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Variation in Interoperability among U.S. Non-federal Acute Care Hospitals in 2017

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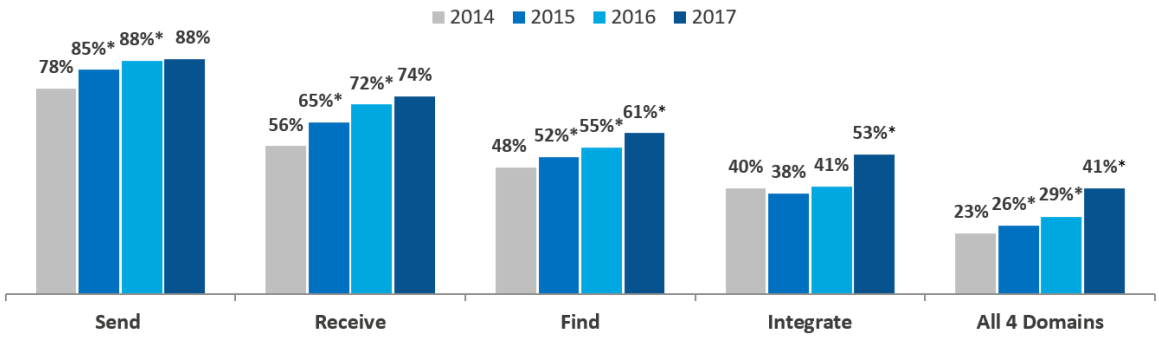
Monitoring the state of interoperability is important to assess current policies and identify ways to advance the electronic exchange of health information. In this data brief, we describe the progress hospitals made in four interoperability domains – sending, receiving, finding, and integrating electronic health information. The data brief shows that engagement in interoperability varies among small, rural, and critical access hospitals (CAHs). These hospitals often possess infrastructure that lags behind their counterparts (1). Yet, small, rural, and CAHs deliver vital health care to diverse subpopulations. We also present data on reported barriers to interoperability and hospitals' rates of availability and use of electronic health information at the point of care.

HIGHLIGHTS

- Hospitals that engaged in all four interoperability domains increased by 41 percent since 2016.
- Hospitals that engaged in four domains of interoperability were over three times more likely to have information electronically available than hospitals that only send and receive summary of care records.
- Nearly 3 in 10 small, rural, and CAHs can send, receive, find, and integrate summary of care records in 2017.
- Small, rural and CAHs increased their rates of engagement in four interoperability domains by 50 percent between 2016 and 2017.
- Small, rural, and CAHs trail their counterparts across all four domains of interoperability.
- Difficulty locating a provider's address when sending information or a provider lacking the technical capability to receive information were the highest barriers to electronic exchange reported by hospitals.

Hospitals engaged in all four domains of interoperability increased by 41 percent since 2016.

Figure 1: Percent of U.S. non-federal acute care hospitals that electronically find patient health information, and send, receive, and integrate patient summary of care records from sources outside their health system, 2014-2017.



SOURCE: 2014-2017 AHA Annual Survey Information Technology Supplement.
NOTES: *Significantly different from previous year (p<0.05).

★ Integration of summary of care records increased by 29 percent, more than any other interoperability domain.

Hospitals engaged in all four interoperability domains were over three times more likely to have information available at the point of care compared to hospitals that only sent and received summary of care records.

Table 1: Percent of U.S. non-federal acute care hospitals whose providers have necessary patient information electronically available from outside providers or sources by level of interoperability, 2017.

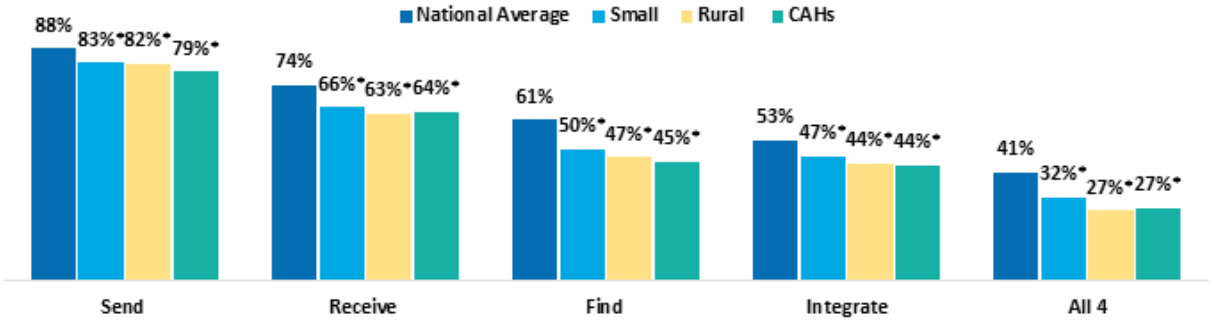
	Percent of hospital providers engaged in domain(s)	Percent of hospital providers that have the necessary information electronically available
Find, send, receive, and integrate	41%	83%*
Find, send, and receive only	13%	64%*
Send, receive, and integrate only	7%	35%*
Send and receive only (reference)	11%	23%
Send only	8%	9%*
Not engaging in interoperability	8%	13%*
Average across all hospitals	-	51%

