Current State of HIE

January 29, 2013

Introduction

Assessing the "Current State of HIE" is more art than science

- One implication of the lack of uniform interoperability is that we don't have the ability to measure across the industry
- Fragmented nature of the health care delivery industry, and the sheer size and heterogeneity of our country, make survey instruments and other research methods complex

Data gathered for this assessment is thus partly quantitative, where such data is available, but mostly impressionistic

- Gathered input from a wide variety of individual experts and organizations
- Made up the rest……

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The following organizations have been generous with their time, data, and insights

- athenahealth
- Atrius Health
- Scott Barclay
- Beth Israel Deaconess Medical Center
- CMS
- Cerner
- eClinicalWorks
- Epic
- Informatics Corporation of America
- Mayo Clinic
- Microsoft
- ONC
- Quest Diagnostics
- RelayHealth
- Siemens Healthcare
- Surescripts

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HIE is maturing

HIE 1.0

- Focused on “the noun”
- Trying to solve “market failures”
- Multi-entity governance, but often driven by third-party entities
- Strived to solve wide variety of rich use cases through comprehensive interoperability
- Complex legal, business, and technical requirements to support rich array of use cases
- Tried to tackle policy issues to enable business practices and technology solutions

hie 2.0

- Focused on “the verb”
- Demand-driven -- trying to meet market needs
- More tactically focused to meet immediate interoperability needs
- Led by any organization that has business need and ability to marshal financial, technical, and organizational resources
- Designed to fit within existing legal, business, and technical constraints – technology out ahead of policy in some areas

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What is driving this transition?

Limited successes of the prior model

Bottom-up demand -- systems are not interoperable because not enough customers asked for interoperability

- Meaningful Use incentives
- Value-based purchasing
- Market expectations about standards of care
- Younger provider expectations about use of technology
- Consumer expectations about use of technology

Supply-side

- EHR certification requirements – common denominator important in a fragmented industry
- Technology advancements in cloud services, mobile, broadband, storage, patient-matching capability, etc

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hie 2.0 comes in many shapes and sizes

Level of external coordination needed

- National level collaborative HIE organizations
- State-level and regional collaborative HIE organizations
- Enterprise-level HIE organizations
- Transaction-specific national level
- Vendor-specific
- Point-to-point
- Point-to-patient

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hie 2.0 comes in many shapes and sizes (2)

Data integration

- Ability to export and import structured data
- Incorporate in EHR and usable for all EHR analytic and decision support functions

Essentially not happening, except:

- Specific transaction streams such as eRX and labs
- Within EHR network, such as Epic and eCW
- Sophisticated implementations such as Healtheway

Document integration

- Ability to export and import clinical documents
- Attach to patient record and viewable

Growing rapidly and likely to increase even more with maturation of directed exchange capabilities

Visual integration

- Ability to provide view into another clinical system at point-of-care
- No exchange of data or documents

Growing increasingly common to solve immediate need without interfacing and application workflow redesign

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National-level HIOs are most comprehensive HIE implementations

HealtheWay™

- Over 20 participants (4 federal) as of September 2011
- Over 90,000 transactions conducted
- HIE solution based on NHIN standards enabling send/receive and query/retrieve
- DURSA covering complete set of exchange patterns

Care Connectivity Consortium

- Five provider organizations (Geisinger, Kaiser, Mayo, Intermountain, Group Health)
- Complete solution based on NHIN standards enabling send/receive and query/retrieve

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State-level collaborative HIE activity high in certain areas

Directed transactions

State HIE Grantee	Monthly transactions
Indiana	14,532,368
Colorado	5,011,816
New York	3,322,812
Minnesota	1,680,124
Vermont	889,700
Delaware	827,483
Washington	138,422
Michigan	98,976
Maryland	48,655
Ohio	35,359
Rhode Island	29,627
California	28,439
Alaska	3,701
Utah	2,482

