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Physicians Use of Electronic Health Records in Community Health Centers and Other Outpatient Settings: Use Purpose and Overall Satisfaction

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Abstract

This paper explores the association between electronic health record (EHR) use and healthcare provider satisfaction using data from the National Electronic Health Records Survey, 2021. Results of data analysis suggest that about nine out of ten physicians use EHR; the EHR system “EPIC” is the market leader, it commands 29% market share; and overall, the respondents were “somewhat satisfied” with EHR.

Introduction

According to the Centers for Disease Control and Prevention, approximately four out of five office-based physicians have a certified electronic health record (EHR) system². The salient benefit of EHR is the provision of accurate information about patients at the point of care to reduce medical errors³.

Empirical studies on the ‘value’⁴ of EHR provide negative assessments of the system; users of EHR report decreased productivity and dissatisfaction with the system⁵. My earlier research on healthcare workers burnout shows work environment as a risk factor for

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² *QuickStats*: Management of Patient Health Information Functions Among Office-Based Physicians with and Without a Certified Electronic Health Record (EHR) System — National Electronic Health Records Survey, United States, 2018. *MMWR Morb Mortal Wkly Rep* 2020; 69:1381.

³ <https://www.healthit.gov/faq/what-are-advantages-electronic-health-records>.

⁴ Perceived value was the focus; operationally, it is often defined as benefits over costs; see Athiyaman, A. (2023). The costs and benefits of recreational cannabis legalization in Illinois: County level analysis. *Research Brief*, 5(19), October 7. Available: http://iira.org/wp-content/uploads/2023/11/RB5_19-The-Costs-and-Benefits-of-Recreational-Cannabis-Legalization-2-published.pdf.

⁵ Yan, Q., Jiang, Z., Harbin, Z., Tolbert, P. H., & Davies, M. G. (2021). Exploring the relationship between electronic health records and provider burnout: a systematic review. *Journal of the American Medical Informatics Association*, 28(5), 1009-1021.

physician burnout⁶. This paper continues with this line of research by exploring the association between EHR use and healthcare provider satisfaction. Research questions that guided data analysis include: which outpatient location, for example, community health center, academic health center, etc., use EHR the most? What is the most preferred brand of EHR? Do providers use EHR to record social determinants of health? How easy is it to document clinical care using EHR? Overall, how satisfied are the users of EHR systems?

Satisfaction, Concepts and Deductions

Research on human relations indicate that the way an innovation will be accepted by workers depends on the way in which it is presented to them - it may be feared and resisted or accepted⁷. Employee participation in the change process is a salient determinant; people tend to react positively to actions that they perceive as being done by them and negatively to innovations that are perceived as imposed on them⁸.

We cannot be certain, therefore, whether dissatisfaction towards an innovation reflects characteristics of the technology or are the consequences of poorly managed change process. However, dissonance theory predicts that dissatisfactions will be minimized or assimilated; the user of the innovation will

⁶ Athiyaman, A. (2023). Worker Burnout in Healthcare: Metro versus Nonmetro. *Research Brief*, 5(5), March 7. Available: http://iira.org/wp-content/uploads/2023/07/RB5_5_Mar_7-Worker-Burnout-in-Healthcare.pdf.

⁷ Wolfe, R. A. (1995). Human resource management innovations: Determinants of their adoption and implementation. *Human Resource Management*, 34(2), 313-327.

adapt her perceptions of the innovation to be more consistent with her expectations⁹.

Methodology

Data are from the National Electronic Health Records Survey, 2021¹⁰; the survey of office-based physicians sampled 10,302 physicians and queried them about EHR adoption and use. A web-based questionnaire was used for data collection. The survey was fielded during March 18, 2021 to July 26, 2021. The microdata of the survey is representative of 403,013 office-based physicians in the nation.

Table 1 shows the operational definitions of the variables used in data analysis. Tree analysis, or configurational analysis, is used to explore relations among variables¹¹.

⁸ Heath, M., & Porter, T. H. (2019). Change management overlooked: physician perspectives on EHR implementation. *American journal of business*, 34(1), 19-36.

