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Impact of Health Information Technology and the Medicare Access and Chip Reauthorization ACT (Macra) on Rural Hospitals

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Abstract

Introduction*: The introduction of Medicare Access and Chip Reauthorization Act of 2015 (MACRA) had led to the transition of the Medicare EHR incentive program, commonly referred to as Meaningful Use. It had established the Quality Payment Program which had introduced the two-track payment system to clinicians – Merit-based Incentive Program System (MIPS) with a primary focus on promoting interoperability and Advanced Payment Program with a primary focus on the certified EHR technology.*

Purpose of the Study: *The purpose of this study was to examine the potential impact of the implementation of MACRA and HIT in rural hospitals to determine current benefits and barriers to the adoption of such changes.*

Methodology: *This study had been conducted by a literature review of scholarly articles, peer-reviewed articles, journals, and case studies. Eight databases and five government websites were used in this study. The study used __ articles for the collection of relevant information, which was then reviewed and reduced to __ articles and were included in the written research material.*

Results: *The results from this study illustrated that the implementation of MACRA and HIT would result in increased quality and accessibility to health care to patients in rural hospitals. However, the payment tracks to these rural hospitals and small physicians were identified as a cause of concern and were correlated to the identification of barriers to the implementation of MACRA and HIT.*

Keywords: *'MACRA' OR 'MIPS' OR "APM' OR 'SGR' AND 'Meaningful Use' AND 'Interoperability' AND 'Rural Hospitals' AND 'Critical Access Hospitals' AND 'Telemedicine' OR 'Telehealth'.*

Introduction

The Centers for Medicare and Medicaid Services (CMS) had reported in 2019 that the national health expenditures increased by 4.6% to $3.8 trillion or $11,582 per person in the United States (CMS, 2019). The cost of these health care expenditures increased to 18% of the U.S. Gross Domestic Product and accounted for 30% of many state budgets (Bauchner, 2019). The healthcare expenditures were expected to rise by 5.6% annually with the earlier reimbursement system, Sustainable Growth Rate (Kelley, Lipscomb, Valdez, Patil & Coustasse, 2019). Hence, the U.S. Congress proposed the Medicare Access and Chip Reauthorization Act (MACRA) in 2015 which aided in the establishment of a two-track performance-based system (CMS, 2015).

Health Information Technology (HIT) could be defined as an automated or computerized system that has been implemented to aid in the management of health information (Brenner, et al., 2015). The adoption of HIT had been accelerated by the Meaningful Use (MU) incentive program, which provided financial incentives to health care providers and organizations that demonstrated usage of certified health information technology, as specified by CMS (Jones, Rudin, Perry, Shekelle, 2014).

The CMS had provided incentives to health care professionals who had demonstrated Meaningful Use (MU) of EHRs' and promoted interoperability through the three stages of MU where Stage 1 included data capture and sharing, Stage 2 included Advanced clinical processes and Stage 3 included Improved outcomes (ONC, 2013). The federal government allocated $30 million in 2009 as part of the American Recovery and Reinvestment Act (ARRA), which increased the pace of development of health information technology infrastructure with interoperability, which has led to increased hospital participation in the Health Information Exchange (HIE) networks. It had been reported that a fully interoperable healthcare system could save $80 billion annually on U.S. healthcare spending (Walker, 2017).

The Quality Payment Program (QPP) of MACRA initiated the Merit-based Incentive Payment System (MIPS) and the Alternative Payment Model (APM) system, which aided in the transition from the traditional fee-for-service reimbursement model to the fee-for-value payment model (Jones, et al., 2019). The final rule along with the comment period had set up incentives for participation in certain Alternative Payment Models and included the standards for use by the Physician-Focused Payment Model Technical Advisory Committee to offer recommendations on Physician-Focused Payment Models (CMS, 2016).

