Electronic Public Health Reporting & Recording of Social & Behavioral Determinants of Health Among Office-Based Physicians, 2019

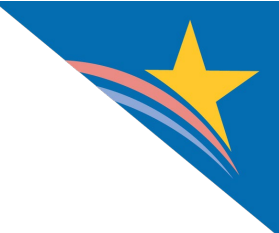Chelsea Richwine, PhD, Dustin Charles, MPH, Vaishali Patel, PhD, MPH

The COVID-19 pandemic exposed gaps in the nation's public health infrastructure, including a need for increased electronic exchange of patient health information between health care providers and public health agencies (PHAs) (1). Physicians play a critical role in supporting public health surveillance by reporting to PHAs. While public health reporting often occurs through manual, paper-based processes, national efforts have focused on increasing electronic reporting to PHAs. Improving surveillance would also include increasing PHAs' access to data on social and behavioral determinants of health that affect a person's health outcomes and risks. These data are important to enhancing public health surveillance as they enable identification of populations in need of greater assistance, including those with comorbidities and other risk factors (2, 3). Using data from a nationally representative sample of physicians, this brief describes primary care and other office-based physicians' electronic public health reporting and social and behavioral determinants of health data recording capabilities and how they varied by physician and practice characteristics. This analysis offers insights into physicians' readiness to electronically support public health activities in the year prior to the pandemic; it does not report on physicians' overall levels of public health reporting—which can occur through manual, paper-based methods—nor does it reflect recent levels of electronic public health reporting which may have improved during the pandemic.

HIGHLIGHTS

▸ In 2019, less than one in five primary care physicians electronically exchanged (i.e., sent or received) health information with PHAs.

▸ Nearly half of primary care physicians reported electronically searching or querying for vaccination or immunization history from sources outside their health care organization.

▸ Most physicians electronically recorded social and behavioral determinants of health data.

▸ Physicians who engaged in interoperability were more likely to electronically: exchange information with PHAs; search for vaccination information; and record social and behavioral determinants of health data.

▸ Certified health IT use is associated with higher rates of electronic public health reporting and electronic recording of social and behavioral determinants of health data.

▸ Public health reporting and recording capabilities varied by EHR developer market share.
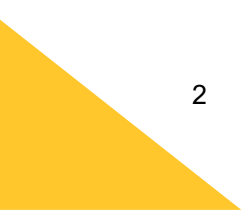
Fewer than one in five primary care physicians electronically exchanged patient health information with PHAs in 2019.

FINDINGS

★ In 2019, about one in ten (12%) office-based physicians nationally electronically exchanged patient health information with PHAs, including the Centers for Disease Control and Prevention (CDC), state or local public health authorities (see Appendix Table A1 for definitions of key measures).

★ Electronic exchange capabilities were higher among primary care physicians (18%) compared to physicians nationally, ranging from 12% of general/family practice primary care physicians to 24% of internal medicine and 26% of pediatric primary care physicians.

★ Overall, about a quarter of physicians nationally did not know whether their practice electronically exchanged patient health information with PHAs.
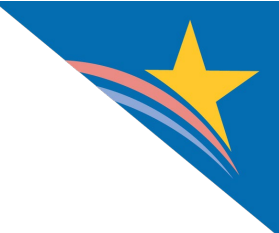
Figure 1. Percent of physicians who electronically exchanged patient health information with PHAs.
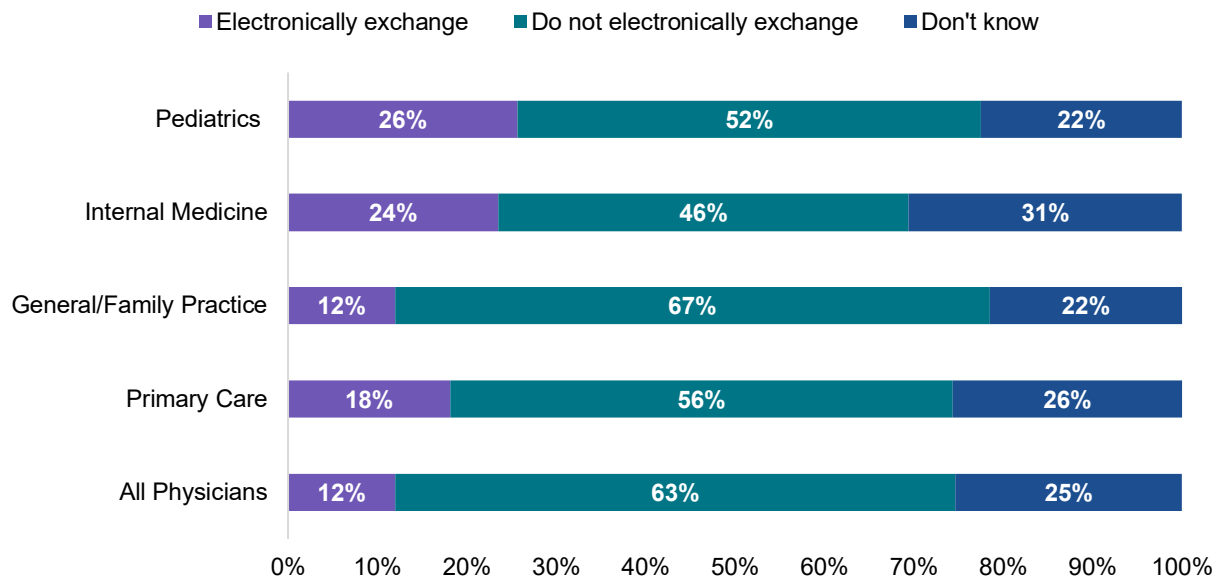
Source: National Electronic Health Record Survey, 2019.
Notes: These data reflect physicians' responses to the survey question, "Does your reporting location electronically send or receive patient health information with public health agencies?" (see Appendix Table A1 to view survey questions for key measures). The "No" category for all physicians includes 1 blank response and 662 "Not applicable" responses from those who said they ONLY send and receive patient health information through paper-based methods including fax, eFax, or mail. The "Primary Care" specialty group represents a subset of all physicians (which includes primary care, medical, and surgical specialists); the "General/Family Practice", "Internal Medicine" and "Pediatrics" sub-specialties are a subset of all primary care physicians (which includes each of these sub-specialty types plus Obstetrics & Gynecology).

