

Systematic Review

Patient and healthcare provider satisfaction in the era of electronic health records and electronic medical records: a systematic review

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ABSTRACT

Electronic health records (EHRs) and electronic medical records (EMRs) are now central to clinical practice worldwide, including in low-and middle-income health systems, yet their effect on patient and healthcare provider satisfaction remains uncertain. Objectives to synthesize evidence published between 2015 and 2025 on how EHR and EMR use relates to patient satisfaction, provider satisfaction, patient-provider communication, workflow and burnout, and to identify the factors that shape these outcomes across different health-system contexts. A systematic review of primary studies was conducted by searching PubMed, Scopus, Web of Science, MEDLINE and Google Scholar. Studies were eligible if they reported patient or provider satisfaction, communication, quality, workflow or burnout in real-world clinical settings. Two reviewers independently screened records and extracted data. Methodological quality was appraised using the mixed methods appraisal tool (MMAT), version 2018. Thirty-six studies were included and synthesized narratively. Patients generally reported moderate to high satisfaction, particularly in primary care and outpatient settings, citing shorter waiting times and clearer explanations. Provider experience diverged by role: nurses and allied health professionals reported benefits in legibility and coordination, whereas physicians reported documentation burden, workflow disruption and burnout. Usability, training quality and organizational support, rather than adoption itself, were the consistent determinants of satisfaction. Evidence from low-and middle-income settings showed that provider-side efficiency gains did not automatically translate into patient benefit. EHR adoption alone does not improve satisfaction. Investment in usability, role-specific training, documentation relief, and patient-centered communication is required.

Keywords: Electronic health records, Electronic medical records, Patient satisfaction, Health personnel, Burnout

INTRODUCTION

With the increasing digitization of healthcare, EHRs have become widely adopted. EHRs have transformed the processes of recording, storing, and sharing health information. They now constitute a fundamental component of healthcare systems, enhancing the quality, safety, and efficiency of care by facilitating improved access to and exchange of information among providers.¹ Patient and healthcare provider satisfaction are widely acknowledged as critical indicators of healthcare quality

and system performance. Patient satisfaction encompasses perceptions of care, communication, and the responsiveness of health services, whereas provider satisfaction is associated with clinical effectiveness, workforce retention, and professional well-being. As EHRs become integrated into routine clinical practice, it is increasingly important to understand their impact on experiences of both patients and healthcare providers.²

The use of EHRs during patient encounters has altered the dynamics of patient-provider interactions. While digital

records and real-time data support clinical decision-making and promote continuity of care, they may also introduce challenges related to attention, communication, and task management.³ These developments raise critical questions about the effects of EHRs on interpersonal relationships and satisfaction in healthcare settings. The integration of EHRs into clinical workflows has also transformed healthcare providers' daily practices. Although EHRs are intended to enhance documentation quality and care coordination, their implementation often requires adapting to new systems, interfaces, and documentation protocols. These adjustments can affect workload, efficiency, and professional experience, underscoring the importance of evaluating satisfaction alongside technological adoption.⁴

METHODS

Study design, data collection and analysis

This systematic review was conducted and reported in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) 2020 statement; the completed PRISMA 2020 checklist is provided as a supplementary file. The review was not prospectively registered.

The review examined how EMRs and EHRs affect patient satisfaction, patient-provider satisfaction, healthcare quality, workflow, and provider outcomes from 2015 to 2025. A comprehensive literature search was conducted across PubMed, Scopus, Web of Science, Medline, and Google Scholar. The initial search identified 878 records. After removing 126 duplicate articles, 752 unique records remained for title and abstract screening. During this stage, 647 records were excluded for being irrelevant to EMR/EHR use, lacking patient-or provider-related outcomes, occurring in non-clinical settings, or being publication types (including systematic reviews, narrative reviews, editorials, and conference abstracts). We

reviewed the full text of 105 articles. 69 were excluded for the following reasons: 23 were not empirical studies, 19 did not address patient and/or healthcare provider satisfaction, 15 focused solely on technical or administrative topics, and 12 were not in English or did not have full text available. After full-text screening, 36 primary empirical studies met the inclusion criteria and were included in the final analysis (Figure 1). We extracted data using a standard framework that included the author, year, country, setting, population, study design, outcome measures, and key findings, as presented in the evidence chart. The full electronic search strategy, including all search strings and dates on which each database was searched, is provided in the supplementary appendix.

Search strategy and eligibility criteria

Studies were included if they assessed either patient or provider satisfaction with EHR or EMR systems. Abstracts were included if they related to the topic clearly. Two investigators independently evaluated each article. References from selected studies and expert-recommended articles were also reviewed. Only primary research conducted in real-world healthcare settings and published in English from 2015 to 2025 was included. Eligible studies examined the impact of EMR or EHR systems on patient satisfaction, patient-provider communication, healthcare quality, workflow, provider satisfaction, burnout, or health service delivery. Reviews, meta-analyses, editorials, commentaries, letters, and opinion pieces were excluded, even if relevant (Table 1).

Grey literature in the form of postgraduate theses was eligible where the full text was publicly available and the methods were reported in sufficient detail to permit appraisal; this decision was taken to reduce publication bias and to improve representation of low- and middle-income settings, which are under-represented in the indexed literature.

Table 1: Eligibility criteria used in this systematic review.

Inclusion criteria	Exclusion criteria
Primary empirical studies evaluating EMR/EHR use.	Systematic reviews, narrative reviews, scoping reviews, meta-analyses.
Studies assessing patient satisfaction, patient-provider communication, healthcare quality, workflow, or provider outcomes.	Editorials, commentaries, letters, conference abstracts.
Conducted in real healthcare settings (primary, secondary, or tertiary care).	Studies outside clinical settings (simulations, laboratory studies).
Participants included patients and/or healthcare providers.	Studies involving only students or trainees.
Quantitative, qualitative, or mixed-methods designs.	Studies focused solely on technical system design or billing/administration.
Peer-reviewed articles and postgraduate theses in English.	Non-English publications or unavailable full text.
Published within the predefined review period (2015-2025).	Duplicate studies or insufficient methodological detail.

Quality and risk-of-bias appraisal

The methodological quality of included studies was appraised using the MMAT, version 2018. MMAT was selected because the included evidence spanned qualitative, randomized controlled, non-randomized quantitative, quantitative descriptive and mixed-methods designs, and MMAT permits appraisal of all five design families within a single comparable framework. Each study was screened against the two MMAT screening questions, assigned to one design category, and rated against that category's five criteria as met, not met, or

indeterminate. Two reviewers independently appraised each study, and disagreements were resolved through discussion. In accordance with the guidance of the MMAT authors, an overall numerical quality score was not calculated; criterion-level ratings are reported instead, together with a qualitative summary judgment of overall methodological concern to support interpretation. Appraisal results were used to weight the narrative synthesis rather than to exclude studies, and findings resting predominantly on studies with substantial methodological concerns are identified as such in the discussion.

