


**SINI 2016**  
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**Building bridges to quality through health information exchange**


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## Long Term Care: By the Numbers

There are 36,000 assisted living facilities in the U.S. and more than 1 million senior citizens are served by these facilities.

On a given day, 1.5 million people are living in the nation's 16,000-plus nursing homes, and in a typical year, more than 3.2 million Americans will spend at least some time in one.



*"Within the next decade, planet Earth will be inhabited by more people aged 65 and older than children under five. The proportion of older people will double from 7 percent to 14 percent of the total world population in just over 30 years."*

*An Aging World: 2008*  
International Population Reports

## Resident Care is Complex in LTC

Leading primary medical diagnoses  
Percent

– Circulatory system	25%
– Mental disorder	16%
– Diseases of nervous system and sense organs	14%
– Require assistance with ADLs	98%
– Bowel or bladder incontinence	35%
– Pressure Ulcers	11%

## Influences in IT adoption

- **Urgency for a national health IT infrastructure**
- **Goals set by developers of this national infrastructure**
  - Develop interoperable information systems
  - Better care coordination
  - Transfer of health information among organizations and systems
- **Problem**  
The role of IT in quality measurement efforts is not well established

## URGENCY

- **Office of the National Coordinator (ONC)**
  - Community Interoperability and Health Information Exchange Cooperative Agreement Program including LTCs
- **Agency for Healthcare Research and Quality (AHRQ)**
  - Making Health Care Safer in Ambulatory Care Settings and Long Term Care Facilities (R01)
- **Federal Advisor Committees (2009)**
  - HIT Policy Committee
  - HIT Standards Committee
    - Define 'Meaningful Use' of HIT
    - Integration through 2015
  - CMS Innovation Grants 2015



## Two National LTC Studies exploring HIE

National Report of Nursing Home Information Technology and Quality Measures: AHRQ

National Demonstration: Missouri Quality Improvement Initiative to Reduce Avoidable Hospitalizations in Nursing Facilities: Centers for Medicare and Medicaid



## Current LTC IT Projects

A National Report of Quality Measures and Information Technology in Nursing Homes- Year 1 Results

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## Increasing IT Capabilities in LTC

RESIDENT CARE	CLINICAL SUPPORT	ADMINISTRATIVE
Admissions	Staff scheduling	
Discharges	Vital signs recording	
Transfers	Medication admin.	
Waiting list management	Staff workload Management	Tracking IT system issues
Bed availability estimation	Physician orders transcription	IT requests
Discharge summary	Care planning/RAPS	IT "Help Desk"
Order entry	Historical records	Backup Power Source
Physician order sheet	Resident acuity	Biotechnology
Progress notes	Quality assurance	Resident ID
Results reporting	Nursing flowsheet	Electronic wand (scanning)
Face sheet (abstracts)	Incident reporting	
	Real time MDS/RAI	
	Clinical reporting	
	Label generation	
	Specimen archiving	
	Recurring test management	

Increasing Extent of IT Use in LTC

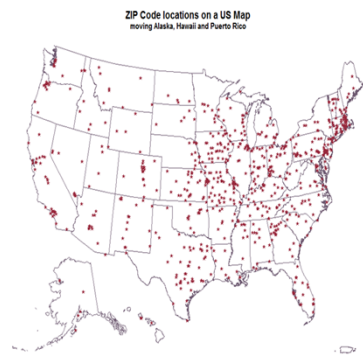
Resident Care	Clinical Support	Administrative Activities
Electronic Tracking Medical records Resident ID Scanning medical records Centralized scheduling Dictation systems Voice recognition systems Connection to external databases Expert System Telemedicine Access to radiological images Sensor systems	PCs at nursing station PCs in the hallway PCs on the med cart PCs at the bedside Portable computing devices Laptops Handheld (PDA) Wireless Touch screens Tablets	Databases Networks Operating Systems Fax machines Fiber optics Wide area network Satellite connections Microwave connections Local area network Integrated Service Delivery Network Wireless network Modems Infrared connections

