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Certified but Still Charting After Hours: Electronic Health Records and the Documentation Burden of Office-Based Physicians

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ABSTRACT

US policy has judged electronic health records (EHRs) mainly by adoption and certification. This study asks whether those measures capture what the record asks physicians to do. It analyses National Electronic Health Records Survey public-use files for 2019 (n = 1,524), 2021 (n = 1,875) and 2024 (n = 1,725), a national probability sample of office-based physicians, with survey weights and design-based variances. On the evaluated measures, the system looks like a success: EHR use rose to 95.6% in 2024, and the share of EHR users reporting a certified system rose from 80.6% in 2019 to 89.1%. On the experienced measures, there was no change: about three in four EHR users spent an hour or more a day documenting outside office hours in 2019 (76.7%) and 2021 (75.6%). Among physicians with a certified system who were satisfied with it, 72.0% still documented for an hour or more after hours in 2021. Survey-weighted models separate two kinds of burden. Reported difficulty tracked the system: it varied by vendor and was lower where the EHR integrated outside records and where staff such as scribes helped. After-hours time tracked almost none of these features. In 2019, 85.0% of physicians agreed that documentation required only for billing added to their documentation time. After-hours charting appears to reflect the volume of what the record must carry more than how the interface works. The design is cross-sectional and self-reported, so the associations are not causal.

Keywords: electronic health records, documentation burden, after-hours work, physicians, health IT certification, invisible work

1. Introduction

The electronic health record (EHR) is now the place where outpatient care in the United States is written down, billed, audited and reported. Federal policy built that position with money and rules. The Health Information Technology for Economic and Clinical Health (HITECH) Act paid clinicians and hospitals to adopt certified systems and to show their "meaningful use" (Blumenthal & Tavenner, 2010). By the measures that policy chose, the program worked: adoption rose quickly after the incentives began (Adler-Milstein & Jha, 2017). The National Electronic Health Records Survey (NEHRS), which the National Center for Health Statistics (NCHS) runs for the Office of the National Coordinator for Health Information Technology, was designed to track exactly this progress (National Center for Health Statistics, 2021).

Physicians describe the same system in different terms. Time-and-motion work found that ambulatory physicians spent nearly two hours on EHR and desk work for every hour of direct patient time, plus one to two hours of after-hours work each night (Sinsky et al., 2016). Event-log studies of primary care physicians found that EHR tasks filled about half of the working day and spilled into evenings (Arndt et al., 2017; Tai-Seale et al., 2017). Survey studies link this work, and the clerical tasks the EHR assigns, to burnout (Shanafelt et al., 2016; Gardner et al., 2019). The EHR can therefore be counted as a success and felt as a burden at the same time.

This paper treats that double description as its object. It asks what the record system asks office-based physicians to do, and whether the measures used to evaluate the system register that work. The term documentation burden here means the time and effort physicians spend producing and maintaining the clinical record, beyond what they judge necessary for care (Moy et al., 2021). Two forms of it can be measured in NEHRS. Time burden is the hours spent documenting outside normal office hours. Friction burden is the reported difficulty of documenting care with the system at hand. The distinction matters because the two forms may have different sources.

The study uses three NEHRS public-use files (2019, 2021 and 2024) and answers three research questions. RQ1: How did the measures on which EHR policy is evaluated (adoption, certification and satisfaction) change between 2019 and 2024, and how did physicians' reported documentation experience change between 2019 and 2021? RQ2: Which features of the record system and the practice are associated with time burden and with friction burden? RQ3: How much documentation burden sits among physicians whom the evaluated measures count as successes?

The study adds to earlier work in two ways. Most direct measures of EHR time come from event logs inside one health system or one vendor, which describe large organisations well but miss small and independent practices. NEHRS covers solo practices, physician-owned groups and hospital-owned clinics in one national frame, and it records which vendor each physician uses. That makes it possible to ask whether burden differs by system as well as by physician. The study also puts the burden items next to the adoption items from the same survey, so that the evaluated and the experienced descriptions of one

technology can be compared in one population.

The answers point to a clear gap. Adoption and certification rose, and satisfaction rose modestly, while after-hours documentation stayed flat. Friction burden varied with features of the system, such as the vendor and the ability to integrate outside records. Time burden varied little with those features. Most physicians who used a certified system and were satisfied with it still documented for an hour or more each day after hours. The paper argues that this pattern fits a sociotechnical reading in which the record carries billing, compliance and reporting work that no single interface feature removes.

2. Related work and framing

2.1 The record as a site of work

Sociotechnical studies of health information technology hold that a record system and the work around it shape each other. Berg (1999) argued that patient care information systems do not simply store facts; they reorganise who records what, for whom and when. Ash et al. (2004) showed that such systems can produce silent errors, both in entering and retrieving information and in the communication and coordination they are meant to support. Harrison et al. (2007) described these unintended consequences as products of interaction between a system and the organisation that uses it. Sittig and Singh (2010) set out a model in which hardware, content, interface, people, workflow, organisation, regulation and measurement all shape how a health IT system behaves.

A second line of work concerns who the record is written for. Pine and Mazmanian (2014) showed that in a hospital unit the record served institutional demands for complete, billable and auditable accounts, so clinicians produced records that were formally perfect but did not match the care given. Bowker and Star (1999) showed more generally that classification systems embed the priorities of those who design and fund them, and that the work of fitting practice into categories is easily overlooked. Star and Strauss (1999) called such effort invisible work, meaning labour that a system depends on but that its accounts do not record. After-hours documentation is a clear case: it happens off the clock, at home, and outside any productivity measure.

2.2 Adoption measures and their limits

Health IT policy in the United States has measured progress mostly by adoption. HITECH tied payment to certified technology and to specific functions, such as electronic prescribing and the exchange of summary records (Blumenthal & Tavenner, 2010). Later programs, such as the Merit-based Incentive Payment System (MIPS), tied part of Medicare payment to quality reporting, which adds its own documentation (Nguyen et al., 2023). Casalino et al. (2016) estimated that practices in four specialties spent about 785 hours per physician each year dealing with quality measure reporting. Greenhalgh et al. (2017) argued that technology evaluation must look beyond adoption to non-adoption, abandonment and the work needed to sustain use. An earlier review by Greenhalgh et al. (2009) found that research on electronic patient records split into traditions that measured different things and rarely spoke to each other.

