The Impact of Scribes on Advanced Practice Provider Burnout

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I have no known conflict of interest to disclose.

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Abstract

Burnout is the highest among Emergency Department (ED) providers; Advanced Practice Providers (APPs) are leaving the specialty which reduces access to care. Medical scribes have been employed in healthcare settings to reduce the documentation burden on medical providers, allowing them to focus more on patient care. This paper aims to evaluate the impact of medical scribe use on emergency department advanced practice providers (APP) productivity, burnout, and job satisfaction. A systematic, comprehensive, and broad review of the literature was conducted to examine the advantages and disadvantages of employing medical scribes. Scholarly search engines (e.g., CINAHL, EBSCOhost, Cochrane Library, and PubMed) were utilized to search for peer-reviewed and credible articles. The results of the literature indicated organization wide benefits with scribes, however, cost may outweigh it. These concerns have led to initiation of an evidence-based project to break down the causes, concerns, and benefits of APPs with and without medical scribes within a busy southwestern emergency department in the United States. Scribes were implemented for 5 consecutive days with and 5 consecutive days without scribes. Results showed an overall decrease in burnout, increase in productivity, and decrease in after work hours documentation time, demonstrating that scribes provided significant benefits for APPs in the Emergency Department. Future research would dive into the financial implications of scribes for an organization and the use of artificial intelligent scribes.

Keywords: Advanced practice providers, medical providers, medical scribes, productivity, job satisfaction, revenue, burnout

The Impact of Scribes on Advanced Practice Provider Burnout

Advanced practice practitioners (APPs) play a crucial role in healthcare in the United States, providing increased access to quality and timely care for individuals with urgent or emergent health needs. As healthcare professionals with advanced education in assessment, diagnosis, and treatment, APPs are widely utilized within both inpatient and outpatient settings. However, more and more, they are being utilized within urgent care and emergency departments to offload the impact of high patient volumes.

Background and Significance

Problem Statement

The emergency department (ED) is a high turnover area for any hospital. It is estimated the average ED services 100 or more patients per day, depending on its location and region. While many emergency departments are staffed with both physicians and APPs, differences in reimbursement and pay structure impact provider workflow. Emergency physicians are staffed to a certain cost basis and generally care for a lower volume of high-acuity patients. Compared to physicians, APPs often provide care to lower acuity patients, which impacts patient volume, productivity, and provider workflow. With the high volume of lower acuity patients also comes the responsibility of assessing and documenting adequately. Hospitals and physician groups have employed medical scribes to assist with real-time documentation to increase provider productivity and decrease the length of stay; however, scribes are often reserved for physicians, leaving APPs fully responsible for all documentation requirements.

Provider burnout is a pressing concern in the United States, particularly in the emergency department (ED) setting. The demanding nature of emergency medicine, characterized by long hours, high-stress environments, and constant exposure to traumatic situations, contributes to a

high prevalence of burnout among emergency providers (Shanafelt et al., 2015). Burnout not only has detrimental effects on the well-being of individual providers but also on patient care, as it is associated with increased medical errors and decreased patient satisfaction. Due to the high burnout rate, providers are leaving this specialty for less strenuous ones. In a study on provider burnout and work-life balance, nearly 70% of emergency providers reported at least one symptom of burnout (Shanafelt et al., 2015). To address this issue comprehensively, it is essential to implement evidence-based interventions that focus on reducing burnout among emergency providers, thus enhancing both their own mental health and the quality of care delivered in the ED. Seitz et al (2022) emphasized that burnout post COVID-19 has been notably strenuous on APPs. Within large urban medical centers, 58.5% reported burnout, with 70% being females and 30% being males.

In 2009, the United States government invested approximately $30 billion in the American Recovery and Reinvestment Act (ARRA) and the Health Information Technology for Economic and Clinical Health Act (HITECH) to implement electronic medical records (EMRs) across the healthcare system as a whole. However, this change led to concerns regarding the unintended clinical consequences associated with EMR utilization (Payne et al., 2015). Of particular concern is the additional burden of non-clinical computerized tasks imposed on medical providers, which is perceived as a potential hinderance to their daily work responsibilities.

Within a high-volume ED in the southwestern United States, APPs are not consistently provided with medical scribes, whereas physicians are. APPs are utilized in the lower acuity area, thus seeing a higher volume of patients due to the quick turnaround time. Due to the limited availability of scribe support and the subsequent increased burden of documentation, APPs are

unable to accomplish all of their tasks and see as many patients as they would like. Therefore, their job satisfaction is negatively affected. As a result of this low level of job satisfaction among APPs, many of these professionals have left the hospital and emergency departments to seek employment elsewhere. The lack of scribe availability for APPs also impacts patient outcomes and satisfaction. Press Ganey Score and HCAHPS surveys intended to measure patient satisfaction have shown that quicker turnaround times lead to more satisfied patients.

Purpose and Rationale

The purpose of this project is to understand the impact of medical scribe usage on APP satisfaction and burnout within a large, high volume emergency department. The project was coordinated with an emergency physician group within a metropolitan area in the southwestern United States that staff's local hospitals with employee's emergency physicians (MDs and DOs) and APPs (NPs and PAs). The setting for this project involves a contracted emergency medicine practice in the southwestern United States with APPs being utilized to see patients within the emergency department (ED) within a prominent hospital organization. The ED includes an urgent care area that is open from 9am to 11pm, and the emergency department that is always open. APPs care for patients in both the urgent care section and the main emergency department; the patient's triage level can be escalated from a low to a higher acuity level at any point of the visit. While APPs have the ability to see critical patients within the emergency department, they are more frequently assigned to care for lower acuity urgent care patients. However, seeing a high volume of lower acuity patients increases the burden of documentation on the APPs staffing the fast care area. APPs have expressed dissatisfaction with the limitations on seeing patients because they are required to complete documentation and monitor them continuously at the same

time. If there is continued dissatisfaction, these APPs may leave their positions in the emergency department, thus, leaving less providers to take care of patients.

Significance and Scope of Problem

Multiple interventions and studies have been conducted to examine the level of satisfaction with APPs to date. Pines et al. (2020) utilized a linear regression to analyze the positive effects of APP coverage. This study found that APPs were allotted for an almost equal amount of relative value unit (RVU) as physicians. In addition, the use of APPs, led to increased patient satisfaction as well due to lower door-to-door times and discharge times. Eley & Allen (2019) discuss the benefits of utilizing a medical scribe to complete documentation on the electronic medical record (EMR) within the ED. For example, when working with medical scribe, physicians are able to focus more on patient care instead of documentation. The authors concluded that the utilization of medical scribes alleviates the stress and workload of documentation. In a quality improvement study, medical scribes reduced providers' documentation time by approximately 5.1 hours per week.(Earl et al., 2017). Less time spent documenting leads to increased provider job satisfaction and decreased burnout. Providers who utilized scribes were able to see more patients per hour, going from 2.01 to 3.14 (Heaton et al., 2017). This is especially significant given that, since the inception of EMRs, providers are spending twice as much time documenting as they are providing patient care (Ball & McBeth, 2021). Shafer et al. (2021) conducted a randomized trial utilizing medical scribes solely for the advanced practice providers to evaluate the impact on job satisfaction scores and RVU numbers. In this quasi-experimental project at a federally qualified health center (FQHC), providers were assigned medical scribes, ultimately demonstrating an increase in job satisfaction because the

providers were able to spend more time with patients and families instead of on documentation (Hudson et al., 2020). The implementation of alternative interventions is key to understanding job satisfaction among APPs, who play a crucial role in emergency departments.

Comparison/Current State

Currently, APPs in this practice are sporadically provided the support of a medical scribe. They may be provided the support of a scribe once a week or only once a month. However, their documentation requirement remains the same, which can be lengthy and a challenging process, particularly in a high turn around department. The organization discussed that providers are not educated as experts in documentation, and burnout due to high-level documentation requirements is becoming more and more problematic. This problem is compounded by the fact that insurance coverage, denials, and lawsuits have become more prevalent, further increasing the need for thorough and accurate documentation.

Generally, providers are encouraged to hire scribes in order to increase job satisfaction and retention. Milewski et al. (2022) found that after hiring scribes, the patient load for providers increased by thirteen times, with seventy-eight percent of the cases written by scribes rather than the provider. This led to the team seeing more patients, increasing their revenue, and allowing providers to focus more on patient care rather than documentation solely. Suller (2017) mentions that the use of nurse practitioners in the ED allows physicians to focus the majority of their care on critical care patients while APPs care for, lower acuity patients, offloading the census in the ED waiting room lobby. However, this system only works effectively if APPs are able to maintain a high patient load while also completing the required documentation. Cleland (2017) found that use of medical scribes improved productivity and job satisfaction which, in turn, created a higher relative value unit (RVU).

