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EHR Capabilities and Interoperability in Critical Access Hospitals

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KEY FINDINGS

- National data of nearly 700 Critical Access Hospitals (CAHs) show that CAHs were less likely to use a comprehensive Electronic Health Record (EHR) than their non-CAH counterparts, with a more substantial lag for independent CAHs compared to system-affiliated CAHs. This finding persists when we consider each of the four domains of interoperability.

- CAHs are less likely to use electronic methods to send data, though system affiliation again mitigates this difference as a higher proportion of system-affiliated CAHs reported "often" using electronic methods to send data compared to independent CAHs.

PURPOSE

U.S. hospitals, including Critical Access Hospitals (CAHs), have widely adopted electronic health records (EHRs) over the past decade through federal incentive programs. Despite challenges such as high implementation costs and limited information technology (IT) resources, nearly all hospitals, including CAHs, now utilize EHRs. The current focus is on leveraging advanced EHR capabilities for improved efficiency and patient outcomes. However, concerns remain that CAHs may not fully maximize these technologies, particularly in advanced clinical data analytics and interoperability. This study uses national survey data to understand CAH EHR capabilities and organizational characteristics, such as system affiliation, that help explain variation in information sharing in the CAH context.

BACKGROUND

U.S. hospitals have participated in over a decade of incentivized federal programming to adopt and meaningfully use EHRs, motivated by the improvements in efficiency, quality, and patient/provider experience that digitization may offer.[1,2] As a result, nearly 100% of hospitals now use an EHR.[3] This includes CAHs, which is an important achievement given that these organizations often face barriers such as high implementation costs, fewer trained and experienced IT staff, and a lack of digital infrastructure (i.e., broadband upload speeds and number of internet service providers).[4,5] EHRs are one important component of what is broadly referred to as Health information technology (HIT), which also includes telehealth, patient health portals, electronic prescribing, and other components.

Now that nearly all hospitals, including CAHs, have an EHR, the focus has shifted to more advanced EHR capabilities to continue improving hospital processes and patient outcomes. There is some concern that CAHs may not be maximizing use of these technologies in the same way as other hospitals. In recent research, CAHs have been less likely to report using advanced clinical data analytics in their EHR compared to non-CAHs.[3] This includes functions such as measuring clinical guideline adherence, using data to support continuous process improvement efforts, and monitoring patient safety. There is also some concern that small, rural hospitals lag in interoperability; that is, the ability to access and exchange health information within and across health systems.[6] Interoperability is an important priority for continuing progress toward digital transformation of the U.S. health care system, as reflected in regulatory changes at the Centers for Medicare and Medicaid Services (CMS), the U.S. Department of Health and Human Services (HHS), and The Office of the National Coordinator for Health Information Technology (ONC).[7–10] The Medicare Promoting Interoperability Program requires hospitals (including CAHs) to report select quality measures related to interoperability and health information exchange; otherwise, they may be subject to a downward payment adjustment.[10] Organizations need to be able to send and receive information, but also search for and integrate data from outside sources to create complete records for patient- and population-level data-informed care. Without these capabilities, CAHs may be struggling to realize value from digital investments.[11]

For policymakers to best support the efforts of CAHs to build advanced digital infrastructure, particularly around interoperability, it is important to understand the factors driving variation among CAHs' existing capabilities. Specifically, system affiliation has been found in other contexts to support information sharing capabilities in less resourced settings but has not been examined in CAHs.[12] The way that information sharing activity is measured and reported also may not fully represent the status of interoperability in the

CAH context; these hospitals may have unique ways of exchanging information given the large geographic referral region for their patients. Therefore, using national survey data that includes nearly 700 CAHs as respondents, we compare CAHs to other hospitals and to each other in terms of progress toward both advanced EHR use and interoperable health information exchange, with a focus on identifying organizational characteristics associated with more advanced capability.