⁹ Marikyan, D., Papagiannidis, S., & Alamanos, E. (2023). Cognitive dissonance in technology adoption: A study of smart home users. *Information Systems Frontiers*, 25(3), 1101-1123.

¹⁰ <https://www.cdc.gov/nchs/nehrs/about.htm>.

¹¹ It is a cross-classification approach of n variables.

Table 1: List of Variables Used in Data Analysis

Variable	Item	Operational Definition
SIZE	How many physicians, including you, work at <u>this practice</u> ?	1='1 physician' 2='2-3 physicians' 3='4-10 physicians' 4='11-50 physicians' 5='More than 50 physicians'
OWN	Who owns the reporting location?	1='Physician or physician group' 2='Insurance company, health plan, or Health Maintenance Organization' 3='Community Health Center' 4='Medical/Academic health center' 5, 6, 7 =Other
EMEDREC	Does your reporting location <u>use</u> an EHR system?	1='Yes' 2='No'
EHRNAME	What is the name of your primary EHR system?	1='Allscripts' 2='athenahealth' 3='Cerner' 4='eClinicalWorks' 5='e-MDs' 6='Epic' 7='Modernizing Medicine' 8='NextGen' 9='Practice Fusion' 10='Greenway' 11='Other' 12='Unknown'
ESDOH	Does the reporting location use an EHR to record social determinants of health (e.g., employment, education)?	1='Yes' 2='No'
EBEHAV	Does the reporting location use an EHR to record behavioral determinants of health (e.g., tobacco use, physical activity, alcohol use)?	1='Yes' 2='No'
ECPOE	Does the reporting location use an EHR to: Order prescriptions?	1='Yes' 2='No'
ESCRIP	If they use an EHR for prescriptions, are prescriptions sent electronically to the pharmacy?	1='Yes' 2='No'
TELEMEDICINE	Does your practice use telemedicine technology (e.g., audio, audio with video, web videoconference) for patient visits?	1='Yes' 2='No'

Table 1: List of Variables Used in Data Analysis (Continued)

Variable	Item	Operational Definition
TELEMEDTOOL4	Telemedicine platform integrated with EHR (e.g., update clinical documentation during telemedicine visit)	0='Box is not marked' 1='Box is marked'
METHSEHRWEB	Do you electronically <u>send</u> patient health information to other providers outside your medical organization using an EHR?	1='Yes' 2='No'
METHREHRWEB	Do you electronically <u>receive</u> patient health information from other providers outside your medical organization using an EHR system?	1='Yes' 2='No'
NSEARCH	When seeing a new patient or a patient who has previously seen another provider, do you electronically search or query for your patient's health information from sources outside of your medical organization?	1='Yes' 2='No'
INTPHI	Does your EHR system integrate any type of patient health information received electronically without special effort like manual entry or scanning?	1='Yes' 2='No'
CINPOC	When treating patients seen by providers outside your medical organization, how often do you or your staff have clinical information from those outside encounters electronically available at the point of care?	1='Often' 2='Sometimes' 3='Rarely' 4='Never' 6='I do not see patients outside my medical organization'
EUSEPHIOUT	How frequently do you <u>use</u> patient health information electronically received from providers or sources outside your organization when treating a patient?	1='Often' 2='Sometimes' 3='Rarely' 4='Never'
TIMEOUT	On average, how many hours <u>per day</u> do you spend <u>outside of normal office hours</u> documenting clinical care in your medical record system?	1='None' 2='Less than 1 hour' system? 3='1 to 2 hours' 4='More than 2 hours to 4 hours' 5='More than 4 hours'
STAFFSUP	Do you have staff support (e.g., scribe) to assist you with documenting clinical care in your medical record system?	1='Yes' 2='No'
EASEDOC	How easy or difficult is it to document clinical care using your medical record system?	1='Very easy; '2='Somewhat easy' 3='Somewhat difficult' 4='Very difficult' 5='Not applicable'
TIMEDOC	Please indicate whether you agree or disagree with the following statement about using your medical record system: The amount of time I spend documenting clinical care is appropriate.	1='Strongly agree' 2='Somewhat agree' 3='Somewhat disagree' 4='Strongly disagree' 5='Not Applicable'