The CMS stated that the MIPS eligibility was specific to each practice and depended on four factors which included the clinician type, the date enrolled as a Medicare provider, whether they had met or exceeded all the three elements of low-volume threshold, and whether they had achieved QP status (CMS, 2017). In MIPS, physicians were evaluated annually based on accomplishments in four realms of Quality, Improvement activities, Cost, and Promoting Interoperability. The performance in each realm would be weighed and evaluated, which determined the final scores, based on which the physicians would receive incentives (Liao & Navathe, 2020).

The CMS had defined the APM as a payment approach that gave additional incentive payments to clinicians or health care organizations who provided superior quality and cost-efficient care (CMS, 2016). The APM system has been considered as a heterogeneous system that could be divided into two subcategories, based on the type of payment, and category of financial risk to the clinicians or health care organizations. The ability of this system was such that it had been the core focus for several initiatives issued by the federal, state, and payer levels since the annunciation of the Patient Protection and Affordable Care Act in 2010 (Carlo, Bensen & Chu, 2020).

According to the U.S. Census Bureau American Community Survey, 60 million people live in rural areas, which approximated 19.3% of the total population (HRSA, 2021). The Centers for Disease Control had attributed the poor health outcomes of the rural population in comparison to their urban counterparts due to their lifestyle choices (Iglehart, 2018). In a report to the Congressional committees, the United States Government Accountability Office identified five key challenges confronted by rural hospitals as financial resources and Risk management, Health Information Technology and Data, Population Health management care delivery, quality and efficiency performance measurement and reporting, and Effects

of model participation and managing compliance with requirements. (U.S. GAO, 2016). The report stated that though there were organizations that offered services to aid the rural hospitals in overcoming the challenges in taking part in Medicare's Value-based payment models, all rural hospitals did not have access to it (U.S. GAO, 2016).

About 60% of the rural hospitals (approximately 1,325) had been designated as Critical Access Hospitals (CAH). It has been reported that in 2012 these CAHs had received $2 billion more than the typical payment (Iglehart, 2018). As rural hospitals have served a vast population, a major barrier for the rural healthcare providers had been vouching for QPP, as it was directly affected by the way that health care organizations report to QPP. Though rural areas encountered many barriers, health care providers had been subjected to a negative payment adjustment when they were under the average threshold (Thompson, 2019).

The purpose of this study was to examine the potential impact of the implementation of MACRA and HIT in rural hospitals to determine current benefits and barriers to the adoption of such changes.

Methodology

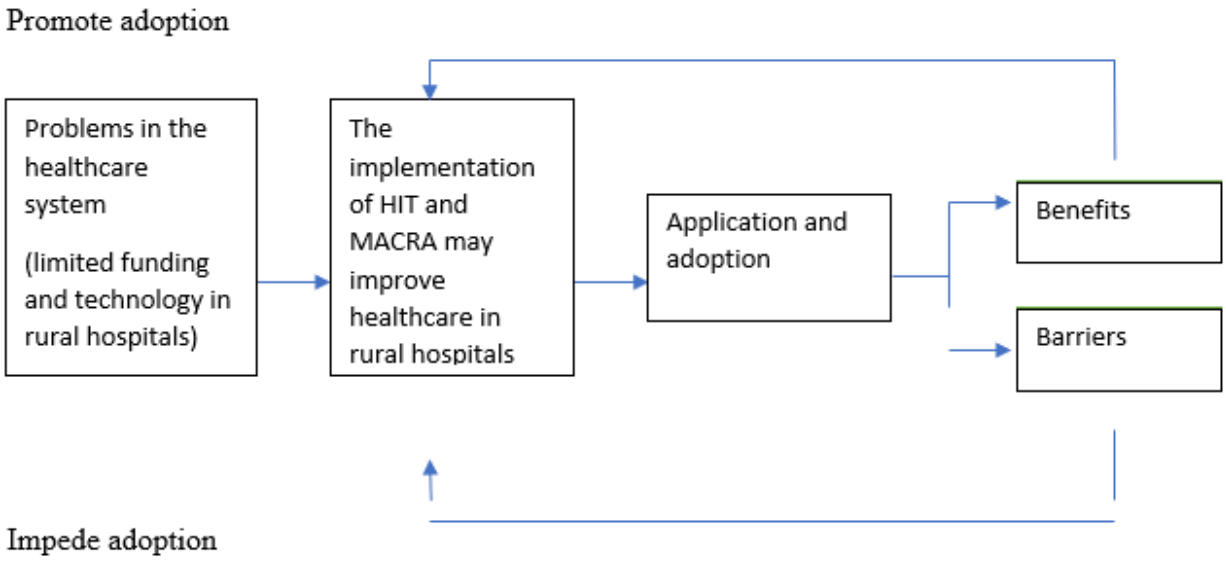
The primary working hypothesis derived out of this research was that the implementation of MACRA and Health Information Technology would result in increased quality and accessibility to health care to patients in rural hospitals in the United States. However, the payment tracks for the rural hospitals and small physicians could be affected negatively if the barriers to the implementation of HIT and MACRA would remain unrecognized and unresolved.