42 remaining HIE activities had fewer than 1,000 monthly transactions

Query transactions

State HIE Grantee	Monthly transactions
Indiana	351,070
Texas	215,005
New York	101,748
Kentucky	92,387
South Carolina	50,515
Delaware	37,245
Oklahoma	32,015
Colorado	22,665
Mississippi	12,909
Nebraska	3,459
Tennessee	3,254
Maryland	3,223
Maine	3,211
New Jersey	1,601
Utah	454
Kansas	302
Minnesota	208
New Mexico	165
Rhode Island	130

37 remaining HIE activities had no query-based transactions

14 million directed exchanges per month

3.2 million directed exchanges per month

200K+ directed exchanges per month

Source: ONC HIE Dashboard

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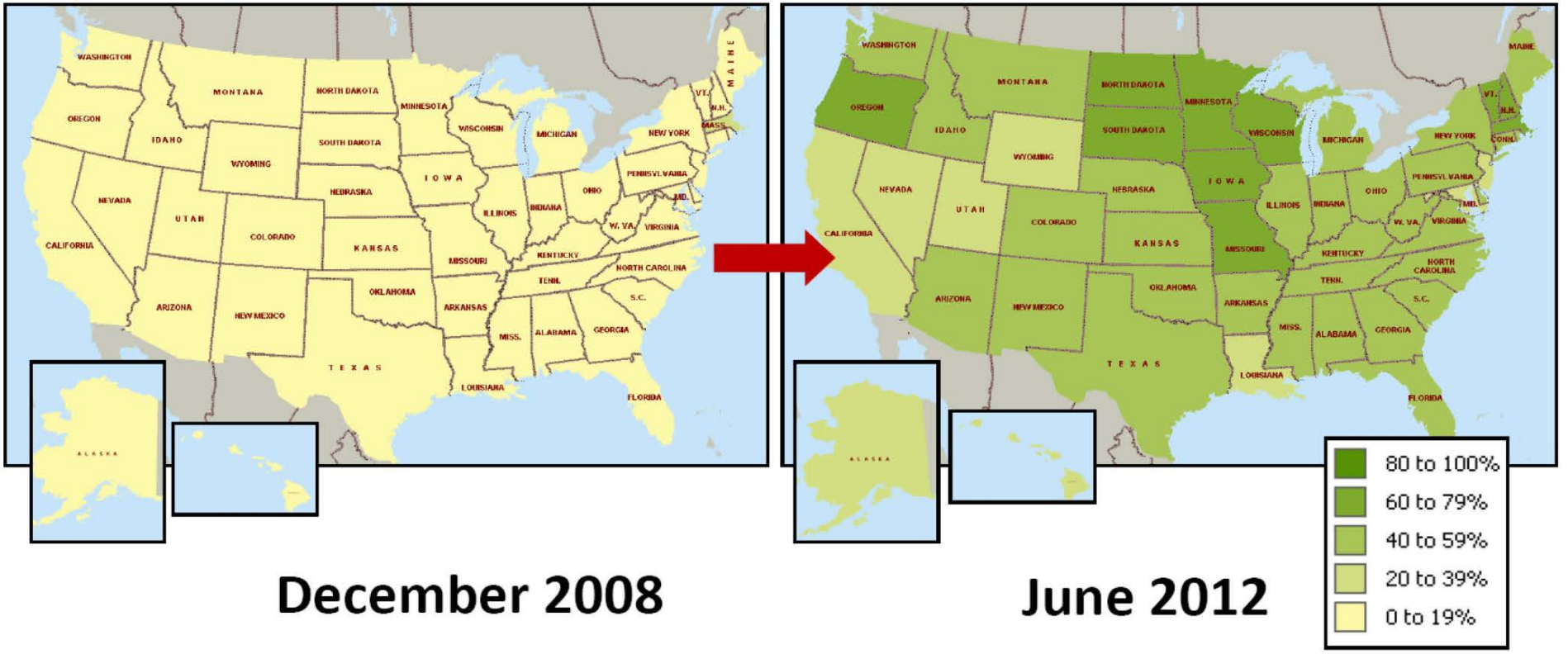
The growth in electronic prescribing is a huge HIE success story, in terms of users…

Percent of physicians e-prescribing using an EHR in December 2008 and June 2012



Source: Hufstader M, Swain M, Furukawa MF. State Variation in E-Prescribing Trends in the United States. *ONC Data Brief, no. 4.* Washington, DC: Office of the National Coordinator for Health Information Technology, November 2012.