Internal Evidence

The organization utilized for this project is a contracting company for emergency departments across a metropolitan area in the southwestern United States. Their mission is to provide the highest quality of care through their core values of: integrity, accountability, respect, excellence, honesty, and collegiality. This group employs medical doctors, osteopathic doctors, nurse practitioners, and physician assistants within the emergency departments. Subjective data gathered by APP self-report revealed that more than 50% of the advance practice providers are considering leaving the organization due to dissatisfaction with the lack of scribe support for APPs and the resulting decrease in relative value units as evidenced by the number of patients they see within their shift period. Because the APPs see a high volume of lower acuity patients, the loss of these providers may leave hospitals and organizations with longer wait times.

PICOT Question

For advanced practice providers (APPs), how does the addition of a medical scribe compared to no medical scribe affect APPs job satisfaction, burnout, and productivity?

Evidence Synthesis

Search Strategy

An extensive review of current evidence was completed to answer the PICOT question. Three databases were comprehensively searched – Cumulated Index to Nursing and Allied Health Literature (CINAHL), PubMed, and SCOPUS. These databases were chosen due to their dependability, relevance, and contribution within the medical field.

The keywords used in all the databases to address the PICOT question included: *physician, advanced practice providers, medical scribe, emergency department, productivity, satisfaction,* and *revenue.* Key terms for the population did not include *nurse practitioner* and

physician assistant as this narrowed the search significantly. Instead, the terms *advanced practice provider, clinician, burnout, provider,* and *physician* were used. For the intervention, *medical scribe* and *scribes* yielded an adequate amount of search results. The outcome was specified using terminology such as: *productivity, satisfaction, burnout, revenue,* and *throughput.* Key terms for outcome did not include *door-to-door, RVU,* and *happiness* as this decreased the search results significantly. Filters applied during the search included publication time frame for within 5 years and peer-reviewed journal articles. Mesh and Boolean terms were utilized with the search process. The titles and abstracts yielded around 220 results.

The initial CINAHL search yielded 24 results, which decreased to 21 with the addition of *healthcare professional, clinician,* and *provider productivity,* decreased the yield result was 21. Utilizing similar key terms with PubMed resulted in a lowest yield of 219 results and a highest yield of 515 results. Lastly, similar terms used in SCOPUS resulted in an end yield of 27 from 29. All results were filtered to include articles published within the last 5 years. Grey literature was not included.

Upon review of the article titles and abstracts, the results were further narrowed to include articles suggestive of provider satisfaction, productivity, throughput, and revenue. Rapid critical appraisal was completed for 20 articles, yielding a final result of 10 articles that were chosen for the literature review. This included two qualitative studies, two randomized clinical trials, one prospective observation cohort study, three retrospective observational studies, one quasi-experimental study, and two meta-analysis studies. Exclusion criteria included any article written before 2018 and articles that examined the medical scribe's point of view.

Critical Appraisal and Synthesis of Evidence

The level of evidence, validity, and quality of each study was determined using an applicable rapid critical appraisal tool (Melnyk & Fineout-Overholt, 2019). Although qualitative studies are considered to be lower level of evidence, these studies examined the important issues of provider beliefs and emotional distress due to stressors within the workload without medical scribes (see Appendix A, Table A2). The quantitative studies (see Appendix A, Table A1) had a variety of data that supported increased provider satisfaction due to use of scribes, as well as revenue, throughput, and documentation time.

The subjects of the studies were mainly emergency department providers (MD, DO, NP, and PA), although a few studies also included outpatient clinics as well. The study times varied, with some consisting of 6-12 weeks and some more than a year. A meta-analysis study examined multiple articles to present a comprehensive overview of the impact of medical scribes. Only one study explicitly identified framework utilized; the rest were inferred. Measurement tools varied, but most of the data was extracted via EMR and collected with use of a Likert scale from different organizations. The creation of specific Likert scale surveys for some of the studies raises questions about study validity, as these Likert scales may not be tested and reliable instruments. While some studies concluded that the use of medical scribes added benefit to the organization, others concluded that the cost outweighed the benefit.

Discussion

Considering the evidence on medical scribe usage and provider productivity, it is clear that scribes positively impact both productivity and job satisfaction. Medical scribes assist providers in decreasing documentation time, increasing patient volume, and increasing time available for patient care. Evidence shows that medical scribes can improve provider efficiency and work satisfaction. They can assist in reducing provider burnout and enhance retention and

recruiting rates by lowering administrative strain (Heaton et al., 2017). Furthermore, medical scribes can assist organizations in optimizing throughput and income while preserving treatment quality. Although the evidence researched was on providers as a whole, the results when implementing this research on APPs alone was intriguing. Heaton et al. (2017) discovered that over the course of a year, scribes increased the throughput of the emergency department leading to increased satisfaction and decreased documentation time by the ED providers.

Theory/Theoretical Framework Application

Christina Maslach's burnout theory describes burnout as a three-dimensional syndrome characterized by depersonalization, emotional exhaustion, and reduced personal accomplishment (Baugh et al., 2020). Depersonalization refers to detachment towards others due to exposure to high levels of stressors at work (Bui et al., 2022). Emotional exhaustion refers to being overwhelmed and drained due to job stressors. This can cause individuals to feel fatigued, disconnected, and depleted from their work (Baugh et al., 2020). Lastly, reduced personal accomplishment refers to a diminished sense of competence and accomplishment which can lead to negative effects on job satisfaction and performance. Maslach's theory contains six areas that contribute to burnout: control, community, fairness, reward, workload, and values (Baugh et al., 2020). Evaluating and addressing each potential stressor, can reduce levels of burnout, leading to increased job satisfaction and overall retention and growth.

Implementation Framework

In healthcare, the management of provider burnout and the optimization of patient care processes are of paramount importance. One quality improvement framework that offers a structured approach to these objectives is the Plan-Do-Study-Act (PDSA) cycle (Katowa-Mukwato, 2021). When applied to the context of assessing and increasing provider satisfaction

while mitigating burnout, the PDSA cycle presents a systematic methodology for continuous improvement. The "Plan" phase of the PDSA cycle requires a comprehensive definition of objectives, the identification of pertinent metrics, the formulation of testable hypotheses, and a thoughtful design for intervention implementation. In this instance, it would involve clarifying the targeted outcomes, selecting appropriate key performance indicators related to provider satisfaction and burnout, and crafting hypotheses that link interventions, such as optimizing scribe services during peak hours, to anticipated improvements in the aforementioned metrics (Katowa-Mukwato et al., 2021).

The "Do" phase initiates the implementation of the planned interventions. This may include hiring of additional medical scribes, restructuring of scribe schedules, and the provision of supplementary training to enhance the efficiency and efficacy of scribing services (Sangani et al., 2022). A meticulous record of these changes and their subsequent effects on provider workload and satisfaction is essential. The "Study" phase involves the continuous collection of data on selected metrics, feedback obtained from providers, and subsequent analysis of the information to identify patterns and insights. These insights allow for a comprehensive evaluation of the efficacy of the implemented changes and inform potential adjustments in the final "Act" phase.

Ultimately, the PDSA cycle offers a structured and systematic approach to evaluate the provider experience and optimize healthcare processes (Sangani et al., 2022). The iterative nature of the cycle enables healthcare organizations to continually adapt to the evolving needs of their providers and their patients, fostering an environment of continuous improvement in both provider satisfaction and burnout mitigation. Thus, the application of the PDSA cycle is poised to be a valuable tool in addressing these critical aspects of healthcare quality.

Ethical Considerations

In the realm of project planning and implementation, ethical considerations are of paramount importance, serving as a safeguard and protecting the welfare of individuals. By integrating ethical considerations into project practices, investigators are equipped to navigate intricate ethical challenges, uphold principles, and garner trust and confidence of the participants.

There were four ethical considerations for this project: respect for autonomy, justice, beneficence, and non-maleficence. Autonomy is demonstrated as allowing stakeholders to have a voice in the decision-making process. Autonomy was upheld by allowing the advance practice providers (APP) to decide whether they wanted to participate and work with a scribe each day. Justice involves ensuring fairness and equity in the distribution of resources. For example, scribes will be either allotted or not allotted for a specific number of days for each participating APP. Additionally, the APPs were able to decide to decline participation in the project any day if overwhelmed by their patient load. Beneficence refers to acting in the best interest of the stakeholders. This project is aimed at improving understanding of factors impacting provider satisfaction and burnout. If the use of scribes proves beneficial, this data showing that APPs benefit from having scribes at all times can be presented to the group. Lastly, non-maleficence focuses on avoiding any harm and minimizing risks to the APPs. Because this project was short term, the risk of the intervention lowering productivity was low.

Consent was obtained from all participants using a clear and concise document detailing the project's objectives, procedures, duration, potential risks, confidentiality, and benefits. The project was thoroughly explained to all APPs, and opportunity for questions was provided. To ensure autonomy, project participation was strictly voluntary. In addition, each participants

identified themselves with a specific identifier, two letters and two numbers. The organization shall have access to the information and data received to ensure the participants risks and privacy is being protected. Lastly, all APPs had the option to withdraw from the project at any given time without any penalty or negative repercussions. The project was reviewed by faculty mentors and granted IRB exempt status from the university IRB.

