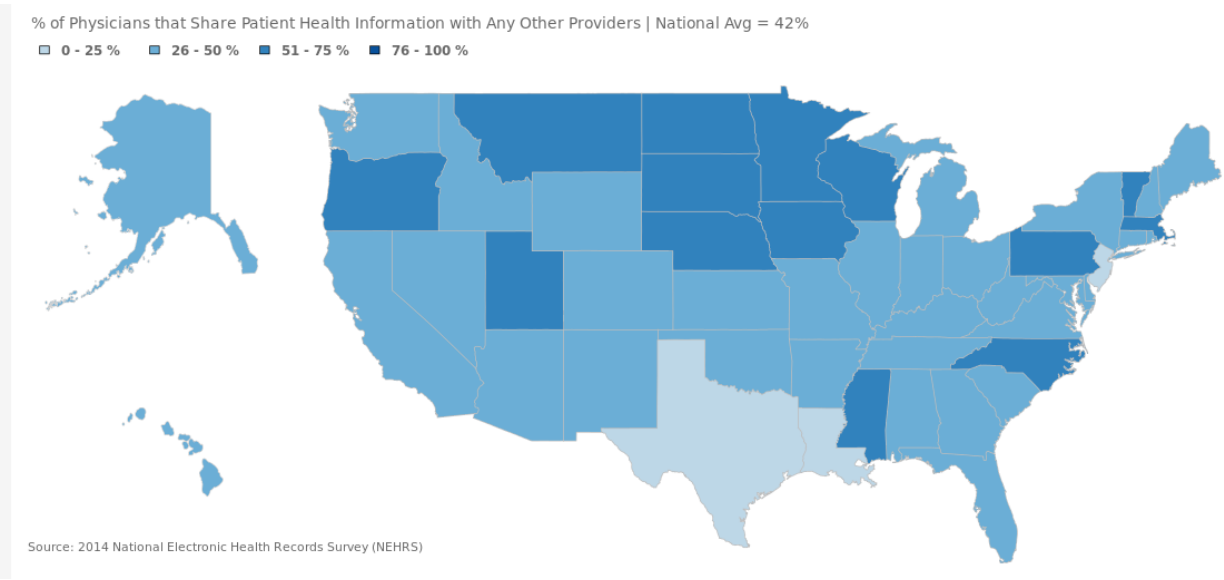


Source: Office of the National Coordinator for Health Information Technology. 'Non-federal Acute Care Hospital Health IT Adoption and Use' Health IT Dashboard. https://dashboard.healthit.gov/dashboards/hospital-health-it-adoption.php. October 2016.

% of All Physicians that have Adopted Certified EHRs



% of Physicians that Share Patient Health Information with Any Other Provider



Source: Office of the National Coordinator for Health Information Technology. 'Office-based Physician Health IT Adoption,' Health IT Dashboard. http://dashboard.healthit.gov/dashboards/physician-health-it-adoption.php. October 2016