Reviews of the post-HITECH period make a similar point. Johnson et al. (2021) traced clinicians' frustration with EHRs over three eras of medical documentation and attributed it to an interplay of technology, policy and care delivery, not to software alone. Downing et al. (2018) made a sharper version of this claim. They argued that the real cause of EHR-related burnout in the United States is documentation shaped by billing and regulation, and they contrasted US notes with much shorter notes in other countries.

2.3 What is known about documentation burden

Studies of documentation time come in two kinds. Log-based studies measure time directly but usually cover one organisation or one vendor. Tai-Seale et al. (2017) found that physicians in one large group split their time evenly between face-to-face visits and desktop medicine. Rotenstein et al. (2021) showed that total and after-hours EHR time differ by ambulatory specialty, with primary care among the highest. Holmgren et al. (2021) found that US clinicians spent more time in the EHR and wrote longer notes than clinicians using the same vendor in other countries.

Note content has grown as well. Rule et al. (2021) found that outpatient progress notes at one academic centre grew longer and more redundant over a decade, with much text copied or imported. Apathy et al. (2023) linked note composition to EHR time and physician efficiency. Koopman et al. (2015) found that primary care physicians felt the forces driving note construction did not match their information needs, and that repeated information cluttered the note. In 2021 the outpatient evaluation and management billing guidelines changed to reduce documentation requirements. Early evidence from one vendor's data showed quick changes in billing codes but no meaningful change in note length or EHR time (Apathy et al., 2022).

Survey studies offer breadth but rely on self-report. Kroth et al. (2019) found that excessive data entry, copied text and notes geared toward billing were the most common EHR complaints among clinicians. Melnick et al. (2020) found that physicians rated EHR usability in the bottom tenth of technologies and that lower usability was associated with burnout. Holmgren, Hendrix, et al. (2024) found that EHR usability varied widely across functions among family physicians and that usability was associated with satisfaction.

NEHRS has already been used to study documentation burden. Gaffney et al. (2022) used the 2019 file to estimate after-hours documentation among office-based physicians. Hong et al. (2022) used the 2018 and 2019 files and found that recording social determinants of health was not associated with after-hours documentation. Nguyen et al. (2023) used the 2021 file and found that MIPS participation was associated with more after-hours documentation. These studies treat burden as an outcome of physician and practice traits. They do not compare burden with the adoption measures that NEHRS was built to track, and they do not separate time burden from friction burden.

2.4 Documentation aids

Medical scribes are the most common organisational response to documentation burden. A randomised trial in an academic family medicine clinic found that scribes improved physician satisfaction with charting time and chart quality (Gidwani et al., 2017). A crossover study in primary care found that scribes

reduced physician EHR time and improved perceived documentation burden (Mishra et al., 2018). Bates and Landman (2018) cautioned that scribes move documentation work to another worker without reducing the amount of documentation the system requires. Health information exchange is a second potential aid, because records that arrive in structured form need not be retyped. Holmgren, Adler-Milstein, and Apathy (2024) found that documentation time crowded out the use of exchanged records by primary care physicians.

2.5 Framing for this study

This study borrows the idea of administrative burden from public administration. Moynihan et al. (2015) defined it as the learning, psychological and compliance costs that people experience when they deal with a state program. Documentation burden can be read as a compliance cost that payers and regulators place on clinicians through the record system. The framing yields a testable expectation. If burden mainly reflects how well the interface works, then features such as vendor, record integration and scribes should predict both friction and time. If burden mainly reflects the volume of what the record must contain, then those features may ease friction while leaving time largely unchanged.

3. Data and methods

3.1 Data source

NEHRS is a periodic mail and web survey of a national probability sample of office-based physicians (National Center for Health Statistics, 2021). The sampling frame covers non-federal physicians principally engaged in patient care in office-based settings, excluding anaesthesiology, pathology and radiology. The sample is a one-stage stratified list sample with strata defined by geographic area, and each responding physician carries a final weight that adjusts for selection probability and non-response (National Center for Health Statistics, 2022). This study downloaded the public-use files and documentation for 2019, 2021 and 2024 from the NCHS file server in October 2026. These were all the public-use years released after 2018.

The 2019 file has 1,524 completed questionnaires (unweighted response rate 41.0%), the 2021 file has 1,875 (46.6%) and the 2024 file has 1,725 (47.4%) (National Center for Health Statistics, 2021, 2022, 2025). The weights sum to an estimated 301,603 eligible physicians in 2019, 403,013 in 2021 and 415,475 in 2024. The documentation burden items were asked in 2019 and 2021 but not in 2024. The 2024 file is therefore used only for the adoption, certification and satisfaction measures (National Center for Health Statistics, 2025).

3.2 Measures

Evaluated measures. Three items describe the system as policy evaluates it. EHR use is a yes answer to whether the reporting location uses an EHR, excluding billing systems. Certification is a yes answer to whether the EHR is certified to meet Department of Health and Human Services requirements; "don't know" answers count as not reporting certification. Satisfaction is "very" or "somewhat satisfied" with the EHR on a five-point scale. These are the measures that a program report would show as success. The certification wording changed between years: in 2019 it referred to meeting meaningful use criteria, and in 2021 and 2024 to certification against federal requirements.

Experienced measures. Time burden comes from the question "On average, how many hours per day do you spend outside of normal office hours documenting clinical care in your medical record system?" with five categories from none to more than four hours. Two binary indicators are used: one hour or more, and more than two hours. Friction burden comes from the question "How easy or difficult is it to document clinical care using your medical record system?" Answers of "somewhat" or "very difficult" count as difficult. A third item records disagreement with the statement that "the amount of time I spend documenting clinical care is appropriate". "Not applicable" answers are excluded.