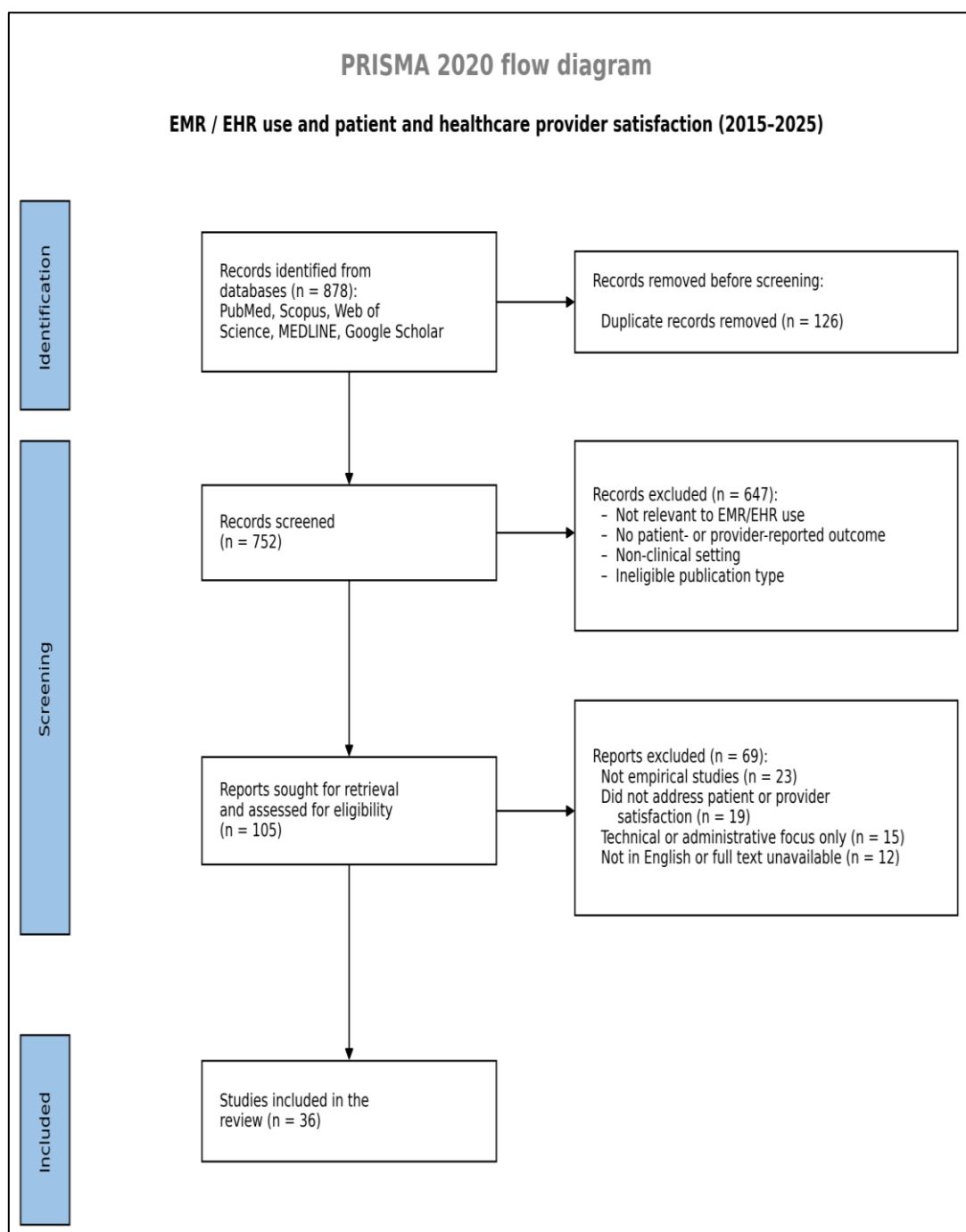


Figure 1: Study selection process (PRISMA 2020 flow diagram).

RESULTS

This systematic review included studies published between 2015 and 2025 that examined patient and healthcare provider satisfaction related to EHR or EMR use across diverse healthcare settings (Table 2).

The evidence base encompassed cross-sectional surveys, observational time-and-motion studies, qualitative interviews, quasi-experimental designs, and randomized controlled trials, demonstrating considerable methodological diversity.

Studies were conducted in primary care, outpatient specialty clinics, inpatient wards, emergency departments, and national healthcare systems across high-, middle-, and low-income countries.

In most settings, patient satisfaction following EHR implementation ranged from moderate to high, especially in primary care and outpatient environments.

Patients frequently reported improved perceptions of care efficiency, shorter wait times, clearer explanations of tests and medications, and better continuity of information when EHRs replaced paper-based systems.

Several studies indicated that patients were comfortable with clinicians' use of computer during consultations and did not view it as detrimental to communication or rapport, provided clinicians maintained verbal engagement and eye contact.

However, patient satisfaction was not consistently positive. Some studies reported an initial decline in satisfaction during early phases of EHR implementation, particularly in settings with workflow disruptions or extended consultation times.

Dissatisfaction was also observed among elderly patients and individuals with limited digital literacy, especially when EHR-driven processes such as digital queuing or appointment systems were poorly explained or insufficiently supported.

Notably, studies consistently demonstrated that the manner in which EHRs were used, rather than their mere presence, was a primary determinant of patient experience.

Healthcare provider satisfaction with EHRs varied considerably across studies as well as the professional groups.

Nurses and allied health professionals generally reported higher satisfaction than physicians, citing benefits such as improved documentation legibility, enhanced access to patient information, reduced medication errors, and better care coordination.

In contrast, physicians often reported dissatisfaction due to increased documentation burden, workflow inefficiencies, usability limitations, and time spent on EHR tasks beyond regular working hours.

Several studies identified burnout and frustration as significant concerns associated with EHR use, particularly among physicians and trainees.

Poor usability, excessive data-entry requirements, and limited system customization were strongly associated with lower satisfaction and an increased risk of burnout.

Conversely, provider satisfaction was consistently higher in settings with comprehensive training, robust technical support, adequate computer access, and user-friendly interfaces (Table 2).

Methodological quality of included studies

All 36 studies passed mixed methods appraisal tool screening. Under mixed methods appraisal tool categorization, there were eighteen non-randomized quantitative studies, twelve quantitative descriptive studies, four qualitative studies, one randomized controlled trial, and one mixed-method study.

Overall methodological concern was rated low or low-to-moderate in seven studies, moderate or moderate-to-high in twenty one, and high in eight shown in the Table 3 below.

The most frequently unmet criteria were representativeness of the sample, reflecting the predominance of single-site sampling in twenty six of thirty six studies, and low risk of nonresponse bias, which could be established in only a minority of survey-based studies.

Confounding was inadequately addressed in seven non-randomized comparative studies, and in two of these the comparison was structurally confounded by the institution.

Seven studies employed objective measurement through event logs, time-and-motion observation, video recording or validated chart-quality scoring, and these were among the most methodologically robust in the review.

Seven studies collected data before 2015 despite being published within the review window, limiting the currency of their findings.

Two included sources were unpublished master's theses rather than peer-reviewed articles.

Two studies drew on an overlapping participant cohort and were therefore not treated as independent sources of evidence.

Table 2: Characteristics and key findings of the included studies.