Source: 2017 AHA Annual Survey Information Technology Supplement.
Notes: *Significantly different from send and receive ($p<0.05$).

- ★ Eighty-three percent of hospitals that engaged in all four domains of interoperability reported having information electronically available at the point of care. This is nearly 30 percent higher than hospitals that engaged in three domains and almost seven times higher than hospitals that did not engage in any domain.
- ★ The largest share of hospitals (41 percent) engaged in all four domains of interoperability.
- ★ Only eight percent of hospitals did not perform any of the four interoperability domains.
- ★ The ability to find information is associated with the largest increase in having information electronically available (40 percentage points more than those who send and receive only).

Nearly 3 in 10 small, rural, and CAHs can send, receive, find, and integrate summary of care records.

Figure 2: Percent of U.S. non-federal acute care hospitals that electronically find patient health information, and send, receive, and integrate patient summary of care records from sources outside their health system by hospital type, 2017.

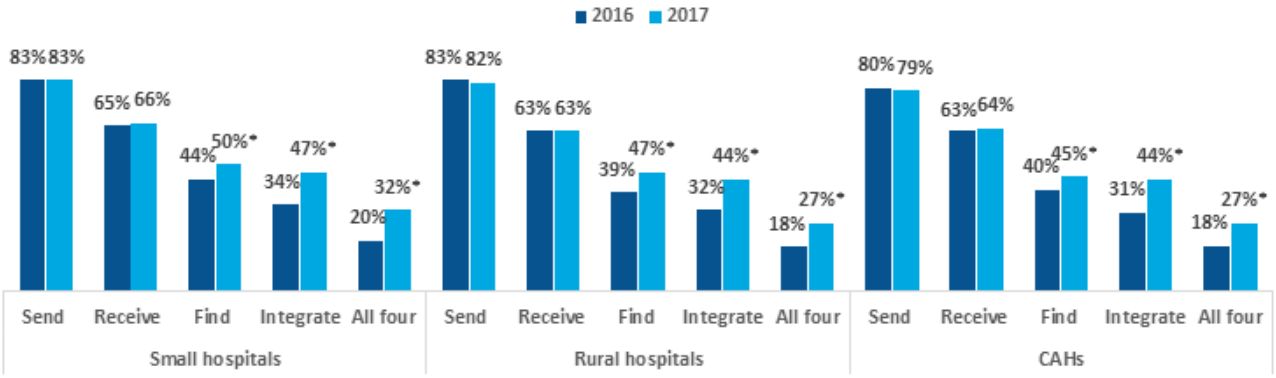


Source: 2017 AHA Annual Survey Information Technology Supplement.
Notes: *Significantly lower than their counterparts ($p<0.05$). Counterparts for small are hospitals that are medium and large; counterparts for rural are all non-rural hospitals; counterparts for CAHS are all non-CAHS. Results are estimated on the sample of non-federal acute care hospitals. See Appendix Table A1 for more details.

- ★ Small, rural, and CAHs trail their counterparts across all four domains of interoperability.
- ★ Finding health information and integrating summary of care records remain most challenging interoperability domains for small, rural and CAHs, where at most 50 percent of these hospitals can engage in one of the domains.

The percent of small, rural, and CAHs using all four domains of interoperability increased between 2016 and 2017 by at least 50 percent.

Figure 3: Percent of U.S. non-federal acute care hospitals that electronically find patient health information, and send, receive, and integrate patient summary of care records from sources outside their health system by hospital type, 2016-2017.