The methodology used to derive this hypothesis was a literature review of scholarly articles, peer-reviewed articles, journals, and case studies. The research study began with the identification of the pros and cons that rural hospitals and small physicians would encounter with the implementation of HIT and MACRA. The barriers to the implementation of HIT and MACRA were then identified and noted during the same process. This systematic review was conducted in a phased manner and included the establishment of an overall strategy, determination of the inclusion and exclusion criteria, and literature and case study classification and analysis.

Conceptual Framework

The conceptual framework for the assessment of the impact of MACRA and HIT on rural hospitals began with the identification of problems in the healthcare system which included limited funding and technology in rural hospitals. Next, the implementation of HIT and MACRA was assessed to determine if it might improve healthcare in rural hospitals. Subsequently, an analysis of the application and adoption of HIT and MACRA in rural hospitals was conducted, which led to the discovery of benefits and

barriers. The benefits promoted adoption, while the barriers impeded adoption, leaving the implementation of HIT and MACRA in rural hospitals to be based on whether the benefits outweighed the barriers (Figure 1) (Thompson, 2019).



Source: Adapted from Thompson (2019)

Figure 1: Conceptual Framework for the Impact of MACRA and HIT on Rural Hospitals.

Step 1: Literature Identification and Collection

The initial phases of the research study were limited to the identification of the impact of Health Information Technology and MACRA on rural hospitals to comprehend the scope of data available for analysis and to identify the key areas to concentrate on. The search was then extended to identify the barriers to the successful implementation of HIT and MACRA. The keywords used to conduct this research included 'MACRA' OR 'MIPS' OR "APM' OR 'SGR' AND 'Meaningful Use' AND 'Interoperability' AND 'Rural Hospitals' AND 'Critical Access Hospitals' AND 'Telemedicine' OR 'Telehealth'. The references used for this research included the use of Google Scholar, NCBI, RHRG, PubMed, ScienceDirect, EBSCOHost, Elsevier, Proquest, and federal government websites such as the Centers for Medicare and Medicaid Services, the U.S. Government Accountability Office, the Quality Payment Program, Congress, and the Human Resources and Services Administration databases. Additional sources were obtained from Marshall Digital Scholar where research material available was limited or more extensive information was needed.

Step 2: Establishment of Inclusion Criteria and Literature Analysis

The inclusion criteria were articles published in the English language and studies conducted across the various states of the United States between 2011 and 2021. The selected literature was chosen for a thorough review based on whether their abstract represented information that was closely related to the study. The articles were then shortlisted for use based on if they had provided further details that were pertinent to the research study.

The exclusion criteria were the years of publication as the articles used in this research were sourced from 2011 to 2021 and did not include earlier publications to include more relativity to the research paper. This research was done by BA, HO, and SP and validated by AC who enacted the role of a reviewer and assessed if the references met the inclusion criteria.

Step 3: PRISMA Framework

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method (Page et al., 2021) was used for the identification of 451 literary reviews that were relevant to the research study. References were included (N= 32) if they met the inclusion criteria and excluded (N= 436) if they did not meet the inclusion criteria. Articles from other sources were also included (N= 7) in the research. These 32 references were subjected to full-text review and included in the final data abstraction and analysis. Only 15 results were used in the results section (Figure 2).