Increasing Internal/External IT Integration in LTC

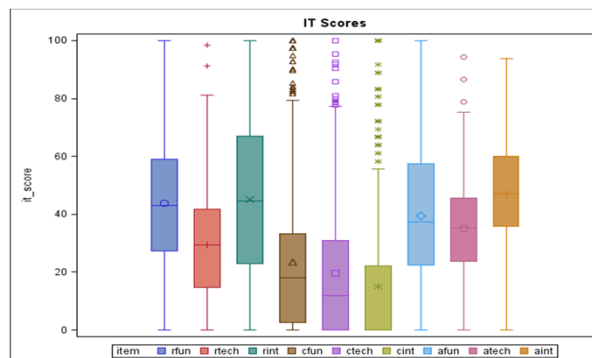
RESIDENT CARE	CLINICAL SUPPORT	ADMINISTRATIVE ACTIVITIES
Resident management systems Admissions Scheduling Resources availability Laboratory Pharmacy Human resources Finance Medical/resident records	Electronic and automatic transfer of information between IT systems Nursing IT integration Pharmacy Dietary PT/OT Laboratory IT Department	Environmental systems in place Fire protection systems Security access Disaster recovery plan Nursing home website External email Electronic bulletin boards Intranet applications Extranet applications Resource Planning

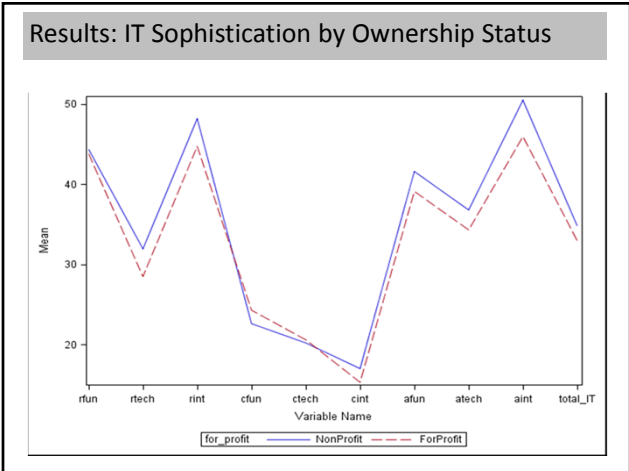
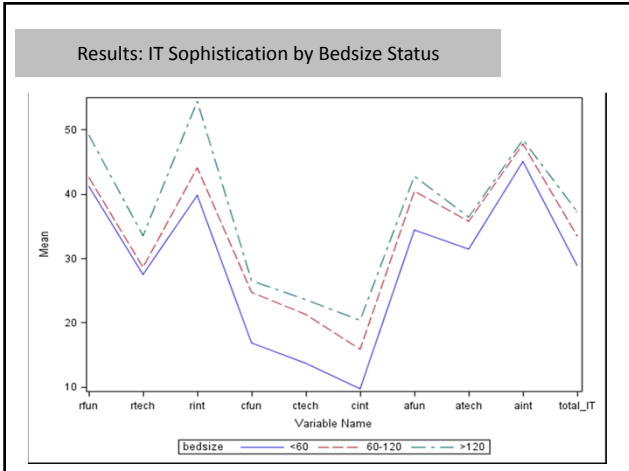
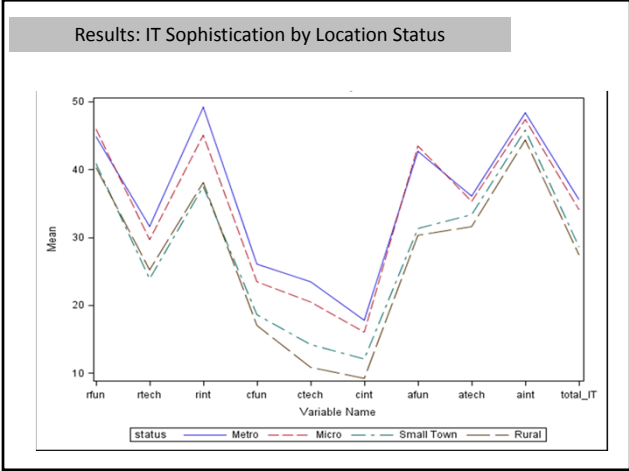
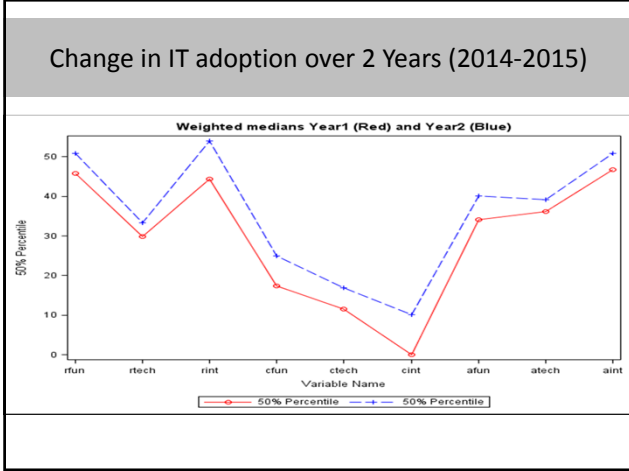
Methods: Sample and Recruitment