Participants and Recruitment

The participants in this project were APPs contracted by a physician contracting organization. The APPs are employed within emergency departments across the southwestern United States. APP contact information was obtained from the project site champion. Recruitment then took place via an email sent to all APPs scheduled to work at the trauma 1 emergency department; those not scheduled in the trauma 1 ED were excluded. There was no exclusion to age, experience, or shift worked. The coverage entailed two APPs every day from 9am to 11pm.

Intervention Description and Timeline

The project aimed to identify whether medical scribes increase satisfaction and productivity of APPs, while decreasing burnout. Once IRB approval was obtained, the project site champion provided a list of scheduled APPs for recruitment purposes. Following recruitment and completion of informed consent for each participant, the site champion assigned each participant to work with a scribe for 5 consecutive 9–12-hour shifts. Each APP also worked 5 consecutive shifts with no scribe. After completion of all shifts, each APP completed a two burnout assessment surveys: one evaluating their shifts with scribes and one evaluating their shifts without scribes. APPs also documented the number of patients seen each shift as well as the time needed to document both with and without a scribe. Following data collection, these

results were analyzed to help determine the benefits of round-the-clock scribe coverage for these providers as well as the organization.

Data Collection

As described previously, data was self-reported by the APPs. They will document the total number of patients seen each day without scribes. Then, that number will be divided by the number of hours worked each day to calculate the average number of patients seen per hour. The same process will be used for 5 days that they did have scribes. APPs were provided with a chart audit tool to ensure ease of documentation. Finally, each APP also completed a Likert scale satisfaction survey. Each participant provided their own subject identification, which was two letters and two numbers to ensure confidentiality. Data was securely stored within Arizona State University's cloud and will remain there to keep secure.

Wilmar Schaufeli, a distinguished figure in the field of burnout research, has made noteworthy contributions through the development of a burnout assessment tool (BAT) known as the "Utrecht Burnout Scale" (UBOS), also referred to as the "Utrecht Burnout Scale - Employee Version." This instrument has gained significant recognition for its utility in assessing burnout among employees and is frequently denoted as the Schaufeli Burnout Questionnaire. The BAT serves the essential purpose of evaluating burnout across three key dimensions, namely emotional exhaustion, depersonalization, and personal accomplishment, in alignment with the foundational framework for understanding burnout, as established by Christina Maslach (Schaufeli et al., 2020).

The Burnout Assessment Tool is a rigorously tested and widely employed instrument in occupational health and psychology. Its reliability and validity have been subjected to rigorous psychometric evaluations. Consequently, this tool is integral in the assessment of burnout levels

among employees, offering valuable insights into identifying individuals who may be at risk of burnout (Schaufeli et al., 2020). Furthermore, it provides a foundation for the implementation of targeted interventions aimed at alleviating burnout within the workplace. It is noteworthy that various versions of the BAT are available, including specialized adaptations designed for distinct professional or occupational groups, thereby ensuring alignment with the unique characteristics and demands associated with specific sectors (Schaufeli et al., 2020).

Data Analysis

The assessment and accurate statistical analysis of the burnout assessment tool (BAT) survey is critical to understanding the prevalence and underlying factors of burnout among healthcare professionals. Data was prepared for analysis, which included data cleaning and coding, a step that is fundamental to ensure the integrity and accuracy of the survey responses. Data was then input into Intellectus Statistics software. Subsequently, descriptive statistics were used to provide a comprehensive overview of the data's patterns, distribution, central tendencies, and variability, thereby offering an initial glimpse into the prevalence and nature of burnout. Reliability analysis was pivotal and assisted in determining the survey's internal consistency and ability to accurately measure the construct of burnout. Because the BAT survey assesses many different variables, factor analysis was used to better identify patterns and correlation in the data.

Results

Outcome(s)

Intellectus Statistical™ package was used to store, manage, and analyze the data. The population of the data set included NPs and PAs (n=10). The majority of the sample included women with 7 (70%) and the remainder were males with 3 (30%). The ethnicity was

predominantly Caucasian (90%) and remaining was Hispanic (10%). 4 of the providers were single (40%) and 6 were married (60%). There were 4 PAs (40%) and 6 NPs (60%). See Table F1.

The average age of the sample was 43 (*SD* =11.85) and the ages ranges from 27 to 65 years of age. The average years of experience of the sample was 8 (*SD*=6.52) and the years ranges from 1½ to 19 years of experience. See Table F2.

The average burnout score before scribes was 2.70 (SD=0.49) and it ranged from 1.65 to 3.09. The average burnout score after scribe usage was 1.78 (SD= 0.33) and it ranged from 1.17 to 2.17. The average secondary symptoms before scribes was 2.51 (SD=2.51) and after scribe usage was 1.54 (SD=1.54). See Table F3 & Figure F1. The results of the two-tailed paired samples *t*-test was significant based on an alpha value of .05, $t(9) = 6.81$, $p < .001$, indicating the null hypothesis can be rejected. This finding suggests the difference in the mean of before scribe burnout and the mean of post scribe burnout was significantly different from zero. See Table F4.

Comparing NPs and PAs, burnout score values were in the same ranges. PAs pre burnout average was 2.28 (SD=0.57) and post burnout score was 1.63 (SD=0.46). See Table F5. NPs pre burnout average was 2.98 (SD=0.07) and post burnout score was 1.88 (SD=0.19). See Table F6.

The average number of total patients seen without scribes was 88.60 (SD=14.61) and the number of total patients ranged of 74 to 124. The average number of total patients seen with scribes was 119.60 (SD=21.08) and the number of total patients ranged of 84 to 146. See Table F7.

The average number of total hours worked without scribes was 48.9 (SD=3.03) and the number of hours ranged of 43 to 54. The average number of total hours worked with scribes was 49.7 (SD=4.08) and the number of total patients ranged of 42 to 55. See Table F8.

The average patients seen per hour worked without scribes was 1.81. The average patients seen per hour worked with scribes was 2.4.

The average extra time to finish charting in minutes without scribes was 58.5 (SD=14.92) and the time ranged of 30 to 90. The average extra time to finish charting in minutes with scribes was 22.5 (SD=7.91) and the time ranged of 15 to 30. See Table F9.

The average burnout score for subcategory exhaustion without scribes was 2.99 (SD=0.55). The average burnout score for subcategory exhaustion with scribes was 2.06 (SD=0.42). The average burnout score for subcategory mental distance without scribes was 2.74 (SD=0.76). The average burnout score for subcategory mental distance with scribes was 1.88 (SD=0.53). The average burnout score for subcategory emotional impairment without scribes was 2.20 (SD=0.68). The average burnout score for subcategory emotional impairment with scribes was 1.34 (SD=0.38). The average burnout score for subcategory cognitive impairment without scribes was 2.70 (SD=0.43). The average burnout score for subcategory cognitive impairment with scribes was 1.68 (SD=0.41. The average burnout score for subcategory secondary symptoms without scribes was 2.51 (SD=0.27). The average burnout score for subcategory secondary symptoms with scribes was 1.54 (SD=0.25). See Table F10.

Statistical and Clinical Significance

A two-tailed paired samples t-test was used to analyze the effect of scribes on burnout scores among advanced practice providers in the emergency department. The results were statistically significant with a t-value of 6.81 and a p-value of less than .001. This indicates a significant decrease in average burnout scores from 2.70 before the intervention to 1.78 after implementing scribe support. Additionally, the intervention also showed statistically significant improvements in the subcategories of burnout, including exhaustion, mental distance, emotional,

cognitive, and secondary symptoms, suggesting that the use of scribes is reliably associated with reductions in various aspects of burnout.

Clinically, the reduction in burnout scores from 2.70 to 1.78 is significant considering the scale of burnout measurement and the potential impact on provider well-being and effectiveness. This marked decrease in burnout symptoms could translate to improved job satisfaction, reduced turnover, and better patient care outcomes. Additionally, results also indicate an increase in the number of patients seen per hour from 1.81 to 2.4 with the use of scribes, alongside a significant decrease in the extra time required to finish charting. These outcomes not only enhance efficiency, but also allow providers more time to focus on patient care rather than administrative tasks. This shift in focus may potentially lead to higher quality of care and reduced provider stress levels. Finally, the consistent results across various demographic groups reinforce the broad applicability and potential benefits of using scribes in diverse clinical settings.

Impact of Project

The ramifications of the project exhibit profound implications across multiple dimensions pertinent to healthcare infrastructure, encompassing the welfare of patients, providers, the healthcare system, and pertinent policies. Within the organizational framework, the absence of dedicated resources, specifically the deployment of scribes for all attending providers within the emergency department, is conspicuously discernible. Empirical findings robustly affirm the advantageous nature of scribe integration, notably accentuated within the realm of Advanced Practice Providers (APPs). Productivity, noted as the patients seen per hour, increased by 32%. Time for chart completion after hours decreased by 61.5%. This empirical validation underscores the observable enhancements in productivity and attenuation of burnout incidents among APPs following scribe incorporation. Notably, the heightened caseloads managed by APPs render the

integration of scribes particularly efficacious, accentuating productivity gains and alleviating the deleterious effects of burnout. The discerned outcomes underscore a salient pathway for APPs to fortify their professional longevity within the organizational milieu, thereby underscoring the significance of this project's impact within the broader context of organizational sustainability and efficacy.