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Among primary care physicians who electronically exchanged information with PHAs, the most common type of data exchanged was immunization data.
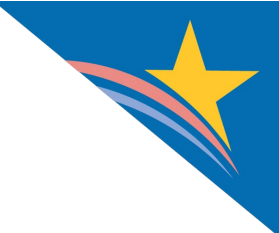
FINDINGS

★ Among primary care physicians who electronically exchanged health information with PHAs (18%), the most common type of data exchanged was immunization data (90%) followed by case reporting (45%), public health registry (27%), and syndromic surveillance data (17%).

★ Pediatricians reported the highest rates of exchanging immunization data (100%), case reporting data (48%), and syndromic surveillance data (28%) compared to other primary care physicians.

★ Internal medicine physicians reported the highest rates of exchanging public health registry data (34%). Most internal medicine physicians exchanged immunization data (82%), nearly half exchanged case reporting data (46%), yet only 14% exchanged syndromic surveillance data.

★ General or family practice physicians reported the lowest rates of data exchange with PHAs compared to other primary care physicians. While a majority exchanged immunization data (89%), only a quarter exchanged case reporting data (27%) and a small share exchanged public health registry or syndromic surveillance data (14% and 12%, respectively).

Figure 2. Types of information exchanged among those who electronically exchanged with PHAs, by primary care sub-specialty.
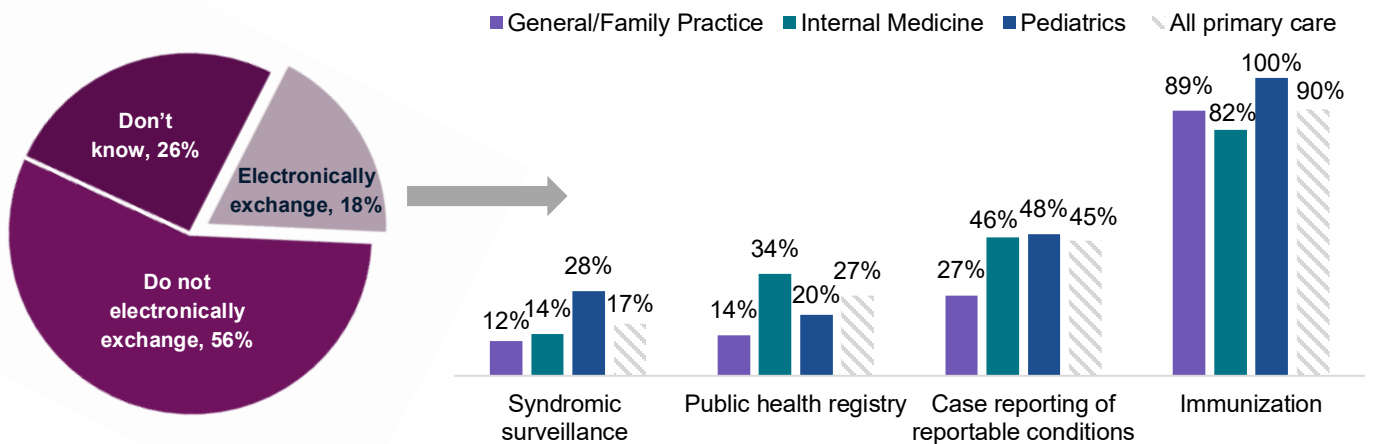
Source: National Electronic Health Record Survey, 2019.
Notes: See Appendix Table A1 to view survey questions for key measures. Only includes respondents who said their reporting location sends or receives patient health information with PHAs.
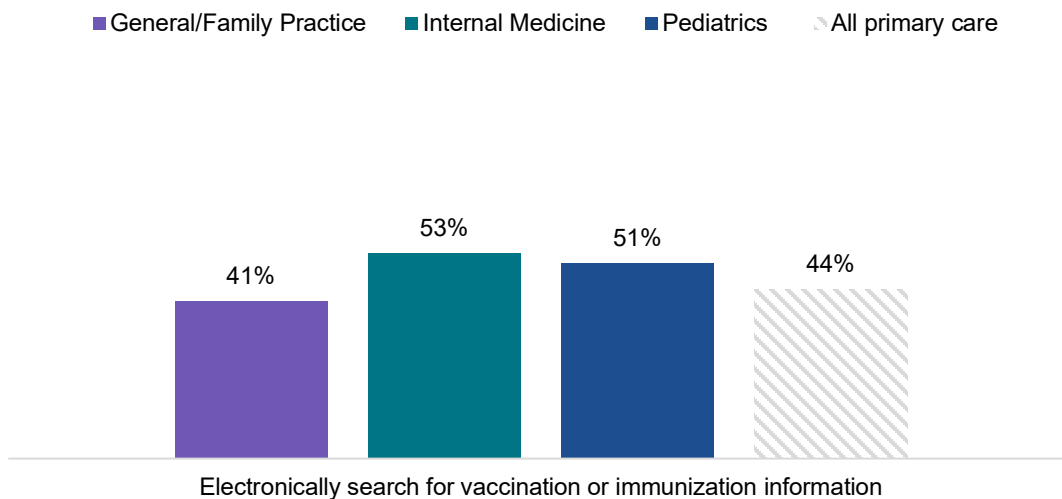
Nearly half of primary care physicians electronically searched for vaccination or immunization history information from sources outside their health care organization.

