The Effect of Medical Scribes in Cardiology, Orthopedic, and Emergency Departments: A Systematic Review

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PREFACE

The VA Evidence Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted health care topics of importance to clinicians, managers, and policymakers as they work to improve the health and health care of Veterans. These reports help:

- Develop clinical policies informed by evidence;
- Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
- Set the direction for future research to address gaps in clinical knowledge.

The program is comprised of three ESP Centers across the US and a Coordinating Center located in Portland, Oregon. Center Directors are VA clinicians and recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Center Program and Cochrane Collaboration. The Coordinating Center was created to manage program operations, ensure methodological consistency and quality of products, and interface with stakeholders. To ensure responsiveness to the needs of decision-makers, the program is governed by a Steering Committee comprised of health system leadership and researchers. The program solicits nominations for review topics several times a year via the program website.

Comments on this evidence report are welcome and can be sent to Nicole Floyd, Deputy Director, ESP Coordinating Center at Nicole.Floyd@va.gov.

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This report is based on research conducted by the Evidence Synthesis Program (ESP) Center located at the **Minneapolis VA Health Care System, Minneapolis, MN**, funded by the Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development. The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of the Department of Veterans Affairs or the United States government. Therefore, no statement in this article should be construed as an official position of the Department of Veterans Affairs. No investigators have any affiliations or financial involvement (*eg*, employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in the report.

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This topic was developed in response to a nomination by Storm Morgan, Program Manager, Office of Nursing Services, on behalf of the Section 507 Committee, for the purpose of informing the Section 507 Committee on the effect of medical scribes in cardiology, orthopedic, or emergency department clinics. This report will be used in conjunction with an evaluation to a pilot on the effects of medical scribes which was mandated by Section 507 of the MISSION Act. The scope was further developed with input from the topic nominators (*ie*, Operational Partners), the ESP Coordinating Center, the review team, and the technical expert panel (TEP).

In designing the study questions and methodology at the outset of this report, the ESP consulted several technical and content experts. Broad expertise and perspectives were sought. Divergent and conflicting opinions are common and perceived as healthy scientific discourse that results in a thoughtful, relevant systematic review. Therefore, in the end, study questions, design, methodologic approaches, and/or conclusions do not necessarily represent the views of individual technical and content experts.

The authors gratefully acknowledge the following individuals for their contributions to this project:

Operational Partners

Operational partners are system-level stakeholders who have requested the report to inform decision-making. They recommend Technical Expert Panel (TEP) participants; assure VA relevance; help develop and approve final project scope and timeframe for completion; provide feedback on draft report; and provide consultation on strategies for dissemination of the report to field and relevant groups.

Storm Morgan, MSN, MBA, RN
Program Manager
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Technical Expert Panel (TEP)

To ensure robust, scientifically relevant work, the TEP guides topic refinement; provides input on key questions and eligibility criteria, advising on substantive issues or possibly overlooked areas of research; assures VA relevance; and provides feedback on work in progress. TEP members are listed below:

Steve Pizer, PhD
Chief Economist, Partnered Evidence-Based Policy Resource Center
Director of Health Law, Policy and Management, Boston University
Boston, MA

Max Napolitano, MPAS
Medical Scribe and Medical Scribe Trainer (former), North Memorial Medical Center
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Lauren Klein, MD, MS
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Minneapolis, MN

Peer Reviewers

The Coordinating Center sought input from external peer reviewers to review the draft report and provide feedback on the objectives, scope, methods used, perception of bias, and omitted evidence. Peer reviewers must disclose any relevant financial or non-financial conflicts of interest. Because of their unique clinical or content expertise, individuals with potential conflicts may be retained. The Coordinating Center and the ESP Center work to balance, manage, or mitigate any potential nonfinancial conflicts of interest identified.