APPROACH

Data for this project comes from the 2019 American Hospital Association Information Technology Supplement (AHAIT). To identify CAHs in this data, we merged in a list of hospitals designated as critical access as of December 31, 2019, from lists maintained by the Flex Monitoring Team (FMT).[13] Survey data from 2019 was used as the most recent year for which all variables of interest for this analysis were available. To describe general IT capabilities in CAH and non-CAH settings, we used previously defined categorizations of "basic" EHR use (nine foundational EHR functions) and "comprehensive" EHR use (all basic functions as well as 14 additional functions).[3] Hospitals without the nine foundational EHR functions are categorized as having "less than basic" EHR use. We then compared rates of comprehensive EHR use in CAHs with and without system affiliations, based on the American Hospital Association (AHA) Annual Survey. The AHA designates hospitals as "system members" if they belong "to a corporate body that owns and/or manages health provider facilities or health-related subsidiaries".

The AHAIT survey asks respondents to report how often they use various methods to send, receive, query, and integrate patient health information from other sources by selecting one category from "often", "sometimes", "rarely", and "never". To analyze interoperability progress, we first coded for each hospital whether they reported "often" sending, receiving, querying, and/or integrating health information using at least one electronic method. We also created a summary

index of these same four capabilities and compared progress between CAHs versus non-CAHs. We next looked only at electronic sending capability (as it was the most prevalent functionality) and compared the frequency of use of each electronic send method between CAHs and non-CAHs. Electronic send methods include ways a hospital sends a patient summary of care record outside of their organization when a patient transfers to a different care setting. We do this first by only counting use of a method as affirmative if a respondent hospital reports "often" using it. We then repeat the analysis by considering a response affirmative if the hospital either "sometimes" or "often" uses it. We combined the specific send methods into two main categories: electronic with intermediaries and electronic without intermediaries. The "with intermediaries" category includes health information service providers (HISPs), health information exchanges (HIEs), EHR vendors, and national exchanges. The "no intermediaries" category includes provider portals, interface, and direct access. We use chi-square tests throughout our analyses to detect significant differences in both overall interoperability progress and use of different methods of electronic send functionality. We report comparison between CAHs and non-CAHs as well as comparison of system-affiliated CAHs to independent CAHs.

RESULTS

General Health Information Technology Capabilities

The survey included responses from 696 CAHs (of 1,351 designated CAHs in 2019) and 1,957 non-CAHs. Of the CAHs in the survey sample, 320 (46%) were independent and 376 (54%) were system-affiliated. In 2019, CAHs had lower rates of comprehensive EHR capability (74% of system-affiliated CAHs and 40% of independent CAHs compared to 80% of non-CAHs, Table 1). CAHs were also significantly more likely to have only a basic EHR, with 28% of CAHs overall (22% of system-affiliated CAHs and 36% of independent CAHs) having a basic EHR compared to 15% of non-CAHs. For both of these categories, the proportion of system-affiliated CAHs was closer to that of non-CAHs than independent CAHs, though there was still a statistically significant difference between these groups. Independent CAHs were also more likely to have a less than basic EHR, but there was not a difference between system-affiliated CAHs and non-CAHs in this category (24% of independent CAHs compared to 5% of system-affiliated CAHs or non-CAHs). These are mutually exclusive categories as described in the approach.

TABLE 1: EHR Capabilities by CAH Status and System Affiliation (2019)

CAH EHR Capabilities	Non-CAH n (%)	System-affiliated CAHs n (%)	Independent CAHs n (%)	p-value comparing Non-CAHs and System-affiliated CAHs
Comprehensive	1,566 (80%)	277 (74%)	128 (40%)	0.006*
Basic	293 (15%)	81 (22%)	116 (36%)	0.002*
Less than basic	97 (5%)	18 (5%)	76 (24%)	0.99

indicates the difference between Non-CAHs and System-affiliated CAHs is statistically significant with a p-value of 0.05 or less

Interoperability

We also looked at the reported use of electronic methods for sending, receiving, querying, and integrating data (often referred to as interoperability domains) in independent CAHs, system-affiliated CAHs, and non-CAHs. Figure 1 shows the number of domains (0-4) for which CAHs and non-CAHs reported using electronic methods. Though a higher proportion of CAHs reported that they use 0 or 1 electronic domains compared to non-CAHs (45% of CAHs compared to 21% of non-CAHs), a majority of CAHs indicated using at least 2 domains (54%). A higher proportion of non-CAHs reported using electronic methods for all four domains compared to CAHs (39% of non-CAHs compared to 21% of CAHs).