Table 1: List of Variables Used in Data Analysis (Continued)

Variable	Item	Operational Definition
EHRSAT	Overall, how satisfied or dissatisfied are you with your EHR system?	1='Very satisfied' 2='Somewhat satisfied' 3='Neither satisfied nor dissatisfied' 4='Somewhat dissatisfied' 5='Very dissatisfied' 6='Not applicable'
MDDO	Type of doctor (Medical Doctor (MD)/Doctor of Osteopathic Medicine (DO)) as sampled	1='MD' 2='DO'
SPECCAT	Physician specialty type obtained from response to survey	1='Primary care specialty' 2='Surgical specialty' 3='Medical specialty' ,
PHYSEX	Sex of Physician	1='Female' 2='Male'
PAGE50	Age group (in years) of physician (two category)	1='Under 50 years' 2='50+ years'

Findings

A majority of the respondents, 68% of the 403,013 office-based physicians, were male. Most of the female respondents, 66%, were primary care physicians and

46% were younger than 50 years of age. In contrast, almost two thirds of the male respondents were more than 50 years of age and 37% were specialists (Figure 1 and Table 2).

Figure 1: Demographics of the Respondents

(i) Gender of the Respondents

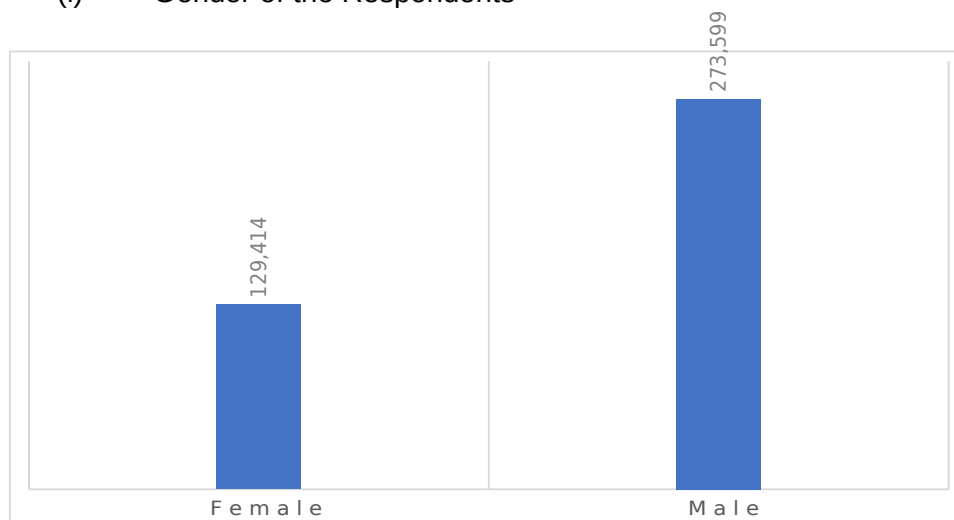


Table 2: Impact of Gender on Respondent's Medical Specialty

(i) Age and Gender

Age	Female	Male
Less than 50 Years	46%	26%
≥ 50 Years	54%	74%
N	129, 414 (32%)	273,599 (68%)

Note: $\chi^2 = 17,052$; $p < .05$; phi coefficient = 0.21.

(ii) Medical Specialty by Gender of the Respondent

Specialty	Female	Male
Primary care	66%	36%
Surgical specialty	8%	27%
Other specialty	25%	37%
N	129, 414 (32%)	273,599 (68%)

Note: $\chi^2 = 35,597$; $p < .05$; phi coefficient = 0.30.

Figure 2 shows ownership details for the office location of the respondent, a majority, 62%, are owned by physicians or physician groups. A mere 4% of

physicians work for community health centers. In general, more female physicians work for HMO-owned locations including community health centers (Table 3).