EXECUTIVE SUMMARY

INTRODUCTION

Medical scribes are individuals who assist clinicians with day-to-day tasks including recording and documenting information in real-time during patient visits.[1,2] In addition to documenting medical visits, medical scribe duties include communicating with patients and completing clerical tasks; verifying and correcting mistakes or inconsistencies in medical records; collecting, organizing, and cataloging data for clinicians; and attending practice-related training. Integrating medical scribes with clinicians is suggested to improve access, quality and timeliness of care, enhance patient and clinician satisfaction and increase productivity and health system revenue.[3-5]

Medical scribe use has increased markedly in the past 10 years, in part, due to implementation of Electronic Medical Records (EMRs) required by legislation. In 2009 the Health Information Technology for Economic and Clinical Health (HITECH) Act, part of the American Recovery and Reinvestment Act (ARRA), was enacted and required meaningful use of health information technology.[2] These acts created a large demand for electronic data entry by clinicians as well as an increase in documentation requirements for billing and reporting initiatives.[2]

EMRs provide important advantages, such as structural and process-related benefits[6] and enhanced patient care.[7] However, EMRs increase the burden of clinical documentation, disrupt face-to-face patient encounters,[8] and reduce time available for resident and student training.[9] Additionally, efficiency measures required by the quality reporting program enacted by the Centers for Medicare & Medicaid Services, such as door-to-doctor time or length of stay, has increased pressure on clinicians and health systems to meet these quality metrics.[10]

While formal training, accreditation, and recertification are not required for all scribe positions, there are 2 scribe accreditation programs available in the United States. In addition to "in house" training, health care systems or individual clinical groups can hire outside companies to train, accredit, place, and conduct performance evaluations of scribes and accompanying documentation through contracting mechanisms. These companies can reduce administrative hiring, training, and oversite burden and serve as a resource to replace scribes that have relatively high turnover. Additionally, these companies can also contract for "virtual scribes" whereby the scribes are located "off-site" and conduct their duties through video teleconferencing.[11]

Within the Department of Veterans Affairs, the 2018 MISSION Act aimed to increase Veterans' access to health care. Section 507 of the MISSION Act[12] mandates a 2-year pilot of in-clinic medical scribes in VA specialty clinics and emergency departments to evaluate clinician efficiency, patient volume, and patient satisfaction. With insight from our Operational Partners and Technical Expert Panel members, we conducted a systematic review of medical scribes focused on outpatient emergency, cardiology, and orthopedic departments. The Section 507 Committee will use the findings of this review to inform the use of medical scribes in the VA. In collaboration with stakeholders, the following Key Questions (KQ) were developed:

1. What is the effect of medical scribes in cardiology, orthopedic, or emergency department clinics?

2. How do the effects of medical scribes vary based on differences in compensation structure (*ie*, contracted through vendor or employees of the institution), qualifications (*ie*, training, accreditation, experience), types of entries (*ie*, medical orders, medical history, coding [billing, diagnoses, complexity/comorbidities]), or setting (*ie*, rural, urban, access-challenged)?

METHODS

Data Sources & Searches

We searched MEDLINE, EMBASE, and CINAHL from 2010 through December 2019 using Medical Subject Headings (MeSH) and key words for medical scribes and outcomes of interest.

Study Selection

Eligible citations were screened independently by 2 reviewers using Distiller SR (Distiller SR, Evidence Partners, Ottawa, Canada) with prespecified criteria. Citations moved to full-text review if either reviewer considered the citation eligible. At the full-text review, agreement of 2 reviewers was needed for study inclusion or exclusion; disputes were resolved by discussion with input from a third reviewer, if needed.

We included English language studies comparing participation in a medical scribe program to usual care or no intervention. Only adult patients and/or practitioners in cardiology, orthopedic, or emergency departments were considered eligible for inclusion. Eligible studies reported outcomes related to clinic efficiency and productivity, clinician and/or patient satisfaction, financial impacts, or quality of documentation.

Data Abstraction & Study Quality Assessment

We abstracted study design and demographic data from eligible studies with low, moderate, or serious risk of bias (ROB) including scribe duties, clinician and scribe experience, scribe training, age, gender, number of patients admitted (for emergency department studies), and funding source. We also abstracted outcomes of interest as described above.

For observational studies we formally assessed ROB for each individual study by assessing critical elements using the ROBINS-I tool.[13] For randomized controlled trials we assessed critical elements using a modified Cochrane tool.[14]

Data Synthesis & Analysis

Due to heterogeneity of populations and interventions, data were not pooled, but narratively synthesized. Tables were developed by outcome and stratified by clinical setting (*ie,* cardiology or emergency department). For Key Question 2, our subgroups of interest included: compensation structure (*ie*, contract or direct hire), qualifications, duties and types of entries required, and setting.

For critical outcomes (number of patients seen per hour or shift, length of stay, patient satisfaction, clinician satisfaction, and relative value units) we rated certainty of the evidence (COE) based on study limitations, directness, precision, consistency, and publication bias. Certainty of evidence was rated as high, moderate, low, or very low.