- Total U.S. Nursing Homes
  - 15,689
- Random sample
  - 10% each state
  - Goal 1570 Nursing Homes
- Exclusion criteria
  - Homes with quality issues (Special Focus)
  - Guam, Puerto Rico, and U.S. Virgin Islands
- Recruitment procedures
  - Initial Call, Follow-up x2 weeks (x3), Last Call
- Survey methodology
  - Electronic
  - Paper



Results: N=805 Nursing Homes, 45% response rate





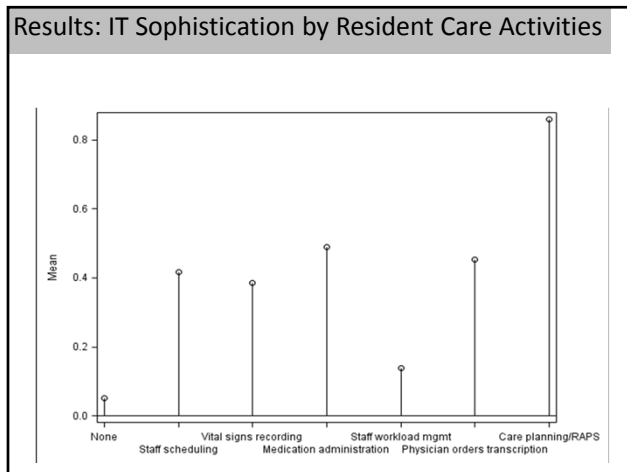
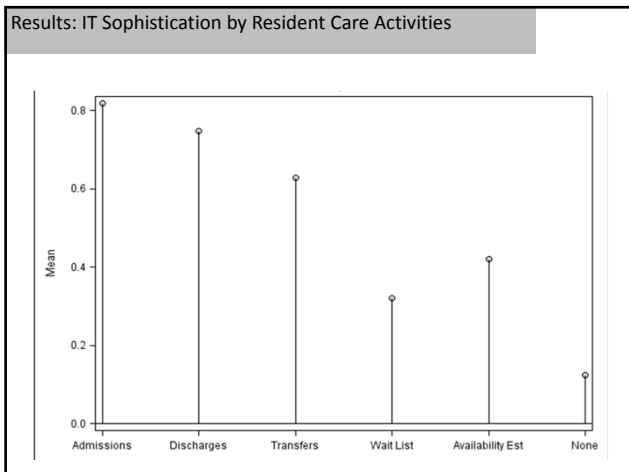