Authors (year)	Setting/ country	Population	Design and outcomes	Key findings
(Williams et al 2019) ⁵	Quaternary care academic hospital (Medical University of South Carolina), using Epic EHR, United States	111 physicians across adult and pediatric specialties	Descriptive cross-sectional survey (Feb-Mar 2016). Outcome: Physician satisfaction with the EHR and its perceived impact on patient care were assessed using continuous scales ranging from 0 to 100. Independent variables included age, clinical position, duration of EHR experience, and perceived system efficiency. Physicians demonstrated moderately favorable satisfaction (mean score 58/100) and a positive perceived impact on patient care (mean score 61/100). Bivariate analysis revealed that older physicians and those in attending roles reported lower satisfaction levels. Multivariable regression analysis identified perceived efficiency as the most significant predictor of both higher physician satisfaction and a more favorable perception of the EHR's impact on patient care.	Physicians reported generally positive satisfaction (mean 58/100) and felt their patients benefited (mean 61/100). Interestingly, older doctors and those with attending status tended to feel less satisfied. Among all factors, perceived efficiency stood out as the most powerful driver of both physician satisfaction and the sense that patients were positively impacted.
(Dubale et al 2023) ⁶	Private hospitals in Addis Ababa implementing Electronic Medical Record (EMR) systems, Ethiopia	403 healthcare professionals (physicians, nurses, laboratory professionals, pharmacists, radiologists, and HMIS staff)	Institution-based cross-sectional quantitative study (March-April 2021). The main outcome was user satisfaction with the EMR system, measured on a 5-point Likert scale and grouped as either satisfied or not satisfied. We used multivariable logistic regression to find related factors.	The overall satisfaction rate among EMR users was 53.1%. Higher satisfaction was associated with greater computer proficiency, ease of use, comprehensive EMR training, and positive perceptions of system quality, information quality, and service quality. Training and system features were identified as the most significant determinants of user satisfaction.
(Farber et al 2015) ⁷	Four Veterans Affairs Medical Center (VAMC) community-based outpatient clinics, San Diego, California, United States	23 clinicians (21 internal medicine physicians, 2 nurse practitioners) and 126 adult patient visits	Observational cross-sectional study using video recordings and EHR screen capture (Morae software). Outcome: Patient satisfaction, including overall scores and subscales for patient-centered communication, clinical skills, and interpersonal skills, was measured using 5-point Likert scales. Clinician EHR use was assessed by tracking gaze time, the number of clicks and scrolls, and length of each visit.	Patients reported high satisfaction even with substantial EHR use, averaging 192 clicks/scrolls per visit, spending about 39% of visit time on EHR tasks. More clinician gaze directed at patients significantly linked to higher overall satisfaction and better patient-centered communication. Amount of EHR tasks did not reduce satisfaction, suggesting that consistent patient-focused communication may counteract potential negative effects of EHR use.
(Bakhom et al 2021) ⁸	Emergency Department of a quaternary care academic medical center (Vanderbilt University Medical Center), using Epic EHR, US	Emergency department nurses (23 observed nurses; 46 total observation hours)	Prospective observational time-and-motion study (March-September 2019). Outcome: The proportion of nursing time allocated to EHR activities and other tasks was measured. Subjective workload was evaluated using the NASA Task Load Index (NASA-TLX), which assesses mental demand, effort, and additional dimensions.	Emergency nurses spent the most time on EHR tasks (median 27%), more than on direct patient care (25%) or indirect care (15%). EHR use was most frequent activity, particularly during morning and afternoon shifts. Nurses reported higher mental demand and effort in the afternoon. These results highlight significant EHR-related workload and underscore need to improve EHR usability to reduce cognitive burden and enhance nursing workflow.
(Raymond et al 2015) ⁹	Private primary care medical practices (family medicine clinics), Canada	331 family physicians using EMR systems in Quebec, Canada	Cross-sectional online Survey using a component-based structural equation modeling (PLS-SEM) approach. Outcome measures include extended EMR use in clinical, communication, and administrative functions; user satisfaction; perceived ease of use; functional coverage; and perceived performance benefits such as quality of care, physician efficiency, and operational, economic, and social performance.	Extended use of EMRs, particularly clinical functionalities, was strongly associated with improved perceived performance benefits ($\beta=0.38$, $p<0.001$). Physicians utilized most administrative functions (approximately 90%), but engaged less with clinical (67%) and communication (41%) features. Ease of use and functional coverage emerged as primary determinants of extended use, while satisfaction independently contributed to performance improvement. These findings indicate that performance gains are contingent upon the extent and clinical depth of EMR utilization, rather than mere adoption.
(North et al 2020) ¹⁰	Six outpatient practice sites of the Mayo Clinic Health System (Wisconsin, Minnesota) and Mayo Clinic Arizona and Florida, US	Adult outpatients completing Press Ganey satisfaction surveys; millions of survey responses across 24 questions over multiple years	Quasi-experimental interrupted time-series study using Press Ganey patient satisfaction data (July 2016-Dec 2019). Outcome: Percentage of "very good" ("top-box") responses measured across 24 questions and 6 patient-experience domains: access, care provider, moving through visit, nursing, practice assessment and personal issues. Piecewise linear regression was employed to compare trends before and after EHR system switch	When new EHR system was introduced, patient satisfaction dropped in several areas of care. The biggest declines were in scheduling and phone access, which fell by upto 8.8%. Satisfaction with care providers, however, only decreased slightly. Patients usually needed 9-15 months to regain their previous level of satisfaction. This shows that switching EHR systems can temporarily disrupt patient experience, especially in terms of access and daily routines
(Mysen, 2016) ¹¹	Primary care clinic in Southeast Michigan, United States	40 adult primary care patients seen by a nurse practitioner (20 intervention, 20 control)	Cross-sectional experimental (pilot) study. Intervention: patients viewed selected components of their EHR (medication/allergy lists, lab results, vitals) during the history portion of the visit. Outcome: Patient satisfaction was assessed using the EHRs Survey, a 10-item instrument with a 5-point Likert scale. Group comparisons were conducted using t-tests.	Allowing patients to view their EHR during nurse practitioner visits did not significantly affect patient satisfaction or perceived communication compared to usual care. Most patients did not view the EHR as a barrier to communication, eye contact, or attentiveness. Overall satisfaction with the visit and communication remained high in both groups.
(Marmor et al 2018) ¹²	Outpatient clinics (general internal medicine, cardiology gastroenterology) at a single academic medical center (University of California San Diego), US	39 attending physicians (27 general internists, 10 cardiologists, 2 gastroenterologists) and their ambulatory patients responding to CG CAHPS surveys	Retrospective observational pilot study using EHR system log data (March 2015-March 2016) linked to CG CAHPS patient satisfaction surveys. Outcome: The primary outcome was likelihood of recommending provider. Secondary outcomes included the communication domain and its subdomains: time spent, respect, listening, and knowledge of history. Univariable regression analysis was performed.	Increased daytime use of the EHR was associated with small but statistically significant declines in patient satisfaction, including the likelihood of recommending the provider and overall communication quality. In contrast, after-hours EHR use was not associated with patient satisfaction. These findings indicate that EHR use during the clinical day, particularly during patient encounters, may negatively affect perceived communication and satisfaction.

Continued.

Authors (year)	Setting/ country	Population	Design and outcomes	Key findings
(Shanafelt et al 2016) ¹³	National, multi-setting clinical practice (private practice, academic medical centers, Veterans hospitals, military settings) US	6,560 U.S. physicians in active clinical practice across all specialties	National cross-sectional survey study (Aug-Oct 2014). Outcome: Physician burnout was measured using the Maslach Burnout Inventory. Satisfaction with clerical burden, including both direct and indirect patient-care tasks, as well as satisfaction with EHRs and CPOE, was assessed. Multivariable logistic regression was performed, adjusting for age, sex, specialty, practice setting, and work hours.	Physicians who used EHRs and CPOE reported significantly lower satisfaction with clerical burden of patient care. Independent use of CPOE was linked to increased odds of burnout (OR=1.29), while EHR use strongly correlated with dissatisfaction concerning time allocated to clerical tasks. Overall satisfaction with EHRs remained low, and majority of physicians indicated that EHRs did not enhance efficiency. These findings underscore the clerical burden imposed by electronic systems as a primary factor contributing to physician burnout and diminished professional satisfaction.
(Ayaad et al 2019) ¹⁴	Two public hospitals: one EMR-adopted hospital and one paper-based record hospital, Jordan	410 healthcare professionals (205 from EMR hospital, 205 from paper-based hospital); majority nurses, followed by physicians and allied health staff	Cross-sectional, descriptive, comparative study. Outcome: The quality of health care services was assessed using SERVQUAL dimensions: tangibles, reliability, responsiveness, assurance, and empathy. The quality of MR was evaluated using E-S-QUAL dimensions: efficiency, availability, fulfilment, and privacy. Data were analyzed using t tests and Pearson correlation.	Healthcare professionals in hospitals using EMRs reported significantly higher perceived quality of health care services than those in paper-based hospitals across all SERVQUAL domains (p<0.001). Discrepancy between expectations and perceptions was reduced in EMR hospitals. Quality of EMRs demonstrated a strong positive correlation with the perceived quality of health care services (r=0.659, p<0.001), with efficiency and availability identified as the most influential predictors. The implementation of high-quality EMRs is associated with substantial improvements in perceived service quality.
(Joukes et al 2018) ¹⁵	Outpatient clinics of two university hospitals that jointly implemented a structured and standardized EHR (one legacy-EHR center, one paper-based center), Netherland	24 physicians from multiple specialties; 439 outpatient consultations observed	Prospective observational time-and-motion study with paired pre-post design (2-6 months before and 6-8 months after EHR implementation). Outcome: The analysis included the percentage of consultation time allocated to dedicated patient care, dedicated documentation, and combined patient care and documentation, as well as consultation duration and the number of consultations per hour. Multilevel linear regression was employed.	The implementation of a structured EHR system resulted in a significant decrease in dedicated patient care time (-8.5%) at the center that previously used a legacy EHR, and a significant increase in dedicated documentation time (+8.3%) at the center that previously relied on paper records. Consultation duration and patient throughput remained unchanged. These findings support concerns that structured EHRs may increase documentation burden and reduce the time available for direct patient care.
(Meltzer et al 2022) ¹⁶	Academic primary care practices (family medicine and internal medicine) at Mayo Clinic, Scottsdale, Arizona, United States	43 healthcare practitioners (physicians, nurse practitioners, physician assistants) and 452 adult patients	Cross-sectional survey study (July-August 2018). The study examined how both practitioners and patients feel about using EHRs during visits, how often eight specific EHR communication skills were used, levels of practitioner burnout (measured by the Mini-Z), and the time spent on EHR documentation outside of office hours. The researchers used descriptive statistics and Cochran–Armitage trend tests to analyze the data.	A significant discrepancy was observed between practitioner and patient perceptions of EHR use. Practitioners reported diminished eye contact, reduced listening, and less personalized interactions. In contrast, patients predominantly reported sufficient eye contact, attentive listening, and positive visit experiences. The majority of patients viewed EHR use favorably (91.7%), whereas practitioners experienced increased stress, burnout, and substantial after-hours EHR workload. These findings indicate that EHR use adversely impacts practitioner experience without diminishing patient satisfaction, underscoring the need for organizational strategies to alleviate EHR-related burdens and address practitioner misperceptions.
(Gidwani et al 2017) ¹⁷	Academic family medicine clinic at a large academic medical center (Stanford University), using Epic EHR, United States	4 family physicians and 1,475 adult patient visits	Randomized controlled crossover trial (July 2015-June 2016). Physicians alternated weekly between scribe-assisted and non-scribe weeks. Outcome: Physician satisfaction was measured using a 5-item Likert scale, patient satisfaction using a 6-item validated survey, and charting efficiency was measured as the time to close charts within 48 hours. Fixed-effects logistic regression was used.	The implementation of medical scribes significantly enhanced physician satisfaction across multiple areas, including face time with patients, time allocated to charting, chart quality, and chart accuracy. Additionally, scribes improved charting efficiency, as evidenced by an increased likelihood of chart closure within 48 hours. Patient satisfaction remained consistently high regardless of scribe involvement. These findings indicate that medical scribes are an effective strategy to reduce clerical burden and may help mitigate physician burnout without negatively impacting patient experience.
(Street et al 2017) ¹⁸	Primary care and specialty outpatient clinics at VA San Diego Healthcare System and University of California San Diego (UCSD), United States	32 physicians (primary care and specialists) and 217 adult patient visits	Cross-sectional observational study using synchronized video recordings and EHR event logs. Patient active participation was assessed through questions, expressed preferences, and articulated concerns. Physician facilitative communication was measured by partnership-building and supportive talk, and periods of silence during visits. EHR interaction measures included number of keystrokes, mouse clicks, and duration of physician's gaze at EHR. Linear mixed-effects models were used, adjusting for visit length.	Increased keyboard activity by physicians correlated with significantly lower levels of active patient participation. Greater physician attention to the EHR was associated with longer periods of silence during clinical encounters. However, physicians' facilitative communication was a strong predictor of higher patient participation and was unaffected by EHR use, suggesting that effective communication skills can offset the potential negative impact of EHR use on patient engagement.
(Eberts and Capurro, 2019) ¹⁹	Two outpatient clinics within a private, academic healthcare network (UC CHRISTUS), Santiago, Chile	100 physicians and 100 adult patients attending outpatient visits	Cross-sectional survey study. Outcome: Study examined how physicians view the impact of EHRs on quality of care, documentation, privacy and patient-physician relationship. It also assessed patient satisfaction and their views on communication and comfort with EHR use, using validated, translated questionnaires. The analysis included descriptive statistics and chi-square tests.	A notable perception gap observed between physicians and patients. While most physicians believed that EHRs enhanced overall care quality, a significant proportion (25-37%) reported negative effect on patient-physician relationship. In contrast, patients reported high levels of comfort with EHR use, satisfaction rate of 98%, and maintained communication and rapport. Physician perceptions did not correlate with age, specialty, computer experience/ EHR training.