Table 2 displays frequencies and percentages of non-CAHs, system-affiliated CAHs, and independent CAHs in each of the four interoperability domains. Overall, a higher proportion of non-CAHs reported using electronic methods compared to both system-affiliated and independent CAHs in each of these four domains, regardless of system affiliation. These differences were considerably smaller between system-affiliated CAHs and non-CAHs; however, they were significant for the send, receive, and query domains.

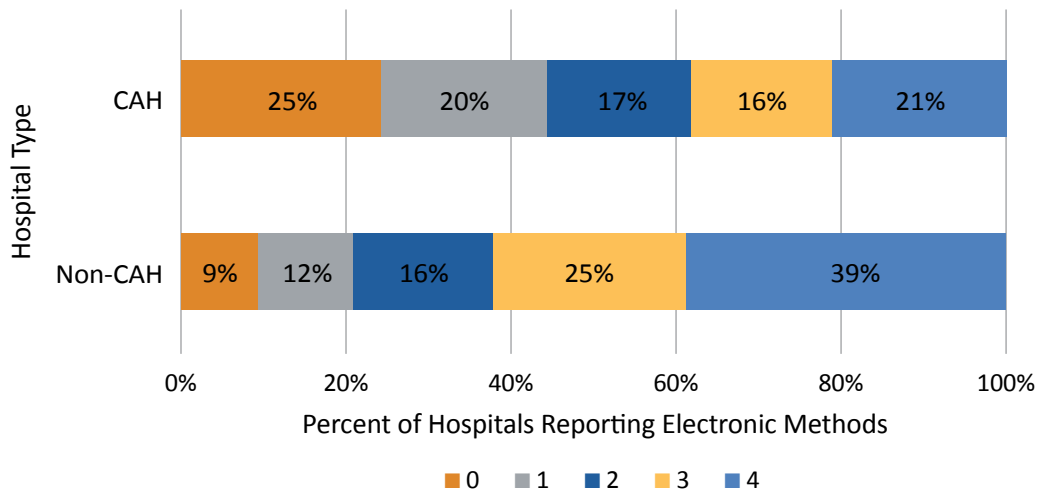**FIGURE 1: Number of Interoperability Domains Utilizing Electronic Methods, by CAH Status (2019)**

TABLE 2: Use of Electronic Methods for Interoperability Domains by CAH Status and System Affiliation (2019)

Domain	Non-CAH n (%)	System-affiliated CAHs n (%)	Independent CAHs n (%)	p-value comparing Non-CAHs and System-affiliated CAHs
Send	1,653 (84%)	283 (75%)	152 (48%)	<0.001*
Receive	1,295 (66%)	228 (61%)	95 (30%)	0.04*
Query	1,413 (72%)	224 (60%)	87 (27%)	<0.001*
Integrate	971 (50%)	184 (49%)	57 (18%)	0.84

indicates the difference between Non-CAHs and System-affiliated CAHs is statistically significant with a p-value of 0.05 or less

TABLE 3: Number and Percent of System-Affiliated CAHs, Independent CAHs, and Non-CAHs that Report "Often" Using Electronic Methods to Send Data (2019)