Table: Spearman's Rank Correlations (r) Between IT Sophistication Scores and QMs

Quality Measures:	Residential Care Activities			Clinical Support			Administrative Activities			Total IT
	IT Capability	Extent of IT Use	Integration	IT Capability	Extent of IT Use	Integration	IT Capability	Extent of IT Use	Integration	
<b>Percent of Long Stay Residents</b>										
ADL Needs Increased	0.00	-0.04	0.02	-0.08	-0.08	-0.09	-0.02	-0.01	-0.03	-0.03
Who Report Mod to Severe Pain	0.08	0.03	0.06	-0.01	-0.07	-0.05	-0.11	0.02	0.01	0.00
High Risk With Pressure Ulcers	-0.01	-0.05	0.01	0.05	0.02	0.04	0.05	0.02	-0.01	0.01
Who Lose Too Much Weight	0.05	0.05	0.05	0.01	-0.02	-0.02	0.02	0.01	0.02	0.02
Low Risk Bowel or Bladder Incontinent	0.16	0.21	0.13	0.00	-0.01	0.05	0.09	0.19	0.16	0.16
With Cath Inserted and Left in Bladder	0.05	0.04	0.06	-0.01	-0.02	-0.02	0.01	0.04	0.03	0.03
With a Urinary Tract Infection	-0.06	-0.07	-0.05	-0.09	-0.13	-0.09	-0.08	-0.04	-0.09	-0.10
Who Have Depressive Symptoms	0.02	-0.03	0.00	-0.05	-0.04	-0.05	-0.07	-0.03	-0.05	-0.04
Who Were Physically Restrained	-0.02	-0.02	0.01	0.01	0.01	0.01	0.01	0.00	-0.02	0.00
One or More Falls with Major Injury	0.06	0.05	0.04	0.04	-0.02	0.05	-0.04	0.02	0.03	0.04
Assessed/ Given Seasonal Flu Vaccine	-0.05	-0.03	-0.10	0.02	0.03	-0.05	-0.05	-0.02	-0.05	-0.05
Assessed/ Given Pneumococcal Vaccine	-0.06	-0.02	-0.07	-0.02	-0.01	-0.03	-0.04	0.01	0.00	-0.03
Received an Antipsychotic Med	-0.09	-0.15	-0.11	-0.02	-0.05	-0.07	-0.08	-0.07	-0.09	-0.11
<b>Percent of Short Stay Residents</b>										
Who Report Mod to Severe Pain	0.07	0.05	0.07	0.03	-0.03	-0.05	-0.04	0.01	0.01	0.02
With New or Worsened Pressure Ulcers	-0.01	-0.01	-0.04	0.03	-0.01	0.01	0.03	0.03	-0.01	0.00
Assessed/ Given Seasonal Flu Vaccine	-0.11	-0.04	-0.10	0.01	0.02	-0.01	-0.04	-0.05	-0.04	-0.06
Assessed/ Given Pneumococcal Vaccine	-0.07	-0.03	-0.07	0.02	0.02	-0.01	-0.02	0.00	0.00	-0.03
Newly Received an Antipsychotic Med	-0.03	-0.06	-0.05	0.05	0.02	0.02	0.01	-0.04	-0.03	-0.02

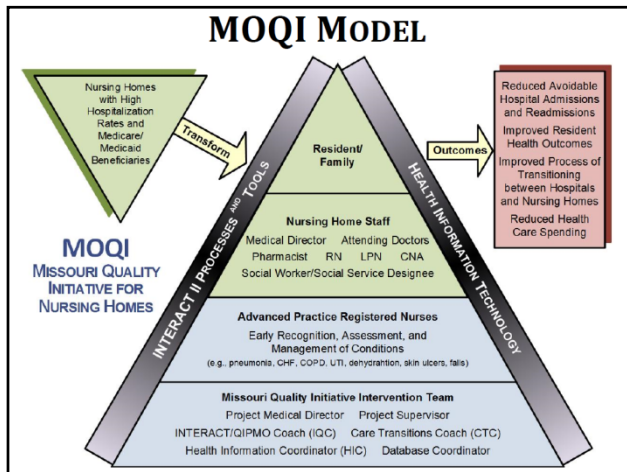
KEY: For all values where r <= -.08 or >= .08 shaded in grey they are significant (P < .05)