RESULTS

Results of Literature Search

After removing duplicates, we identified 621 citations for title and abstract triage. A hand-search of systematic review bibliographies yielded 2 additional references. We reviewed the full text of 45 articles and identified 22 which met our inclusion criteria.

Twenty of 22 reports (91%) were from emergency departments. Of these, 6 publications (all observational) came from the same group at a Rochester, MN-based health care system and 6 publications (1 RCT, 1 secondary analysis of the RCT data, 4 observational) came from a group based in Australia. The remaining 8 publications consisted of 1 RCT and 7 observational studies. One of these observational studies was conducted in Canada, and the remaining observational studies and the RCT were conducted in the US.

Two observational studies from cardiology departments were identified, both from the same group at a Minneapolis, MN health care system. No eligible articles were identified from orthopedic departments. No studies were conducted in VA health care systems.

Summary of Results for Key Questions

Seventeen studies (and both cardiology reports) were rated as having serious or critical risk of bias. All scribe programs were in-clinic rather than virtual. Eighteen studies reported clinic efficiency, 5 patient satisfaction, 5 clinician satisfaction, 16 financial impacts, 3 quality of documentation and 3 cost/time of training. Only 4 reports described 4 out of our 5 outcomes of interest and only 2 reported on 3 outcomes of interest. Definitions of outcomes across studies varied. Most reports analyzed information after scribes had gone through an “in-house” training and orientation program and permitted clinicians to select to participate. Reports describing financial impacts typically based the cost of a scribe program on the hourly wages paid for a scribe, and did not report administrative or supervisory cost, the cost of identifying, hiring, training, supervising, maintaining or replacing scribes, documentation verification costs, or costs related to contracting through outside vendors.

Data to address KQ1 are limited in quality and quantity. We identified no studies from orthopedic clinics. The effect of scribes in cardiology clinics is uncertain and based on a single, serious risk of bias study from a single cardiology clinic.

In emergency departments, medical scribes may increase the number of patients seen per hour (low COE) and probably decrease length of stay (moderate COE). The magnitude of effect is likely small, and efficiency may vary based on the setting and outcomes assessed. Medical scribes may increase revenues or relative value units (RVUs) due to more patients seen per hour (low COE). However, resources to train, staff, maintain, and monitor scribes are substantial and rarely accounted for in these estimations. Financial impacts varied based on how outcomes were measured. Medical scribes may make little to no difference in door-to-room or door-to-provider time, number of patients who left without being seen, and patient or clinician satisfaction, though results were mixed. There were no data on quality of documentation or medical errors or the role of scribes in VA emergency departments.

In cardiology or orthopedic clinics, no studies addressed our KQ2 examining how the effects of medical scribes may vary based on differences in compensation structure (*ie*, contracted through vendor or employees of the institution), qualifications (*ie*, training, accreditation, experience), types of entries (*ie*, medical orders, medical history, coding [billing, diagnoses, complexity/comorbidities]), or setting (*ie*, rural, urban, access-challenged).

The effect of medical scribes on emergency department efficiency is uncertain and may vary based on the clinical training, experience, and area service within the emergency department.

DISCUSSION

Key Findings & Strength of Evidence

Findings from our systematic review on the effects of medical scribes in orthopedic, cardiology, and emergency departments are limited by the quantity and quality of available information. Available information is based from studies mostly rated as having serious risk of bias and of limited applicability to widespread implementation. There are no data in VA health care settings or among Veterans.

We found no data on medical scribes in orthopedic clinics. In cardiology clinics the efficiency, financial productivity, and effect on patient and provider satisfaction of scribe programs is uncertain, with findings based on a single, serious risk of bias study from a cardiology group in the United States that evaluated medical scribes provided by a vendor. In emergency departments, medical scribes may improve efficiency (low COE) and financial productivity (low COE). The magnitude of effect on efficiency is likely small to moderate. Efficiency varies based on the setting, outcomes assessed, and methods for evaluating financial productivity. The effect on costs is difficult to ascertain as complete cost reporting was not provided. Resources required to identify, hire, train, staff, maintain, and monitor a scribe program are expected to be substantial and rarely reported in the literature. Online searches for such costs did not provide data. Thus, net financial impact is not known and likely varies by key assumptions and methods for scribe program development, implementation, and maintenance. There are no direct comparative data on quality of documentation, medical errors, or scribe training (*eg,* time to train, turnover), and no data comparing these outcomes in contracted (*ie*, vendor supplied) scribes versus scribes trained “in-house” or using “virtual scribes”.