The 2019 questionnaire had further items on how notes are built and what they are for. Three of them ask how often physicians use template-based notes and how easy it is to find information in template and in free-text notes. Three others ask whether documentation reduces time with patients, whether documentation required only for billing adds to documentation time, and whether private insurer rules align with Medicare rules.

System and practice features. The first is the primary EHR vendor: Epic, Cerner, eClinicalWorks, athenahealth, Allscripts, NextGen, or other and unknown. The second is whether the EHR integrates patient information received electronically without special effort, such as manual entry or scanning. The third is whether the physician has staff support, such as a scribe, for documentation. It also uses participation in MIPS, broad specialty (primary care, medical, surgical), the number of physicians in the practice, practice ownership, physician age group (under 50 or 50 and older) and physician sex. The vendor codes differ across years and were mapped by name using each year's file layout.

3.3 Analysis

All estimates use the final physician weight. Variances use Taylor series linearisation with the masked sampling stratum and the physician as the sampling unit, as the NCHS documentation specifies (National Center for Health Statistics, 2022, 2025). When years are pooled, strata are made unique within each year. Confidence intervals for proportions use the logit method. The analysis was run in R with the survey package; strata with a single unit were handled by centring on the grand mean.

The analytic sample for documentation measures is physicians whose reporting location uses an EHR: 1,372 in 2019 and 1,694 in 2021. Year differences are tested with survey-weighted logistic regressions that include only a year indicator. For RQ2, survey-weighted logistic regressions of each binary burden indicator are fitted on the pooled 2019 and 2021 EHR users. Each model includes year, specialty, practice size, ownership, age group, sex, staff support, record integration, MIPS participation and vendor. A proportional-odds model of the five-category after-hours item checks the binary results. Two further checks restrict the sample to questionnaires completed by the physicians themselves (83.8% of 2021 and 79.8% of 2019 EHR users) and add the 2019-only template and billing items to 2019 models. Results are reported as odds ratios (ORs) with 95% confidence intervals (CIs).

Complete-case samples range from 2,494 to 3,039 physicians.

Two cut points are used for after-hours time because they answer different questions. The one-hour threshold shows how common after-hours documentation is; the two-hour threshold isolates the heaviest burden and separates physicians better, since three in four cross the lower threshold. NCHS treats an estimate as unreliable when it rests on fewer than 30 records or has a relative standard error above 30% (National Center for Health Statistics, 2022). Every estimate quoted in the text meets this standard. Three small segments in the 2019 specialty breakdown of after-hours time do not, and the caption of Figure 2 flags them.

For RQ3, burden is estimated within groups defined by the evaluated measures: all EHR users, users of a certified EHR, and users of a certified EHR who are or are not satisfied with it. The weighted 2024 estimates of EHR use (95.6%) and certification (89.1% of EHR users) match the published NCHS tables for the same file once "don't know" answers are handled the same way, which supports the variable coding.

4. Findings

4.1 Who the sample represents

Table 1 describes the weighted population of office-based physicians using an EHR. The weighted totals are about 271,000 physicians in 2019 and 355,000 in 2021. About half worked in primary care in both years, and about three in five worked in practices owned by physicians or physician groups. Epic was the most common named vendor, and its share rose from 24.0% to 28.9%. The share reporting that the EHR integrated outside records without manual entry rose from 31.3% to 42.9%. About one in three physicians had staff support, such as a scribe, for documentation in both years.

Table 1. Weighted characteristics of office-based physicians whose practice uses an EHR, NEHRS 2019 and 2021

Characteristic	2019 (%)	2021 (%)
Unweighted respondents (n)	1,372	1,694
Weighted physicians (approx.)	271,000	355,000
Specialty: primary care	48.5	48.8
Specialty: medical	29.6	31.0
Specialty: surgical	21.9	20.2
Solo practice	20.0	22.8
Practice with more than 50 physicians	12.3	13.7
Owned by physician or physician group	59.5	57.4
Owned by hospital or academic medical centre	22.1	19.9
Aged 50 or older	74.1	64.8
Female	31.6	32.7
Primary EHR vendor: Epic	24.0	28.9
Primary EHR vendor: other or unknown	40.7	34.2
Staff support for documentation (such as a scribe)	32.2	34.4
EHR integrates outside records without manual entry	31.3	42.9
Participates in MIPS	29.3	19.2
Questionnaire completed by the physician	79.8	83.8

4.2 RQ1: The evaluated measures rose while the experienced measures stayed flat

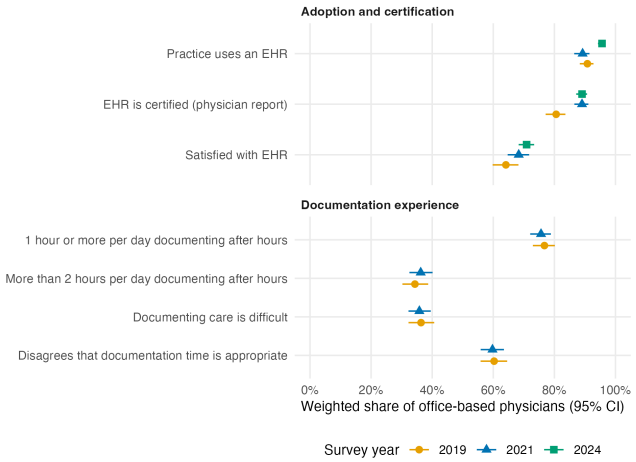

Figure 1 sets the two kinds of measure side by side. On the evaluated side, EHR use was 90.8% (95% CI 88.3–92.8) in 2019, 89.2% (86.5–91.5) in 2021 and 95.6% (94.3–96.6) in 2024. Among EHR users, the share reporting a certified system rose from 80.6% (77.1–83.6) in 2019 to 89.0% (86.5–91.1) in 2021 and 89.1% (87.1–90.7) in 2024. Satisfaction rose from 64.1% (59.8–68.2) to 68.3% (64.7–71.7) and then 70.9% (68.3–73.4). The 2024 values for all three measures were higher than in 2019 ($p < 0.01$ for each).