Results

A study conducted by Bai, Yehia, Chen & Anderson on 1,004 rural hospitals, which constituted 83% non-profit and 17% profit hospitals, between 2011-2017 (Exhibit 1) showed that the median profit margin improved for the non-profit critical access hospitals from 2.5% to 3.2% but decreased from 3.2% to 0.5% for profit critical access hospitals, and from 3% to 2.6% for non-profit non-critical access hospitals, and from 5.7% to 1.6% for profit non-critical access hospitals (Exhibit 2) (Bai, et al., 2020).

A study conducted by DesRoches, Worzala, Joshi, Kralovec & Jha in 2011 on 3,233 hospitals and which included 2,646 hospitals for the results, that accounted for 58% of all acute care hospitals in the United States had revealed that small and rural hospitals were the slowest in the adoption of health information technology with 14.7% and 14.8% respectively. In addition, 19.4% had reported deployment of a basic EHR. The same study concluded that meaningful use was exhibited by 13.9% of small and 12.9% of rural hospitals, while the remaining hospitals did not fulfill meaningful use criteria (DesRoches, et al., 2012).

McCullough, Casey, Moscovice & Burlew in 2011 reported that Critical Access Hospitals and other rural hospitals depicted a less prospect of EHR system adoption, as only 3% of CAHs' 5% rural hospitals

reported full use of an EHR as opposed to 9% in urban hospitals. The authors had concluded that the cost of meaningful use compliance might be higher for CAH and other rural hospitals (McCullough, et al., 2011).

However, in contrast, a study conducted by Gabriel, Jones, Samy & King in 2014 on 1,342 Critical Access Hospitals had concluded that HIT infrastructure, such as EHRs and telehealth equipment, was widely adopted by these CAH hospitals. It was also reported that 89% of the hospitals had EHRs' and 85% of the hospitals that did not have an EHR system planned to install an EHR within 12 months. While 62% of CAH hospitals with EHR systems reported that their system was completely electronic, 27% of CAH hospitals reported that they had a part-electronic and part-paper system (Exhibit 3) (Gabriel, et al., 2014).

A study conducted by Toth, Holmes, Van-Houtven, Toles, Weinberger & Silberman in 2015 had provided evidence that Medicare beneficiaries in rural areas had received lower post-discharge follow-up and care. The results showed that Medicare beneficiaries living in secluded rural areas had a lower rate of follow-up care with a hazard ratio of 0.81. This had a direct impact on ED use as Medicare beneficiaries in these areas had an increased risk of ED visits as compared to urban beneficiaries with a hazard ratio of 1.44 and 1.55, respectively. This could lead to increased hospital spending per beneficiary, which might result in adverse outcomes to the providers (Toth, et al., 2015).

Kruse, Kristof, Jones, Mitchell & Martinez in 2016 identified that the most common barrier for implementation of HIT, such as an EHR system was the initial cost which accounted for 14.4% of the results. It was closely followed by 8% technical support, 7.2% technical concerns, 6.4% maintenance/ongoing costs and resistance to changing work habits, 5.6% training, 4% insufficient time, privacy concerns, and workflow challenges, 3.2% financial incentives, and productivity loss, respectively. The researchers had proposed that incentives should be aimed precisely to correct these disparities between initial and ongoing costs barriers in small and rural hospital settings (Kruse, et al., 2016).

Henning-Smith, Prasad, Casey, Kozhimannil & Moscovice based on 2016 County Health Rankings data of Medicare enrollees on Preventable Hospitalizations, Diabetic monitoring, and Mammography screening, reported that rural hospitals (non-core and micropolitan counties) had performed worse than their urban counterparts (Table 1). The results from this study had shown that 71 in 1,000 Medicare enrollees were hospitalized for preventable conditions in rural areas as opposed to 56 in urban areas. Only 84% of Medicare enrollees in rural areas had received appropriate HbA1C monitoring for diabetes against 86% in metropolitan areas. And 59% and 61% of female Medicare enrollees aged 67-69 years had received mammography in non-core and micropolitan counties, as opposed to 62% in metropolitan counties (Henning-Smith, et al., 2017).