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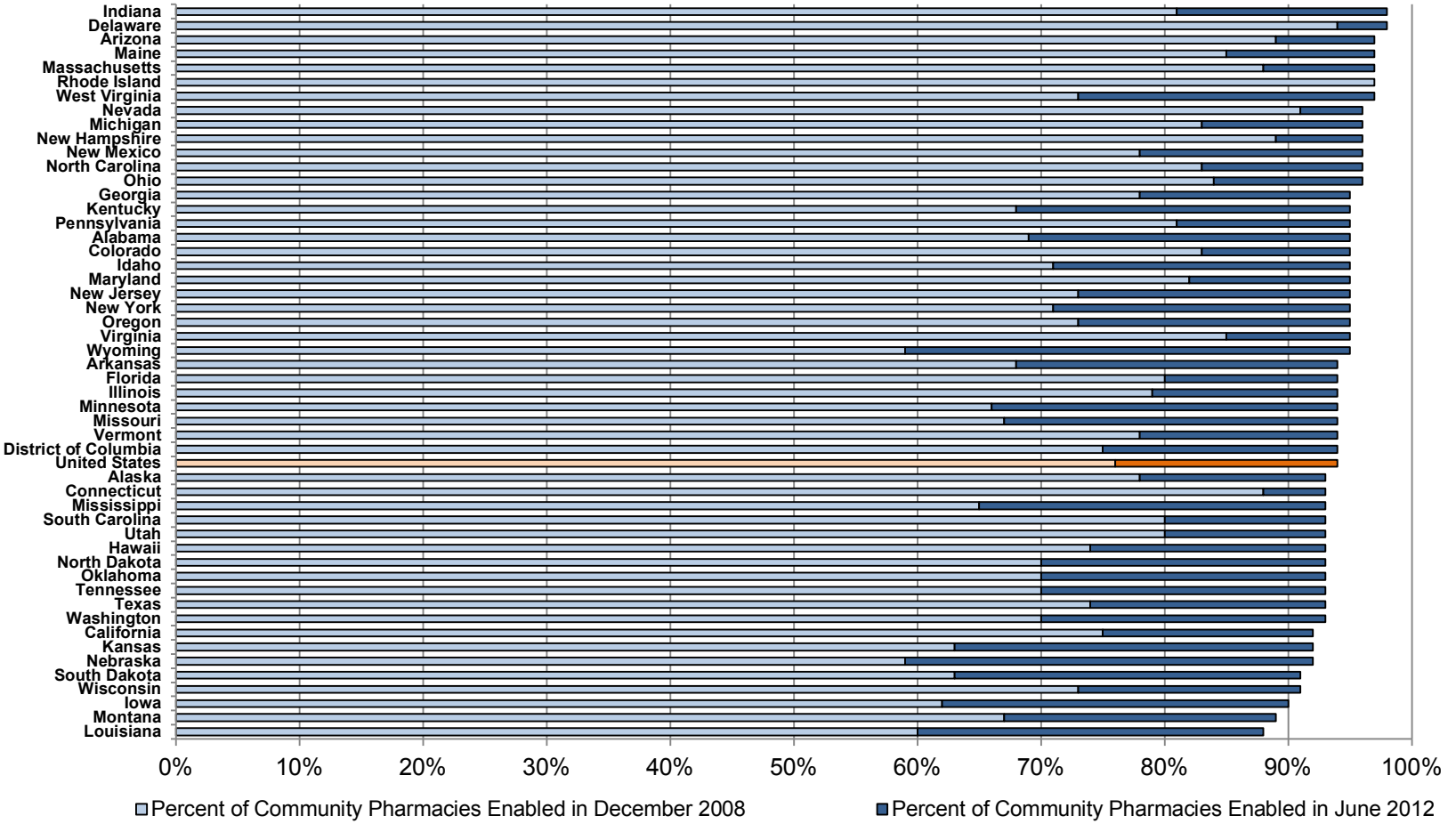
…pharmacy infrastructure…

Growth in the percent of pharmacies enabled to e-prescribe; December 2008 to June 2012, by state.