On the experienced side, there was no change. In 2019, 76.7% (73.0–80.1) of EHR users spent an hour or more a day documenting outside office hours; in 2021 the figure was 75.6% (72.1–78.9). The share spending more than two hours was 34.3% (30.3–38.7) and 36.2% (32.5–40.1). The share who found documenting difficult was 36.3% and 35.8%, and the share who disagreed that their documentation time was appropriate was 60.3% and 59.7%. None of these year differences was statistically meaningful (p values from 0.51 to 0.86). Over the same two years, certification rose by more than eight percentage points ($p < 0.001$).

The flat line matters because 2021 was not an ordinary year. The outpatient billing guidelines changed in January 2021 with the stated aim of reducing documentation (Apathy et al., 2022), and the 2021 survey was fielded during the COVID-19 pandemic. Neither shift shows up in the share of physicians charting after hours. The data cannot say why; they only show that the burden reported in mid-2021 matched the burden reported in late 2019.

Figure 2 shows the full distribution. In 2021, 6.2% of EHR users reported no after-hours documentation, 18.2% less than one hour, 39.4% one to two hours, 27.9% more than two to four hours and 8.4% more than four hours. Only 3.0% of primary care physicians reported none. Surgeons reported less after-hours time than other groups: 24.1% of surgeons spent more than two hours in 2021, against 38.2% in primary care and 41.0% in medical specialties.

The modal answer in both years was one to two hours a day. If that figure is read at its lower bound and applied to a five-day week, the typical physician using an EHR spends at least five

hours a week on records outside office hours. This is a floor, not an estimate of the mean, because the survey reports categories rather than minutes. It still shows that after-hours documentation is a routine part of office-based practice, not a problem of a small group of outliers. The appropriateness item points the same way. Six in ten physicians disagreed that their documentation time was appropriate in both years, which is close to the share who spent at least an hour after hours.

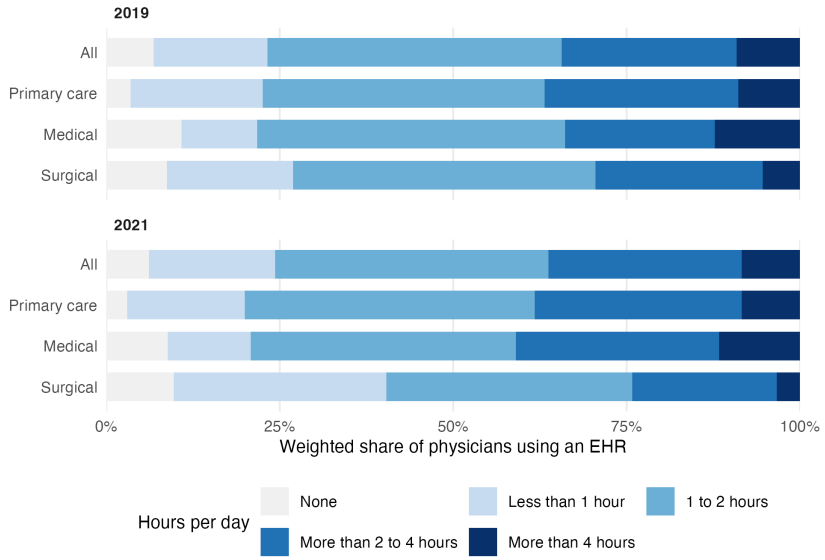

Figure 2. Reported hours per day spent documenting clinical care outside normal office hours, by specialty group, among office-based physicians whose practice uses an EHR, NEHRS 2019 and 2021. Bars show weighted shares. Three 2019 segments have relative standard errors above 30% and do not meet the NCHS reliability standard: medical specialties, more than 4 hours; surgical specialties, none; surgical specialties, more than 4 hours.

4.3 RQ2: Friction tracks the system; time does not

Figure 3 and Table 2 report the adjusted models. The clearest result is a contrast between the two forms of burden. Friction burden, the reported difficulty of documenting, varied with what the record system does. Time burden, the after-hours hours, varied with very few of the same features.

Vendor. Compared with Epic users, the adjusted odds of finding documentation difficult were higher for users of Allscripts (OR 2.60, 95% CI 1.56–4.33), Cerner (2.37, 1.37–4.12), NextGen (2.24, 1.19–4.24) and eClinicalWorks (2.17, 1.37–3.42). Weighted, 29.3% of Epic users and 28.5% of athenahealth users found documenting difficult, against 51.6% of Cerner users and 46.8% of Allscripts users. For after-hours time the pattern did not repeat. No vendor had higher odds than Epic of more than two hours, and athenahealth users (OR 0.60, 0.36–0.99) and users of other or unknown systems (0.58, 0.40–0.86) had lower odds. In weighted terms, 38.9% of Epic users documented for more than two hours after hours.

Integration of outside records. Physicians whose EHR integrated information received from other organisations without manual entry or scanning had lower odds of finding documentation difficult (OR 0.63, 0.48–0.83). They were also less likely to disagree that their documentation time was appropriate (0.71, 0.55–0.93). Their odds of documenting for more than two hours after hours were about the same as others (0.94, 0.71–1.24).

Staff support. Physicians with staff support, such as a scribe, had lower odds of finding documentation difficult (OR 0.62, 0.47–0.82) and of judging their documentation time inappropriate (0.65, 0.50–0.85). Staff support was not associated with after-hours time: the OR for more than two hours was 0.96 (0.73–1.26), and for one hour or more it was 0.82 (0.60–1.12). Weighted, 33.8% of physicians with staff support and 36.3% without it documented for more than two hours after hours.

