

The Use of Medical Scribes in Primary Care Settings

A Literature Synthesis

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Background: Clerical burdens have strained primary care providers already facing a shifting health care landscape and workforce shortages. These pressures may cause burnout and job dissatisfaction, with negative implications for patient care. Medical scribes, who perform real-time electronic health record documentation, have been posited as a solution to relieve clerical burdens, thus improving provider satisfaction and other outcomes.

Objective: The purpose of this study is to identify and synthesize the published research on medical scribe utilization in primary care and safety net settings.

Research Design: We conducted a review of the literature to identify outcomes studies published between 2010 and 2020 assessing medical scribe utilization in primary care settings. Searches were conducted in PubMed and supplemented by a review of the gray literature. Articles for inclusion were reviewed by the study authors and synthesized based on study characteristics, medical scribe tasks, and reported outcomes.

Results: We identified 21 publications for inclusion, including 5 that examined scribes in health care safety net settings. Scribe utilization was consistently reported as being associated with improved productivity and efficiency, provider experience, and documentation quality. Findings for patient experience were mixed.

Conclusions: Published studies indicate scribe utilization in primary care may improve productivity, clinic and provider efficiencies, and provider experience without diminishing the patient experience. Further large-scale research is needed to validate the reliability of

study findings and assess additional outcomes, including how scribes enhance providers' ability to advance health equity.

Key Words: scribes, primary care, health information technology, physician burnout

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Pressure to integrate electronic health records (EHRs) in the clinical setting has intensified over the past decade, with financial incentives offered for its adoption and the threat of revenue losses for nonadoption.¹ As a result, nearly all primary care practices, including community health centers (CHCs), have adopted EHRs, though smaller practices have been slower to fully transition from paper records.^{2,3} While the emergence of the EHR has been heralded for its positive impacts on patient safety, the efficiency of care, and other outcomes,⁴ providers are experiencing a negative impact on joy in practice,⁵ with studies showing providers spend more time working in the EHR than in direct face time with the patient^{6,7} including spending significant after-hours time updating charts.⁸ Patient satisfaction and perception of clinical visits may also suffer when providers spend more time looking at the computer and less time interacting directly with the patient.⁹

At the same time, health care providers, especially those in primary care, are navigating rapid shifts in the health care landscape, including the emergence of alternative payment models and a growing call to document and address patients' social needs in the delivery of health care.^{10,11} The culmination of these challenges may result in shocks to workflows that can be especially hard to absorb in primary care, where workforce shortages are widespread, demand is expected to exceed physician supply, and the emergence of coronavirus disease 2019 (COVID-19) has stressed the already vulnerable primary care system.^{12,13}

Medical scribes (scribes) have emerged as a solution to offsetting growing provider dissatisfaction with the clerical burden and perceptions of the diminished patient and provider interactions associated with the use of EHRs.¹⁴ Medical scribes have been identified by many primary care leaders as a way to reinstate joy in practice while simultaneously increasing provider efficiency¹⁵ and strengthening patient-provider relationships.¹⁴ Scribes can be unlicensed, certified, or licensed clinical staff that accompanies a provider in the examination room and provide real-time documentation assistance of the clinical visit.¹⁶ Systematic reviews of the use of scribes in the emergency department and specialty settings

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indicate positive associations between scribe utilization and productivity and efficiency, provider satisfaction, and documentation quality.^{17,18} Further, medical scribes may serve as a crucial tool for decreasing provider burnout.¹⁹

While recent observations in the literature suggest an increased interest in the integration of medical scribes in the primary care setting,²⁰⁻²² no review of this subset of the literature has been conducted to date, making reliability and generalizability of findings difficult. We, therefore, aim to describe and synthesize the published research on medical scribe utilization in the primary care setting as it relates to study characteristics, scribe tasks, and reported outcomes. Given the heightened national focus on health equity, we pay added attention to scribes in health safety net settings and also outline new research avenues for assessing how they enhance providers' ability to deliver high-quality care, address social determinants of health, and improve population health. Findings may elucidate potential benefits and considerations for scribe utilization in primary care, including health safety net settings.