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…and prescriptions

Volume of New and Renewal Prescriptions Sent Electronically in 2008 and 2012, by state.

State	New and Renewals 2008	New and Renewals 2012	Percentage Point Increase
United States	**4%**	**45%**	**41**
Alabama	2%	35%	33
Alaska	2%	33%	31
Arizona	6%	50%	44
Arkansas	2%	40%	39
California	3%	34%	31
Colorado	4%	36%	32
Connecticut	6%	42%	36
Delaware	7%	50%	43
District of Columbia	3%	29%	27
Florida	4%	37%	33
Georgia	2%	37%	35
Hawaii	1%	40%	39
Idaho	4%	40%	35
Illinois	4%	44%	41
Indiana	3%	45%	42
Iowa	2%	55%	53
Kansas	3%	46%	43
Kentucky	3%	39%	36
Louisiana	3%	27%	25
Maine	6%	55%	49
Maryland	5%	40%	34
Massachusetts	20%	64%	44
Michigan	8%	46%	37
Minnesota	4%	75%	72
Mississippi	1%	35%	34
Missouri	4%	65%	61
Montana	1%	42%	41
Nebraska	2%	44%	42
Nevada	9%	34%	25
New Hampshire	3%	61%	58
New Jersey	5%	31%	27
New Mexico	2%	45%	43
New York	3%	41%	37
North Carolina	6%	49%	42
North Dakota	0%	55%	54
Ohio	4%	73%	68
Oklahoma	2%	41%	39
Oregon	4%	54%	50
Pennsylvania	6%	45%	39
Rhode Island	17%	54%	36
South Carolina	1%	38%	37
South Dakota	1%	56%	55
Tennessee	4%	36%	32
Texas	3%	41%	38
Utah	1%	36%	35
Vermont	4%	57%	52
Virginia	3%	42%	39
Washington	4%	51%	47
West Virginia	3%	31%	28
Wisconsin	2%	60%	58
Wyoming	2%	36%	34

Source: Hufstader M, Swain M, Furukawa MF. State Variation in E-Prescribing Trends in the United States. *ONC Data Brief, no. 4.* Washington, DC: Office of the National Coordinator for Health Information Technology, November 2012.

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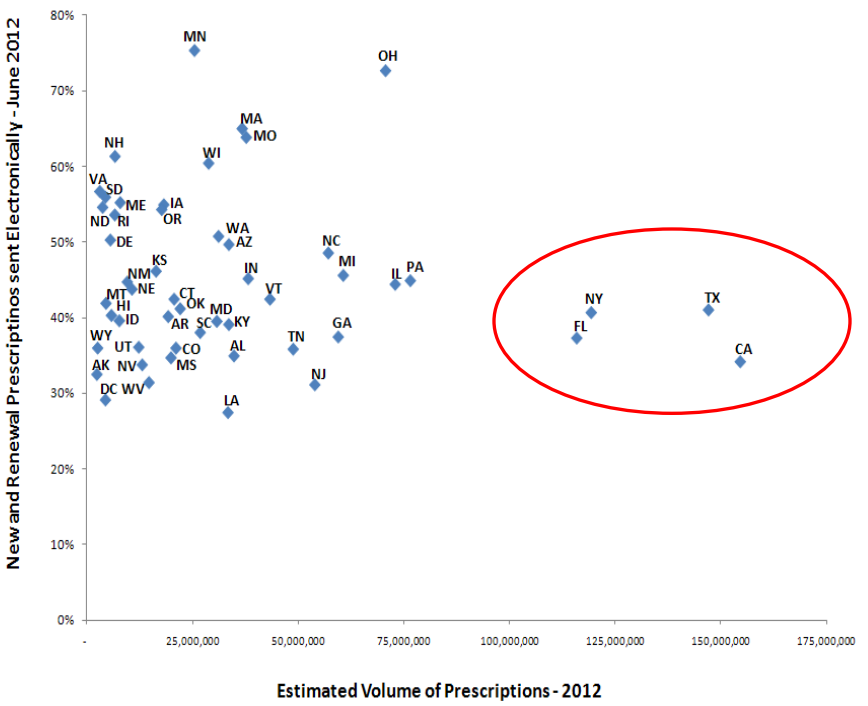
Gaps remain, however, especially in the largest states

Percent of new and renewal prescriptions sent electronically in 2012, by state.