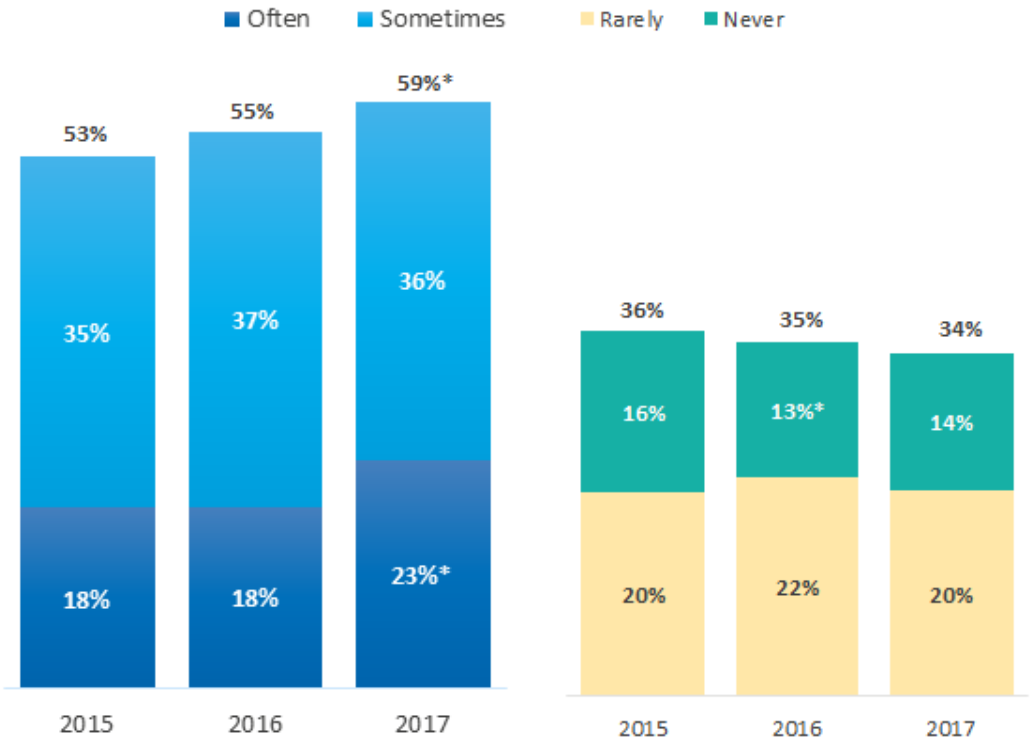


Source: 2016-2017 AHA Annual Survey Information Technology Supplement.
Notes: *Significantly different from previous year (p<0.05).

- ★ All hospital types experienced an increase in electronically finding information between 2016 and 2017.
- ★ In 2017, the proportion of CAHs that routinely integrate summary of care records increased by 42 percent.
- ★ For each hospital type, rates of sending and receiving did not change between 2016 and 2017.

Hospitals that often used patient health information received electronically increased to 23 percent between 2016 and 2017.

Figure 4: Percent of U.S. non-federal acute care hospitals' use of patient health information received electronically from providers or sources outside their health system when treating patients, by frequency of use, 2015-2017.



Source: 2015-2017 AHA Annual Survey Information Technology Supplement.
Notes: *Significantly different from a corresponding category in previous year (p<0.05). The category *Do not Know* is not shown.

- ★ Percent of hospitals that reported using patient information often or sometimes increased by six percentage points between 2015 and 2017.
- ★ In 2017, over half of hospitals (59 percent) reported they often or sometimes use patient health information received electronically from outside providers when treating a patient.
- ★ The percent of hospitals that never use patient health information decreased between 2015 and 2016.

Difficulty integrating information into their EHR was the most common reason reported by hospitals for not using health information received electronically from sources outside their health system.

Table 2: Reasons for rarely or never using patient health information received electronically from providers or sources outside their health system when treating patients, 2017.

Reason	2017
Difficult to integrate information in EHR	55%
Information not always available when needed (e.g. timely)	47%
Information not presented in a useful format	31%
Information that is specific and relevant is hard to find	20%
Information available and integrated into EHR but not part of clinicians' workflow	16%
Do not trust accuracy of information	10%
Vocabulary and/or semantic representation differences limit use	7%

Source: 2017 AHA Annual Survey Information Technology Supplement.
Notes: *Significantly different from previous year (p<0.05).