METHODS

A literature search was conducted to identify published articles on medical scribe utilization in the primary care setting. Searches were conducted in PubMed using the following search strings (Fig. 1): (((medical[Title/Abstract]) OR (clinical[Title/Abstract])) OR (physician[Title/Abstract])) OR (primary[Title/Abstract])) AND (((scribe[Title/Abstract])

OR (scribing[Title/Abstract])) OR (scribes[Title/Abstract])); ((scribe[Title]) OR (scribes[Title])) OR (scribing[Title]); and "documentation assistant"[Title/Abstract]. Two members of the research team independently performed a title and abstract review of all PubMed search results. US-based studies published between 2010 and the spring of 2020 that examined scribe utilization in ambulatory primary care practice settings (either sole setting of interest or as an included setting in multisite studies) were selected for inclusion. Perspectives, commentaries, and articles that did not report outcomes associated with scribe utilization were excluded. Further, we intentionally omitted studies if the clinical documentation aspect of scribing was not the independent variable of interest.

A reference list review of inclusion studies was performed to identify any relevant publications not captured in the original literature searches but did not yield any additional articles meeting study inclusion criteria. Due to our interest in scribe utilization implications for CHCs, a targeted Google search was conducted to identify gray literature on the subtopic using terms similar to those for the scholarly search, plus key word variations of "community health center," "federally qualified health center," and "safety net." Articles for inclusion were reviewed by the study authors and evaluated based on role(s) of medical scribe/clinical documentation assistant, outcomes examined, and results. Any discrepancies in content interpretation between authors was addressed and reconciled until consensus was achieved.



FIGURE 1. Flow diagram of literature synthesis review process.

TABLE 1. Literature Review Study Descriptions

References	Scribe Model	Setting	Study Design		
			Study Type	Methods	Participants; Data Source
Basu et al ²³	Not specified	Multisite	Quantitative	Microsimulation	643 US primary care practices Cost, revenue, and time use data
Danak et al ²⁴	Not specified	Single site; FM clinic	Mixed methods	Quasi-experimental	3 MD-scribe pairs, 34 patients Surveys, video recordings, MD interviews
Earls et al ²⁵	External	Single site; academic FM practice	Mixed methods	Quasi-experimental	6 MDs; 2 scribes; nurses; patients Surveys, time tracking data, focus groups
Gidwani et al ²⁶	External	Single site; academic FM clinic	Quantitative	Experimental	4 MDs MD and patient questionnaires, EHR timestamp data
Heckman et al ²⁷	External	Single site; IM clinic	Quantitative	Quasi-experimental	13 MDs; 2 scribes Surveys and productivity metrics
Howard et al ²⁸	Not specified	Single site; community health center*	Mixed methods	Quasi-experimental	6 clinical providers; 8 scribes Focus groups
Indieke and Martel ²⁹	Not specified	Single site; IM clinic*, safety net hospital	Quantitative	Quasi-experimental	4 clinical providers; 6 support staff; 8 scribes; patients Surveys
Lowry et al ³⁰	Internal; homegrown	Multisite; single health network*	Quantitative	Quasi-experimental	51 clinical providers; 40 scribes; patients Surveys, provider self-reports, EHR data
Martel et al ³¹	Internal; homegrown	Multisite; academic hospital clinics*†	Mixed methods	Quasi-experimental	102 clinical providers, 28 from primary care; 45 scribes Surveys, interviews, EHR data
Miller et al ³²	External	Medical group	Mixed methods	Quasi-experimental	6 MDs‡ Surveys, interviews, EHR data
Mishra et al ²⁰	External	Multisite; single health system	Quantitative	Quasi-experimental	18 MDs Surveys
Misra-Herbert et al ³³	Internal; existing staff	Multisite; single health system	Quantitative	Quasi-experimental	18 MDs Outpatient progress notes
Morawski et al ³⁴	External	Single site; academic IM practice	Quantitative	Quasi-experimental	5 MDs; 1 PA; patients Surveys, productivity metrics
Phillips et al ³⁵	Not specified	Single site; academic pediatric practice	Quantitative	Quasi-experimental	5 MDs; 1 NP Billing system procedure codes
Platt and Altman ³⁶	External	Single site; family practice group	Mixed methods	Quasi-experimental	5 MDs; 3 scribes; 150 patients EHR data; surveys
Pozdnyakova et al ²¹	External	Single site; academic IM clinic	Mixed methods	Quasi-experimental	6 MDs; 325 patients Surveys; MD logs, and interviews
Sattler et al ³⁷	External	Single site; academic medical center	Qualitative	Nonexperimental	4 MDs; 2 scribes Open text questionnaire
Taylor et al ³⁸	Internal	Single site; military FM outpatient facility	Quantitative	Quasi-experimental	2 MDs, 4 scribes Questionnaires
Yan et al ³⁹	Internal; existing staff	Multisite; 6 health systems	Qualitative	Nonexperimental	18 MDs; 17 clinical scribes; 36 patients Interview audio recordings
Yan et al ⁴⁰	Internal; existing staff	Multisite; single health system	Quantitative	Nonexperimental	123 patients of 8 physician-scribe pairs Surveys
Zallman et al ²²	External	Single site; safety net clinic*	Mixed methods	Quasi-experimental	5 MDs and their patients EMR productivity data, observation, surveys