Some causes of eRX gaps

- **Controlled substances**
- **Prescription not suited to eRX**
- **Patient preference**
- **Mis-configuration – inadvertent faxing**
- **eRX "dead-zones"**

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EHR vendors with high penetration generating large amount of vendor-specific HIE traffic

- Large majority of customers (200+) participating in query-based exchanges
- Currently CCD/CDA query-based exchange is ~2.2 million records for ~385K unique patients per month
- Volume doubled over previous year
- Does not include HL7 directed exchange transactions

- 16,743 providers using query-based exchange
- ~2.5 million new CCD records made available on query exchange hubs or sent directly to referral providers per month
- Processed over 75+ million lab result records in 2012

- ~1.5 million query-based exchanges per month
- ~58.5 million directed exchange transactions per month (including HL7 lab result delivery)

Source: Epic, eClinicalWorks, Cerner

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Enterprise-level HIEs

Value-based purchasing initiatives (ACO, PCMH, hospital readmission penalties, etc) are driving creation of enterprise-level HIE infrastructures

Sometimes enabled by vendor-specific networks in markets where major clinical entities are using same EHR vendor

- Very few vendors have enough market penetration to make this feasible

Usually driven by IDN or hospital spearheading technological enablement of a value-based purchasing model

- Building rich functionality in HIE platform to perform functions essential for risk management for value-based purchasing
- More nimble because do not have same collective action constraints as higher level collaborative HIE activities
  - Designed to solve focused business needs
  - Sustainability not a barrier to progress (yet) – often funded by hospital/IDN
  - Building to fit within constraints of law and business practice

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Point-to-point HIE

Point-to-point transactions require no third-party coordination or orchestration – all technical and legal and business issues resolved between the transacting parties themselves

Currently vast majority of HIE traffic occurs as point-to-point transactions, namely, lab results delivery

Direct has a lot of promise, but not proven yet

- How EHR vendors implement Direct per MU Stage 2 requirements will determine whether it is paradigm-breaking or just another little used standard

"If Rishel and McCallie are right", Direct transactions will asymptotically approach point-to-point architecture

- Shrink need for intermediaries over time and allow end-users to transact universally without regard to network or EHR system
- In the short run, role of intermediary HISPs still taking shape and have not yet merged into the background

Visual integration is fast growing type of point-to-point HIE

- Tactical, easily deployable solution that is relatively easy to implement and integrate into clinical workflows
- Solves immediate need for rich information at the point-of-care
- According to Orion Health, this is fastest growing type of integration among their HIE customers
- Epic, eClinicalWorks, Beth Israel Deaconess, Atrius Health have made wide use of this mode of interoperability

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Lab Market Is Highly Fragmented

116,634 physician office laboratories

5,604 commercial labs

- Quest: ~30%
- LabCorp: ~20%
- Only Quest and LabCorp cover the entire US
- Next largest, Spectra, covers 1/3 of US counties and county-equivalents