Methods	Non-CAH n (%)	System-affiliated CAHs n (%)	Independent CAHs n (%)	p-value comparing Non-CAHs and System-affiliated CAHs
Electronic, Intermediaries	1,519 (78%)	259 (69%)	125 (39%)	<0.001*
Electronic, No Intermediaries	1,183 (60%)	205 (54%)	72 (22%)	0.04*

indicates the difference between Non-CAHs and System-affiliated CAHs is statistically significant with a p-value of 0.05 or less

TABLE 4: Number and Percent of System-Affiliated CAHs, Independent CAHs, and Non-CAHs that Report "Often" or "Sometimes" Using Electronic Methods to Send Data (2019)

Methods	Non-CAH n (%)	System-affiliated CAHs n (%)	Independent CAHs n (%)	p-value comparing Non-CAHs and System-affiliated CAHs
Electronic, Intermediaries	1,762 (90%)	328 (87%)	205 (64%)	0.12
Electronic, No Intermediaries	1,597 (82%)	287 (76%)	166 (52%)	0.02*

indicates the difference between Non-CAHs and System-affiliated CAHs is statistically significant with a p-value of 0.05 or less

To further assess the specific interoperability capabilities of CAHs, we compared the rate of the different send methods between system-affiliated CAHs, independent CAHs, and non-CAHs as seen in Table 3. These differences included hospitals that selected they "often" use each method to send a patient summary of care electronically when a patient is transferred to a different facility. The various methods were combined into two groups: electronic with intermediary support (such as HISPs, HIEs, and EHR vendors) and electronic without intermediary support. We found significant differences between the three types of hospitals in both types of electronic send method, with a higher proportion of non-CAHs reporting they "often" use each method. These differences were again smaller between non-CAHs and system-affiliated CAHs.

We also completed this analysis using a different definition of use, by including responses for "often" and "sometimes", as shown in Table 4. When we considered intermittent and consistent use in this way, the relative difference in reported use shrunk between CAHs and non-CAHs, particularly for methods that include intermediaries. By this definition, 87% of system-affiliated CAHs and 90% of non-CAHs reported using electronic methods with intermediaries to send data, compared to 69% and 78% respectively for only "often" using these methods. Thus, adding in intermittent use appears to close the gap between system-affiliated CAHs and non-CAHs in this domain.

DISCUSSION

Using a national survey dataset with nearly 700 CAH respondents, we find that CAHs lag in robustness of HIT capabilities compared to non-CAHs. However, system affiliation is associated with a narrowing of this gap. Developing advanced digital capabilities in all health care environments, including CAHs, is essential for enabling any true technology-enabled transformation of care. To ensure that CAHs have equitable access to these improvements, we need to understand more about how system-based support is best optimized for this setting and what options are available for helping independent CAHs to build their digital infrastructure.

This is especially true when thinking about electronic information sharing to support safe and coordinated care across settings. CAHs manage a high rate of outbound transfers for high-acuity patients who require specialty care that is outside the scope or capacity of a CAH.[14] During these transfers, CAHs must provide information and also access records of that subsequent care upon patients' return to the community.[14] Quick and accurate exchange of information during these patient transfers is critical for patient safety.[15] This is reflected by the inclusion of the Emergency Department Transfer Community (EDTC) measure in the Medicare Beneficiary Quality Improvement Program that is the quality reporting program for CAHs as a part of the Medicare Rural Hospital Flexibility (Flex) Program, and was established because of these known issues and the impact that fast and accurate information flow has on patient outcomes.[15] We found evidence of CAHs reporting less robust capability with respect to interoperability, with system affiliation again mitigating these differences. This suggests that system resources may be providing essential support for adoption and implementation of tools and processes (e.g., training, workflow design, etc.). This could also be related to system-affiliated CAHs transferring patients to other hospitals within their system, and thus having more seamless interoperability capabilities with those hospitals. Additional analysis of transfer data may offer further insights on this.