Joynt, Nguyen, Snyder, Lechner & Ogunwumiju (2016) had established that those rural hospitals subjected to Hospital-Based Value Purchasing in FY 2015 had a greater mean total performance score

as compared to the urban hospitals. This echoed in the improved performance in efficiency and patient experience domains. This explained the higher average base Diagnosis-Related Group (DRG) payment adjustment factor of +0.22% for rural hospitals, as compared to +0.07% for urban hospitals (Exhibit 4). However, the researchers noted that rural hospitals had more penalties under the HRRP program than their urban counterparts (Table 2) (Joynt, et al., 2016).

The CMS has allowed for the exemption of those providers which had less than $30,000 in Medicare part B revenue or saw fewer than 100 Medicare patients per year in 2017. This had a direct impact on the physicians in the rural hospitals which exempted 134,000 clinicians from QPP participation. The CMS also aimed to reduce MIPS burdens on small practices and rural hospital physicians and hence could grant providers 1-3 bonus points if their patient population was considered exceptionally complicated (Eastman, 2017).

A study conducted by Mason, Mayer, Chien & Monestime in 2017 identified the barriers to EHR implementation faced by rural healthcare providers. Study participants consisted of 21 healthcare providers in the southeastern region of Missouri, who were interviewed and enquired about the barriers that must be overcome for successful implementation of EHR systems as mandated by federal legislation. The Findings had indicated four emergent themes among the participants' responses as Limited finances to support EHRs, Health information exchange issues, Lack of business education, and Lack of change management at rural medical practices (Mason et al., 2017).

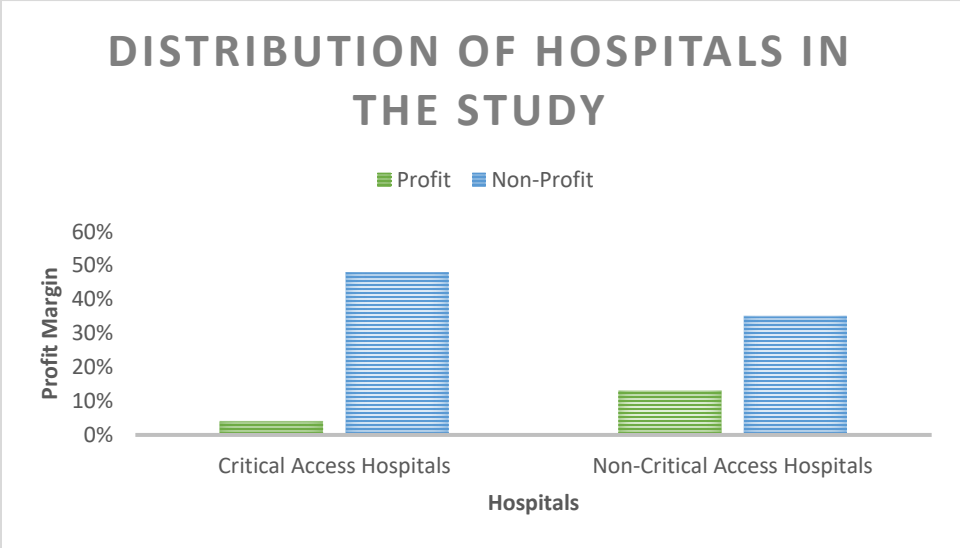
A study conducted by Mejia with Walden University in 2018 identified the strategies that rural hospital leaders used to implement a successful EHR system that balanced hospital personnel needs with technology adoption and implementation. The target population for the study consisted of rural hospital leaders in South Texas, and findings from the study disclosed that ongoing EHR training, provider acceptance and buy-in of EHRs, constant communication, use of super users, and workflow maintenance were common themes described by the participants for successful implementation of an EHR system. Additionally, several participants suggested that the results of the study could be utilized by all rural hospital leaders to improve workflow, profitability, and increased EHR implementation (Mejia, 2018).