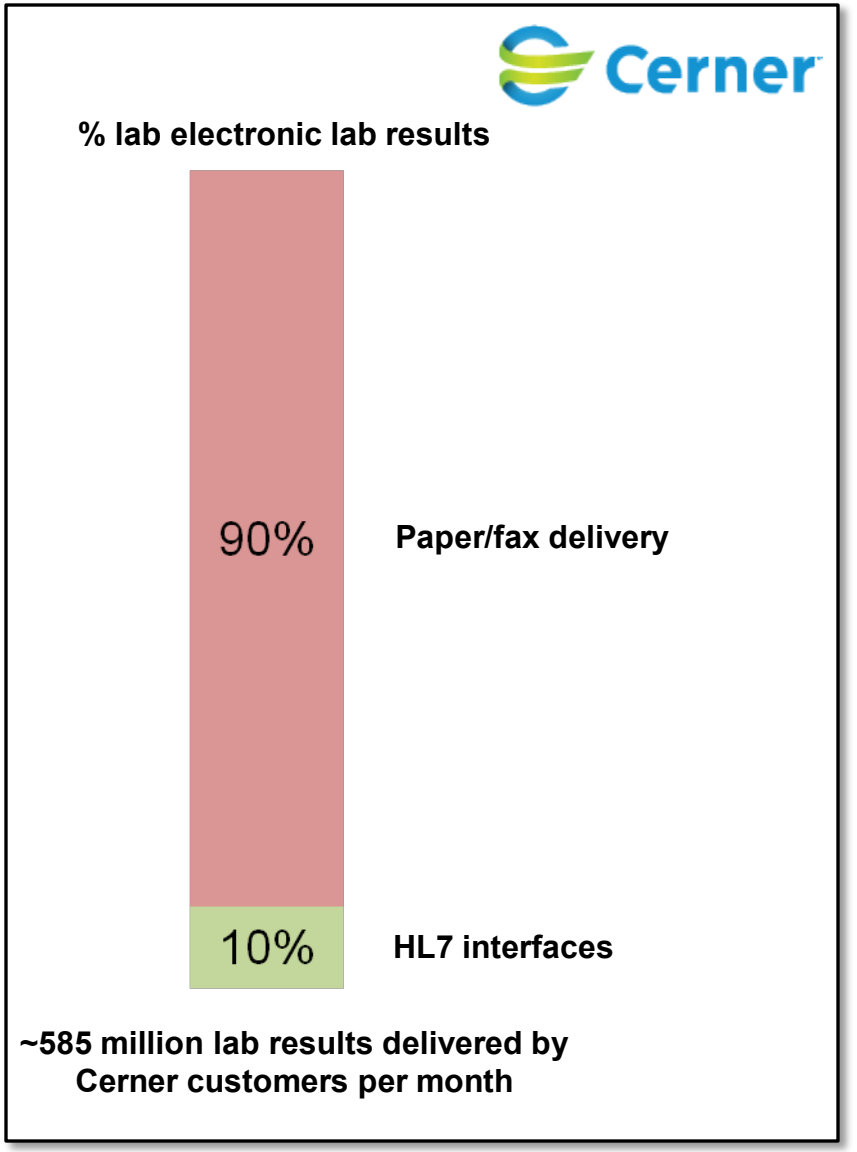
8,807 hospital labs

% of labs conducted

Source: Quest Diagnostics 2009 Annual Report; CMS CLIA Update July 2012

- Fragmentation may be increasing as hospitals increase lab business to offset revenue decreases in other areas
- Fragmentation makes it difficult to generate collective action for a national lab network like Surescripts
- Meaningful Use is the only industry-wide force driving standardization of lab results delivery
- High fragmentation of lab market makes it difficult to measure progress of electronic transactions
- ONC is now fielding national lab survey

Large fraction of lab results delivery still via fax and paper



Source: Cerner Corporation

- Progress in electronic results delivery tied to EHR penetration
- Interface implementation is significant barrier to progress – lack of standardization and competing priorities
- MU Stage 2 may not be enough of a spur to significantly increase electronic delivery from hospitals – does not require electronic delivery and standardization of electronic delivery is menu set item