*Safety net health care setting.

†Including 3 primary care clinics.

‡Including 1 FM physician.

EHR indicates electronic health record; EMR, electronic medical record; FM, family medicine; IM, internal medicine; MD, medical doctor; NP, nurse practitioner; PA, physician assistant.

TABLE 2. Literature Review Study Outcomes

Studies (N = 21)	Positive Outcomes	Neutral or Negative Outcomes
Productivity (n = 11)	Significantly greater RVUs/hr, ^{22,27} visit ³⁵ Increased patient volume ^{22,28,32,34} Increased productivity rate ²⁸ Positive returns on investment ^{25,27,35} Increased willingness or availability for patient care ^{20,21,31,34}	Lower net revenue gains than control ²⁸ Net revenue gains not realized; scribes are cost neutral ³¹ No change in work RVUs/patient ²² 7%–8% increase in patient volume required to avoid net revenue losses ²³
Efficiency (n = 14)	Decreased charting time ^{25–29,31,36,37} Decreased after-hours EHR ^{20,21,30,31,34,38} Improvements in chart completion at 24 h, ²⁰ 48 h, ²⁶ 72 h ³⁸ Improved operational efficiency (eg, signed laboratories, other admin tasks) ^{32,37} Decreased visit times ^{30,38} Increase in patient visits/h ²⁷ Increase in “on-time” visits ³²	No difference in incomplete notes between intervention and control at 72 h ³⁰ Preclinic documentation time did not differ for visits with vs. without the scribe ²¹
Provider experience (n = 13)	Overall satisfaction; positive reaction to experience with scribes ^{21,25,26,28,29,31,32,36,37} Improved patient interactions ^{21,26,31,36–39} Improved work/life balance ^{25,38} Decreased levels of burnout ³⁴ and stress ^{21,36} High satisfaction with workload ^{21,28} Strengthened intent to stay practice ^{28,31}	Provider concerns about patient privacy or transparency ^{21,37,38} No difference in number of physicians experiencing burnout ²¹ No change in provider satisfaction scores ²⁷
Patient experience (n = 18)	Overall patient satisfaction or positive reaction to scribes ^{20,24,25,34,36} Majority comfortable/accepting with scribe ^{22,25,28,29,36,39} Actual or perceived increased interaction or face time with provider ^{20,22,36,39} Decreased provider time on computer during patient visit ^{20,22} High satisfaction with provider communications ²⁴	No change in patient satisfaction or neutral reaction to scribes ^{21,26,27,30,32,38,40} Slight decrease in patient experience or satisfaction ^{22,29,31,38} Discomfort with scribe based on patient characteristics or topics discussed ^{21,37,39,40}
Documentation quality (n = 7)	High levels of actual or perceived chart quality/accuracy ^{26,28,31,33,37,39} Improved documentation of high-risk or complex conditions, ^{31,37} quality measures ³⁶	Physician and scribe concerns with documentation style or medical terminology ³⁹
Staff experience (n = 3)	Clinical staff satisfaction ^{25,29} Positive scribe-patient relationships ³⁹	Increase in scribe stress when role is added to existing duties due to workflow changes ³⁹