Figure 2: Ownership of the Office Location of the Respondents

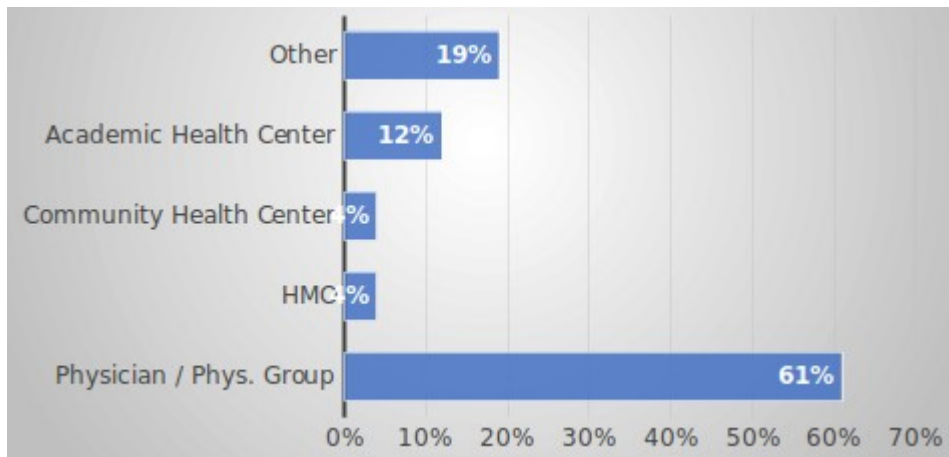


Table 3: Impact of Gender on Workplace Choice

Workplace Ownership	Female	Male
Physician / Phys. Group	55%	64%
HMO	7%	2%
Community Health Center	7%	3%
Academic Health Center	13%	12%
Other	18%	19%
N	129,084	273,167

Note: $\chi^2 = 8,795$; $p < .05$; phi coefficient = 0.15.

Use of EHR

About nine out of ten physicians' workplaces use EHR. However, 17% of office-based settings owned by physicians or physician groups lack EHR. The EHR system "EPIC" has the most market share

(29%) followed by "eClinicalWorks" (12%). While office locations owned by HMOs favor the EPIC system, community health centers were split in their patronage, 31% for EPIC and 25% for eClinicalWorks (Table 4).

Table 4: EHR Use, Market Share of EHR Systems, and Ownership Status of the Outpatient Clinic

EHR in Use?	Physician/Group	HMO	Community Health Center	Academic Health Center	Other
Yes	83%	100%	100%	100%	97%
No	17%	-	-	-	3%
N	244,259	15,176	15,535	49,795	72,884

Note: $\chi^2 = 24,069$; $p < .05$; phi coefficient = 0.25.

EHR System	Physician/Group	HMO	Community Health Center	Academic Health Center	Other
EPIC	10%	77%	31%	68%	31%
eClinicalWorks	16%	3%	25%	1%	11%
N	203,228	15,176	15,535	48,742	70,827

Note: The "Other" ownership category includes hospital and other healthcare corporations; $\chi^2 = 155,314$; $p < .05$; phi coefficient = 0.66.

EHR, Use Purposes

EHR systems are mostly used to send prescriptions to pharmacies. Most office locations owned by physicians or physician groups do not send or receive patient health information from providers outside their medical organization. Furthermore, employees at locations owned by physicians or physician groups do not electronically query new patient

information from sources outside their medical organization. In general, locations owned by physicians or physician groups lag behind HMO owned locations and community / academic health centers in EHR practices (Table 5). Figure 3 shows the median proportion of “use” purposes in various office locations; higher values indicate extensive use.