Continued.

Authors (year)	Setting/ country	Population	Design and outcomes	Key findings
(Shaarani et al 2017) ²⁰	Family Medicine Clinics at the American University of Beirut Medical Center (AUBMC), Lebanon	382 adult patients attending family medicine outpatient visits	Cross-sectional survey study. Outcome: Physician communication quality was assessed using the validated communication assessment tool (CAT), which patients completed immediately after their visit. The study examined associations between physician computer use and CAT scores.	Approximately 62% of patients did not perceive physician computer use as negatively affecting communication. Communication scores were higher when an ongoing physician-patient relationship existed. Extensive computer use for reviewing results, retrieving patient records, and providing patient education was associated with significantly higher communication scores ($p<0.001$). Overall, physician computer use did not impair the quality of communication as rated by patients.
(Asan et al 2016) ²¹	Three primary care clinics affiliated with the Medical College of Wisconsin, using the same EHR system, United States	32 adult patients attending internal medicine resident clinics	Qualitative study using semi-structured, in-depth patient interviews. Outcome: This study explores how patients view EHR use during appointments and examines its effects on communication with physicians, patient involvement, information exchange, and health education. The findings were uncovered through inductive thematic analysis.	Most patients reported positive or neutral perceptions of EHR use during clinic visits. EHR use did not appear to impair physician communication skills when clinicians maintained effective verbal and non-verbal engagement. Practices such as screen sharing and inviting patients to view and interpret EHR information enhanced patient satisfaction, trust, understanding, and engagement. Negative perceptions primarily occurred when physicians focused on computer without providing explanations/maintaining eye contact. These findings indicate that manner in which EHRs utilized, rather than their mere presence, determines degree of patient centeredness
(Meyerhoefer et al., 2018) ²²	Ambulatory OB/GYN practices and an affiliated hospital perinatal triage unit within Lehigh Valley Health Network, Pennsylvania, US	108 clinical staff (including physicians, nurses, midwives) and 325 total staff surveyed; Patients: >8,000 OB/GYN patients responding to Press Ganey surveys	Quasi-experimental longitudinal study during phased EHR implementation and integration (2009-2013). Outcome: Provider satisfaction with information availability and EHR usability was measured using 5-point Likert surveys administered across 4 waves. Patient satisfaction with care experience was assessed using Press Ganey survey domains. Zero-truncated Poisson regression was applied for analysis.	Integration of ambulatory and hospital EHRs improved provider satisfaction with information availability, particularly regarding inpatient triage data. Nevertheless, physicians reported significantly lower satisfaction with impact of EHRs on workflow and productivity compared to other staff members. Patient satisfaction decreased following initial EHR implementation and did not improve significantly after full EHR integration. These findings indicate that provider dissatisfaction and workflow disruptions during EHR adoption may adversely affect patient experience, even when information continuity improves.
(Wali et al., 2020) ²³	Five Primary Health Care Centers (PHCs) in the Western Region (Jeddah, Makkah, Taif), Saudi Arabia	377 adult patients (≥ 18 years) attending PHCs before and after EMR implementation	Cross-sectional survey study (2018). Outcome: Patient satisfaction with EMR-based versus paper-based care was assessed using a structured questionnaire with multiple-choice and 5-point Likert-scale items, administered in primary health care center waiting areas. Domains included physician attention, explanation of tests and medications, time spent with the patient, active listening, waiting time, prescription handling, appointment scheduling and referral.	Patient satisfaction was significantly higher with EMR compared to paper medical records (PMR) (mean 3.724 vs 3.692; $p<0.001$). Implementation of EMR was associated with increased physician attention (82.3%), improved explanation of tests and medications (85.8%), greater time spent with patients (80.4%), and enhanced active listening (77.3%). Additionally, patients reported improvements in primary health care (PHC) services, such as reduced waiting times, more efficient prescription processes, easier appointment scheduling, and improved referral systems.
(Romana, 2024) ²⁴	Multiple healthcare settings in Egypt; national context including public and private healthcare institutions, Egypt	177 healthcare providers (physicians, dentists, nurses, pharmacists, administrative staff) and 7 healthcare management experts	Mixed-methods study (unpublished master's thesis, American University in Cairo). Quantitative: self-administered survey based on Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Diffusion of Innovation (DOI). Outcome: The study assessed outcomes including knowledge, attitude, subjective norms, perceived barriers, and intention to use EHR. Quantitative data were analyzed using correlation, multiple linear regression, and logistic regression. Qualitative data were collected through semi-structured expert interviews and were analyzed thematically to identify barriers and facilitators to implementation.	Positive attitudes, subjective norms, and gender were identified as significant predictors of healthcare providers' intention to use EHR. The primary barriers to EHR adoption were financial constraints, limited technical support, inadequate training, and concerns regarding data security. Key facilitators included perceived usefulness, perceived ease of use, and organizational support. The findings indicate that effective EHR implementation in Egypt necessitates targeted training, increased financial investment, and user-centered implementation strategies.
(Tajirian et al., 2020) ²⁵	Large academic mental health hospital (Centre for Addiction and Mental Health), Toronto, Canada	208 respondents: 176 physicians and 32 learners (residents and fellows) across inpatient, outpatient, emergency, and telehealth mental health services	Cross-sectional survey combined with EHR usage log analysis (May-June 2019). Outcome: Variables measured included time spent in the EHR per patient, after-hours EHR time, satisfaction, frustration, usability, training adequacy, documentation style, and perceived usefulness. Statistical analyses were conducted using chi-square and Fisher exact tests. Qualitative content analysis was applied to open-ended responses.	A total of 24.5% of respondents reported experiencing one or more symptoms of burnout, and 74.5% of those individuals identified the EHR as a contributing factor. Lower satisfaction with the EHR and increased frustration were strongly associated with both burnout and perceptions of EHR-related burnout. Physicians and learners consistently overestimated the time spent using the EHR compared with usage logs, with estimates averaging approximately 14 minutes per patient and exceeding 5 hours after regular working hours.
(Hasanain et al., 2015) ²⁶	Seven public hospitals in the Western Region (Jeddah, Makkah, Taif), Saudi Arabia	333 healthcare professionals (physicians, nurses, pharmacists, laboratory staff, administrators, receptionists)	Cross-sectional quantitative survey study (Nov 2011-Jan 2012). Outcome: The study assessed knowledge of EMR, preference for EMR compared to paper records, computer and EMR literacy, English language proficiency, and perceived barriers to EMR adoption. Statistical analyses included Spearman correlation, chi-square tests, and t-tests.	83% of participants preferred EMRs over paper records. Higher levels of computer literacy, EMR literacy, English proficiency, and education were significantly associated with a preference for EMR use. Staff whose first language was not Arabic were more likely to prefer EMRs. Hospital size was not associated with EMR preference. These findings underscore the importance of training and language proficiency as critical factors for successful EMR implementation in Saudi public hospitals.