EHR indicates electronic health record; RVU, relative value unit.

RESULTS

Twenty-one publications (refer to Table 1 for study descriptions) comprising 20 peer-reviewed journal articles and 1 gray literature report²⁸ were identified as meeting the inclusion criteria for this review, 20 of which were published within 4 years of this analysis.

Study Settings

Studies included in this literature synthesis took place in a variety of primary care practice settings (Table 1). Thirteen were based at a single-practice site, while 7 examined scribe utilization across >1 practice site. Most studies were set in family medicine or internal medicine clinics. We identified 5 studies that took place in safety net settings, which we define as a CHC, federally qualified health center, or author-designated safety net health care setting.^{22,28–31}

Study Design Characteristics

Most studies employed quasi-experimental research methods using pretest and posttest designs, though a single randomized controlled trial (RCT) was identified.²⁷ Two qualitative studies were included in the synthesis.^{37,39} While 19 of the 21 studies included physicians or advance practice providers as research subjects, in over half of these studies, the provider sample size was <10. An evaluation of a scribe

program implemented across 5 primary care clinics serving a low-income population represented the largest sample of primary care providers in our review.³⁰ Provider and patient surveys and EHRs were the most frequently cited data sources across studies.

Scribe Models

In most studies in which it was described, scribe procurement was outsourced to third-party scribe management companies (external scribe model), though 3 studies described homegrown scribe recruitment and training programs,^{30,31,36} 2 of which recruited undergraduate students with an interest in the health professions (internal, homegrown model).^{30,36} One of these 2 studies recruited students as volunteers.³⁰ In an additional 3 studies, existing clinical staff such as medical assistants were used to scribe (internal, existing staff model).^{33,39,40}

Scribe Tasks

EHR documentation during the clinical visit was the medical scribe's dominant task described in the literature, with 11 of the publications citing it as the only task undertaken by scribes. When tasks expanded beyond that of clinical documentation, the most frequently cited was ordering of referrals or medications,^{22,30,32,37} though physicians typically still had to sign off on these orders, and some physicians were

hesitant to use scribes in this capacity.²² Rarely, studies described medical scribe tasks that enhanced their role in patient care, including previsit planning or patient intake,^{22,27,32} notifying patients of normal laboratory results,²⁸ or gathering support or resources for complex patients.³⁷ In 1 qualitative study, scribes were credited with being able to reiterate information to patients at the end of their appointments, based on the provider's clinical summary.³⁹ Several articles also described activities undertaken by medical scribes that contributed to clinic operations or quality assurance, such as prompting physicians to address EHR-initiated health maintenance items with the patient,²¹ preparing and tracking patient reports,²⁸ and optimizing coding for billing.³⁵

Reported Outcomes

Studies included reported outcomes related to productivity, efficiency, provider experience, patient experience, documentation quality, and staff experience (Table 2).

Productivity and Efficiency

Productivity outcomes were reported in 9 studies using measures of patient volume, relative value units (RVUs), overall revenue generation, or return on investment (ROI). Scribe utilization was associated with productivity gains in all studies in which it was assessed, though productivity gains did not always translate to net revenue gains.^{28,31} A micro-simulation model using data from a national sample of primary care practices estimated the mean net cost of hiring a scribe in a fee-for-service model at \$33,600 once accounting for hiring and training costs in addition to salary, benefits, and opportunity costs, dropping to \$29,500 in subsequent years (estimated cost was closer to \$50,000 in capitated systems). Based on these costs, study authors found visit volume would need to increase by 7% (capitation) to 8% (fee for service) to achieve medical scribe net revenue neutrality, noting that volumes need to be higher in the first year of scribe implementation to meet this benchmark.²³ The literature provides evidence that scribes can yield a positive ROI, with 2 pilot studies reporting actual and projected ROIs of 30%,²⁷ and 112%²⁵, respectively.