Figure 3: EHR Use among Office Locations, Median Use Rate

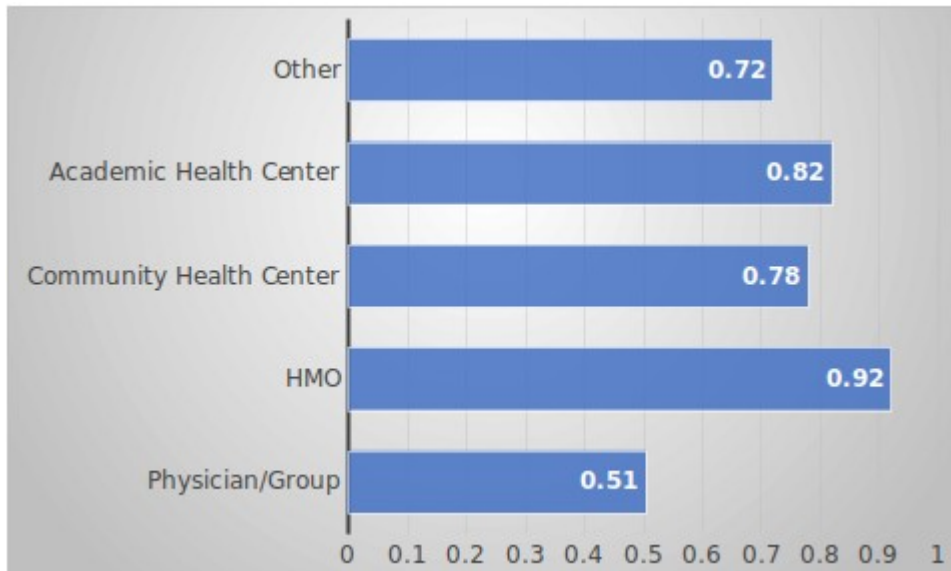


Table 5: EHR Practices by Ownership of Office Locations, Affirmative or “Yes” Responses

Practice Related Item / Question	Physician/Group	HMO	Community Health Center	Academic Health Center	Other
Does the reporting location use an EHR to record social determinants of health (e.g., employment, education)?	81%	100%	87%	96%	87%
Does the reporting location use an EHR to record behavioral determinants of health (e.g., tobacco use, physical activity, alcohol use)?	96%	100%	97%	99%	97%
Does the reporting location use an EHR to order prescriptions?	97%	100%	100%	100%	100%
If they use an EHR for prescriptions, are prescriptions sent electronically to the pharmacy?	99%	100%	98%	99%	99%
Do you electronically send patient health information to other providers outside your medical organization using an EHR?	40%	54%	58%	57%	43%
Do you electronically receive patient health information from other providers outside your medical organization using an EHR system?	48%	86%	80%	76%	60%
When seeing a new patient or a patient who has previously seen another provider, do you electronically search or query for your patient's health information from sources outside of your medical organization?	40%	87%	75%	73%	62%
Does your EHR system integrate any type of patient health information received electronically without special effort like manual entry or scanning?	41%	68%	72%	62%	51%
When treating patients seen by providers outside your medical organization, how often do you or your staff have clinical information from those outside encounters electronically available at the point of care?	49%	86%	64%	82%	68%
How frequently do you use patient health information electronically received from providers or sources outside your organization when treating a patient?	52%	97%	76%	82%	76%
N	244,259	15,176	15,535	49,795	72,884

Satisfaction with EHR

Overall, the respondents were “somewhat satisfied” with EHR; a higher level of satisfaction was indicated by physicians working for HMOs (Figure 4). To

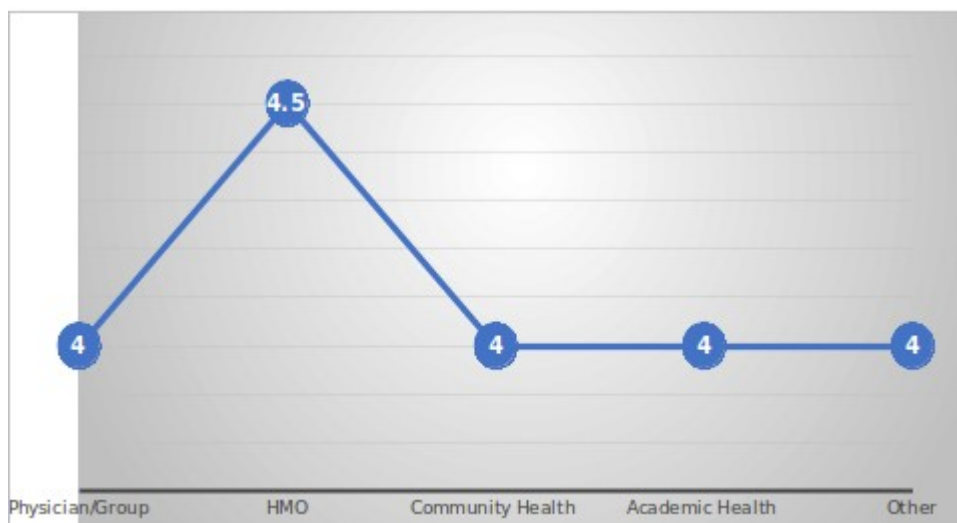
understand the determinants of EHR satisfaction, an econometric model was calibrated with the predictors shown below:

STAFFSUP	Do you have staff support (e.g., scribe) to assist you with documenting clinical care in your medical record system?
EASEDOC	How easy or difficult is it to document clinical care using your medical record system?
TIMEDOC	Please indicate whether you agree or disagree with the following statement about using your medical record system: The amount of time I spend documenting clinical care is appropriate.
MDDO	Type of doctor (Medical Doctor (MD)/Doctor of Osteopathic Medicine (DO)) as sampled

Table 6 shows the results of the linear model; two variables explain 40% of the variability in the criterion, satisfaction with EHR. Ease of documenting clinical care and time spent documenting it matter. It doesn't matter whether the physician is a

MD or a DO. Similarly, presence of support staff to assist with documenting clinical care doesn't impact the physician's satisfaction with the EHR.

Figure 4: Satisfaction with HER by Office Locations



Note: Satisfaction was measured on a 5-step scale with “5” indicating “Very Satisfied” response.

Table 6: Results of Regression Model Run

Root MSE	0.99035	R-Square	0.4034
Dependent Mean	3.57434	Adj R-Sq	0.4019
Coeff Var	27.70734		

Parameter Estimates							
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	95% Confidence Limits	
Intercept	1	0.97737	0.16907	5.78	<.0001	0.64576	1.30897
STAFFSUP	1	-0.00612	0.05264	-0.12	0.9075	-0.10938	0.09713
MDDO	1	-0.02361	0.09666	-0.24	0.8070	-0.21319	0.16597
ease	1	0.81677	0.03769	21.67	<.0001	0.74285	0.89069
time	1	0.19124	0.03207	5.96	<.0001	0.12835	0.25414

Summary and Conclusion

This research addresses research questions that are related to healthcare worker satisfaction with EHR systems. Microdata from the National Electronic Health Records Survey, NHES, 2021, were analyzed to gain insights into issues.

Results of data analysis show that:

1. Of the 403,013 office-based physicians that were represented in the NHES, 2021, 46%, were primary care physicians and 21% were surgeons. A majority of the physicians were male, 68%.
2. A small proportion of physicians, 4%, work for community health centers.
3. About nine out of ten physicians use EHR.
4. The EHR system “EPIC” is the market leader, it commands 29% market share.
5. EHR systems are mostly used to send prescriptions to pharmacies.

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6. In general, locations owned by physicians or physician groups, lag behind HMO owned locations and community / academic health centers in EHR practices, for example, sending patient health information to providers outside their medical organization.
 7. Overall, the respondents were “somewhat satisfied” with EHR.
 8. Determinants of physician satisfaction with EHR include ease of use of the system and time spent documenting clinical information in the system; higher time spent documenting information in EHR results in dissatisfaction with the system.

The results of this research imply that the healthcare work environment that adopts innovations such as EHR has little to worry about worker burnout - the relationship between the concepts ‘innovation adoption’ and ‘burnout’ is moderated by worker satisfaction with EHR. While the assimilation theory of cognitive dissonance would justify the inference, there could be a threshold for assimilation beyond which contrast effects, for example, dissatisfaction, could be the outcome of innovation adoption. In this scenario, innovation adoption would lead to worker burnout. Future research should delineate this relationship.