Authors (year)	Setting/ country	Population	Design and outcomes	Key findings
(Shaker et al., 2015) ²⁷	Ministry of Health (MOH) government hospitals in the Makkah Region (Makkah, Jeddah, Ta'if), Saudi Arabia	317 physicians (consultants, specialists, residents) working in six MOH hospitals using EMRS for ≥1 year	Cross-sectional survey (July-August 2009) using a structured 15-item Likert-scale questionnaire. Outcome: The measures assessed physicians' perceptions of electronic medical record systems (EMRs) regarding usability, workflow, productivity, and quality of care.	52.8% of physicians reported a positive overall perception of electronic medical record systems (EMRs). The majority agreed that computers are important for medical practice (77.7%) and that EMR enhances practice quality (71.2%). Nevertheless, a substantial proportion of physicians expressed concerns about workflow disruption (35.1%) and discomfort with data entry compared to handwriting (34.8%). Senior physicians and expatriates demonstrated more favorable perceptions than junior and Saudi physicians.
(Mather, 2019) ²⁸	Public health care facility (tertiary and secondary care hospitals) in Doha, Qatar	Registered general nurses (n=11) working in inpatient, outpatient, day care units, and theatre, with ≥1-year EHR experience	Qualitative exploratory descriptive study using semi-structured individual interviews, analyzed by Graneheim and Lundman content analysis (unpublished master's thesis, Stellenbosch University); The outcome measures included nurses' experiences, perceptions, and attitudes regarding EHR use, specifically focusing on training, technical challenges, documentation quality, and end-user computing.	Nurses generally reported positive experiences and high levels of satisfaction with the use of EHRs. Reported benefits included increased documentation accuracy and legibility, improved time efficiency, reduced medication errors, enhanced access to patient information, and improved continuity of care. However, significant challenges were identified, including inadequate pre-implementation training, technical issues such as system downtime and slow performance, difficulties with data extraction, and adaptation challenges among older nurses or those with limited computer proficiency.
(Achampong et al 2025) ²⁹	Public health facilities in the Central Region of Ghana using the Lightwave Health Information Management System (LHIMS), Ghana	1,126 health professionals (doctors, nurses, midwives, prescribers, auxiliary staff) working in 10 health facilities and using LHIMS for service delivery	Descriptive cross-sectional survey using a structured questionnaire adapted from validated usability scales (CSUQ, IsoMetricsL); Outcome: Health professionals' satisfaction with the efficiency, usability, flexibility, accuracy, speed, reliability, and interface quality of the EHR system was assessed using descriptive statistics, chi-square tests, and ordinal logistic regression.	Health professionals reported overall satisfaction with the EHR system, particularly regarding information accuracy, interface clarity, system flexibility, speed, and ease of information retrieval. Satisfaction was significantly influenced by educational level, work experience, training status, training duration, and computer efficacy, whereas age and sex did not have a significant effect. Greater digital literacy and extended work experience correlated with higher satisfaction, underscoring the need for targeted training and digital skills development to optimize EHR utilization.
(Adomah-Afari et al 2023) ³⁰	37 Military Hospital, Greater Accra Region, Ghana	228 adult outpatients (≥18 years) receiving care at the 37 Military Hospital	Quantitative cross-sectional study using a structured questionnaire based on Donabedian's quality-of-care model. Outcome: Patients' satisfaction and perceived quality of care were assessed across domains, including attention to patients' needs, responsiveness, efficiency, timeliness, patient-provider communication, and overall satisfaction. Analyses utilized descriptive statistics, chi-square tests, and logistic regression.	Following the implementation of EHR, patients reported high levels of satisfaction and perceived quality of care. Notably, high scores were recorded for reduced waiting times, service efficiency, timeliness of healthcare, responsiveness to emergencies, and overall patient care. Furthermore, service efficiency, timeliness of healthcare, and overall patient care emerged as significant predictors of patient satisfaction, suggesting that EHR implementation had a positive impact on service delivery and patient experience.
(Burke et al 2015) ³¹	Outpatient primary care clinics within the Military Health System (multicenter), United States	100 adult patients with type 2 diabetes; 300 outpatient clinical visit notes assessed (100 pre-EHR, 100 post-EHR, 100 at 5 years post-EHR)	Five-and-a-half-year longitudinal retrospective multicenter quantitative study. Outcome: The quality of clinical notes was assessed using the validated QNOTE instrument, which provides scores ranging from 0 to 100 across 12 clinical documentation elements.	The implementation of EHRs led to substantial improvements in the quality of outpatient clinical notes. Mean QNOTE scores increased from 52.0 prior to EHR adoption to 61.2 at six months post-implementation, and further to 80.4 at five years, representing a 55% improvement (p<0.0001). All documentation elements, including both core and non-core components, demonstrated significant long-term improvement, indicating that EHR adoption enhances the completeness and quality of clinical documentation.
(Benarou and Boumekhila, 2025) ³²	Youssef Yalaoui Hospital, Ain Azel, Sétif Province (public hospital), Algeria	Healthcare professionals (doctors, nurses, administrators, department heads) and patients attending Youssef Yalaoui Hospital; sample size not reported	Qualitative case study using semi-structured interviews, direct observation, and participant observation. Outcome: This study examines how the digital electronic medical record system (DEM.DZ) affects the quality of healthcare services for both providers and patients, focusing on efficiency, organization, waiting time, access, and satisfaction.	The impact of the digital electronic medical record (DEM.DZ) system on healthcare quality was mixed. Healthcare professionals noted improvements in service organization, prioritization of urgent cases, reduced paperwork, enhanced coordination, and modernization of care. In contrast, many patients reported longer waiting times, confusion due to non-sequential digital queuing, diminished perceived access to free healthcare, and challenges in adapting to the system, particularly among elderly and low-literacy individuals. While EMR implementation enhanced technical and organizational quality from providers' perspectives, it did not consistently improve patient-perceived service quality without sufficient training, patient education, and an inclusive system design.
(Kurniawan and Arini, 2024) ³³	Siti Khodijah Muhammadiyah Hospital, Sepanjang Branch (private hospital), inpatient units, Indonesia	86 healthcare workers (doctors, nurses, midwives, radiographers, laboratory staff, medical record officers, administrators) using the inpatient EMR system	Cross-sectional quantitative study using validated questionnaires; Outcome: The effectiveness of EMR was evaluated using the technology acceptance model (TAM), which includes perceived usefulness, ease of use, and intention to use. User satisfaction was measured with the SERVQUAL method. Associations between variables were examined using chi-square analysis.	Relevance and accuracy of EMRs were identified as the most significant determinants of user satisfaction (both p=0.001). Users who perceived EMRs as relevant and accurate reported substantially higher satisfaction. In contrast, timeliness, data completeness, and the support system did not demonstrate statistically significant associations with satisfaction. These findings suggest that prioritizing accurate, clinically relevant EMR content is essential to enhancing healthcare worker satisfaction and promoting effective EMR use in inpatient care.