### Key Questions about the Future

1. What are the pattern of changes in overall ITS over time and what links exist between the changes in ITS and NH attributes.
2. Are patterns of overall ITS changes over time associated with changes in Quality Measures over time.
3. Which relationships between specific types of ITS (dimensions and domains), facility attributes (Staffing, Facility, and Market Characteristics), and Quality Measures create the best opportunities for quality improvement.

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The Missouri Quality Improvement Initiative (MOQI):  
The Initiative to Reduce Avoidable Hospitalizations among  
Nursing Facility Residents



## Geographic Reach



Source: Centers for Medicare & Medicaid Services



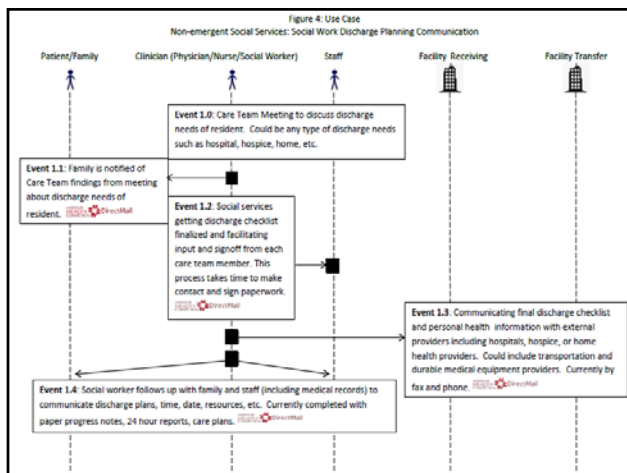
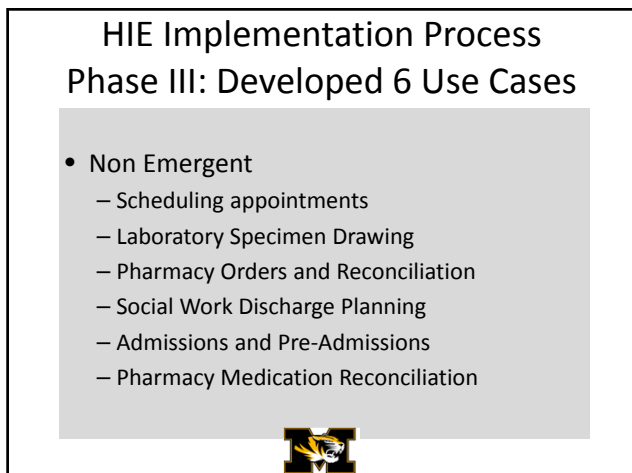
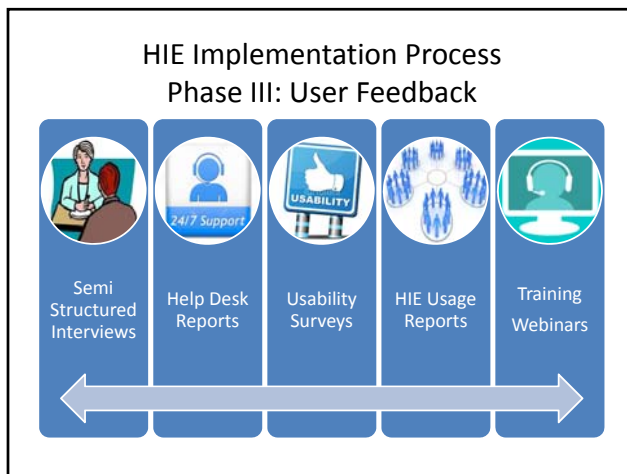
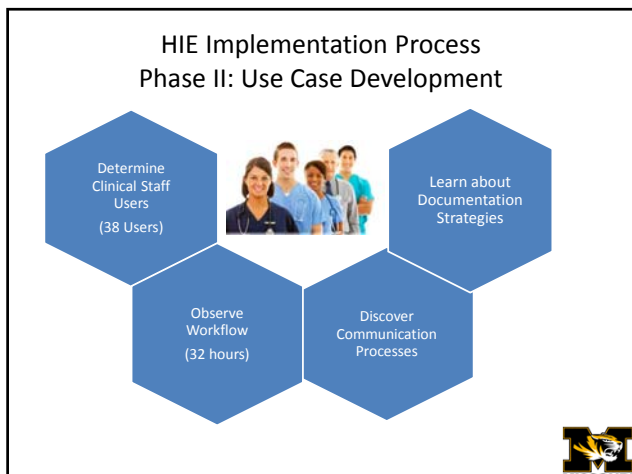
## HIE Implementation Process