While 20% of the rural population was estimated to live in the rural areas, only 10% of physicians had reported of practices, including Physicians, Nurse Providers, and Physician Assistants as opposed to 89% in urban areas (Table 3) (AHRQ, 2012). Medicare's reimbursement program for telemedicine was considered as pallid and had a direct impact on rural healthcare in the U.S. and affected beneficiaries' health outcomes negatively. This could be supported by stating that while CMS had provided $1 trillion (about $3,100 per person in the US) (about $3,100 per person in the U.S.) reimbursement for Medicare but provided only $29 million on telehealth. This had led to an urge to lawmakers to pass the Creating Opportunities Now for Necessary and Effective Care Technologies (CONNECT) for the Health Act in 2018

(Slabodkin, 2018). The U.S. Senate introduced CONNECT for the Health Act in April 2021, which aimed to promote the continued expansion of Telehealth services by the amendment of the Social Security Act (Congress, 2021).

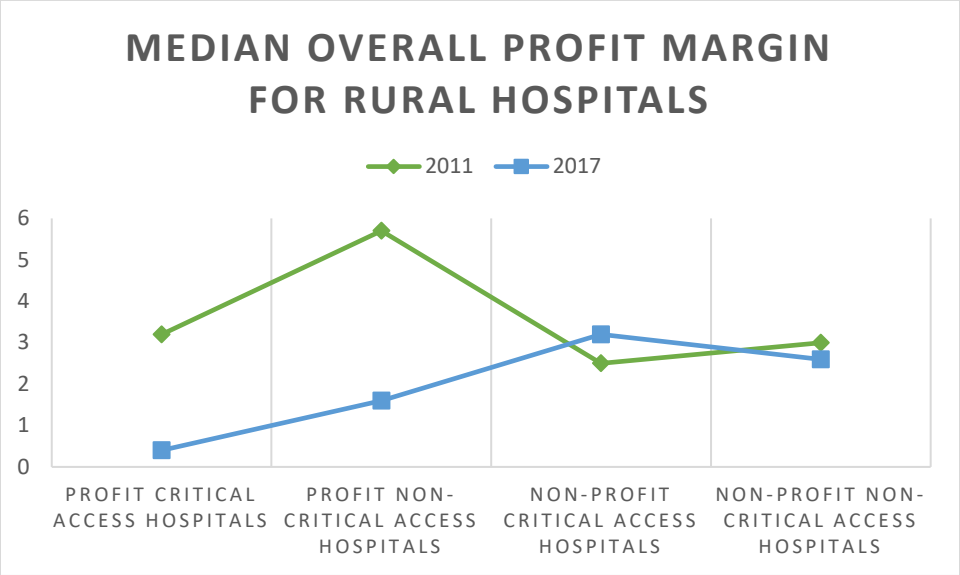
A study conducted by Pessima in 2020 explored the relationship between EHR/HIT adoption and the quality of healthcare delivery in rural Georgia. Results from the study showed that higher EHR/HIT adoption was associated with increased quality of healthcare delivery based on clinician and physician perceptions of burden and interoperability. These results suggested to policymakers that improvements in healthcare as experienced within rural communities were shaped by the adoption of EHR/HIT to meet local needs (Pessima, 2020).

A study conducted by Chen, Amaize, and Barath, in 2020 assessed telehealth adoption among hospitals located in rural and urban areas and identified barriers related to enhanced telehealth capabilities in the areas of patient engagement and HIE capacity with external providers and community partners. Findings from the study showed that rural hospitals were least likely (1.98 vs 2.72, $P < 0.001$) to have telehealth systems as opposed to their urban area counterparts with patient engagement capabilities, such as the ability to view their health information online and electronically transmit medical information to a third party. The authors also indicated that rural hospitals were least likely (0.46 vs 0.67, $P < 0.001$) as opposed to their urban equivalents to report that clinical information was available electronically from outside providers (Chen et al., 2021).