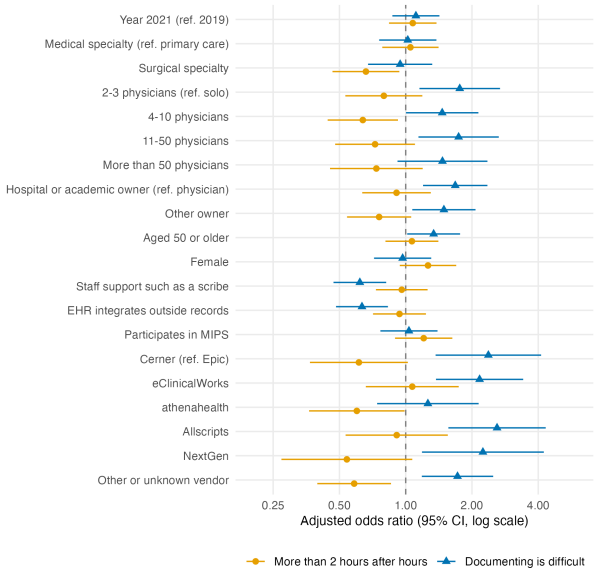

Figure 3. Adjusted odds ratios for documenting more than two hours a day after hours and for finding documentation difficult, pooled NEHRS 2019 and 2021 physicians whose practice uses an EHR. Survey-weighted logistic regressions include all terms shown. Horizontal lines are 95% confidence intervals; the dashed line marks an odds ratio of 1. MIPS = Merit-based Incentive Payment System.

Practice organisation. Practice features showed the same split. Compared with physician-owned practices, practices owned by

hospitals or academic centres had higher odds of difficulty (OR 1.68, 1.20–2.35) but not of heavy after-hours time (0.91, 0.64–1.30). Solo physicians had the lowest share finding documentation difficult (28.7%) and the highest share spending more than two hours after hours (40.0%).

The appropriateness item behaved differently from both. Physicians in larger practices were more likely to call their documentation time inappropriate, with odds rising from 1.47 (1.02–2.11) for practices of 4–10 physicians to 2.37 (1.43–3.91) for practices of more than 50. Their after-hours time was no higher than that of solo physicians. One reading is that physicians in large organisations judge documentation against what they see as its purpose, and more of their documentation serves organisational reporting. The data cannot test this reading directly, but it fits the larger-practice pattern for difficulty.

Specialty and requirements. Surgical specialty was the only feature consistently associated with less after-hours time (OR 0.66, 0.47–0.94 for more than two hours; 0.55, 0.38–0.80 for one hour or more). MIPS participation had point estimates above one for after-hours time (1.21, 0.90–1.63) and for judging documentation time inappropriate (1.34, 0.99–1.80), but both intervals included one. Physician sex was not clearly associated with either outcome after adjustment.

Table 2. Adjusted odds ratios (95% CI) for documentation burden, pooled NEHRS 2019 and 2021 office-based physicians using an EHR

Term	1 hour or more after hours	More than 2 hours after hours	Documenting is difficult	Time not appropriate
Year 2021 (ref. 2019)	0.92 (0.70–1.22)	1.08 (0.84–1.38)	1.11 (0.87–1.42)	1.07 (0.84–1.37)
Surgical (ref. primary care)	0.55 (0.38–0.80)	0.66 (0.47–0.94)	0.94 (0.68–1.32)	0.74 (0.53–1.02)
Medical (ref. primary care)	1.03 (0.73–1.44)	1.05 (0.78–1.41)	1.02 (0.76–1.38)	0.92 (0.69–1.23)
4–10 physicians (ref. solo)	1.13 (0.75–1.70)	0.64 (0.44–0.92)	1.47 (1.00–2.14)	1.47 (1.02–2.11)
More than 50 physicians (ref. solo)	1.49 (0.81–2.72)	0.74 (0.45–1.20)	1.47 (0.92–2.35)	2.37 (1.43–3.91)
Hospital or academic owner (ref. physician)	0.88 (0.58–1.36)	0.91 (0.64–1.30)	1.68 (1.20–2.35)	1.11 (0.78–1.59)
Staff support such as a scribe	0.82 (0.60–1.12)	0.96 (0.73–1.26)	0.62 (0.47–0.82)	0.65 (0.50–0.85)
EHR integrates outside records	0.95 (0.70–1.30)	0.94 (0.71–1.24)	0.63 (0.48–0.83)	0.71 (0.55–0.93)
Participates in MIPS	1.14 (0.82–1.58)	1.21 (0.90–1.63)	1.04 (0.77–1.40)	1.34 (0.99–1.80)
Cerner (ref. Epic)	0.82 (0.43–1.57)	0.61 (0.37–1.02)	2.37 (1.37–4.12)	1.45 (0.82–2.54)
eClinicalWorks (ref. Epic)	1.53 (0.84–2.77)	1.07 (0.66–1.74)	2.17 (1.37–3.42)	1.15 (0.72–1.84)
Allscripts (ref. Epic)	0.88 (0.47–1.65)	0.91 (0.53–1.55)	2.60 (1.56–4.33)	1.38 (0.81–2.32)
Unweighted n	3,039	3,039	3,029	3,023

The checks support this reading. In the proportional-odds model of all five after-hours categories, staff support (OR 0.91, 0.72–1.17), record integration (0.88, 0.69–1.12) and MIPS (1.19, 0.91–1.57) again had intervals that included one, while surgical specialty again had lower odds (0.60, 0.45–0.80). When the sample was restricted to physicians who completed the questionnaire themselves, staff support (0.63, 0.47–0.85), integration (0.62, 0.46–0.82) and the vendor contrasts kept their associations with difficulty, and staff support still showed no association with after-hours time (0.98, 0.72–1.32). Adding heavy after-hours time to the difficulty model did not remove the vendor, integration or staff support associations. Physicians who documented for more than two hours had about four times the odds of finding documentation difficult (OR 4.43, 3.39–5.78), yet the system features still predicted difficulty among physicians with similar time burden.