FINDINGS

★ Nearly half of primary care physicians nationally (44%) electronically searched for vaccination or immunization history information from sources outside their health care organization. This could include via remote or view only access to other facilities' EHR or health information exchange organization.

★ More than half of internal medicine (53%) and pediatric (51%) primary care physicians reported electronically searching for vaccination or immunization history from outside sources compared to 41% of general/family practice primary care physicians.

Figure 3. Percent of primary care physicians who electronically searched for vaccination or immunization history information from sources outside their health care organization.

Electronically search for vaccination or immunization information

Source: National Electronic Health Record Survey, 2019.
Notes: These data reflect physicians' responses to the survey question, *"Do you electronically search for vaccination/immunization history information from sources outside your medical organization?"* This could include via remote or view only access to other facilities' EHR or health information exchange organization. The "Do not search for vaccination or immunization information" category includes both respondents who do not search for any type of patient health information from sources outside their health care organization (51% nationally) as well as respondents with the capacity to electronically search or query for patient information that do not specifically search for vaccination/immunization history information from sources outside their health care organization (21% nationally). See Appendix Table A1 to view survey questions for key measures.
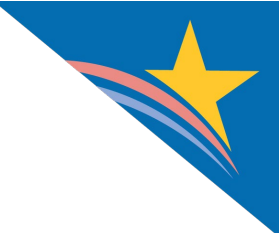
Primary care physicians using certified health IT were significantly more likely to exchange information with PHAs compared to those without certified health IT.
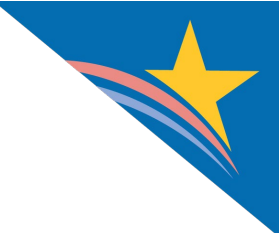
FINDINGS

★ Primary care physicians in larger practices were significantly more likely to search for vaccination or immunization information from outside sources compared to those in smaller practices.

★ Primary care physicians participating in MIPS were significantly more likely to exchange information with PHAs.

Table 1. Public heath reporting capabilities among primary care physicians, by physician and reporting location characteristics.

Primary Care Physician and Reporting Location Characteristics	Electronically exchange patient health information with PHAs		Electronically search for vaccination or immunization information	
	Weighted %	N	Weighted %	N
Practice Size				
1 physician	17%	22	34%***	53
2-3 physicians	22%	25	43%**	52
4-10 physicians	19%	49	42%***	97
11-50 physicians	17%	32	47%*	38
> 50 physicians †	12%	19	69%	56
Practice Type				
Single-specialty practice †	18%	73	36%	126
Multi-specialty practice	19%	49	68%***	113
Solo practice	18%	25	36%	57
Ownership				
Physician or physician group †	17%	78	37%	143
Hospital or health center	19%	57	50%**	131
Other	20%	12	62%**	22
Participate in Medicaid EHR Incentive Program?				
Yes	22%	89	46%	161
No	15%	58	43%	135
Participate in Merit-based Incentive Payment System (MIPS)?				
Yes	29%**	45	47%	62
No	15%	102	44%	234
EHR Certification				
Certified	21%**	130	44%	233
Not Certified	10%	17	46%	63

Source: National Electronic Health Record Survey, 2019.
Notes: Table 1 reports the percent of primary care physicians who electronically send or receive patient health information with PHAs (Columns 1-2) or electronically search for vaccination or immunization information from sources outside their health care organization (Columns 3-4), by physician and reporting location characteristics. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$ † Indicates reference category.

Primary care physicians who engaged in interoperability were more likely to electronically exchange with PHAs and electronically query for vaccination information.

FINDINGS

★ Primary care physicians who reported the ability to electronically send and receive patient health information were 3 times more likely to exchange patient health information with PHAs compared to physicians who did not electronically exchange.

★ Primary care physicians who reported the ability to integrate patient health information into their EHRs were twice as likely to search for immunization information from outside sources.

★ Among primary care physicians who reported the ability to electronically search or query for patient health information from outside sources, more than three quarters (81%) reported searching for immunization data.

Table 2. Public health reporting capabilities among primary care physicians, by interoperability domain (send, receive, find, integrate).