The results of this project have significant implications for various aspects of healthcare, including patient care, provider well-being, system efficiency, and relevant policies. The data strongly supports the benefits of providing scribes for advanced practice providers working in the emergency department. With scribes, productivity—measured as patients seen per hour—increased by 32%. The time needed for charting after hours decreased by 61.5%. These findings indicated clear improvements in productivity and reductions in burnout among APPs following the introduction of scribes. The significant improvements in productivity and reductions in burnout among these providers are particularly noteworthy, considering that the high patient caseloads managed by the APPs typically predispose them to both decreased productivity and increased burnout risk. In summary, these outcomes suggest that the use of scribes is an effective method for decreasing burnout amongst emergency department APPs, thereby improving provider retention and allowing organizations to capitalize on the many benefits provided by APPs.

Sustainability

The sustenance of project interventions manifests a strategic trajectory aimed at extending their applicability to emergency departments across the southwestern region and other tiers of trauma care facilities. This expansive outreach facilitates the identification of critical areas necessitating the integration of medical scribes for APPs. Furthermore, it enables the

delineation of productivity metrics across diverse healthcare institutions within the region. Notably, comprehensive project details have been disseminated to pertinent stakeholders within the organization, thereby fostering knowledge diffusion and subsequent dissemination to affiliated providers for rigorous validation and refinement. Such meticulous dissemination and collaborative engagement underscore the concerted efforts towards bolstering the enduring viability and scalability of the project interventions within the broader healthcare ecosystem.

As a result of the intervention's successful outcomes, strategic plans are in place to implement similar projects beyond the initial setting to include emergency departments across the southwestern region and various trauma care facilities. This approach will not only help identify other critical areas that would benefit from the integration of medical scribes for APPs, but will also measure productivity impacts across diverse healthcare settings within the region. In addition, to ensure sustainability within the organization, detailed project information and outcomes were shared with key stakeholders within the organization, enhancing knowledge transfer and encouraging further validation and refinement by affiliated providers. This collaborative and iterative process is vital for adapting the interventions to different environments, thereby strengthening the project's viability and effectiveness over time within the broader healthcare ecosystem.

Discussion

The burgeoning discourse surrounding medical scribes in healthcare underscores the imperative of comprehensively evaluating their impact on provider well-being, clinical efficiency, and financial sustainability. In the context of emergency department (ED) environments, where the confluence of high-stakes patient care and time-sensitive demands put providers at increased risk for stress and burnout, the benefits of medical scribes assume

heightened significance. By examining the interplay between scribe use, provider burnout, and productivity outcomes, this study provides actionable insights for healthcare organizations grappling with the complex dynamics of scribe utilization.

A wealth of literature corroborates the positive impact of medical scribes on mitigating provider burnout. Notably, studies have consistently reported reductions in emotional exhaustion, depersonalization, and overall burnout prevalence with scribe assistance. However, the differential impact of scribes on providers at varying career stages warrants closer examination. While seasoned practitioners may experience a reprieve from burnout, novice clinicians may confront challenges stemming from adjustments to new workflows and the delegation of documentation tasks. This underscores the need for tailored interventions that account for provider experience levels and facilitate seamless integration of scribes into clinical practice.

Furthermore, empirical evidence attests to the positive influence of scribes on productivity metrics, such as patient throughput rates. Enhanced documentation efficiency and real-time charting facilitate streamlined workflows, enabling providers to devote more time to direct patient care. Nonetheless, methodological intricacies, including variations in patient acuity levels and scribe proficiency, introduce nuances that complicate the interpretation of productivity data. Rigorous study designs, incorporating robust control measures and longitudinal analyses, are indispensable for elucidating the true impact of scribes on clinical efficiency. In addition, another barrier was that inconsistency in number of hours each provider worked each day as it was based on the organization's needs, thus, could not be adjusted.

Financial considerations constitute a pivotal determinant in the strategic deployment of scribes within healthcare organizations. While studies have underscored the potential for

enhanced provider efficiency and revenue generation with scribe assistance, the upfront costs associated with scribe employment pose significant barriers to widespread adoption. Comparative cost-benefit analyses, accounting for factors such as labor expenses, revenue gains, and quality-of-care indicators, are essential for informing prudent investment decisions regarding scribe integration.

To advance knowledge in this domain, future research endeavors should adopt a multidimensional. Collaborative partnerships between healthcare institutions, academic researchers, and industry stakeholders can foster interdisciplinary inquiry, facilitating a holistic understanding of scribe utilization dynamics. Moreover, longitudinal studies conducted across diverse clinical settings, including Level 1 trauma centers in the Southwestern region, can elucidate regional variations in scribe efficacy and inform tailored implementation strategies.

Innovative technologies, such as artificial intelligence (AI)-driven scribe solutions, hold promise for augmenting the capabilities of traditional scribe models. Future research initiatives should explore the feasibility and efficacy of AI-based scribe technologies in enhancing documentation accuracy, streamlining clinical workflows, and mitigating provider burnout (Monfries et al., 2023). Recent studies have shown AI-based scribes to reduce EMR documentation times by 16%. With telemedicine growing in a positive trend, AI-based scribes are beneficial as they can be used in any situation, location, and time; unlike physical on-site scribes (Stephens et al., 2022). Longitudinal investigations, coupled with rigorous outcome measures and stakeholder feedback mechanisms, are imperative for assessing the long-term viability and scalability of AI-driven scribe interventions.

In conclusion, the integration of medical scribes into emergency department settings represents a multifaceted endeavor with profound implications for provider well-being, clinical

efficiency, and increased productivity. By synthesizing empirical evidence and theoretical frameworks, this project underscores the need for a nuanced approach that accounts for the interplay between provider characteristics, organizational dynamics, and technological innovations. Through collaborative research efforts and evidence-based decision-making, healthcare organizations can harness the transformative potential of medical scribes to optimize patient care delivery and cultivate a culture of resilience and innovation within the clinical workforce.

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Appendix A

Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
(Heaton et al., 2017) Impact of scribes on emergency department patient throughput one year after implementation **Country:** USA **Funding:** None **Bias:** None	Lewin's Change Management Theory	**Design:** Meta-analysis, prospective cohort design **Purpose:** To evaluate clerical burden of providers. Assess the impact of scribes on an academic emergency department throughput one year after implementation	**N=** 17053 charts **Demographics:** adult and pediatrics **Setting: hospital** **Exclusion:** 9617 charts. Psych, left without being seen or direct admission, sexual assault nurse examination, nurse only, missing data, not a hallway/time of interest, scribe sick **Attrition:** 0	**IV1:** EMR charts **DV1:** LOS **DV2:** Patients seen per hour for attending & resident **DV3:** Treatment room time **DV4:** Patient seen per hour for attending & NP **Definitions:** EMR charts	**Tools:** EMR charts **Validity/ Reliability:** Reliability is high as it is true data from EMR charts	**Statistical Tests Used:** Wilcoxon rank sum. Chi-square test. Version 9.3 SAS software	**DV1:** Increased 214 vs 215 min, p = 0.34 **DV2:** Increased 2.00 vs 2.13 **DV3:** increased 190 vs 179 mins, p = 0.021 **DV4:** Increased 2.01 vs 2.14	LOE 2 **Strengths:** Same group of scribes and providers a year into the program **Weakness:** Scribes were only with providers, not residents or APPs **Feasibility:** Scribes did not show much impact other than for the provider to see more patients **Application:** Costly to apply as investment is needed to train scribes.