4.4 What the 2019 items add: how notes are built and what they are for

Figure 4 reports the 2019 items. Most EHR users (63.3%) used template-based notes often. Physicians found it hard to locate information in template notes less often (22.5%) than in free-text notes (31.1%). The items on what documentation is for were more striking. Of EHR users, 60.4% (56.1–64.6) disagreed with the statement that their documentation time did not reduce their time with patients, and 85.0% (81.1–88.2) agreed that documentation required solely for billing increased their overall documentation time. Only 15.7% thought that private insurer rules did not align with Medicare rules, so the billing load was not mainly a problem of conflicting payers.

Because agreement with the billing item was close to universal, it did little to separate physicians in the 2019 models. Its odds ratio was 1.15 (0.61–2.15) for more than two hours after hours and 1.15 (0.64–2.07) for difficulty. Frequent template use was not associated with either outcome. The integration of outside records again predicted lower odds of difficulty in 2019 alone (0.59, 0.40–0.89). A shared condition cannot explain variation between physicians in a cross-sectional survey, so this null result is expected. It is still informative that almost every physician, whatever the vendor, named billing documentation as part of the load.

4.5 RQ3: Burden among the successes

Table 3 estimates burden inside the groups that the evaluated measures count as successes. In 2021, 76.6% of physicians with a certified EHR documented for an hour or more after hours, about the same as all EHR users. Among physicians with a certified EHR who were also satisfied with it, 72.0% (67.0–76.4) documented for an hour or more, and 33.1% (28.4–38.1) for more than two hours. Almost half of this satisfied group (49.1%) disagreed that their documentation time was appropriate.

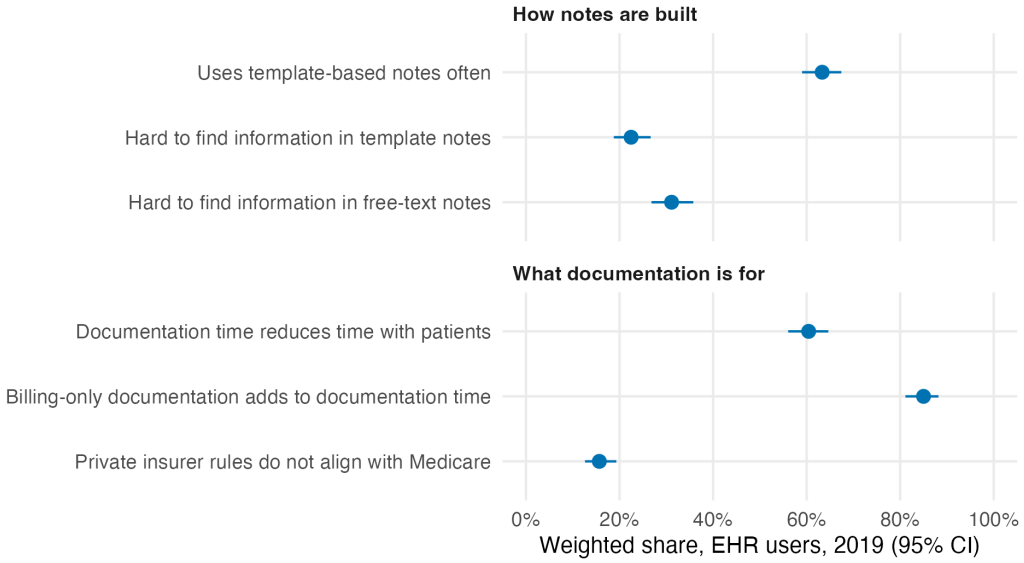

Figure 4. Reports on note construction and the purposes of documentation among office-based physicians whose practice uses an EHR, NEHRS 2019. Points are weighted shares with 95% confidence intervals. "Not applicable" answers are excluded.

Table 3. Documentation burden within groups defined by the evaluated measures, office-based physicians using an EHR, NEHRS 2019 and 2021 (weighted %, 95% CI)

Group	Year	n	1 hour or more after hours	More than 2 hours after hours	Documenting is difficult	Time not appropriate
All EHR users	2019	1,372	76.7 (73.0–80.1)	34.3 (30.3–38.7)	36.3 (32.2–40.7)	60.3 (55.8–64.5)
Certified EHR	2019	1,075	80.0 (75.9–83.5)	35.5 (30.8–40.4)	35.5 (30.9–40.3)	60.0 (54.9–64.8)
Certified EHR, satisfied	2019	688	76.4 (70.9–81.1)	29.6 (24.5–35.1)	18.9 (14.9–23.7)	46.6 (40.6–52.7)
Certified EHR, not satisfied	2019	384	86.0 (79.8–90.5)	46.0 (37.5–54.7)	67.2 (59.0–74.4)	85.1 (78.3–90.1)
All EHR users	2021	1,694	75.6 (72.1–78.9)	36.2 (32.5–40.1)	35.8 (32.2–39.5)	59.7 (55.9–63.5)
Certified EHR	2021	1,466	76.6 (72.8–80.0)	37.7 (33.7–41.9)	34.3 (30.5–38.3)	60.0 (55.9–64.0)
Certified EHR, satisfied	2021	991	72.0 (67.0–76.4)	33.1 (28.4–38.1)	17.2 (13.8–21.4)	49.1 (44.0–54.1)
Certified EHR, not satisfied	2021	467	87.5 (82.0–91.5)	48.0 (40.8–55.3)	73.5 (66.5–79.6)	85.2 (78.6–90.0)

Satisfaction and difficulty move together much more than satisfaction and time do. Satisfied users of a certified system were about a quarter as likely as unsatisfied users to find documentation difficult (17.2% against 73.5% in 2021). The gap in time was far smaller: 72.0% against 87.5% for an hour or more. Put as a share of all EHR users, 49.0% (45.1–52.9) of physicians in 2021 were both satisfied with their EHR and documented for an hour or more after hours. In 2019 the share was 47.1% (42.7–51.4).