Interoperability Domains		Electronically exchange patient health information with PHAs		Electronically search for or query vaccination or immunization information	
Send		Weighted %	N	Weighted %	N
	Yes	32%***	98	52%*	123
	No	11%	49	41%	173
Receive					
	Yes	33%***	110	55%***	147
	No	8%	37	37%	149
Find/Query					
	Yes	21%	88	81%	296
	No	14%	59	--	
Integrate					
	Yes	26%***	71	70%***	139
	No	13%	76	30%	157

Source: National Electronic Health Record Survey, 2019.
Notes: Table 2 reports the percent of primary care physicians who electronically send or receive patient health information with PHAs (Columns 1-2) or electronically search for vaccination or immunization information from sources outside their health care organization (Columns 3-4), by on interoperability domain. The survey question related to the "find/query" interoperability domain is the parent question for the ability to "electronically search for vaccination or immunization information" (see Appendix Table A1). If the respondent said "no" or "don't know" to the parent question, they were not asked the sub-question regarding the ability to find/query for immunization data. Thus, for all respondents with find/query = 0, electronically search for vaccination or immunization information is also n=0 due to the survey's skip pattern. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$
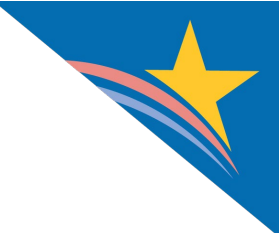
In 2019, almost 7 in 10 physicians electronically recorded both social and behavioral determinants of health data.

FINDINGS

★ Approximately two-thirds of physicians (69%) reported using a computerized system to electronically record data on social determinants of health, which refer to social factors and physical conditions of the environment in which people are born, live, work, and play that affect health and quality of life outcomes (e.g., employment, education, social and community context) (4).

★ More than three-quarters of physicians (84%) recorded data on behavioral determinants of health (e.g., alcohol and tobacco use, physical activity) that affect a person's health outcomes and risks (5).

★ Only 15 percent of physicians recorded neither social nor behavioral determinants of health data electronically.

Figure 4. Relationship between use of a computerized system to record social and behavioral determinants of health data.
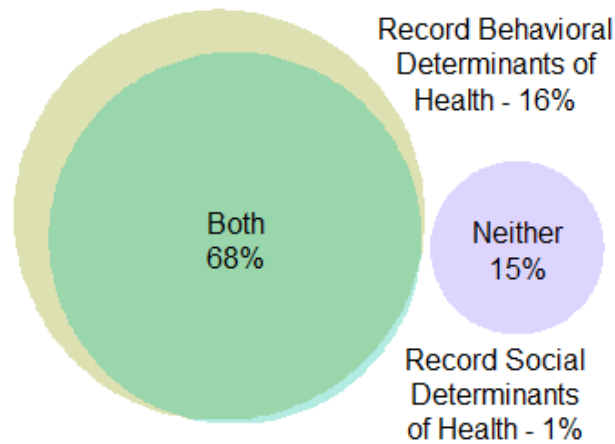

Source: National Electronic Health Record Survey, 2019.
Notes: Electronic recording of social and behavioral determinants of health data is defined as using a computerized system (e.g., EHR or other system) to record social determinants of health data or behavioral determinants of health data. See Appendix Table A1 to view survey questions for each measure. The relationship between the use of a computerized system to record social and behavioral determinants of health is statistically significant at the 1% level (χ^2=555.98, p < 0.01).
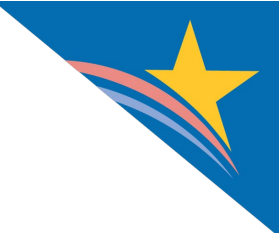
Physicians with public health reporting capabilities were more likely to electronically record social and behavioral determinants of health data.

FINDINGS

★ Physicians who electronically exchanged patient health information with PHAs—representing 12% of physicians nationwide—were significantly more likely to electronically record social and behavioral determinants of health data (84% and 99%, respectively) compared to those who did not exchange with PHAs (67% and 82%, respectively).

★ Physicians who electronically searched for vaccination or immunization information from outside sources were significantly more likely to electronically record social and behavioral determinants of health data (78% and 92%, respectively) compared to those who did not electronically search for vaccination or immunization history (65% and 81%, respectively).

Table 3. Use of a computerized system to record social and behavioral determinants of health data, by physicians' public health reporting capabilities.

Public Health Reporting Capabilities		Record social determinants of health data	Record behavioral determinants of health data
Electronically exchange patient health information with PHAs			
	Yes	84%**	99%**
	No	67%	82%
Electronically search for vaccination or immunization information from outside sources			
	Yes	78%**	92%**
	No	65%	81%

Source: National Electronic Health Record Survey, 2019.
Notes: Table 3 reports the percent of physicians who use a computerized system to record social determinants of health or behavioral determinants of health, conditional on public health reporting capabilities (i.e., electronically exchange patient health information with PHAs and electronically search vaccination or immunization information from outside sources). *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$
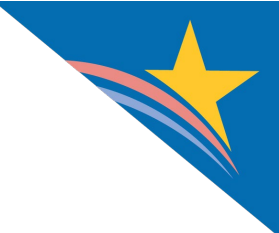
Physicians using certified health IT were more likely to electronically record social and behavioral determinants of health data.
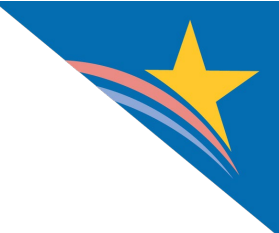
FINDINGS

★ Primary care physicians were significantly more likely to electronically record social and behavioral determinants of health data compared to specialists.