Phase One:

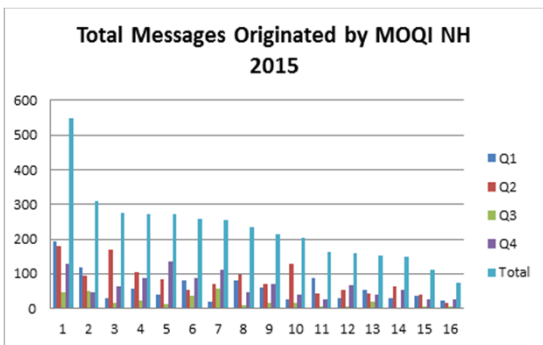
**It's all in the preparation**

- IT Readiness Assessment:
- Electronic Interfaces:
  - Direct "CareMail" and Bidirectional Portal "CareView"
- System Administrator
- Help Desk and Training

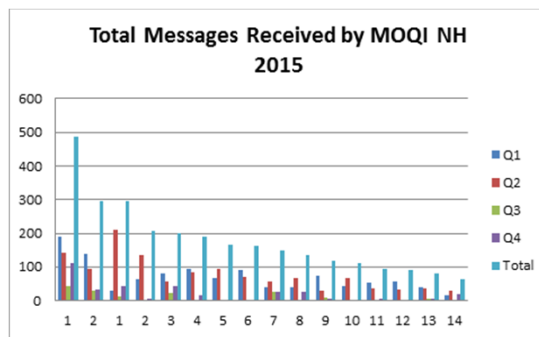




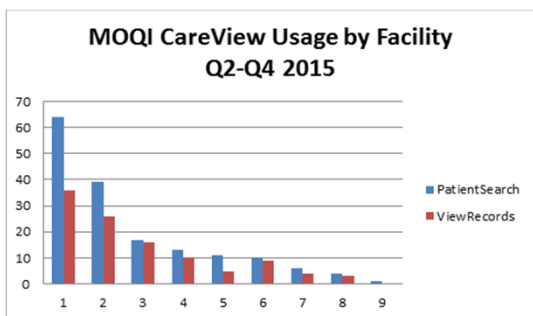
### MHC CareMail Usage



### MHC CareMail Usage



### MHC CareView Usage



### Outcomes

Summary of ECCP intervention effects on utilization and expenditure outcomes, Missouri