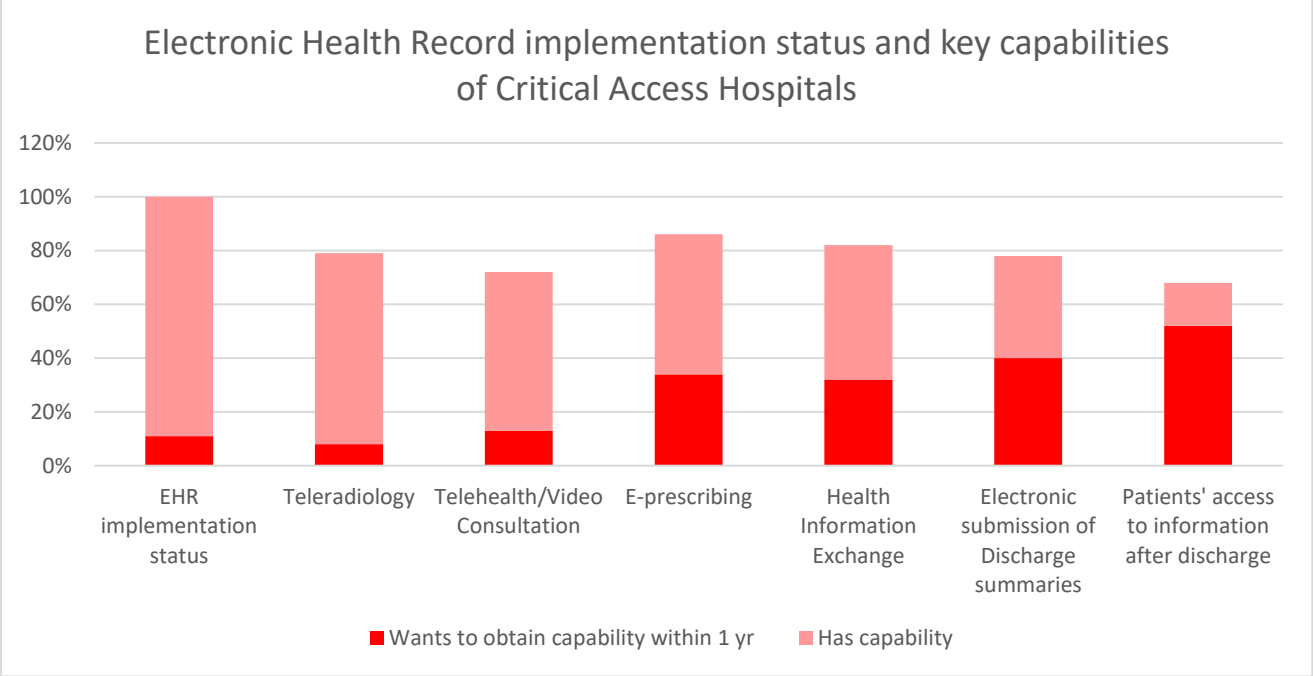
Reference: https://doi.org/10.1377/hlthaff.2019.01545

Exhibit 1: Distribution of 1,004 Hospitals in the study



Reference: https://doi.org/10.1377/hlthaff.2019.01545

Exhibit 2: The Median Overall Profit Margin for U.S. Rural Hospitals, by type of hospital, 2011-17