★ Physicians in larger practices were significantly more likely to record social and behavioral determinants of health data, with the largest reporting 79% and 99%, respectively

★ Physicians in hospital or health center-owned practices were also more likely to record social and behavioral determinants of health data compared to those working in physician-owned practices.

Table 4. Use of a computerized system to record social and behavioral determinants of health data, by physician and reporting location characteristics.

Physician and Reporting Location Characteristics	Record social determinants of health data		Record behavioral determinants of health data	
Physician Specialty	Weighted %	N	Weighted %	N
Primary care †	77%	589	89%	683
Surgical	59%**	215	80%*	280
Medical	63%**	282	79%**	343
Practice Size				
1 physician	58%**	212	66%**	250
2-3 physicians	72%	195	88%**	239
4-10 physicians	69%	346	85%**	415
11-50 physicians	74%	197	95%*	239
> 50 physicians †	79%	135	99%	162
Practice Type				
Single-specialty practice †	70%	538	88%	660
Multi-specialty practice	76%	310	92%	369
Solo practice	61%	238	69%**	277
Ownership				
Physician or physician group †	65%	604	79%	727
Hospital or health center	78%**	409	92%**	481
Other	64%	70	92%**	94
EHR Certification				
Certified	76%**	856	93%**	1020
Not Certified	50%	230	61%	286

Source: National Electronic Health Record Survey, 2019.
Notes: Table 4 reports the percent of physicians who use a computerized system to record social determinants of health (Columns 1-2) or behavioral determinants of health (Columns 3-4), conditional on physician and reporting location characteristics. *** p < 0.01 ** p < 0.05 * p < 0.10   † Indicates reference category.

Physicians who were engaged in interoperability were more likely to electronically record social and behavioral determinants of health data.

FINDINGS

★ Physicians who reported the ability to electronically send and receive patient health information were significantly more likely to record social and behavioral determinants of health data.

★ Physicians who reported the ability to electronically find and integrate patient health information were significantly more likely to record social and behavioral determinants of health data.
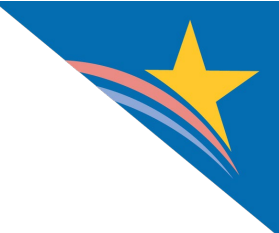
Table 5. Use of a computerized system to record social and behavioral determinants of health data, by interoperability domain (send, receive, find, integrate).

Interoperability Domains		Record social determinants of health data		Record behavioral determinants of health data	
Send		Weighted %	N	Weighted %	N
	Yes	78%**	405	94%**	472
	No	64%	681	79%	834
Receive					
	Yes	79%**	442	93%**	513
	No	63%	644	79%	793
Find					
	Yes	74%*	543	89%**	629
	No	64%	543	79%	677
Integrate					
	Yes	80%**	328	96%**	386
	No	64%	758	79%	920

Notes: Table 5 reports the percent of office-based physicians who use a computerized system to record social determinants of health (Columns 1-2) or behavioral determinants of health (Columns 3-4), conditional on interoperability domain. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$.
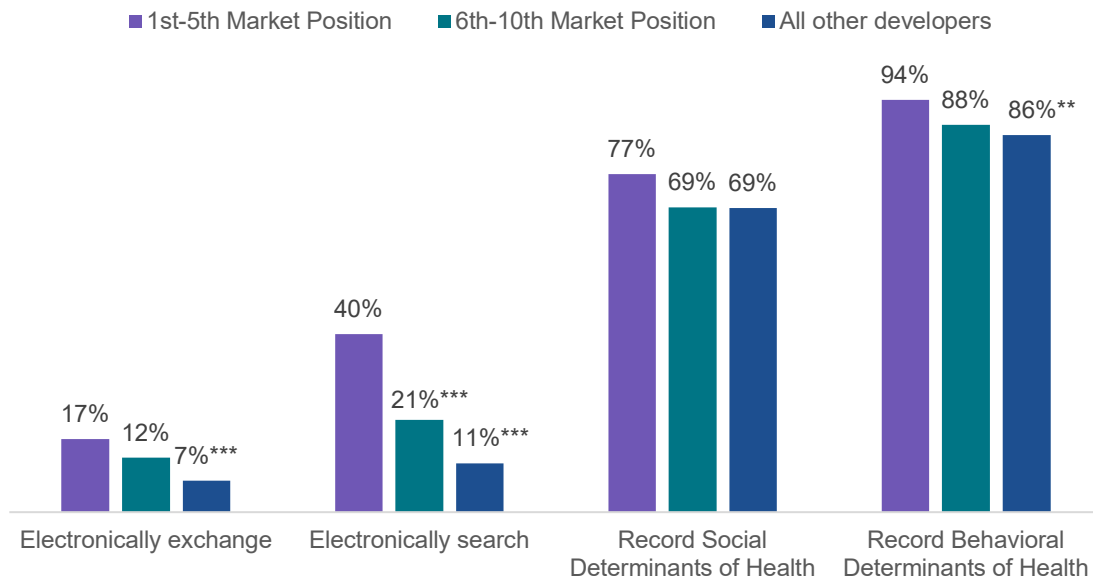Source: National Electronic Health Record Survey, 2019.