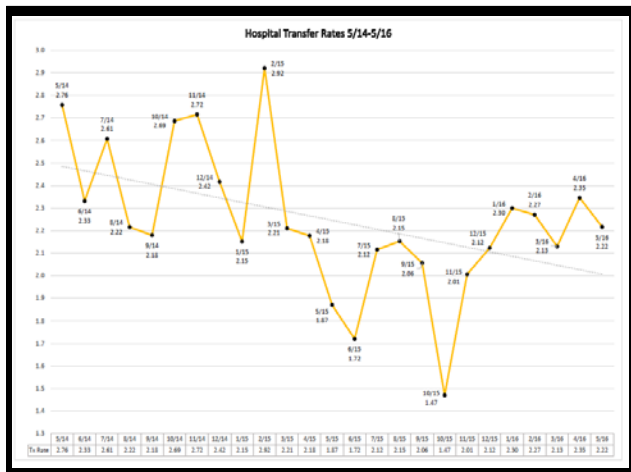
Outcome	Mean, 2012	Effect: 2012 to 2014	Effect (% of mean)
<b>Medicare utilization (count of events per resident)</b>			
All-cause hospitalizations	0.491	-0.105***	-21.4%
Potentially avoidable hospitalizations	0.206	-0.071***	-34.5%
All-cause ED visits	0.351	-0.098***	-27.9%
Potentially avoidable ED visits	0.105	-0.041***	-39.0%
<b>Medicare expenditure (dollars per resident)</b>			
Total	20,345	-92	-0.5%
All-cause hospitalizations	4,503	-729**	-16.2%
Potentially avoidable hospitalizations	1,587	-456**	-28.8%
All-cause ED visits	173	-53***	-30.6%
Potentially avoidable ED visits	55	-15*	-28.0%

NOTE: The 2012 mean indicates the overall mean of each outcome among all residents in that year. Effect is the marginal effect of the ECCP intervention in 2014 relative to the baseline difference between ECCP and comparison in 2012.

ECCP = Enhanced Care and Coordination Providers, ED = emergency department.

Statistical significance: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ , else not significant ( $p \geq 0.10$ ).





- ### Implementation Challenges for Nursing Homes
- Lack of IT equipment (network linked, accessible, multipage scanners, laptops, smart phones, desktops)
  - Inconsistent Internet connectivity
  - Leadership's lack of familiarity with IT/ Computers
  - Line staff frequently don't have email accounts
  - Unfamiliarity with Surface Tablets and Windows 8
  - Policy change management (staff and administration) is labor intensive
  - Requires interface testing with multiple stakeholders

- ### Successes and Bright Spots
- Successful HIE launch in all 16 homes
  - Successful CareView launch in 8 nursing homes providing access to EHRs associated with hospitals partners
  - Increasing interest in other forms of HIE such as EpicCare Link, secure texting with Mediprocity
  - Piloting HIE exchange from nursing home to hospital partners using CareMail. Requires workflow assessment and identification of key personnel involved in exchange
  - Jump start the journey into how technology and computers can streamline work flow, enhance compliance and allow for better patient care.

### References

Alexander GL, Madsen RW, Miller EL, Wakefield D, Wise K, Alexander RL. (2016). **The State of Nursing Home IT Sophistication in Rural and Non-Rural US Markets.** Journal of Rural Health. Available early online access June 2016.

Alexander GL, Madsen RW, Miller EL, and Wise K. (2016). **A National Report of Nursing Home Information Technology Adoption and Quality Measures.** Journal of Nursing Care Quality, 31(3):201-6.

Alexander GL, Madsen RW, Miller EL, Schaumberg MK, Holm AE, Alexander RL, Wise KK, Dougherty ML, and Gugerty B. (2016). **A National Report of Nursing Home Information Technology: Year One Results.** Journal of the American Medical Informatics Association. Available early online access Apr 2016

Alexander GL, Popejoy LL, Lyons V, Shumate S, Mueller J, Vogelsmeier A, Galambos C, Rantz M, and Flesner M. (in press, 2016) **Exploring Health Information Exchange Implementation using Qualitative Assessments of Nursing Home Leaders.** Perspectives in Health Information Management.

Alexander, G.L., Rantz, M.J., Galambos, C., Vogelsmeier, A., Popejoy, L., Mueller, J., Shumate, S., and Elvin, M. (2015). **Preparing nursing homes for the future of health information exchange.** Applied Clinical Informatics, 6(2), 248-266.

Thank you

Questions

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