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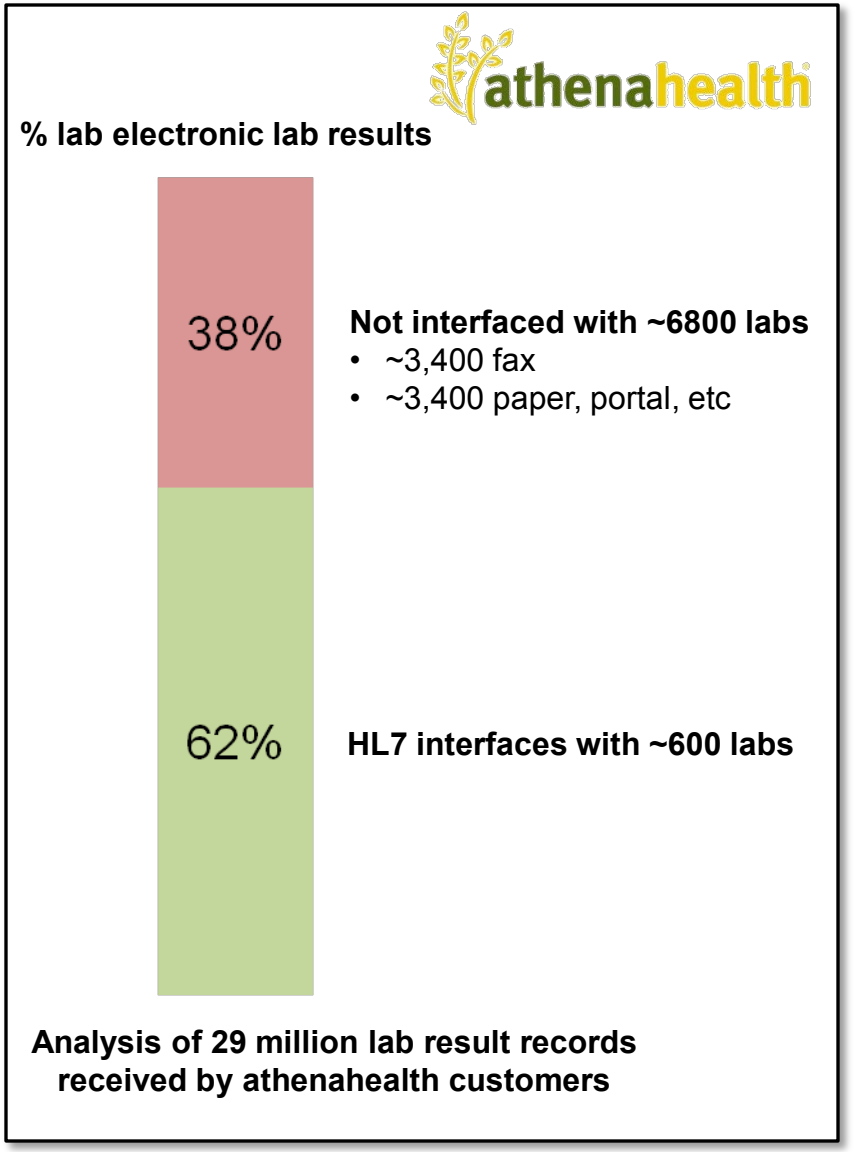

Source: athenahealth

- athenahealth has unique data because they track ALL lab result reports delivered to their customers
- Small number of labs account for majority of electronic results
- Effort required for interface deployment is barrier both on the lab side as well as on EHR vendor side
- athenahealth completing about 15 new lab interfaces per month
- Large practices have higher lab interface rate (68%) than small practices (56%) who get lower priority from labs -- commercial labs do not cover cost of interfaces to small practices