Three studies reported significant increases in scribe-associated RVUs per hour^{22,27} or visit.³⁵ A pediatric practice-based comparative study found significant increases of nearly 8% in RVUs with medical scribes, noting that the increase in RVUs offset scribe cost without adding more patients to the physician's schedule.³⁵ Scribe utilization was also associated with increased patient volume, with 1 CHC-based program evaluation reporting physicians with scribes saw 25 more patients on average than those without them over the 4-month study period.²⁸ Four studies that did not conduct formal revenue analyses nonetheless noted a provider's willingness to increase patient visits as a result of working with a medical scribe.^{20,21,31,34}

Unexpected productivity results, though infrequent, included a program evaluation that reported a higher productivity rate with scribes, but lower net revenue gains compared with a control group without them²⁸ and 1 quasi-experimental study that found scribes to be cost neutral, although no formal ROI analysis was included.³¹

Fourteen studies in our sample included efficiency outcomes related to chart documentation or clinic operations, with nearly all studies reporting positive associations with scribe utilization. Scribes were associated with substantial decreases in both overall time spent charting and after-hours chart time, with 3 studies reporting decreases in the latter by half.^{30,31,38} The use of scribes was also credited in the literature with a 30% increase in on-time visits³² and in one study was associated with an increase of half a patient visit per hour, relative to a control group.²⁷ In addition, significant decreases in patient visit time were noted in the literature,^{30,38} with one evaluation of a scribe program implemented across 5 safety net clinics finding 70% of participating providers had faster cycle times with scribes than without them.³⁰

Provider and Staff Experience

Provider experience outcomes were reported in over half of the studies and were based on a wide variety of self-report and objective measures. Most of these studies (n = 9) reported overall provider satisfaction with or positive reactions to using scribes, though 2 found scribes made no difference in provider satisfaction²⁷ or burnout,²¹ and some studies noted provider concerns around scribe presence in the examination room for sensitive or complex patient visits.^{37,38} One qualitative study of physicians' experiences with scribes described physician-reported "joy of practice" due to improved quality of life, greater relaxation, and the physician-scribe partnership³⁷; another study described the addition of scribes as the most substantive change some providers had ever experienced, even "saving" some providers' careers or allowing them to put off retirement.³¹ This latter finding was reinforced by a CHC-based program evaluation reporting that almost all clinicians assessed thought they would stay in clinical care longer as a result of having a scribe.²⁸ Several studies attributed positive provider experience to enhanced patient interactions and more meaningful patient-provider relationships. In fact, the only RCT included in our review found a significant, positive association between scribe utilization and provider face time with patients.²⁶ Two studies in our review measured burnout, with mixed results. A pilot study from a complex internal medicine practice reported provider decreases in all burnout domains using a validated tool,³⁴ but another small pilot study found no change in the number of physicians experiencing burnout in 1 internal medicine clinic.²¹

Just 3 studies included scribe or clinic staff outcomes. One qualitative study described scribes taking on more active roles during the patient visit, which led to the positive formation of relationships between patient and scribe,³⁹ while nonscribe staff in 2 pre-post intervention studies reported improvements to clinic workflow and patient care.^{25,29}

Patient Experience

Findings related to patient experience with scribes were reported in 86% (n = 18) of our studies, making it the most common area of assessment in our review studies. Overall, the literature points to positive or neutral patient experiences associated with scribes. Multiple studies reported positive patient reactions to scribes or patient acceptance of the model.