AHRQ Agency for Healthcare Research and Quality **CAHPS** Consumer Assessment of Healthcare Providers and Systems **CI** Confidence Interval **DV** Dependent Variable **IV** Independent Variable **LOE** Level of Evidence **LOS** Length of Stay **RVU** Relative Value Unit **ED** Emergency Department **EMR** Electronic Medical Record **NP** Nurse Practitioner **PDCA** Plan-Do-Check-Act **PAs** Physician Assistant **REDCap** Research Electronic Data Capture **SAS** Statistical Analysis Software **RQ** Research Question

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
Walker et al., (2023) Impact of scribes on emergency medicine doctors' productivity and patient throughput: multicentre randomized trial **Country:** Australia **Funding:** None **Bias:** None	Six Sigma	**Design:** Randomized, multicentre clinical trial **Purpose:** To evaluate the changes in productivity when scribes were used by emergency physicians in emergency departments in Australia and assess the effect of scribes on throughput.	**N=** 88 providers 12 scribes 589 scribed shifts 3296 non-scribed shifts **Demographics:** Permanent, Salaried physicians working more than one shift a week **Setting:** Emergency department **Exclusion:** Public holidays and overnight shifts, observation unity shifts, unrecorded and unpaid overtime **Attrition:** none	**IV1:** Allocation of scribe **DV1:** Physician productivity **DV2:** Patient throughput **DV3:** LOS **Definitions:** none	**Tools:** Kruskall-Wallis, Stata **Validity/ Reliability:** Direct data obtained from charts, data is highly reliable.	**Statistical Tests Used:** Confidence interval, significance level, mean, X2	**DV1:** Increased 1.13hr to 1.31hrs for productivity showing no improvement **DV2:** 15.9% gain in productivity **DV3:** LOS Reduced from 192 minutes to 173 minutes. ($P<0.001$)	LOE 2 **Strengths:** Greatest gains showed with senior doctors at triage. Productivity gains showed a favorable financial position with the use of scribes. Scribes were deemed as beneficial for this study. **Weakness:** One Australian state **Feasibility:** Economically viable to increase productivity and financial gain for hospitals **Application:** Can be complicated due to training the scribes, but ones trained, can gain traction.

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
(Heaton et al., 2019) A Time-Driven Activity-Based Costing Analysis of Emergency Department Scribes **Country:** USA **Funding:** Mayo Foundation for Medical Education and Research **Bias:** None	PDCA	**Design:** Prospective observation cohort study **Purpose:** To apply time-driven activity-based costing methodology to determine emergency physician documentation costs with and without scribes	**N=** 64 hours **Demographics:** adult and pediatrics **Setting:** hospital **Exclusion:** None **Attrition:** 0	**IV1:** EMR charts **DV1:** Documentation during shift **DV2:** Post shift documentation **DV3:** Scribe present or not **DV4:** ESI level **Definitions:** EMR charts	**Tools:** EMR charts Tablet based time recorder **Validity/ Reliability:** Reliability is high as it is true data from EMR charts	**Statistical Tests Used:** Averaging the time	**DV1:** decreased by 9.6 minutes with scribe **DV2:** decreased by 50.85 minutes with scribe **DV3:** being present helped in total time **DV4:** dependent on patient and how ill they are	LOE 4 **Strengths:** Two research assistants were present in-person over the course of 2 months for documentation **Weakness:** Limited number of clinical hours and practice differences between each provider **Feasibility:** Scribes did show to be an impact for providers to have less overall documentation time. **Application:** Costly to apply as investment is needed to train scribes. But overall beneficial in documentation time so providers can see more patients, increasing RVU.

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
(Gottlieb et al., 2021) Effect of Medical Scribes on Throughput, Revenue, and Patient and Provider Satisfaction: A Systematic Review and Meta-analysis **Country:** USA **Funding:** None **Bias:** None	PDCA	**Design:** Meta-analysis **Purpose:** To assess the effect of scribes on throughput, revenue, provider satisfaction, and patient satisfaction in both the emergency department (ED) and non-ED setting.	**N=** 39 studies **Demographics:** adult and pediatrics **Setting:** hospital **Exclusion:** Case reports, case series, review articles, and studies not available in English or Spanish **Attrition:** 0	**IV1:** EMR charts **DV1:** RVU **DV2:** Throughput **DV3:** Provider satisfaction **DV4:** Patient satisfaction **Definitions:** EMR charts	**Tools:** Cochrane Risk of Bias, Newcastle-Ottawa Scale, Manual extraction of data **Validity/ Reliability:** Reliability is high as it is true data from all of the respective studies	**Statistical Tests Used:** Inverse-variance	**DV1:** Increased by 0.30 (95% CI) **DV2:** No difference 5.74 mins: 95% CI **DV3:** Increased 14 of 16 studies **DV4:** Increased 7 of 18 studies	LOE 1 **Strengths:** Largest review of this topic **Weakness:** Funnel plot may indicate bias. There was significant heterogeneity between studies **Feasibility:** The findings are sustainable for many emergency departments, but would just depend on the need. **Application:** Given the overall benefit, it would be great to apply the scribes in to practices.

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
(Cleland, 2017) Effect of Medical Scribe use on Medical Provider Productivity and Job Satisfaction in a Walk-in Urgent Care Medical Clinic **Country:** USA **Funding:** None **Bias:** None	PDCA	**Design:** clinical project **Purpose:** To understand provider productivity and provider satisfaction with scribe usage	**N=** 5 **Demographics:** MD, DO, NP, PA **Setting:** Urgent Care clinic **Exclusion:** none **Attrition:** none	**IV1:** EMR charts **DV1:** provider productivity **DV2:** provider satisfaction **Definitions:** N/A	**Tools:** Mean, standard deviation, Excel spreadsheet Likert scale **Validity/ Reliability:** Amman, AMA, UCSF (2012, 2014, 2014) Likert Scale from AMA and UCSF CSP model	**Statistical Tests Used:** Mean, median, standard deviation, confidence interval, t-test, Mahn-Whitney test	**DV1:** Improved number of patients per hour by 0.59 P<0.001 **DV2:** Improved P<0.001	**LOE 1** **Strengths:** SPSS software and excel **Weakness:** small sample size and one institution **Feasibility:** easy to accomplish at a small practice **Application:** Can be applicable, however if the practice is small, then the cost may outweigh the benefit

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
(Taylor et al., 2019) Medical Scribe Impact on Patient and Provider Experience **Country:** USA **Funding:** None **Bias:** None	PDCA	**Design:** mixed method **Purpose:** To understand provider productivity and provider satisfaction with scribe usage	**N=** 250 observations **Demographics:** 2 MDs and 4 scribes **Setting:** Ambulatory Care Military Treatment Facility **Exclusion:** none **Attrition:** none	**IV1:** EMR charts **IV2:** questionnaire **DV1:** patient satisfaction **DV2:** provider satisfaction **DV3:** Time efficiency **Definitions:** N/A	**Tools:** Likert scale **Validity/ Reliability:** Questionnaire created and approved by Navy Medicine, unable to determine reliability due to questionnaire being constructed.	**Statistical Tests Used:** ANOVA, Dunnett's C Post-hoc, Mann-Whitney U tests, Levene's test of homogeneity	**DV1:** Not improved P=0.014 **DV2:** Improved **DV3:** Improved P=0.03	**Level of Evidence:** Level IV **Strengths:** small sample size made it more focused **Weakness:** Need for a validated questionnaire for pre and post patient and provider experience **Feasibility:** easy to apply, but patient and providers must agree on implementation **Application:** Can be applicable, however if the practice is small, then the cost may outweigh the benefit

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
(Addesso et al., 2019) Impact of Medical Scribes on Provider Efficiency in the Pediatric Emergency Department **Country:** USA **Funding:** None **Bias:** None	Six Sigma	**Design:** observational pre and post study **Purpose:** To understand provider efficiency, nursing satisfaction, and patient satisfaction with scribe usage	**N=** 22 providers **Demographics:** 18 MDs and DOs, 2 pediatricians, 2 NPs **Setting:** pediatric ED **Exclusion:** none **Attrition:** none	**IV1:** EMR charts **DV1:** patient satisfaction **DV2:** provider efficiency **DV3:** ED efficiency **DV4:** Nursing satisfaction **Definitions:** N/A	**Tools:** Likert scale, RVUs via EMR **Validity/ Reliability:** Reliable for scribe usage via EMR and Likert scale Questions were adapted and modified from CAHPS developed by AHRQ	**Statistical Tests Used:** REDCap	**DV1:** No statistical significance 42.96% chose provider with a scribe, 47.74% were neutral, and 9.30% chose without a scribe **DV2:** Improved by 0.24 patients/hr ($p<0.001$) **DV3:** Improved by 4.1% in ED census **DV4:** Improved 51.16% nurses would work with a scribe, 46.51% were indifferent	**LOE 3** **Strengths:** first study to obtain nursing satisfaction, increased provider and patient satisfaction **Weakness:** Limited to nonurgent area of the ED, lack of a validated tool to assess patient, provider, and nurse reaction to scribe **Feasibility:** easy to apply, but providers must agree on implementation due to the cost of scribes being variable **Application:** Can be applicable, but may be better to be used in the urgent care side of the ER

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
(Shuaib et al., 2019) Impact of a scribe program on patient throughput, physician productivity, and patient satisfaction in a community-based emergency department **Country:** USA **Funding:** None **Bias:** None	PDCA	**Design:** Quasi-experimental, before-and-after study **Purpose:** To understand physician productivity, patient throughput, and patient satisfaction with scribe usage	**N=** 12,721 EMR charts pre-scribe 13,598 EMR charts post-scribe **Demographics:** Patient encounters in emergency department **Setting:** community based emergency department **Exclusion:** none **Attrition:** none	**IV1:** EMR charts **DV1:** patient throughput **DV2:** physician productivity **DV3:** patient satisfaction **DV4:** time-motion analysis **Definitions:** N/A	**Tools:** descriptive statistics **Validity/ Reliability:** Reliable for scribe usage via EMR as it was real-time factual data	**Statistical Tests Used:** t-test, standard deviation, p-values	**DV1:** Improved $p < 0.0001$ **DV2:** Improved $p < 0.001$ **DV3:** Improved $p < 0.01$ **DV4:** Improved $p < 0.001$	**LOE 3** **Strengths:** Real-time factual data. **Weakness:** No randomization **Feasibility:** easy to apply, but patient and providers must agree on implementation **Application:** Can be applicable, but may be better to be used in the urgent care side of the ER