Figure 5 shows the same pattern from the other direction. Among physicians who reported no after-hours documentation, 9.4% found documenting difficult and 81.3% were satisfied with their EHR. Among those who reported more than four hours a day, 66.9% found documenting difficult, yet 52.5% (41.9–62.8) were still satisfied. Satisfaction fell as after-hours time rose, but slowly. A satisfaction score would register only part of the time burden that physicians report.

5. Discussion

5.1 Two measures of the same system

The first finding answers RQ1 directly. Between 2019 and 2024 the measures that policy uses to track EHRs kept rising, while the after-hours burden that physicians reported in 2019 and 2021 did not change. A reader of the adoption and certification series would see a program close to completion: 95.6% of office-based physicians worked in practices with an EHR in 2024, and nearly nine in ten EHR users reported a certified system. A reader of the documentation items would see three quarters of the same population working on records after hours, with one in three doing so for more than two hours a day.

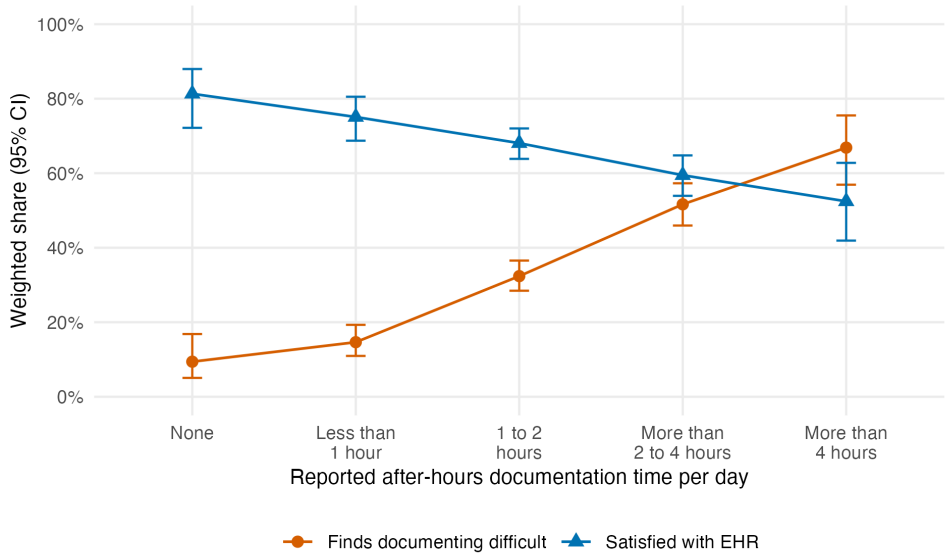

Figure 5. Share of physicians who find documentation difficult and share satisfied with their EHR, by reported after-hours documentation time, pooled NEHRS 2019 and 2021 physicians whose practice uses an EHR. Points are weighted shares with 95% confidence intervals.

These are not contradictory facts. They are answers to different questions. Certification asks whether a product can perform listed functions, such as sending a summary of care record or recording structured data. It does not ask how many hours a physician spends making the product perform them. This is the kind of gap that Greenhalgh et al. (2017) warned against when they argued that evaluation should look beyond adoption. It also fits the account of Star and Strauss (1999): the after-hours work that keeps the record complete is invisible in the measures the system reports about itself.

5.2 Friction and time have different sources

The second finding answers RQ2 and is the main contribution of the study. Features of the record system were associated with friction burden but not with time burden. Vendor, integration of outside records, staff support and hospital ownership all predicted whether documenting felt difficult. Almost none of them predicted whether physicians charted after hours. Difficulty and after-hours time were strongly related to each other, yet the system features predicted difficulty even among physicians with similar after-hours time.

One plausible reading is that the interface shapes how hard each unit of documentation feels, while the amount of documentation is set elsewhere. Better integration means less retyping of outside records, and a scribe takes over some of the typing. Both make documentation easier. Neither changes what the note must contain for billing, quality reporting and audit. This reading fits the near-universal agreement in 2019 that billing-only documentation added time, and it fits the argument of Downing et al. (2018) that US documentation load is driven by payment and regulation as much as by software design. It also fits the observation of Pine and Mazmanian (2014) that records are built to satisfy institutional accounts, so a better tool for writing them may simply produce the same account with less strain.

The integration result shows how a technical function changes the work. When an EHR cannot take in an outside record without manual entry, someone must read a faxed or scanned document and retype what matters into structured fields. Physicians whose systems avoided this step were less likely to find documentation difficult, by about a third in odds terms. Yet they were not less likely to document after hours. Integration removes one source of typing but does not shorten the note that billing and quality programs require. Holmgren, Adler-Milstein, and Apathy (2024) found the reverse link as well: heavy documentation days reduced physicians' use of exchanged outside records. Interoperability and documentation load are therefore tied together in both directions.

The scribe result deserves care. In single-site studies, scribes improved physicians' satisfaction with charting time (Gidwani et al., 2017) and reduced physician EHR time (Mishra et al., 2018). NEHRS does not show such a difference at the national level, where staff support was linked to easier documentation but not to fewer after-hours hours. Several explanations are possible. Staff support in NEHRS is broad and may mean part-time help rather than a dedicated scribe. Physicians with heavy workloads

may be the ones given support, which would hide any reduction. Or, as Bates and Landman (2018) suggested, scribes may move work to another person while the physician still reviews, corrects and signs every note after clinic. The survey cannot separate these explanations.

The vendor result also needs a careful reading. Epic and athenahealth users reported the least difficulty, but Epic users did not report less after-hours time than others. Vendor is bound up with practice type: Epic is common in large health systems, which may also supply training, templates and support staff. The vendor contrasts should be read as differences between the sociotechnical systems that come with each product, not as product ratings. That is also the point of Sittig and Singh (2010): the same software behaves differently in different organisations.

5.3 Satisfaction is a partial signal

The third finding answers RQ3. Satisfaction, which is the closest thing to an experience measure in the NEHRS adoption series, follows friction more closely than time. About half of all EHR users in 2021 were both satisfied with their EHR and charting for an hour or more each day after hours. A program that reported satisfaction as its experience indicator would count these physicians as successes. Physicians may also have adapted their expectations: when after-hours charting is the norm across vendors and practices, it may not register as a fault of the particular system they use.