Public health reporting and recording capabilities varied by EHR developer market share.

FINDINGS

★ Physicians with large market share EHR developers (i.e., 1st-5th market position) had the highest rates of electronic exchange with PHAs (17%), electronically searching for vaccination or immunization information (40%) and recording social and behavioral determinants of health data (77% and 94%, respectively) compared to those with smaller market share vendors (i.e., 6th-10th market position and all other developers).

★ Physicians without a top 10 market share vendor (i.e., all other developers) were significantly less likely to electronically exchange with PHAs, search for vaccination or immunization information, and record behavioral determinants of health data compared to those with a top 5 market share vendor.

Figure 5. Public health reporting and recording capabilities, by EHR developer market share.

Source: National Electronic Health Record Survey, 2019.
Notes: The 1st-5th market positions include Epic, eClinicalWorks, athenahealth, Cerner and Allscripts (N = 740). The 6th-10th market positions include NextGen, Practice Fusion, Greenway, GE, and Modernizing Medicine (N = 227). The "all other developers" category includes Amazing Charts, e-MDs, and other developers (N = 386). Excludes blank and "unknown" responses (N = 19) and individuals who indicated their reporting location does not use an EHR system (N = 152). Reference category is 1st – 5th market position. *** p < 0.01 ** p < 0.05 * p < 0.10.

SUMMARY

The COVID-19 pandemic revealed significant gaps in the public health infrastructure needed to support the electronic exchange of public health data among health care providers and PHAs (6). In 2019, only 12 percent of physicians nationally reported <u>electronically</u> exchanging patient health information with PHAs. However, electronic exchange capabilities were higher among primary care physicians (18%) particularly among those working in internal medicine (24%) and pediatrics (26%). Encouragingly, overall rates of public health reporting among physicians have risen over time, with rates among primary care physicians increasing 5 percentage points between 2018 and 2019 (Appendix <u>Figure A1</u> and <u>Table A2</u>).

While our findings indicate that most office-based physicians were not engaged in <u>electronic</u> public health reporting in the year prior to the pandemic, a larger share of physicians may have been reporting to PHAs using manual methods. Our results do not reflect overall reporting rates to PHAs, nor do they distinguish between the proportion of reporting performed manually versus electronically. However, recent studies demonstrate that provider-based public health reporting occurs primarily through manual processes (e.g., paper-based data sharing, phone calls, e-mail, and fax) and rates of electronic exchange between clinicians and PHAs remain low (7-10). Low rates of electronic reporting may be due, in part, to variation in jurisdictional requirements for electronic reporting (i.e., most jurisdictions allow paper or electronic reporting) as well as PHAs' capacity to electronically receive standardized data from office-based physicians. For instance, while most providers collect immunization and case reporting information in their EHRs at the point of care, information is often not automatically shared electronically with PHAs due to varying data standards and a lack of integration between EHRs and public health surveillance systems (10).

Our findings also indicate a potential gap in physician's awareness of their role in reporting timely and accurate data to support key public health activities. A quarter of office-based physicians nationally didn't know whether their practice electronically exchanged data with PHAs. Physicians who didn't know whether their practice exchanged health information with PHAs were more likely to be in larger practices and may not be aware of electronic connections with external entities. Therefore, it is possible that reported rates underestimate rates of electronic exchange with public health. As new data on physicians' public health reporting capabilities become available, we intend to examine how public health reporting capabilities evolve over time. This will provide greater insight into whether the pandemic has changed physicians' awareness and exchange practices with PHAs.

Immunization data was the most common type of data exchanged (sent or received) between primary care physicians and PHAs. In 2019, 100 percent of pediatric primary care physicians who exchanged patient health information with PHAs sent or received immunization data compared to 89% of general/family practice and 82% of internal medicine primary care physicians. Nearly half of primary care physicians who exchanged information with PHAs sent or received case reporting information (45%), however, other types of public health data—such as public health registry and syndromic surveillance data (which are primarily sent to PHAs from hospitals)—were exchanged at much lower rates. Additionally, 44% of primary care physicians electronically searched (or queried) for immunization history from other providers.

More than two-thirds of physicians nationally (68%) reported using a computerized system to electronically record both social and behavioral determinants of health data (e.g., employment, income, housing, or

education; alcohol and tobacco use, physical activity) that could help support public health activities. Encouragingly, we found that physicians electronically engaging with PHAs (either via exchange or querying public health data), electronically recorded social and behavioral determinants of health data at significantly higher rates compared to respondents who did not engage in these activities. This suggests that physicians who electronically exchanged with PHAs may be more likely to possess information that could facilitate better care coordination and help support critical public health surveillance and reporting.
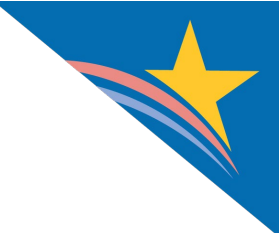
The COVID-19 pandemic revealed significant gaps in health care and health equity in our society and have highlighted the link between socio-behavioral factors and public health. Our analysis of 2019 NEHRS data suggest that social and behavioral determinants of health data may be available for public health reporting; however, the survey did not specify which types of social or behavioral data elements were recorded electronically, nor did it capture whether data were recorded in a standardized format or included as free text within clinical notes which would limit the ability for the data to be exchanged electronically (11-15).