By investing in EHRs and receiving adequate support, CAHs can leverage HIT to achieve several crucial objectives. First, they should aim to enhance patient care and safety by efficiently managing EHRs, ensuring accurate medication tracking, and reducing medical errors through digital systems. Many of the functions included in our definition of a comprehensive EHR (e.g., ability to view diagnostic test images, clinical guidelines, and drug interactions) are designed to reduce errors, and CAHs without these capabilities may want to consider prioritizing utilizing these functions.

Additionally, CAHs should prioritize interoperability, enabling seamless data exchange with larger health care networks as well as local facilities (e.g., nursing homes, home health agencies) to facilitate coordinated care and informed decision-making, particularly given the relatively large volume of outbound transfers initiated by CAHs. Ideally, CAHs' investment in interoperable HIT solutions, comprehensive training for staff to ensure proficient system utilization, and partnerships with larger health care entities to facilitate data sharing and resource allocation will contribute to more seamless data exchange, ultimately enhancing patient care and safety. In practice, CAH leaders must make difficult decisions about what to prioritize within the constraints of their specific scale and resources available. One possible approach may be for a CAH to pursue lower cost non-intermediary health information exchange options (such as direct access or portal access) with their highest-volume referral partners. This would establish a foundation for streamlined communication and data exchange while the CAH pursues building capacity for long-term advanced HIT solutions. Additionally, in December 2023, HHS and ONC launched a nationwide health data exchange, which may be an option for CAHs to explore in the future.[9]

Fostering relationships with other organizations may also provide access to more advanced EHRs and/or technical assistance, and there are many different affiliation structures that CAHs may consider with health care systems that could include access to their EHRs.[16]

These relationships may not be attractive or feasible for all independent CAHs, and can come with significant financial costs or giving up some control over decision-making.[17] Some alternatives include establishing a health information exchange or other alliance to share health care data and access needed big data analytics.[17] Organizations beyond hospital systems may provide additional options; for example, Oregon Community Health Information Network (OCHIN) recently launched tailored access to Epic specifically for rural hospitals nationally as a new product.[18] Through OCHIN, CAHs and other rural hospitals can access a version of epic that is tailored specifically to their needs without going through a larger health system.

There are several ways to support CAHs in these endeavors at the state and federal levels. Continued attention to the specific needs and capabilities of CAHs in terms of interoperability and health information exchange is critical to narrowing the gaps we found in electronic means of interoperability. We found some evidence that CAHs are more likely than their non-CAH counterparts to use these electronic methods more sporadically, particularly among independent CAHs. Thus, CAHs may benefit from workflows and managerial best practices that target consistent use of these electronic methods. Advanced EHR functions are also important for public health reporting, as has been demonstrated throughout the COVID-19 pandemic.[19] To that end, CAHs may need support with advancing their current EHRs or exploring using a different EHR vendor. In 2024, State Flex Programs (SFPs) will receive details about their CAHs' EHR vendors as part of the National CAH Quality Inventory and Assessment. This information could be used by SFPs to encourage collaboration between CAHs that use the same EHR to share best practices and processes at it relates to their EHR's functions and interoperability methods. Previous work from the Colorado and Illinois SFPs may serve as examples of how to support CAHs address interoperability challenges during care transitions.[20]

There are some limitations of this study and the use of survey data. First, these data are cross-sectional, with responses taken at just one moment in time and may not reflect more recent changes to HIT development and advances in CAHs since the data were collected in 2019. Second, there are some limitations with the response rate as only about half of CAHs participated in the AHA IT survey. While this is a fairly robust response rate, responses may not be reflective of all CAHs, and data may underestimate or overestimate the true nature of HIT capabilities in CAHs.

CONCLUSION

This analysis found that CAHs generally lag behind non-CAHs in HIT capabilities, however, the gap is narrower for CAHs affiliated with systems. To facilitate a technology-driven transformation in health care, especially in information sharing for patient safety during transfers, efforts should be made to enhance digital capabilities in all health care settings, with a focus on CAHs. Investing in advanced EHRs for CAHs has the potential to improve patient care, track medications, reduce errors, and promote interoperability for coordinated care.

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