Authors (year)	Setting/ country	Population	Design and outcomes	Key findings
(Al-Dahshan et al 2017) ³⁴	Al-Wakrah Primary Health Care Center, Primary Health Care Corporation, Qatar	52 patients attending Al-Wakrah PHC center during morning and evening shifts (100% response rate)	Descriptive cross-sectional interview-based study using a structured Likert-scale questionnaire. Outcome: Patient satisfaction was measured in several areas after EMR implementation. it included accessibility; workflows such as waiting time, registration, consultation, laboratory, and pharmacy; the kindness of staff; the quality of health education; effectiveness; and the continuity of care.	Patient satisfaction generally high following implementation of EMR. Majority of patients expressed satisfaction with registration time (76.9%), waiting time before physician consultation (65.4%), physician computer use during consultation (76.9%), physical exam (69.3%), laboratory services (73.1%), and pharmacy services (65.4%). Despite these positive outcomes, notable dissatisfaction persisted regarding continuity of care, particularly with the referral system (38.5%) and follow-up with same physician (31.4%). Additionally, only 61.5% of patients were satisfied with physician-delivered health education. These results suggest widespread patient acceptance of EMR systems at primary care level, although challenges remain in ensuring continuity of care and effective communication.
(Bani-Issa et al 2016) ³⁵	Eight mid-sized government hospitals across multiple Emirates (Dubai and Northern Emirates) using a unified EHR system, UAE	680 health-care providers (nurses 74%, physicians 15%, other HCPs 11%) working in medical-surgical, ICU, pediatric, maternity, and emergency units	Cross-sectional survey (Apr–Sep 2014) using a structured Likert-scale questionnaire. Outcome: It measures overall satisfaction with the EHR's impact on access and viewing, documentation, and medication administration, as well as perceived implementation barriers such as training, computer skills, trust in the system, administrative support, and perceived value for patients.	Overall satisfaction with EHRs was high (mean 4.02 out of 5). Physicians demonstrated the highest overall satisfaction, whereas nurses reported significantly greater satisfaction with medication administration functions. The primary barriers identified included skepticism regarding the value of EHRs for patients, insufficient computer skills, limited training, and concerns about system reliability. Administrative support was the least frequently cited barrier. The study concludes that although EHRs are generally well accepted, successful and sustained adoption necessitates improved training, enhanced informatics competencies-particularly among nurses-and the application of a socio-technical approach to implementation.
(Gomes and Ratwani, 2019) ³⁶	National EHR vendor market (EHR systems certified under US Office of the National Coordinator for Health IT), United States	27 EHR vendors with the highest meaningful-use attestations; clinician usability test participants whose data were reported by vendors	Observational cross-sectional comparative evaluation using secondary publicly available usability data; Outcome: SUS scores (range: 0-100) were compared for EHR products certified in 2014 and 2015. A paired t-test was conducted to assess differences relative to established usability benchmarks (average=68, above-average=80).	No significant improvement in clinician satisfaction with EHR usability was observed between 2014 and 2015 certified products (mean SUS 73.2 vs 75.0; p=0.51). Approximately one-third of 2014 products and one-quarter of 2015 products scored below the average usability benchmark. SUS scores declined for 44% of vendors despite enhanced certification requirements, suggesting persistent usability challenges and limited advancement in clinician satisfaction with EHR systems.
(Moll et al 2018) ³⁷	National patient portal (Journalen) providing patient-accessible EHRs across 21 county councils, Sweden	2,587 adult patients who accessed their EHR via Journalen during 2016 (out of 423,141 eligible users); includes patients with and without healthcare professional backgrounds	National cross-sectional patient survey using a structured questionnaire. Outcome: The study examined the frequency of EHR use, reasons for use, attitudes toward patient-accessible EHRs, perceived importance of various information types, and perceived effects on empowerment, communication, safety, and anxiety. Data were analyzed using descriptive statistics, chi-square tests, Mann-Whitney U tests, and Kruskal-Wallis tests.	Patient-accessible EHRs received very high acceptance, with over 96% of patients viewing access as beneficial and as a positive reform. The primary motivations for use included obtaining an overview of health information, reviewing details from clinical visits, and increasing engagement in personal care. Only 26% of patients reported feeling worried after reviewing their records, suggesting that patient access generally promotes empowerment, understanding, and perceived safety without causing substantial anxiety.
(von Wedel et al 2022) ³⁸	Nationwide acute-care hospitals participating in national quality and IT datasets, Germany	383 German hospitals (emergency and elective care cases); patient satisfaction data from 354 hospitals; HIT in 2017	Nationwide cross-sectional analytical study using multiple linear regression models with a 1-year time lag.	Adoption of HIT or EHRs alone was not significantly associated with clinical outcomes or patient satisfaction. However, greater user-perceived value and usability of digital systems were associated with improved outcomes. Specifically, user-friendly digitization enhanced emergency care outcomes, user-friendly EHRs improved elective care outcomes, and higher perceived HIT value modestly increased patient satisfaction.
(Kröner et al 2025) ³⁹	National context-consumer use of the German national electronic health record (ePA), Germany	432 adult citizens insured under statutory health insurance (including patients, citizens, and healthcare professionals); 93 active ePA users	Exploratory observational cross-sectional online survey (2021-2022). Outcome: Awareness and adoption rates of the national electronic patient record, perceived usefulness and expectations, barriers to adoption, preferred information sources, and communication needs were analyzed using descriptive statistical methods.	One year after its introduction, adoption of national EHR, (ePA) remained low at approx. 21.5% despite widespread awareness. Key barriers to adoption included insufficient information, privacy concerns, limited access, and perceived lack of necessity. Consumers identified document storage, data exchange between providers, and access to emergency information as most valuable use cases. Majority of participants reported feeling inadequately informed, expressed preference for direct communication from health insurance providers and physicians.
(Xanthidou and Nicholas, 2018) ⁴⁰	Public and private hospitals in Greece (4 hospitals) and Oman (2 hospitals), Greece and Oman	40 healthcare professionals (CEOs/administrators, physicians, nurses, laboratory/ pharmacy staff, ICT experts, legal/quality assurance staff); patients were not included	Qualitative phenomenological study using in-depth semi-structured interviews. Outcomes include assessing professionals' views on the structure and content of EMRs, their economic feasibility, the impact on time and costs, and the way medical records are shared.	Healthcare professionals generally regard EMRs as beneficial for improving quality of care, patient safety, and information availability. Key recommendations included structuring EMRs with tiered access to sensitive data, adopting an open and flexible system architecture, and implementing these systems incrementally to address financial and workload limitations. Major concerns focused on increased time required for data entry, economic feasibility in resource-limited environments, potential privacy risks. Most professionals supported inter-institutional sharing of EMRs, contingent upon patient consent, robust security measures, well-defined governance frameworks

Table 3: Summary of MMAT quality appraisal of the 36 included studies.

Overall methodological concern	N	Studies (reference numbers)
Low	3	10, 15, 21
Low to moderate	4	13, 22, 28, 29
Moderate	16	5, 6, 7, 8, 16, 17, 18, 19, 20, 24, 25, 26, 30, 35, 38, 40
Moderate to high	5	9, 27, 31, 33, 34
High	8	11, 12, 14, 23, 32, 36, 37, 39

*MMAT: Mixed Methods Appraisal Tool. Criterion-level ratings for each included study are provided in supplementary file.

DISCUSSION

This systematic review of 36 empirical studies published between 2015 and 2025 demonstrates that patient and healthcare provider satisfaction with EHRs is shaped by the interaction of technology, workflow, training, and communication, rather than by EHR adoption in isolation. Considered together, the included studies point to a socio-technical pattern: EHRs create the infrastructural conditions for more efficient, accessible, and coordinated care, but whether these conditions translate into satisfaction depends on how systems are implemented, how well they are actually used in clinical work, and how clinicians balance screen-based tasks with interpersonal engagement. This pattern recurred across high-, middle-, and low-income settings and across primary care, specialty outpatient clinics, emergency departments, and inpatient wards, although the strength and even the direction of specific associations varied by professional role, care setting, and EHR maturity.

Patient satisfaction with EHRs: a consistent but conditional benefit

Across most included studies, patient satisfaction with EHR-enabled care was moderate to high, particularly in primary care and outpatient settings.^{11,23,30} Patients frequently linked this satisfaction to tangible efficiency gains, including shorter wait times, faster result retrieval, and clearer explanations of tests and treatment plans. In a comparative Saudi primary-care study, Wali et al found that patients rated EMR-based care significantly higher than paper-based care (mean 3.72 vs 3.69, $p < 0.001$), with the largest gains in physician attention (82.3%), explanation of tests and medications (85.8%), and active listening (77.3%).²³ At a Ghanaian military hospital, Adomah-Afari et al found that reduced waiting times, service efficiency, and responsiveness to emergencies were significant predictors of overall satisfaction following EHR implementation, while in Qatar, Al-Dahshan et al found high satisfaction with registration time (76.9%) and physician computer use during consultation (76.9%).^{30,34} However, satisfaction with continuity of care lagged, particularly regarding the referral system (38.5%) and physician-delivered health education (61.5%). Notably, Mysen found that allowing primary-care patients to actively view their own record during nurse-practitioner visits did not significantly

change satisfaction or perceived communication relative to usual care, suggesting that patients were broadly comfortable with EHR use regardless of how visibly it was incorporated into the visit.¹¹

This benefit, however, was conditional rather than automatic. Several studies documented an early or transient decline in patient satisfaction around EHR implementation or system transition, concentrated in domains related to access and scheduling rather than clinical care itself. North et al found that a legacy EHR switch produced declines of up to 8.8% in scheduling and telephone-access satisfaction, with recovery to baseline requiring 9 to 15 months, while satisfaction with care providers themselves fell only slightly.¹⁰ Marmor et al and Meyerhoefer et al similarly found that patient satisfaction declined following the integration of ambulatory and hospital EHR systems and did not recover significantly even after full integration, despite improvements in information availability for providers.^{12,22} These findings suggest that the disruption associated with EHR transitions, rather than EHR use itself, is often responsible for short-term declines in satisfaction, and that the patient-facing consequences of implementation can persist well beyond the technical go-live date.