This matters for the theme of evaluation. Measures of adoption, certification and satisfaction are not wrong. They capture whether the infrastructure exists, whether it meets federal specifications and whether users accept it. They do not capture the hours that the infrastructure demands. Studies based on event logs have shown how much of that time can be measured directly (Arndt et al., 2017; Rotenstein et al., 2021). A national monitoring program that kept the after-hours item would at least keep the time burden visible. Its absence from the 2024 questionnaire means that, at present, the national series can show continued adoption gains but cannot show whether the hours have changed.

5.4 The survey as an evaluation instrument

NEHRS is itself part of the evaluation apparatus that this paper examines. It was set up to track progress toward the policy goals of the HITECH Act, and its core series are adoption, certification, exchange and use of specific functions (National Center for Health Statistics, 2021). The documentation items appear in the 2019 and 2021 questionnaires but not in the 2024 questionnaire. The survey therefore reproduces in its own design the gap it can reveal. The measures that show success are the ones that persist; the measures that show burden came and went. This is not a criticism of NCHS, which must balance questionnaire length against response, and which shortened the 2021 form to improve response (National Center for Health Statistics, 2022). It is an observation about what a system of accounts makes visible. Bowker and Star (1999) argued that classification systems make some kinds of work visible and leave other kinds out of view. A time measure that appears in two survey years and then disappears cannot anchor a policy target in the way that the adoption series has.

The same logic applies inside practices. An EHR records when a note is signed, which billing code was chosen and whether a quality measure was met. Event logs can also record after-hours activity, and studies have used them to measure it (Arndt et al., 2017; Rotenstein et al., 2021). Whether such logs are reported to anyone with authority over documentation requirements is an organisational choice, not a technical limit. The finding that system features predicted friction but not time suggests that practices and vendors will see the friction first, because it shows up in complaints and satisfaction scores. The hours are easier to miss, because they fall outside the working day and outside most of the accounts the system keeps about itself.

5.5 Relation to earlier NEHRS studies

The results are consistent with earlier analyses of the same survey. Gaffney et al. (2022) documented heavy after-hours documentation in the 2019 file, and this study finds the same level in 2021. Nguyen et al. (2023) reported higher ordinal odds of after-hours documentation with MIPS participation in 2021 (OR 1.44). The pooled ordinal estimate here points the same way (1.19) but its interval includes one. The difference may reflect pooling, the added controls for vendor and integration, or the smaller 2021 MIPS share. Hong et al. (2022) found that documenting social determinants of health was not linked to after-hours work, which also fits the claim that specific documentation tasks explain little of the variation in time.

5.6 Implications

The findings suggest three practical points. First, interface improvements and integration may reduce friction, and they are worth pursuing for that reason, but they should not be expected to remove after-hours charting on their own. Second, reductions in after-hours time are more likely to come from reducing what the record must hold for billing, quality reporting and compliance, as the 2021 billing guideline change tried to do (Apathy et al., 2022). This study does not detect an effect of that change in mid-2021, although the timing was early and the comparison year differed in other ways. Third, national evaluation of EHR policy should report a time measure next to adoption and certification, so that a rise in one cannot be read as progress on the other.

6. Limitations

The design is cross-sectional, so none of the associations is causal. Physicians with heavy workloads may seek scribes or may move to practices with particular vendors, and these selection paths cannot be separated from effects of the features.

All measures are self-reported. After-hours time was reported in broad categories, which cannot capture exact minutes, and physicians may over- or under-state it. Some questionnaires were completed by office staff; restricting to physician-completed questionnaires did not change the main results.

Response rates were between 41.0% and 47.4%. The NCHS weights adjust for non-response, but physicians with strong

views about EHRs may have been more willing to respond.

The 2019 and 2021 questionnaires differ. The 2021 form was shortened from eight to four pages and dropped telephone completion (National Center for Health Statistics, 2022), and 2021 fell during the COVID-19 pandemic. The flat year comparison is therefore a comparison of two survey years, not a test of any policy. The certification item was also reworded after 2019, so part of the rise in reported certification between 2019 and 2021 may reflect wording rather than change in systems. The 2024 survey did not ask the documentation items, so the analysis cannot say whether time burden changed after 2021.

Some measures are coarse. Staff support combines different kinds of help, the integration item counts "don't know" answers as no, and the vendor variable groups many smaller products as "other or unknown". Vendor associations are associations with the whole setting in which a vendor is used. The public-use files also suppress geographic and detailed specialty information, which limits finer analysis.

7. Conclusion

By the measures used to evaluate it, the US office-based EHR is close to complete: almost all physicians use one, and most report a certified system and are satisfied with it. By physicians' own reports, the same system keeps three in four of them documenting after hours, a share that did not change between 2019 and 2021. Features of the system, such as vendor, integration of outside records and staff support, track how difficult documentation feels, but they track the hours very little. Most physicians who use a certified system and are satisfied with it still chart after hours. The study's main claim is that time burden and friction burden have different sources, and that evaluations which count adoption, certification and satisfaction see the second far better than the first. Keeping a time measure in national monitoring, and reducing the volume of what the record is required to carry, are the steps this evidence most directly supports.

Declaration of conflicting interests

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Ethics statement

This study is a secondary analysis of publicly available, de-identified public-use survey files released by the National Center for Health Statistics. No human participants were contacted, no attempt was made to identify any respondent, and the files were used under the NCHS data use restrictions. No ethics approval was required.

Data availability statement

This study uses the National Electronic Health Records Survey public-use files and documentation for 2019, 2021 and 2024, released by the National Center for Health Statistics: https://www.cdc.gov/nchs/nehrs/ (file server: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/dataset_documentation/NEHRS/), accessed October 2026. The analysis code will be deposited in a public repository on acceptance; it is withheld during review only to keep the review anonymous.

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