In 1 pilot study, a subset of surveyed patients expressed that they supported scribing if their doctor benefited.²¹ The literature reports unequivocal positive associations with measures of patient care and engagement, like patient-provider face or interaction time,^{20,22} patient-perceived attention from the provider,³⁹ and patient-provider communications.²⁴ These findings were illustrated in 1 qualitative analysis of family medicine physician reflections, which revealed that scribes allowed providers to bond with patients and devote more attention to complex patient situations.³⁷

Neutral results related to patient experience were common. Several studies including an RCT²⁶ found scribes made no difference in patient satisfaction or experience. Some study authors noted that while scribes may not improve patient satisfaction, they usually do not diminish patients' experience either.^{38,40} Four studies did report slight decreases in patient satisfaction or comfort, and another 4 described negative experiences or concerns specific to patient characteristics,²¹ scribe-patient sex discordance,^{21,39,40} or the sensitivity of topics being discussed.³⁷

Documentation Quality

Less often, outcomes related to documentation quality were reported in the literature. Seven studies reported positive associations between scribe use and documentation quality. A retrospective review of ambulatory notes found scribed notes were higher in overall quality, more thorough, comprehensible, and up to date than physician control group notes,³³ while a prospective study across 9 inner-city clinics reported an increase in documentation of high-risk conditions after scribes were implemented.³¹ Another study found the use of scribes in a family medicine practice was associated with significant improvements in the documentation of pay-for-performance quality measures.³⁶

Safety Net Study Outcomes

Outcomes reported among the health safety net subset of literature mimicked those in other primary care studies and included productivity,^{22,28,31} patient experience,^{22,28–31} provider experience,^{28,29,31} staff satisfaction,²⁹ efficiency,^{28–31} and documentation quality.^{28,31} Safety net studies reported scribe-associated benefits in most of these areas, but not necessarily net revenue gains.^{28,31}

DISCUSSION

In reviewing the available outcomes studies on the use of scribes in primary care, we find scribes are associated with increased productivity and efficiency, improved provider satisfaction, and in many cases, higher patient satisfaction. While several of the included studies involve small sample sizes or amount to single-site program evaluations, collectively, they point to significant benefits from the use of scribes with no evidence of any associated harm beyond small decreases in patient satisfaction in a few studies.

Many primary care practices have limited staffing budgets. Therefore, it is important to note that covering the cost of scribes appears to be feasible based on the increased visit volumes and ROI analysis reported in the studies we assessed. A microsimulation of the cost of scribes showed

that primary care providers would need to increase visits by 8% in fee-for-service models.²³ This is consistent with the visit increases reported in the studies²⁶ and statements of provider willingness to see 1 more patient per shift to help offset costs.^{20,21} Given that providers who use a scribe may not experience the same gains in net revenue compared with those who do not,²⁸ practices may be reluctant to invest in scribes which can cost \$33,600 or more in the first year when factoring in start-up and opportunity costs.²³ The other path for achieving scribe cost neutrality is through improved coding, which may be a more palatable approach for clinics with already overworked providers who are unable or unwilling to divert time saved with scribes to more patient care. In fact, Phillips et al³⁵ report this scenario in their study. Further analysis of coding and billing outcomes associated with scribes is suggested for future research.

There may be other benefits associated with scribes that are not captured in a traditional ROI analysis that nonetheless enhance joy in practice and contribute to the triple aim of improved population health and patient care at a lower cost. Lower provider turnover and higher quality of care in the primary care setting are logical extensions of several of the outcomes that have been reported in this review. For example, providers that are burned out might be less likely to seek other positions or retire earlier than expected if they had a scribe who cut their documentation time in half, enabling them to leave work earlier due to reduced after-hours chart time^{30,31,38} and making it possible for them to have more meaningful patient encounters.^{21,26,37,39} This could in turn lead to a higher quality of care and the need for fewer follow-up visits as providers pick up on important nonverbal cues they might have missed if focused on the screen or forgotten when completing documentation at the end of the day.^{31,37,39} The growing emphasis on social determinants of health screening and documentation in health care points to an additional contribution that scribes can make towards advancing health equity and population health that should be evaluated, similar to the study which found that scribes led to increased documentation of high-risk conditions³¹ as well as pay-for-performance quality metrics.³⁶ As primary care practices increasingly move towards value-based models focused on improving quality and lowering the cost of care, it will be important to explicitly research how scribes can contribute to greater recruitment and retention or whether it enhances providers' ability to provide high-quality care, address social determinants of health, and improve population health and health equity.