Digital literacy and system design further moderated patient experience, particularly outside high-resource settings. In Algeria, Benarou and Boumekhila found that although the DEM.DZ digital record system improved organizational efficiency from the provider's perspective, many patients, especially elderly and less literate individuals, experienced longer waits and confusion due to non-sequential digital queuing, illustrating that provider-side gains do not automatically translate into patient-side satisfaction.³² At a national level, Kröner et al found that uptake of Germany's electronic patient record remained low (approximately 21.5%) one year after launch, driven less by technical limitations than by insufficient communication, privacy concerns, and uncertainty about the record's value.³⁹ By contrast, when patients were given direct, well-explained access to their own records, acceptance was very high: Moll et al found that over 96% of Swedish patients viewed access to their electronic record as beneficial, with only 26% reporting any resulting worry, suggesting that patient-facing

transparency initiatives are generally well received when properly explained and supported.³⁷

Healthcare provider satisfaction: a persistent divide between physicians and other clinical staff

Provider satisfaction diverged sharply by professional role, a pattern that recurred in nearly every included study comparing groups. Nurses and allied health professionals tended to report favorable experiences, citing improved documentation legibility, faster retrieval of patient information, and better interdisciplinary coordination.^{9,28,35} In the United Arab Emirates, Bani-Issa et al found high overall provider satisfaction with EHRs (mean 4.02/5), with nurses reporting particularly strong satisfaction with medication-administration functions. However, limited computer skills and insufficient training remained barriers.³⁵ In Qatar, Mather similarly found generally positive nursing experiences with EHRs, alongside persistent challenges such as inadequate pre-implementation training, system downtime, and difficulty for older or less computer-proficient nurses.²⁸ Documentation quality also improved with EHR adoption: Burke et al found that mean outpatient clinical note quality scores rose from 52.0 before EHR adoption to 61.2 at six months and 80.4 at five years post-implementation, a 55% improvement ($p<0.0001$), across both core and non-core documentation elements. Even where satisfaction was high overall, task burden remained meaningful: Bakhoum et al found that emergency-department nurses devoted more time to EHR-related tasks (median 27%) than to direct patient care (25%) or indirect care (15%), with the highest subjective workload occurring during afternoon shifts.^{8,31}

Physicians, in contrast, more consistently reported dissatisfaction tied to documentation burden, workflow disruption, and after-hours EHR use. Williams et al found only moderate physician satisfaction (mean 58/100), with older physicians and those in attending roles reporting lower satisfaction than trainees, while perceived system efficiency was the strongest predictor of both satisfaction and perceived benefit to patients.⁵ Shanafelt et al in a large national U.S. sample, linked independent computerized provider order entry (CPOE) use to significantly increased odds of burnout ($OR\approx 1.29$) and found that most physicians did not believe EHRs improved their efficiency at all; Tajirian et al reported a similarly strong association between EHR-use characteristics and physician burnout in a separate cross-sectional sample.^{13,25} Joukes et al provided direct time-and-motion evidence for this burden: implementation of a structured EHR was associated with an 8.5% reduction in dedicated patient-care time and an 8.3% increase in documentation time, even though total consultation duration was unchanged, meaning the same visit length was reallocated away from the patient and toward the record.¹⁵ At the system level, Gomes and Ratwani found that clinician-rated usability (System usability scale) did not meaningfully improve between 2014- and 2015-

certified EHR products (73.2 vs 75.0, $p=0.51$) and actually declined for 44% of vendors despite stricter certification requirements, suggesting that physician dissatisfaction reflects a structural, vendor-level usability problem rather than a transitional adjustment period.³⁶

Cultural and organizational context further shaped provider satisfaction. In Saudi Arabia, Shaker et al found that just over half of physicians held a positive overall perception of their EMR system, with more favorable views among senior and expatriate physicians than among junior or Saudi national physicians, and over a third reported discomfort with electronic data entry relative to handwriting.²⁷ Hasanain et al similarly found, in a separate Saudi sample, that computer literacy, EMR literacy, and English-language proficiency were the strongest correlates of preference for EMRs over paper records, while hospital size showed no association, reinforcing that individual-level readiness, rather than institutional scale, drives acceptance.²⁶ In Egypt, Romana likewise emphasized user-side barriers such as training gaps and resistance to workflow change, echoing findings from other transitional health systems included in this review.²⁴

The patient-provider perception gap

A recurring and clinically important finding across the review was a measurable gap between how clinicians and patients perceived the same EHR-mediated encounters. Meltzer et al documented this divergence directly: physicians reported that EHR use diminished eye contact, listening, and personalization of the encounter, whereas the same patients overwhelmingly rated their visits favorably, with 91.7% viewing EHR use positively, even as clinicians simultaneously reported rising stress, burnout, and substantial after-hours documentation workload.¹⁶ Eberts and Capurro found a similarly asymmetric pattern: while a substantial proportion of physicians (25-37%) believed EHRs had harmed the patient-physician relationship, patient-reported satisfaction remained very high (98%), with communication and rapport largely preserved from the patient's point of view.¹⁹

This gap suggests that physicians and patients are, in effect, evaluating different aspects of the same encounter. Physicians appear to judge EHR use against an internal benchmark of undivided clinical attention and the cognitive and time cost of documentation, in contrast, patients appear to judge it primarily against relational cues, namely whether the clinician remained attentive, explained what they were doing, and maintained a respectful, unhurried tone. Detailed observational work supports this interpretation: increased physician keyboard activity was associated with reduced active patient participation and longer silences during the visit, yet physicians' facilitative communication behaviors, not the amount of EHR use itself, emerged as the strongest predictor of patient engagement, largely unaffected by

how much the EHR was used¹⁸. In practice, this means that provider-reported dissatisfaction should not be assumed to signal equivalent patient-reported harm, and that satisfaction surveys targeting only one stakeholder group risk providing an incomplete or even misleading picture of how well an EHR implementation is functioning.

Determinants of satisfaction: usability, training, and organizational support

Across both patient- and provider-facing studies, usability, training, and organizational support, rather than EHR adoption itself, consistently emerged as the proximate determinants of satisfaction. In Ethiopia, Dubale et al found that overall EMR user satisfaction was modest (53.1%) but significantly higher among staff with greater computer proficiency, more comprehensive training, and more favorable perceptions of system, information, and service quality, with training and system features emerging as the strongest predictors in multivariable analysis. Comparable patterns emerged in Ghana, where Achampong et al found that health professionals' satisfaction with their EHR system was shaped significantly by educational level, work experience, and training duration, and in Indonesia, where Kurniawan and Arini found that the perceived relevance and accuracy of EMR content, more so than system speed or completeness, were the strongest predictors of health-worker satisfaction.^{6,29,33}

System quality mattered at the institutional level as well. Ayaad et al found that healthcare professionals in an EMR-adopting Jordanian hospital reported significantly higher perceived service quality across all SERVQUAL domains than staff in a comparable paper-based hospital ($p < 0.001$), with EMR quality, particularly efficiency and availability, strongly correlated with perceived service quality ($r = 0.659$, $p < 0.001$).¹⁴ Organizational interventions that directly offload documentation burden showed clear benefit as well: in a randomized controlled trial, Gidwani et al found that introducing medical scribes significantly improved physician satisfaction across face time with patients, charting time, and chart quality, and increased the likelihood of charts being closed within 48 hours, all without reducing patient satisfaction.¹⁷ This remains one of the few experimentally supported interventions in the reviewed literature for mitigating clerical burden without compromising the patient experience.