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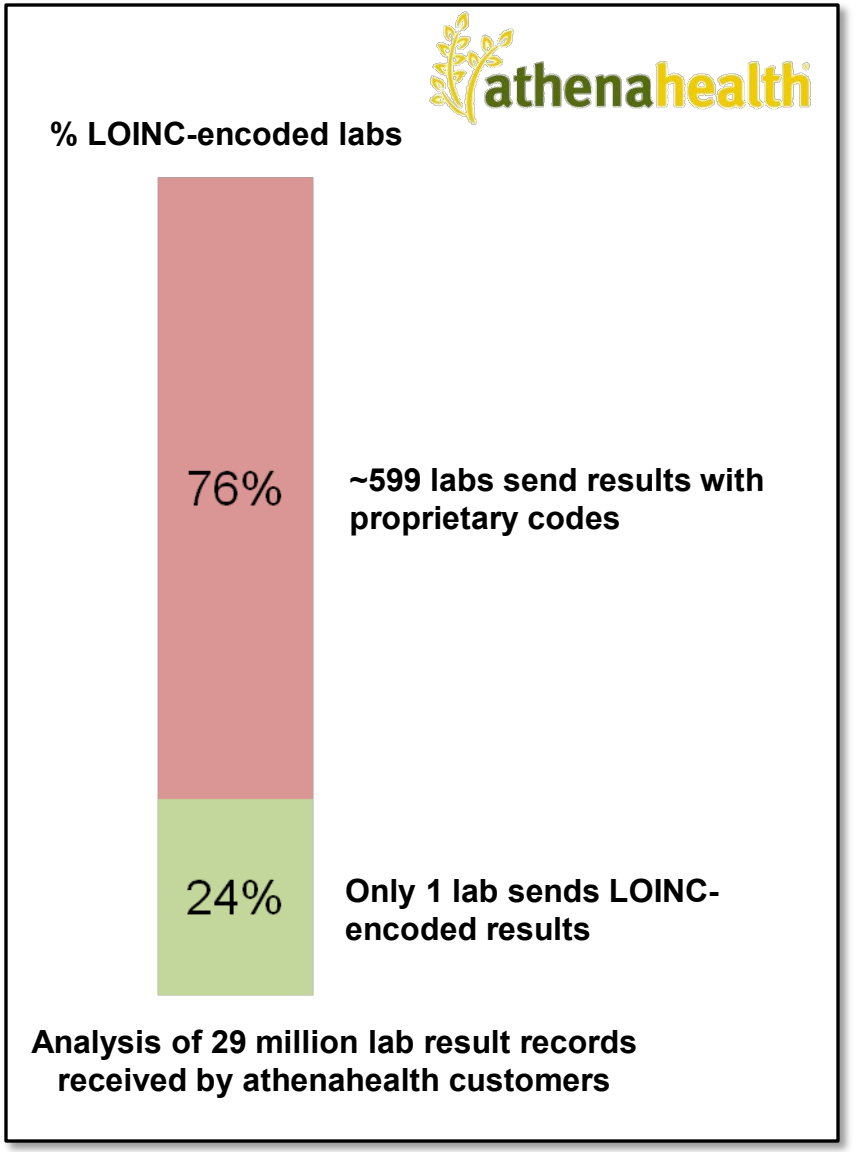
Large gap in LOINC-mapping capabilities



Source: athenahealth

- Vast majority of labs do not send LOINC-encoded results
- 1 national lab does, another national lab can but currently does not because has not been asked to
- Large commercial labs capable of LOINC-encoding, however, vast majority of hospitals are not and will take significant effort to get them there
- MU Stage 2 may not provide enough of a spur given difficulty of effort, allowed variation in state public health requirements, and competing priorities

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Point-to-Patient

EHR vendor patient portals command largest market share of market for patient-facing applications, for example:

- eClinicalWorks: over 8 million patients on patient portal, in 2012, over 16 million secure message transactions conducted between patients and providers
- Epic: does not release patient portal information per customer contracts, however, Kaiser alone reports over 4 million patients and over 13 million secure email transactions between patients and providers in 2012

Patient-controlled applications not able to get large traction without greater impetus from providers and EHR vendors

- HealthVault has over 1 million customers
- Some providers and EHRs automate upload of clinical data to Microsoft HealthVault, for example
- Blue button and Stage 2 MU may open door for greater demand from providers and consumers

Large growth in tools for patient-generated data – now treated as a separate silo, but will likely become an extension of our health care system very soon

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Conclusions

HIE activity is starting to flourish

Heterogeneity will be the hallmark of HIE activity in the coming years

Multi-layered HIE modes seem to be developing as business practices mature

- "B2B"-style patterns to move documents around with little to no centralized coordination – Direct and Directed Query
- "Supply-chain" style patterns with deep integration among very closely aligned entities seeking centralized orchestration for rich applications to support complex uses

With MU Stage 2 and CMS ACO initiatives, seedbed has been laid to allow many HIE areas to proliferate on their own

- Allow the market to develop norms and business practices around what has been put in place
- 3 areas where more policy & standards are needed to spur market innovation
  - Labs – organic motivation for standardization difficult in current market structure
  - Lightweight "Directed Query" – ability to have cross-system query without having to deploy elaborate legal and technical infrastructure
  - eMeasures and eCPOE – enable enterprise-level dispersal of measure and decision support algorithms to give leverage to ACOs
- 1 area to keep a close eye on
  - Highly constrained core data set and exportable/importable CCDA
  - MU Stage 2 defines this, but need to see how the market responds

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