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Table A2

Evaluation Table for Qualitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method/ Sampling	Sample/ Setting	Major Themes Studied/ Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Level/ Quality of Evidence; Decision for/ Application to practice; Generalization
(Corby et al., 2021) A qualitative study of provider burnout: do medical scribes hinder of help? **Country:** USA **Funding:** Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services **Bias:** None	Six Sigma	**Design:** Qualitative study **Method:** Qualitative Rapid assessment process **Purpose:** To identify relevant elements of the provider-scribe relationship and describe how and to what extent they may influence provider burnout.	**Sample:** 184 transcripts **Demographics:** Scribes and medical students **Setting:** Clinics and hospitals, 5-site visit **Attrition:** None	• RQ1: provider satisfaction • RQ2: provider burnout • RQ3: provider retirement • RQ4: ways to eliminate burnout teaching	**Data Collection:** Interview transcripts and observational field notes **Data Dependability:** All interviews were straight from the source and not third-party, thus making it dependable	Content analysis NVivo12 to identify patterns and themes across data	(1) Increased with scribes (2) Decreased with scribes (3) Kept providers from retiring early (4) Increased opportunities for providers to serve as mentors	**Level of Evidence:** Level VI **Strengths:** Overall agreement on impact of concerns **Weakness:** Due to the participants volunteering, there may be a potential bias **Feasibility:** Scribes decrease overall burnout, thus, retaining providers making it feasible. **Application:** Scribes are an investment. Organizations must take the decision based on overall impact.

AHRQ Agency for Healthcare Research and Quality **CAHPS** Consumer Assessment of Healthcare Providers and Systems **CI** Confidence Interval **DV** Dependent Variable **IV** Independent Variable **LOE** Level of Evidence **LOS** Length of Stay **RVU** Relative Value Unit **ED** Emergency Department **EMR** Electronic Medical Record **NP** Nurse Practitioner **PDCA** Plan-Do-Check-Act **PAs** Physician Assistant **REDCap** Research Electronic Data Capture **SAS** Statistical Analysis Software **RQ** Research Question

Citation	Theory/ Conceptual Framework	Design/ Method/ Sampling	Sample/ Setting	Major Themes Studied/ Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Level/ Quality of Evidence; Decision for/ Application to practice; Generalization
(Heckman et al., 2020) Medical Scribes, Provider and Patient Experience, and Patient Throughput: a trial in an Academic General Internal Medicine Practice **Country:** USA **Funding:** The Linde Family Institute for Primary Care and the Beth Israel Deaconess Division of General Internal Medicine **Bias:** None	Kolb's Experiential Learning Theory	**Design:** quasi-experimental **Method:** qualitative interviewing **Purpose:** To measure the effect of medical scribes on patient satisfaction, provider satisfaction, and provider productivity	**Sample:** 4 attending physicians who worked with scribes and 9 physicians who did not **Demographics:** Physicians in a large hospital-affiliated general internal medicine practice **Setting:** clinic **Attrition:** 664 clinic sessions and returned 547 (82%) surveys	• RQ1: provider satisfaction • RQ2: patient satisfaction • RQ3: provider productivity	**Data Collection:** Interview transcripts and 5-point Likert scale survey from the AMA Steps Forward Team Documentation Module **Data Dependability:** Possibly early adopter bias for medical scribes	Content analysis, inter-rater reliability, interpretation of patterns and themes in textual data,	(1) Average experience scores did not differ between providers with and without scribes (4.01 vs 3.40; *p* time-by-group interaction = 0.26) (2) Did not differ (4.73 vs 4.75 respectively; *p* interaction = 0.90) (3) Increased with scribes (2.29 vs 1.91; *p* interaction < 0.001)	**LOE 3** **Strengths:** Overall agreement on impact of concerns **Weakness:** Low survey rates from patients. Limited funding which didn't allow more scribes to participate. **Feasibility:** Scribes increase overall satisfaction, thus, retaining providers making it feasible. **Application:** Scribes are an investment. Organizations must take the decision based on overall impact.

AHRQ Agency for Healthcare Research and Quality **CAHPS** Consumer Assessment of Healthcare Providers and Systems **CI** Confidence Interval **DV** Dependent Variable **IV** Independent Variable **LOE** Level of Evidence **LOS** Length of Stay **RVU** Relative Value Unit **ED** Emergency Department **EMR** Electronic Medical Record **NP** Nurse Practitioner **PDCA** Plan-Do-Check-Act **PAs** Physician Assistant **REDCap** Research Electronic Data Capture **SAS** Statistical Analysis Software **RQ** Research Question

Table A3

Synthesis Table

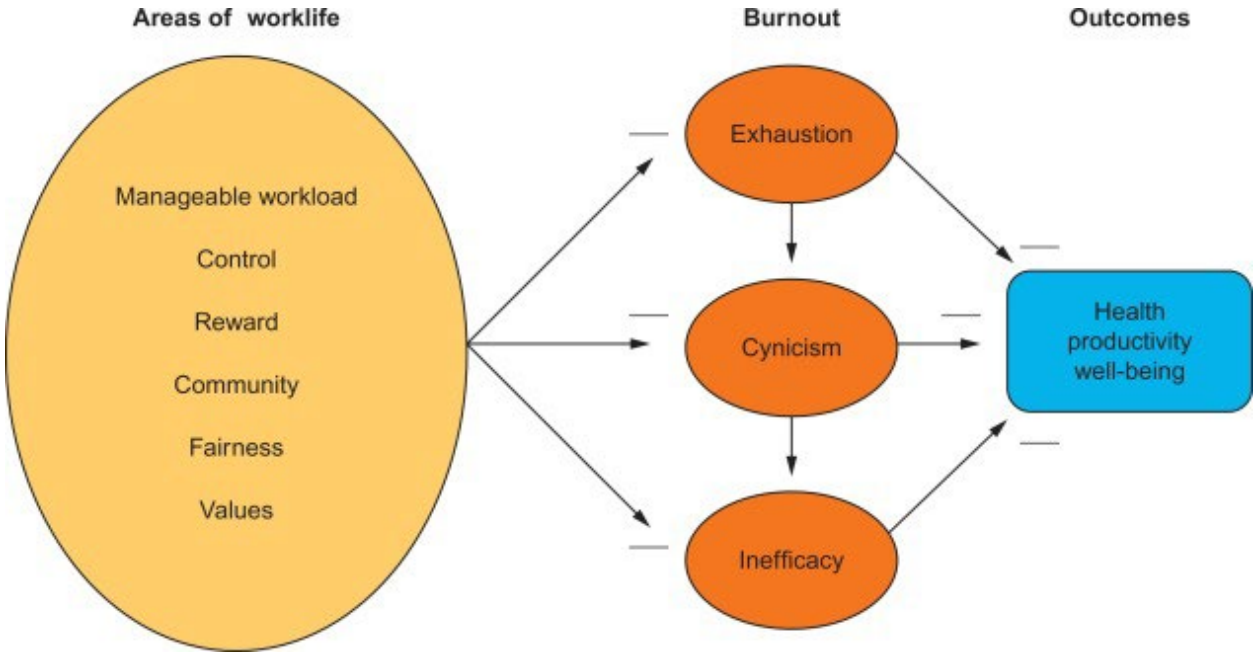
Study (Author, year)	Heaton et al., 2017	Walker et al., 2013	Heaton et al., 2019	Gottlieb et al., 2021	Cleland et al., 2017	Taylor et al., 2019	Addesso et al., 2019	Corby et al., 2021	Heckman et al., 2020	Shuaib et al., 2019
Design	MA	RMCT	POCS	MA	CS	MM	OBS	QS	QE	QE
LOE	II	II	IV	I	I	IV	III	IV	III	III
Sample										
EMR charts	17,053						15			26,319
Employees (Doc, NP, PA)		100			5	6		76	13	
Hours			64							
Setting										
Clinic (Different)						X		X	X	
ED	X	X	X	X	X		X	X		X
Interventions										
Provider Satisfaction				X	X	X	X	X	X	
Provider Productivity		X			X			X	X	X
Patient Satisfaction				X		X	X		X	X
Nursing Satisfaction							X			
ED Throughput		X		X			X			X
Length of Stay	X	X								
Treatment Time	X		X							
Provider to Dispo	X									
RVU				X						
Tools										
Likert Scale (different)					X	X	X		X	
Interview								X		
EMR	X		X				X			
Other		X		X						X
Outcomes										
Improved	X	X	X	X	X	X	X	X	X	X
No Improvement	X (PD)	X (PP)				X (Pt)		X		
No Change				X (TP)			X (Pt)			

CS Clinical Study **CSS** Cross Sectional Study **MA** Meta Analysis **ED** Emergency Department **MM** Mixed Method **OBS** Observational Study **POCS** Prospective Observational Cohort Study **PD** Provider Disposition **PP** Provider Productivity **Pt** Patient Satisfaction **QE** Quasi Experimental **QS** Qualitative Study **RMCT** Randomized Multicentre Clinical Trial **SA** Statistical Analysis **TP** Throughput

Appendix B

Models and Frameworks

Figure B1
Maslach's Burnout Theory



(Bui et al., 2022)

Figure B2
Plan Do Study Act Model

Figure A2. Adapted by World Health Organization, 2019. The Plan-Do-Study-Act Model: What it is and why it matters to cope with workplace stress. Copyright 2019.