Scribe utilization in the safety net setting is a topic not well represented in the literature, but the few studies we identified indicate scribes may be one promising strategy for improving clinic operations and provider experience. These findings have important implications for how to address increasing dissatisfaction among providers in safety net settings like federally qualified health centers.⁴¹ The Health Services Research Administration and foundations interested in increasing workforce capacity in underserved communities may want to help safety net practices fund and train scribes as well as support additional research on the benefits of their use. Primary care practices that are facing recruitment and

retention challenges, such as CHCs in Medicaid expansion states,⁴² could become more attractive to prospective job candidates if scribes were available. Given that CHCs in Medicaid expansion states are also experiencing higher wait times for appointments and have increased revenue due to expansion,⁴² use of scribes could be an affordable option for making practice more professionally rewarding while simultaneously increasing access to care and potentially creating a pipeline of providers interested in practicing in underserved communities. One of the study sites in our review deliberately recruited scribes that demonstrated a commitment to the urban and underserved, with a further goal of targeting students underrepresented in medicine.³⁰ Whether CHCs or other safety net settings that employ medical students as scribes can create a pipeline of providers more likely to practice in underserved communities is a suggested area of future inquiry.

The use of scribes may be evolving during the COVID-19 pandemic. Despite rates of in-person outpatient visits rebounding significantly from their lowest points in the early days of the pandemic,⁴³ social distancing concerns could reduce both patient and provider acceptance of having an additional person in the office during the encounter. Some practices have shifted to a virtual scribing model, where scribes document in-person or telemedicine visits from a remote location.^{44,45} Many primary care practices, including CHCs, are furloughing staff. Reduced revenue due to drops in visit volume may also make it more difficult for practices to afford scribes in the foreseeable future.⁴⁶ It will be important to track how demand for this position and utilization of alternate scribing modalities evolve as primary care practices, including CHCs, adapt to these new practice realities. However, the passage of the American Rescue Act of 2021, which includes nearly \$8 billion in CHC funding, may make it easier for CHCs to afford the start-up cost of hiring scribes,⁴⁷ particularly given scribes' potential to be financially self-sustaining in the long run.

We acknowledge the limitations of this literature synthesis. Despite the comprehensiveness of our review protocol, it does not meet the reporting standards for systematic reviews.⁴⁸ Our study design was intentional due to the exploratory nature of our research aims, heterogeneity of included study designs and methodologies, and a lack of strong empirical data across studies. Further, the rigor of individual studies assessed and the quality of the evidence for scribes' effectiveness was variable. Most of the studies were based on small sample sizes, lacked a matched comparison group, and were unable to account for potential confounding variables such as the impact of scribes having preexisting clinical experience.^{33,39,40} The single RCT in our trial was based on a sample of only 4 physicians.²⁶ Nonetheless, we believe our research provides a valuable contribution. To the best of our knowledge, we have identified all peer-reviewed publications representing outcomes-based research on scribe utilization in primary care. Our synthesis points to consistencies in the literature and has identified several areas for future research on the topic that may be appropriate for more robust research designs.

CONCLUSIONS

The available evidence on the use of medical scribes in the primary care setting show scribes are associated with

increased productivity and efficiency, improved provider satisfaction, and in many cases, higher patient satisfaction. Moreover, the resulting increased productivity and billing appears to be enough to make use of scribes an affordable option, although more research is needed to fully understand the full ROI. As primary care practices continue to experiment with the use of scribes, including how to adapt to the new challenges introduced by COVID-19, it will be important to build in measures to better understand how the use of scribes contributes to providers' ability to provide high-quality care, address social determinants of health, and improve population health and health equity.

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