- ★ About half of hospitals reported information was not always available when needed.
- ★ Nearly one in three hospitals reported information was not presented in a useful format.
- ★ About one in 10 hospitals reported they do not trust accuracy of information and that differences in vocabulary and/or semantic representation limited their use of health information received electronically from sources outside their health system.

The most common barrier to electronic exchange reported by hospitals was difficulty locating providers' addresses when sending information.

Table 3: Percent of U.S. non-federal acute care hospitals that experienced issues when trying to electronically send, receive, or find health information to/from other care settings or organizations, 2017.

Barriers related to electronically sending patient health information	Small	Rural	CAH	National
Lacking the technical capability to electronically send patient health information to outside providers or other sources	14%*	13%*	16%*	10%
Exchange partners' we would like to send data to do not have an EHR or other electronic system to receive data	41%^	40%^	40%^	45%
Exchange partners' EHR system lacks capability to receive data	45%^	45%^	42%^	53%
Difficult to find providers' addresses	51%^	52%^	48%^	55%
Many recipients of care summaries report that the information is not useful	36%	36%	35%	37%
Cumbersome workflow to send the information from our EHR system	29%*	32%*	33%*	26%
The complexity of state and federal privacy and security regulations makes it difficult for us to determine whether it is permissible to electronically exchange patient health information	18%	18%	21%*	18%
Barriers related to electronically receiving patient health information				
We lack the technical capability to electronically receive patient health information from outside providers or other sources	22%*	21%*	24%*	17%
Difficult to match or identify the correct patient between systems	31%^	31%^	30%^	36%
There are providers whom we share patients with that don't typically exchange patient data with us	51%^	52%	51%	53%
Other barriers related to exchanging patient health information				
Greater challenges exchanging data across different vendor platforms	55%	58%*	59%*	53%
Paying additional costs to exchange with organizations outside our system	31%	31%	31%	31%
Develop customized interfaces in order to electronically exchange health information	25%	25%	24%	25%

Source: 2017 AHA Annual Survey Information Technology Supplement.
Notes: *Significantly higher from their counterparts (p<0.05). ^Significantly lower from their counterparts (p<0.05).

- ★ More than half of each hospital type reported a challenge with exchanging across different vendor platforms.
- ★ About half of hospitals reported that their exchange partners do not have an EHR (45 percent) or that their EHR system lacks the capability to receive data (53 percent).
- ★ Over 50 percent of hospitals reported that there are providers with whom they share patients; however, these providers do not exchange patient data with the hospital.

Summary

Interoperability among U.S. hospitals is improving (2). In 2017, most hospitals reported that they could send (88 percent) and receive (74 percent) patient summary of care records from outside sources. Moreover, hospitals reporting that they were able to find (or query) and integrate patient health information with sources outside their health system increased significantly. Four in 10 hospitals were engaging in all four domains of interoperability (find, send, receive, and integrate) (1). Additionally, hospitals' adoption of newer EHRs increased. About 93 percent of non-federal acute care hospitals reporting that they have already upgraded to the 2015 Edition or plan to upgrade by the end of 2018 (2).

While small, rural, and CAHs continue to trail the national average across all domains of interoperability, these hospitals showed encouraging improvement in 2017. Three in 10 small, rural and CAHs are now engaging in all four domains of interoperability – which is a 50 percent increase from 2016.

Engaging in all four domains of interoperability is critical to ensure that clinicians have the information they need at the point of care. Eighty-three percent of hospitals that engaged in all four domains of interoperability reported having information electronically available at the point of care. This is nearly 30 percent higher than hospitals that engaged in three domains. The ability of hospitals to find information from sources outside their health system is associated with the largest increase in having information electronically available at the point of care.

More hospitals are also using information received electronically from sources outside their health system. Over half of hospitals (59 percent) reported that they often or sometimes use patient health information received electronically when treating a patient. This was a six percentage point increase from 2015. Among hospitals who reported rarely or never using health information received from sources outside their health system, difficulty integrating information into their EHR was the most common reason cited for not using this information.

Challenges remain that impede the progress toward nationwide interoperability. Hospitals' limited ability to integrate data, difficulty locating provider addresses, and exchange partners' EHR systems lacking the capability to receive health information stand out as significant barriers to interoperable exchange. Additionally, small, rural, and CAHs experience these barriers at significantly higher rates which result in a sizable gap in interoperable exchange among different hospital types. For example, more than half of hospitals report challenges exchanging health information across different vendor platforms. Also, there are providers with whom hospitals share patients that don't typically exchange data with the hospital.