Appendix C
Instrument

Clinician Burnout Survey

Demographics: We would love to know more about you!

Age _____ (yrs)

Please put a ***check mark*** to what applies to you.

Gender: _____ Male _____ Female _____ Other _____ (write in)

Ethnicity:
____ Caucasian
____ African American/Black
____ Hispanic/Latino
____ Island/Pacific Asian
____ Asian
____ Native American
____ Other _____ (write in)

Marital Status:
_____ Single
_____ Married
_____ Separated
_____ Divorced
_____ Widow/Widower

Role: _____ NP _____ PA

Years of Experience: _____ (yrs)

Purpose: Measure clinician burnout and understand the clinician experience as it relates to the collaborative documentation process.

Instructions: Each clinician shall answer the survey based on their burnout with team documentation established.

Work-related version of the BAT

Instruction

The following statements are related to your work situation and how you experience this situation.

Please state how often each statement applies to you.

Scoring

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

Core symptoms

	Never	Rarely	Sometimes	Often	Always
Exhaustion					
1. At work, I feel mentally exhausted*	☐	☐	☐	☐	☐
2. Everything I do at work requires a great deal of effort	☐	☐	☐	☐	☐
3. After a day at work, I find it hard to recover my energy*	☐	☐	☐	☐	☐
4. At work, I feel physically exhausted*	☐	☐	☐	☐	☐
5. When I get up in the morning, I lack the energy to start a new day at work	☐	☐	☐	☐	☐
6. I want to be active at work, but somehow I am unable to manage	☐	☐	☐	☐	☐
7. When I exert myself at work, I quickly get tired	☐	☐	☐	☐	☐
8. At the end of my working day, I feel mentally exhausted and drained	☐	☐	☐	☐	☐
Mental distance					
9. I struggle to find any enthusiasm for my work*	☐	☐	☐	☐	☐
10. At work, I do not think much about what I am doing and I function on autopilot	☐	☐	☐	☐	☐
11. I feel a strong aversion towards my job*	☐	☐	☐	☐	☐
12. I feel indifferent about my job	☐	☐	☐	☐	☐
13. I'm cynical about what my work means to others*	☐	☐	☐	☐	☐

	Never	Rarely	Sometimes	Often	Always
Cognitive impairment					
14. At work, I have trouble staying focused*	☐	☐	☐	☐	☐
15. At work I struggle to think clearly	☐	☐	☐	☐	☐
16. I'm forgetful and distracted at work	☐	☐	☐	☐	☐
17. When I'm working, I have trouble concentrating*	☐	☐	☐	☐	☐
18. I make mistakes in my work because I have my mind on other things*	☐	☐	☐	☐	☐
Emotional impairment					
19. At work, I feel unable to control my emotions*	☐	☐	☐	☐	☐
20. I do not recognize myself in the way I react emotionally at work*	☐	☐	☐	☐	☐
21. During my work I become irritable when things don't go my way	☐	☐	☐	☐	☐
22. I get upset or sad at work without knowing why	☐	☐	☐	☐	☐
23. At work I may overreact unintentionally.	☐	☐	☐	☐	

Appendix D

Chart Audit

Subject ID With Scribes	AGE/ YEARS	GENDER 1 Male 2 Female 3 other (write in)	APP 1.NP 2.PA	Number of Patients Day 1 & Hrs worked	Number of Patients Day 2 & Hrs worked	Number of Patients Day 3 & Hrs worked	Number of Patients Day 4 & Hrs worked	Number of Patients Day 5 & Hrs worked	Post work charting (minutes)
100									
101									
102									
103									
104									
105									
106									
107									
108									
109									
Subject ID Without Scribes	**AGE/ YEARS**	**GENDER 1 Male 2 Female 3 other (write in)**	**APP 1.NP 2.PA**	**Number of Patients Day 1 & Hrs worked**	**Number of Patients Day 2 & Hrs worked**	**Number of Patients Day 3 & Hrs worked**	**Number of Patients Day 4 & Hrs worked**	**Number of Patients Day 5 & Hrs worked**	**Post work charting (minutes)**
100									
101									
102									
103									
104									
105									
106									
107									
108									
109									

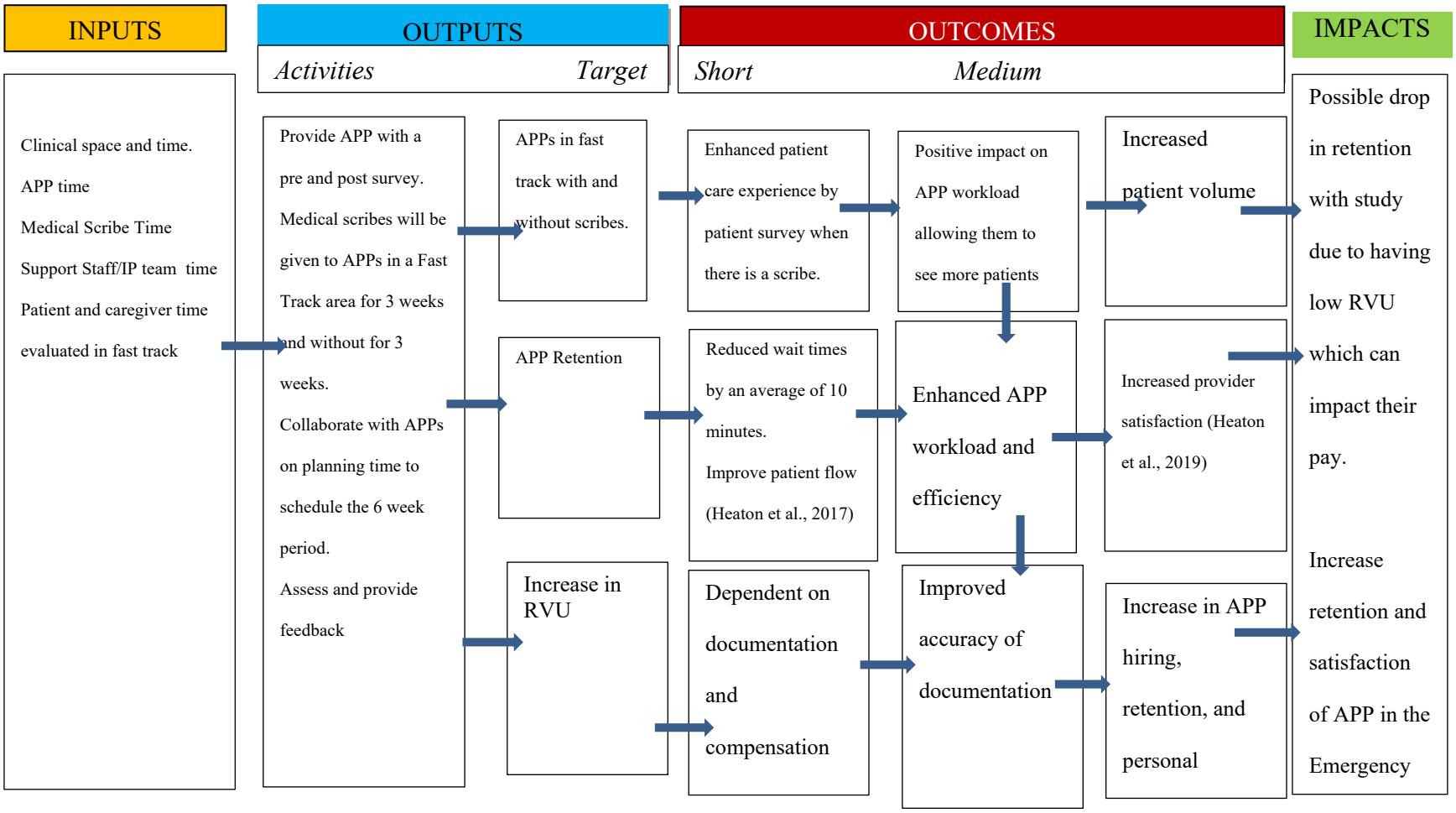
Appendix E
Budget

EXPENSE ITEMS	Requested Amount
Operations	
Equipment	50
Materials and supplies	20
Printing/duplication/marketing	10
Postage	0
Consultant Fees	0
Education	0
Implementation	0
Data Collection	0
Data Analysis	0
Training	0
Participant Payments	0
Other	0
TOTAL EXPENSES	80

Appendix F
Logic Model

Figure 1. Logic Model of APP Satisfaction With and Without Medical Scribes in the ED

Goals:



Assumptions: Improved documentation by medical scribes, improved communication and collaboration among healthcare providers, positive impact on physician workload, increased patient satisfaction, improved accuracy of documentation (Heaton et al., 2019)

Appendix G

Informed Consent

I am a Doctorate of Nursing Practice student under the direction of Professor Dr. Samantha Currier in the Edson College of Nursing and Health Innovation at Arizona State University. I am conducting a research study to evaluate Advance Practice Provider's satisfaction and productivity in the Emergency Department with and without medical scribes.