Contextual variation across settings and health systems

At the health-system level, von Wedel et al analyzing hospital-level data across Germany, found that HIT or EHR adoption alone was not significantly associated with clinical outcomes or patient satisfaction; instead, higher user-perceived value and usability of the digital systems modestly improved outcomes and satisfaction.³⁸ This finding closely parallels Raymond et al observation in Canadian family practices that the depth and clinical,

rather than purely administrative, use of EMR functionality, not adoption alone, predicted perceived performance benefit.⁹ Together, these system-level analyses support a 'quality and depth of use' model over a simple 'adoption' model: satisfaction gains appear to require genuine clinical integration of EHR functionality, not merely its installation. Regional and professional-culture factors added a further layer of variation: in Greece and Oman, Xanthidou and Nicholas found that healthcare professionals generally viewed EMRs as beneficial for care quality, patient safety, and information availability, but expressed concern about the time cost of data entry and the financial feasibility of digitization in resource-limited environments, favoring incremental rather than wholesale implementation.⁴⁰ Taken together, these findings suggest that policy recommendations drawn from high-resource, single-institution studies may not transfer directly to national or resource-constrained contexts without adaptation.

Patient-provider interaction in the EHR era

Consistent with the perception-gap findings above, the review reinforces that patient-centered communication behavior, rather than the mere presence of a screen, determines whether EHR use is experienced as intrusive or integrative. Onur Asan et al found that practices such as screen-sharing and actively inviting patients to view and interpret their own information enhanced trust, understanding, and engagement, while negative perceptions arose specifically when clinicians focused on the computer without explanation or eye contact.²¹ Shaarani et al similarly found that most patients (62%) did not perceive physician computer use as harmful to communication, and that extensive computer use for reviewing results and delivering patient education was associated with significantly higher communication scores, suggesting that EHR use directed toward the patient, rather than away from them, can enhance rather than erode the clinical relationship.²⁰ These findings collectively support reframing EHR-related communication training around specific, teachable behaviors, namely screen-sharing, narrating actions aloud, and preserving eye contact during data entry, rather than treating computer use itself as an unavoidable barrier to rapport.

Broader implications for practice and policy

Taken together, these findings support conceptualizing EHR adoption as a socio-technical intervention in which technology design, clinical workflow, training, organizational culture, and patient engagement must be aligned simultaneously rather than addressed in isolation.^{6,15,22} Several actionable implications follow directly from the evidence synthesized here. First, because usability deficits appear to be a persistent, vendor-level problem rather than a transitional one, health systems and regulators should treat EHR usability as an ongoing procurement and certification priority rather than

a one-time implementation milestone.³⁶ Second, because training quality and digital literacy, not merely the existence of training, were repeatedly identified as key predictors of satisfaction, training programs should be role-specific, competency-based, and sustained beyond the go-live period rather than delivered as a single onboarding session.^{6,26,29,33} Third, because interventions that offload documentation burden, such as medical scribes, improved physician satisfaction without harming patient experience, healthcare organizations should consider team-based documentation models where feasible, particularly in high-burden specialties. Fourth, because national and system-level EHR initiatives failed to gain traction when communication with patients was inadequate, policymakers should invest as heavily in patient communication and education strategies as in the underlying technology itself.^{17,39} Finally, given the consistent finding that clinician communication behavior, not EHR use in itself, drives patient satisfaction, communication-skills training focused on EHR-specific behaviors should be incorporated into both medical education and continuing professional development.^{18,20,21} Figure 2 summarizes the principal evidence-based drivers identified across the included studies that raised or lowered satisfaction for patients and for providers respectively.

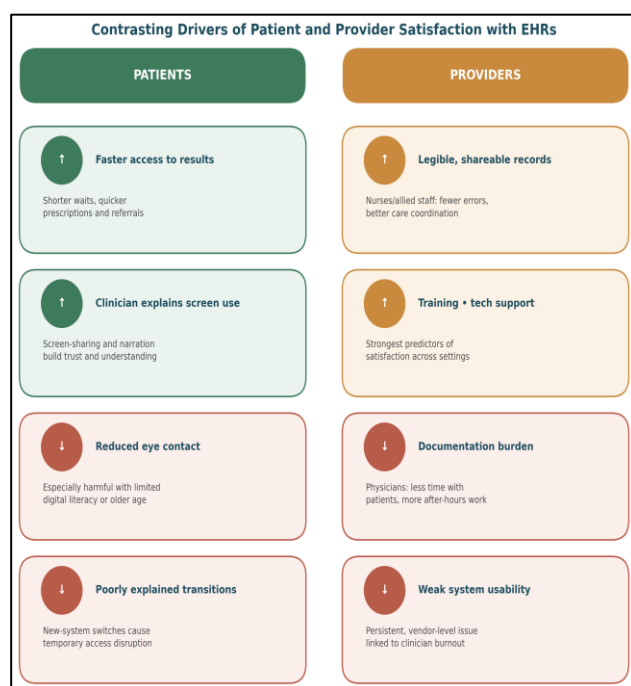


Figure 2: Selected evidence-based drivers that raise or lower patient and provider satisfaction with EHRs, synthesized from 36 studies included in this review.

Limitations

This review has several limitations. First, the included studies were methodologically heterogeneous, spanning cross-sectional surveys, time-and-motion studies, quasi-experimental designs, qualitative interview studies, and a

randomized controlled trial, and employing a wide range of outcome measures and satisfaction instruments; this diversity precluded meta-analytic pooling of effect sizes and limited direct comparability across studies. Second, although formal appraisal was undertaken using MMAT, methodological quality across the evidence base was uneven: eight studies were judged to carry a high degree of methodological concern, and findings resting principally on these studies should be regarded as hypothesis-generating. Third, most included studies relied on self-reported satisfaction measures, which are susceptible to social desirability and recall bias, and response rates were not recoverable for the majority of survey-based studies, so the risk of nonresponse bias could not be excluded. Fourth, eligibility was defined by year of publication rather than year of data collection, and seven included studies collected data before 2015, describing system generations that have since been superseded. Two included sources were unpublished master's theses and had therefore not undergone external peer review, although both reported their methods in greater detail than several of the published articles. Fifth, two included studies drew on an overlapping participant cohort, so the evidence base comprises fewer independent samples than the study count implies. Sixth, the review was restricted to English-language publications, which may have excluded relevant evidence and could introduce language bias. Finally, this review was not prospectively registered with PROSPERO, a practice increasingly expected for systematic reviews. Future reviews would benefit from protocol registration and from applying a formal certainty-of-evidence framework such as GRADE or GRADE-CERQual.

CONCLUSION

This review finds that EHRs influence patient and healthcare provider satisfaction differently across settings. Often, EHRs led to moderate or high patient satisfaction, especially when they improved care efficiency, transparency, and accessibility. Patients tended to appreciate when clinicians used computers during visits, especially if they explained what was on the screen or shared clinical details directly.

In contrast, healthcare provider satisfaction varied by professional role. Nurses and allied health professionals often reported better documentation, easier access to information, and improved care coordination. Physicians, however, frequently expressed frustration with heavier documentation, workflow interruptions, and usability problems that sometimes led to burnout. These issues were worse when training was limited, technical support was lacking, or the system design was poor. Dissatisfaction was not guaranteed, though; it depended on how well EHRs fit into daily routines and the support provided by the organization.

Overall, these findings show that adopting EHRs alone does not guarantee better satisfaction for patients or

healthcare providers. The main factors driving satisfaction are thoughtful system design, effective training, clear communication, and strong organizational support. To get the most out of EHRs and avoid problems, healthcare systems should focus on user-centered design, tailored training, smoother workflows, and involving patients in EHR use. Future research should focus on long-term, intervention-based studies to identify the best ways to improve both patient experiences and provider well-being as healthcare becomes increasingly digital.

Recommendations

Several practical steps follow from this review. First, EHR vendors and health systems should prioritize user-centered interface design, reducing unnecessary clicks and streamlining documentation workflows to minimize clerical burden on physicians. Second, organizations should invest in comprehensive, role-specific training programs delivered both at go-live and on an ongoing basis as inadequate training was consistently associated with lower satisfaction across the included studies. Third, adequate technical and administrative support, including responsive help-desk services and sufficient computer access, should be maintained to reduce frustration during daily use. These considerations are particularly relevant in resource-constrained settings, where the evidence synthesized here indicates that provider-side efficiency gains do not automatically translate into improved patient experience.

Clinicians should be encouraged to adopt patient-centered EHR practices, including explaining actions performed on the screen, sharing results directly with patients, and maintaining verbal engagement and eye contact during computer use. Health systems are advised to develop concise patient education materials on digital processes such as patient portals, digital queuing and appointment systems, with particular attention to older adults and individuals with limited digital literacy. Finally, given the strong and consistent association between EHR usability, documentation burden and physician burnout, healthcare leaders and policymakers should treat EHR optimization as an occupational health priority, incorporating clinician feedback into ongoing system design and considering support strategies such as scribes or team-based documentation models where feasible.

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