Policies aimed at addressing these barriers will be particularly important for improving interoperable exchange in health care. The 2015 Edition of the health IT certification criteria (2015 Edition) includes updated technical requirements that allow for innovation to occur around application programming interfaces (APIs) and interoperability-focused standards such that data are accessible and can be more easily exchanged. The 21st Century Cures Act of 2016 further builds upon this work to improve data sharing by calling for the development of open APIs and a Trusted Exchange Framework and Common Agreement (3). These efforts, along with many others, should further improvements in interoperability.

Definitions

Non-federal acute care hospital: Hospitals that meet the following criteria: acute care general medical and surgical, children's general, and cancer hospitals owned by private/not-for-profit, investor-owned/for-profit, or state/local government and located within the 50 states and District of Columbia.

Interoperability: The ability of a system to exchange electronic health information with and use electronic health information from other systems without special effort on the part of the user (3). This brief further specifies interoperability as the ability for health systems to electronically send, receive, find, and use health information with other electronic systems outside their organization.

Integrate: Whether the EHR integrates summary of care record received electronically (not eFax) from providers or sources outside your hospital system/organization without the need for manual entry.

Find: Whether providers at your hospital query electronically for patients' health information (e.g., medications, outside encounters) from sources outside of your organization or hospital system.

Small hospital: Non-federal acute care hospitals of bed sizes of 100 or less.

Rural hospital: Hospitals located in a non-metropolitan statistical area.

Critical Access Hospital: Hospitals with less than 25 beds and at least 35 miles away from another general or critical access hospital.

Data Source and Methods

Data are from the American Hospital Association (AHA) Information Technology (IT) Supplement to the AHA Annual Survey. Since 2008, ONC has partnered with the AHA to measure the adoption and use of health IT in U.S. hospitals. ONC funded the 2017 AHA IT Supplement to track hospital adoption and use of EHRs and the exchange of clinical data.

The chief executive officer of each U.S. hospital was invited to participate in the survey regardless of AHA membership status. The person most knowledgeable about the hospital's health IT (typically the chief information officer) was requested to provide the information via a mail survey or secure online site. Non-respondents received follow-up mailings and phone calls to encourage response.

The survey was fielded from the beginning of January 2018 to the middle of May 2018. The response rate for non-federal acute care hospitals was 64 percent. A logistic regression model was used to predict the propensity of survey response as a function of hospital characteristics, including size, ownership, teaching status, system membership, and availability of a cardiac intensive care unit, urban status, and region. Hospital-level weights were derived by the inverse of the predicted propensity.

References

1. Johnson C., Pylypchuk Y. & Patel V. (November 2018) Methods Used to Enable Interoperability among U.S. Non-Federal Acute Care Hospitals in 2017, no.41. Office of the National Coordinator for Health Information Technology: Washington DC.
2. Acute Care Hospitals Are More Interoperable Than Ever but New Challenges Lie Ahead. Blog Post. Office of the National Coordinator for Health Information Technology: Washington DC.
3. 21st Century Cures Act, section 4006. https://www.gpo.gov/fdsys/pkg/PLAW-114publ255/pdf/PLAW-114publ255.pdf.

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Appendix

Appendix Table A1: Percent of U.S. non-federal acute care hospitals that electronically find patient health information, and send, receive, and use patient summary of care records from sources outside their health system by hospital type, 2017.

	Send	Receive	Find	Integrate	All four domains
Small hospitals	83*	66*	50*	47*	32*
Medium and large hospitals	93	82	72	59	50
Rural hospitals	82*	63*	47*	44*	27*
Suburban and urban hospitals	92	82	72	60	51
CAHs	79*	64*	45*	44*	27*
Non-CAHs	92	78	68	57	46

SOURCE: 2017 AHA Annual Survey Information Technology Supplement.
Notes: *Significantly different from category directly below ($p<0.05$).

Appendix Table A2: Survey questions assessing variation in interoperability among hospitals.