I am inviting your participation, which will involve 10 days of evaluation. You will complete a pre and post survey of your satisfaction and experience. You will be given a medical scribe for 5 days. You have the right not to answer any question, and to stop participation at any time. Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. The potential benefit of participation is that at the end of the evaluation if it is deemed that medical scribes do provide benefit in increased satisfaction and productivity, then they may be implemented at all working hours. There are no foreseeable risks or discomforts to your participation.

Your responses will be anonymous. The results of this study may be used in reports, presentations, or publications but your name will not be used. Surveys will be de-identified using your own personalized two letters and two numbers as your identification which will be unknown to this investigator. The same survey will be answered twice and will take no more than 5 minutes each time. De-identified data will not be shared with others (e.g., investigators or industry partners) for future research purposes or other uses.

All participants must be at least 18 years old.

If you have any questions concerning the research study, please contact the research team: Archana Pabla, asethi21@asu.edu or (510)393-4322 or Dr. Samantha Currier (Principal Investigator) at (415)906-4757 or Samantha.currier@asu.edu. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know if you wish to be part of the study.

By signing below you are agreeing to be part of the study.

Name:

Signature: Date:

Appendix F

Table F1

Demographics

Variable	*n*	*%*
Gender		
Female	7	70.00
Male	3	30.00
Ethnicity		
Caucasian	9	90.00
Hispanic	1	10.00
Marital Status		
Single	4	40.00
Married	6	60.00
Role		
PA	4	40.00
NP	6	60.00

Note. Due to rounding errors, percentages may not equal 100%.

Table F2

Demographics (Age & Years of Experience)

Variable	*M*	*SD*	*n*	Min	Max
Age	42.70	11.85	10	27.00	65.00
Years of Experience	7.65	6.52	10	1.50	19.00

Table F3

Summary Statistics for Pre and Post Burnout Overall Scores

Variable	*M*	*SD*	*n*	Min	Max
Pre Burnout	2.70	0.49	10	1.65	3.09
Post Burnout	1.78	0.33	10	1.17	2.17
Pre Secondary Symptoms	2.51	0.27	10	2.00	2.80
Post Secondary Symptoms	1.54	0.25	10	1.00	2.00

Table F4

Two-Tailed Paired Samples t-Test for the Difference Between Pre Burnout and Post Burnout

Pre Burnout		Post Burnout				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
2.70	0.49	1.78	0.33	6.81	< .001	2.15

Note. N = 10. Degrees of Freedom for the *t*-statistic = 9. *d* represents Cohen's *d.*

Figure F1

The means of Pre Burnout and Post Burnout with 95.00% CI Error Bars

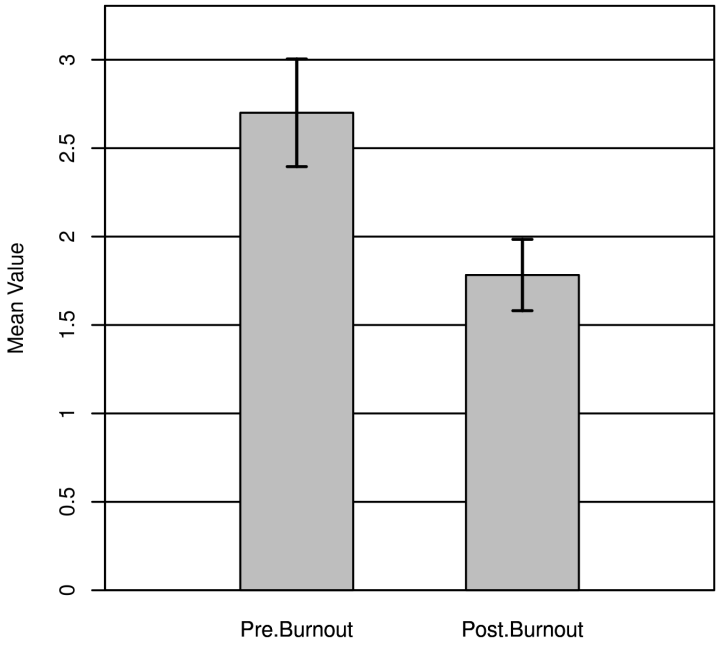


Table F5

Overall Burnout Scores for PAs

Variable	*M*	*SD*	*n*	Min	Max
Pre Burnout	2.28	0.57	4	1.65	3.04
Post Burnout	1.63	0.46	4	1.17	2.17

Table F6

Overall Burnout Scores for NPs

Variable	*M*	*SD*	*n*	Min	Max
Pre Burnout	2.98	0.07	6	2.91	3.09
Post Burnout	1.88	0.19	6	1.57	2.13

Table F7

Number of Patients Seen with and Without Scribes

Variable	*M*	*SD*	*n*	Min	Max
Patients Seen Without Scribes	88.60	14.61	10	74.00	124.00
Patients Seen with Scribes	119.60	21.08	10	84.00	146.00

Table F8

Number of Hours Worked with and Without Scribes

Variable	*M*	*SD*	*n*	Min	Max
Hours Worked Without Scribes	48.90	3.03	10	43.00	54.00
Hours Worked with Scribes	49.70	4.08	10	42.00	55.00

Table F9

After Work Hours for Chart Completion (in minutes)

Variable	*M*	*SD*	*n*	Min	Max
Extra Time Charting Without Scribes	58.50	14.92	10	30.00	90.00
Extra Time Charting with Scribes	22.50	7.91	10	15.00	30.00

Table F10

Burnout Scores by Categories

Variable	*M*	*SD*	*n*	Min	Max
Pre Exhaustion	2.99	0.55	10	2.00	3.62
Post Exhaustion	2.06	0.42	10	1.38	2.62
Pre Mental Distance	2.74	0.76	10	1.00	3.40
Post Mental Distance	1.88	0.53	10	1.00	2.60
Pre Emotional Impairment	2.20	0.68	10	1.00	3.20
Post Emotional Impairment	1.34	0.38	10	1.00	2.20
Pre Cognitive Impairment	2.70	0.43	10	2.00	3.20
Post Cognitive. Impairment	1.68	0.41	10	1.00	2.20
Pre Secondary Symptoms	2.51	0.27	10	2.00	2.80
Post Secondary Symptoms	1.54	0.25	10	1.00	2.00

Appendix G

Glossaries

Mean (*M*): The average value of a scale variable.

Percentage (*%*): The percentage of the frequency or count of a nominal or ordinal category.

Sample Minimum (Min): The smallest numeric value in a given sample.

Sample Maximum (Max): The largest numeric value in a given sample.

Sample Size (*n*): The frequency or count of a nominal or ordinal category.

Standard Deviation (*SD*): The spread of the data around the mean of a scale variable.

Paired Samples *t*-Test

The paired (dependent) samples *t*-test is used to assess for significant differences between two scale variables that can be matched. Typically, the scale variables are matched by time (e.g. pretest vs. posttest), but the data can also be matched in other ways (e.g. husband vs. wife). The test uses the average difference between each pair of matched scores to compute the t statistic, which is used with the *df* to compute the *p*-value (i.e., significance level). A significant result indicates the observed test statistic would be unlikely under the null hypothesis. The dependent samples *t*-test assumes that the differences between pairs of matched scores are normally distributed (i.e., normality).

Cohen's *d*: Effect size for the *t*-test; determines the strength of the differences between the matched scores. The larger the effect size, the greater the differences in the matched scores.

Degrees of Freedom (*df*): Refers to the number of values used to compute a statistic. The *df* is determined by the number of observations in the sample and equal the number of observations - 1; used with *t* to compute the *p*-value.

Normality: Refers to the distribution of the data. The assumption is that the data follows the bell-shaped curve.

***p*-value:** The probability of obtaining the observed results if the null hypothesis is true. A result is usually considered statistically significant if the *p*-value is $\leq .05$.

Shapiro-Wilk Test: A test to assess if the assumption of normality is met. If statistical significance is found in this test, the data is *not* normally distributed.

***t*-Test Statistic (*t*):** Used with the *df* to determine the *p* value.