Major efforts supported by ONC are underway to support the standardization and exchange of social determinants of health (SDOH) data including work done by The Gravity Project to develop standards for SDOH data and the recent addition of SDOH data elements to the USCDI version 2. Leveraging existing work in this area, ONC recently awarded a cooperative agreement to Health Level 7 (HL7) to address gaps in the current health IT environment by advancing standards for SDOH and public health that can help support the treatment and care of patients affected by COVID-19 and other public health threats. The advancement and uptake of SDOH standards in EHRs will enable the exchange of these data to support public health activities and advance health equity.

To ensure that health care providers are equipped to support critical public health activities, there are numerous HHS efforts aimed at improving the flow of information between health care providers and PHAs. To further advance standards that make it easier to exchange data between PHAs and health care providers, the USCDI+ initiative will support the identification and establishment of public health specific datasets that will operate as extensions to the existing USCDI. This should allow for a more tailored approach to support data exchange for public health. Additionally, ONC's certified health IT supports electronic case reporting applications, such as eCR Now, that transmit data to PHAs using HL7 Fast Healthcare Interoperability Resources (FHIR®). ONC is also supporting efforts to enhance data aggregation, integration, and quality improvement services provided by health information exchange organizations (HIEs) through the Strengthening the Technical Advancement and Readiness of Public Health via Information Exchange Program (STAR HIE Program). This initiative supports the use of HIE infrastructure to facilitate public health reporting as well as identify and support communities disproportionately impacted by the pandemic.

To increase public health reporting among physicians, CMS has proposed a new requirement that eligible clinicians participating in the Promoting Interoperability performance category of the Merit-Based Payment System report on program measures related to immunization and electronic case reporting. The CDC's ongoing Data Modernization Initiative aims to improve data sharing and public health data system interoperability through the adoption of common standards and by reducing burden on clinicians and other frontline workers that report to public health. In support of President Biden's Executive Order (EO) on Ensuring a Data-Driven Response to COVID-19 and Future High-Consequence Public Health Threats, the Public Health Data Systems Task Force helped inform ONC and CDC's response to Section 3 of the EO
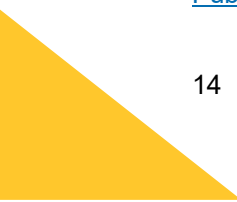
by identifying technical gaps in the current U.S. public health infrastructure and characteristics of an optimal future state for public health data systems. Insights from health care providers, PHAs, and other key stakeholders will be leveraged to identify specific recommendations to ensure public health data systems are equipped to support future high-consequence public health threats. Ultimately, efforts to standardize the collection and exchange of data for public health, as well as encourage and improve the use of methods and systems that make it easier for health care providers and PHAs to exchange data will help support key public health activities during the ongoing pandemic and in future public health emergencies.

DEFINITIONS

Behavioral Determinants of Health: refers to individual behaviors that affect a person's health outcomes and risks (e.g., tobacco use, physical activity, alcohol use) (5).

Certified health IT: physicians indicated that their reporting location uses an ONC-certified electronic health record (EHR) technology, and that EHR technology meets the requirements for those physicians to participate in Department of Health and Human Services payment programs that require use of ONC-certified health IT.

Find: refers to physicians' ability to electronically search or query for (or to "find") patient health information from sources outside of their health care organization.

Integrate: the ability of an EHR system to integrate any type of patient health information received electronically (not eFax) without special effort like manual entry or scanning.

Office-based Physician: physicians who see ambulatory patients in office-based settings, clinics, health centers, or other health system practices.

Public Health Agency (PHA):   state and local public health agencies support interoperability efforts and data exchange with electronic health records, many of which have been utilized by the Centers for Medicare & Medicaid Services (CMS) Promoting Interoperability Programs.

Receive: refers to physicians' ability to electronically receive patient health information from other providers outside their health care organization using an EHR system (not eFax) or a Web Portal (separate from EHR).

Send: refers to physicians' ability to electronically send patient health information to other providers outside their health care organization using an EHR (not eFax) or a Web Portal (separate from EHR).

Social Determinants of Health: refers to social factors and physical conditions of the environment in which people are born, live, learn, work, and play (e.g., employment, education, social and community context) that affect health and quality-of-life outcomes (4).
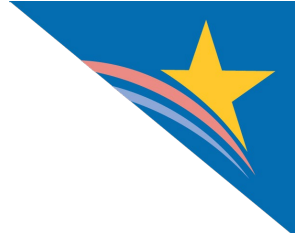
DATA SOURCE AND METHODS

Data are from the 2019 National Electronic Health Records Survey (NEHRS). The NEHRS is an annual survey of office-based physicians conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics. Physicians included in this survey provide direct patient care in office-based practices and community health centers; excluded are those who do not provide direct patient care (radiologists, anesthesiologists, and pathologists).