Question Text	Response Options
When a patient transitions to another care setting or organization outside your hospital system, how often does your hospital use the following methods to **send** a summary of care record?	Often | Sometimes| Rarely |Never | Don't Know/NA Methods without intermediaries • Mail or fax • eFax using EHR • Provider portal for view only access to EHR system • Interface connection between EHR systems (e.g. HL7 interface) • Direct access to EHRs (via remote or terminal access) Methods with intermediaries • Standalone HISP or HISP provided by a third party that enables secure messaging (such as DIRECT) • Community (regional, state, or local) health information exchange organization (HIO) *NOT local proprietary, enterprise network* • Single EHR vendor network (use your EHR vendor's network that enables connection to vendor's other users such as Epic's Care Everywhere) • Multi-EHR vendor networks, like CommonWell • e-Health Exchange
When a patient transitions to another care setting or organization outside your hospital system, how often does your hospital use the following methods to **receive** a summary of care record?	Often | Sometimes| Rarely |Never | Don't Know/NA Methods without intermediaries • Mail or fax • eFax using EHR • Provider portal for view only access to EHR system • Interface connection between EHR systems (e.g. HL7 interface) • Direct access to EHRs (via remote or terminal access) Methods with intermediaries • Standalone HISP or HISP provided by a third party that enables secure messaging (such as DIRECT) • Community (regional, state, or local) health information exchange organization (HIO) *NOT local proprietary, enterprise network* • Single EHR vendor network (use your EHR vendor's network that enables connection to vendor's other users such as Epic's Care Everywhere) • Multi-EHR vendor networks, like CommonWell e-Health exchange
Do providers at your hospital **query** electronically for patients' health information (e.g. medications, outside encounters) from sources **outside** of your organization or hospital system?	• Yes • No, but do have the capability • No, don't have capability • Do not know

Question Text	Response Options
Does your EHR integrate the information contained in summary of care records received electronically (not eFax) without the need for manual entry? *This could be done using software to convert scanned documents into indexed, discrete data that can be integrated into EHR.*	• Yes, routinely • Yes, but not routinely • No • Do not know • NA
Do providers at your hospital routinely have necessary clinical information available electronically (not e-Fax) from outside providers or sources when treating a patient that was seen by another health care provider/setting?	• Yes • No • Do not know
How frequently do providers at your hospital use patient health information received electronically (not e-Fax) from outside providers or sources when treating a patient?	• Often • Sometimes • Rarely • Never • Don't know
If rarely or never used, please indicate the reason(s) why. Check all that apply.	• Information not always available when needed (e.g. not timely) • Do not trust accuracy of information • Information available but not integrated into EHR • Information available and integrated into EHR but not part of clinicians' workflow • Information not presented in a useful format (e.g. too much information, redundant, or unnecessary information) • Information that is specific and relevant is hard to find • Vocabulary and/or semantic representation differences limit use • Other
Which of the following issues has your hospital experienced when trying to electronically (not eFax) send, receive or find (query) patient information to/from other care settings or organizations? Check all that apply.	• We lack the technical capability to electronically send patient health information to outside providers or other sources • We lack the technical capability to electronically receive patient health information from outside providers or other sources • Providers we would like to electronically send patient health information to, do not have an EHR or other electronic system with capability to receive the information • Providers we would like to electronically send

Question Text	Response Options
Which of the following issues has your hospital experienced when trying to electronically (not eFax) send, receive or find (query) patient information to/from other care settings or organizations? Check all that apply. (continued).	patient health information to have an EHR; however, it lacks the technical capability to receive the information • The complexity of state and federal privacy and security regulations makes it difficult for us to determine whether it is permissible to electronically exchange patient health information • Many recipients of our electronic care summaries (e.g. CCDA) report that the information is not useful • Cumbersome workflow to send (not eFax) the information from our EHR system • Difficult to match or identify the correct patient between systems • There are providers whom we share patients with that don't typically exchange patient data with us • Difficult to locate the address of the provider to send the information (e.g. lack of provider directory) • Experience greater challenges exchanging (e.g. sending/receiving data) across different vendor platforms • We have to pay additional costs to send/receive data with care settings/organizations outside our system • We had to develop customized interfaces in order to electronically exchange health information
Please indicate whether you have used electronic clinical data from the EHR or other electronic system in your hospital to: (Please check all that apply)	• Create a dashboard with measures of organizational performance • Create a dashboard with unit-level performance • Create individual provider performance profiles • Create an approach for clinicians to query the data • Assess adherence to clinical practice guidelines • Identify care gaps for specific patient populations • Generate reports to inform strategic planning • Support a continuous quality improvement process • Monitor patient safety (e.g. adverse drug events) • Identify high risk patients for follow-up care using algorithm or other tools • None of the above