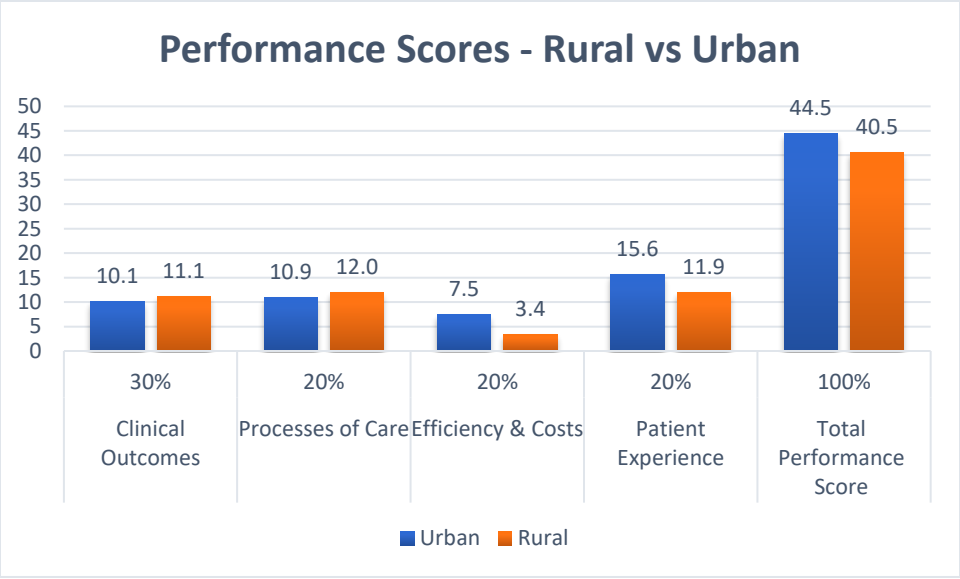
Reference: https://doi.org/10.1377/hlthaff.2014.0279

Exhibit 3: Electronic Health Record (EHR) implementation status and key capabilities of Critical Access Hospitals

	Preventable Hospitalizations per 1,000 Medicare Enrollees		Percentage of Medicare Enrollees with Diabetes receiving HbA1C monitoring		Percentage of Female Medicare Enrollees 67-69 receiving Mammograms	
	Mean	SD	Mean	SD	Mean	SD
Metropolitan	56.14	16.81	0.86	0.04	0.62	0.07
Micropolitan	61.84	21.75	0.84	0.07	0.61	0.08
Rural, noncore	71.40	30.07	0.84	0.07	0.59	0.09

Reference: https://doi.org/10.1111/jrh.12261

Table 1: Differences in Quality Scores by Rurality



Reference: https://www.claritygrp.com/hubfs/Rural%20Hospitals%20HHS%20Report%202016.pdf

Exhibit 4: FY 2015 HVBP Performance by domain for Rural vs Urban hospitals

Medicare value-based payment program	Rural, N (%) of participants penalized	Urban, N (%) of participants penalized	Difference (Rural-Urban)
Hospital Value-Based Purchasing Program	288 (34%)	1,040 (49%)	-15%
Hospital-Acquired Conditions Reduction Program	129 (14%)	586 (26%)	-12%
Hospital Readmissions Reduction Program	709 (79%)	1,902 (76%)	+3%

Reference: https://www.claritygrp.com/hubfs/Rural%20Hospitals%20HHS%20Report%202016.pdf

Table 2: FY 2015 Penalties in Medicare's Value-Based Payment Programs

Geography	All Specialties			U.S. Population
	Nurse Practitioners	Physician Assistants	Physicians	
Urban	84.4%	84.4%	89%	80%
Large Rural	8.9%	8.8%	7.1%	10%
Small Rural	3.9%	3.8%	2.6%	5%
Remote rural/frontier	2.8%	3.0%	1.3%	5%

Reference: https://www.ahrq.gov/research/findings/factsheets/primary/pcwork3/index.html

Table 3: Geographic Distribution of Healthcare Professionals, 2010

Discussion

Summary

Study Limitations: The study limitations could be attributed to the limited inclusivity of the research articles that were published >2018. Publication bias in this study could be ascribed to the scope of the study as only 8 databases and 5 federal websites were used for the study. Finally, research bias could be imputed to this study as the group involved in this study had vested interests in the health care system and its functionalities.

Practical Implications: The practical implications of this research study could be intended for further research in the identification of the barriers to the implementation of HIT and MACRA on rural hospitals and small physicians. This research study could be used as a core to eliminate these barriers and improve the accessibility and quality of health care to the rural population.

Conclusions

The results drawn from the research study illustrated that the impact of MACRA and HIT in rural hospitals depended on its implementation. While the benefits had promoted its adoption, the barriers hindered the process of its enactment. Since the payment tracks were dependent on the implementation of MACRA and HIT, rural hospitals and small physicians could be affected negatively if the barriers eclipsed the benefits of its implementation.

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