Among 10,302 total respondents to the survey, 2,280 met the necessary inclusion criteria, of which 1,524 completed all survey items – yielding a response rate of 67% among eligible respondents. Adjustments were made to account for non-response among physicians whose eligibility could not be determined and for those who did not participate in the survey. Responses for the 1,524 records included in the final 2019 NEHRS were weighted to reflect national estimates for approximately 301,603 office-based physicians in the U.S.

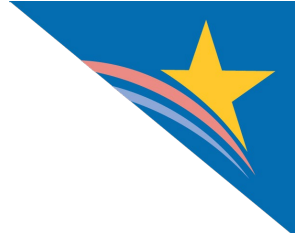Additional survey documentation can be found on the NEHRS website.

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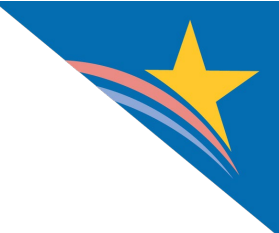
ACKNOWLEDGEMENTS

SUGGESTED CITATION

APPENDIX

Appendix Table A1: Survey questions for key measures.

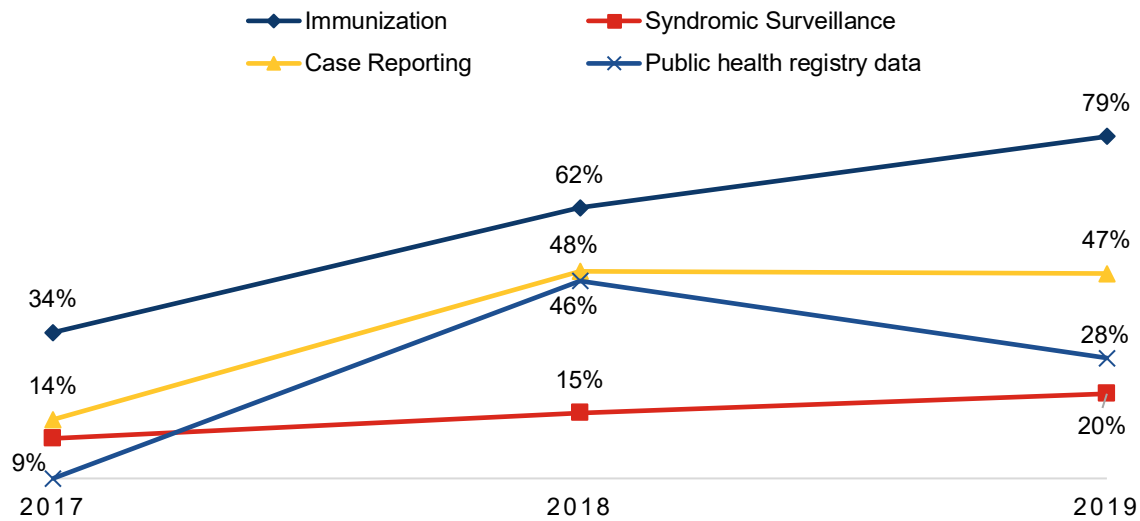| Measure	Survey Question
Public Health Reporting	
Electronically exchange patient health information with PHAs	Q35. Does your reporting location electronically send or receive patient health information with public health agencies? Yes / No (Skip to 36) / Don't know (Skip to 36) / Not applicable (Skip to 36)
Types of information exchanged	Q35a. What types of information do you electronically send or receive? CHECK ALL THAT APPLY. □1 Syndromic surveillance data □2 Case reporting of reportable conditions □3 Immunization data □4 Public health registry data (e.g., cancer)
Electronically search for vaccination or immunization information	Q37a. Do you electronically search for the following patient health information from sources outside your health care organization? **Vaccination/Immunization History** Yes / No / Don't know
Recording Social & Behavioral Determinants of Health	
Record Social Determinants of Health	Q24. Does the reporting location use a computerized to system to: **Record social determinants of health** (e.g., employment, education)? Yes / No / Don't know
Record Behavioral Determinants of Health	Q24. Does the reporting location use a computerized to system to: **Record behavioral determinants of health** (e.g., tobacco use, physical activity, alcohol use)? Yes / No / Don't know
Interoperability Domains	
Send	Q31. Do you electronically <u>send</u> patient health information to other providers outside your health care organization using an EHR (not eFax) or a Web Portal (separate from EHR)? Yes / No (Skip to 33) / Don't know (Skip to 33)
Receive	Q33. Do you electronically <u>receive</u> patient health information from other providers outside your health care organization using an EHR system (not eFax) or a Web Portal (separate from EHR)? Yes / No (Skip to 35) / Don't know (Skip to 35)
Find	Q37. 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 health care organization? Yes / No (Skip to 38) / Don't know (Skip to 38)
Integrate	Q38. Does your EHR system integrate any type of patient health information received electronically (not eFax) without special effort like manual entry or scanning? Yes / No (Skip to 39) / Don't know (Skip to 39) / Not applicable (Skip to 39)

Appendix Table A2: Percent of primary care physicians nationally who electronically exchange patient health information with PHAs, 2018-2019.

	Yes	No	Don't know
2019	18%	56%	26%
2018	13%	64%	23%

Source: National Electronic Health Record Survey, 2018-2019.
Note: The "No" category includes blank and not applicable responses.

Appendix Figure A1: Types of information physicians electronically sent or received with PHAs (among those who exchange), 2017-2019.

Source: National Electronic Health Record Survey, 2017-19.