Additional information on the role of medical scribes in primary care and other specialty settings was beyond the scope of our report and not included. However, these studies are typically of similar methodological quality to those identified in our report – that is, single site reports with clinician volunteers, vendor-supplied scribes, and limited outcome (including financial) reporting. Their results suggest modest effects for improving documentation time and patient satisfaction.[15] It is not known how the results from these settings can be applied to future implementation in orthopedic, cardiology, and emergency departments or in Veterans Affairs Medical Centers. A prior systematic review identified 5 studies published through 2014 and noted limited quality and quantity of information.[16]

Applicability

Current findings have limited applicability and raise important questions about implementation, research gaps, and future research. Despite information that there may be 100,000 medical

scribes in the US in 2020,[17] there is a paucity of data on the effectiveness, harms, costs, and quality of scribes, or on best methods for implementation and evaluation. No studies were conducted in Veterans Affairs Medical Centers and the effectiveness and financial productivity for widespread implementation across a national health care system are not known. Several reports were not from the US, and many evaluated programs after training had been completed and limited inclusion to clinicians volunteering for scribe services. Additionally, a large amount of information was reported from 2 emergency department groups, 1 in Australia. The only report from a cardiology department was limited to a single clinic in the US that assigned scribes to clinician volunteers and altered the daily schedule of clinicians working with scribes to permit more clinic visits. Scribes in the cardiology report were hired by an outside vendor and had extensive experience. Charges and costs for the services provided by the vendor were not described. None of the programs described the possible role of allocating scribe services to employees currently assigned other clinic duties, including administrative, nursing, or "clinician extenders". The effect of scribes on improving efficiency, patient access, and throughput likely also requires additional programmatic factors including reducing clinic appointment times and increasing the number of patients scheduled per day.

Research Gaps & Future Research

Our principal finding is that there are large gaps in evidence that require future research. Despite the marked increase in the use of medical scribes in the United States there is no high-quality information evaluating their effects on clinic efficiency, health care access, patient or clinician satisfaction, or financial investment and productivity in cardiology, orthopedic, and emergency departments. There are no data on the use of virtual scribes. Additionally, there are limited data on other important aspects of a medical scribe program, including documentation quality, the comparative effects of in-house versus contracted hiring, training, maintaining, and/or supervising, large-scale implementation of medical scribes, and other components of medical scribe programs required to enhance care quality, including productivity. Data from other clinical settings (primary care and other specialty clinics) are of limited applicability, quality, and quantity.

Policy Implications

Our results have policy implications and suggest that prior to widespread implementation, more information is needed on the effectiveness, harms, and costs of scribe programs. If information is deemed sufficient for programmatic rollout, then clear identification and evaluation of programmatic goals (improving access and patient/provider satisfaction, enhancing documentation quality, increasing clinical throughput), resources, programmatic models, and personnel required, as well as implementation barriers and facilitators, are needed.

Conclusions

Based on mostly serious risk of bias reports, in-person medical scribes may improve clinic efficiency and improve financial productivity and revenue as measured by relative value units in emergency departments. The effects on clinic efficiency appear to be small in magnitude and dependent on the type and method of outcome assessment. Cost and financial productivity data do not include the cost of hiring, training, maintaining, and supervising scribes. Generalizability of findings outside the reported settings is limited. The effect of medical scribes in cardiology departments is uncertain. There is no information from orthopedic departments, VA Medical

Centers, or on virtual scribes. There is little information on patient or clinician satisfaction, scribe documentation quality, or whether results vary by in-house versus contracted hiring and training.

ABBREVIATIONS TABLE

Abbreviation	Definition
ARRA	American Recovery and Reinvestment Act
CI	Confidence interval
CMS	Centers for Medicare and Medicaid Services
COE	Certainty of evidence
ED	Emergency department
EMR	Electronic Medical Record
ESP	Evidence Synthesis Program
GRADE	The Grading of Recommendations Assessment, Development and Evaluation Approach
HITECH	Health Information Technology for Economic and Clinical Health Act
KQ	Key Question
MD	Mean difference
MeSH	Medical subject heading
RCT	Randomized controlled trial
ROB	Risk of bias
RVU	Relative value units
TEP	Technical expert panel
US	United States of America
VA	Department of Veterans Affairs