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Empowering Clinicians through AI-Augmented Documentation: Insights from Dragon Copilot Implementation

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ABSTRACT: Microsoft Dragon Copilot is an AI-enabled clinical documentation platform connecting and easing the burden of administrative tasks for healthcare providers. With the ability for real time transcription of conversations; detailed notes, mapped to a clinical specialty, and in partnership with Microsoft Dragon Medical One and DDX Copilot. Dragon Copilot also has voice command editing, template use (with ability to edit), and the ability to create notes for tasks such as order entry and letters of referral. Within academic medical centers, studies demonstrate a reduction in after-hours charting of >50%, and the overall time for documentation of almost 40% creating more face-to-face time with patients and decreasing the cognitive burden of documentation. There is also a chance Dragon Copilot improves clarity and thoroughness of notes, which would also help with patient safety. The software is simplified to use in conjunction with current electronic health records, and the user is also given the choice to customize the notes according to workflow. Future research would need to explore whether the platform has lasting impacts on patient outcomes and clinician burnout, but this tool could change the clinical documentation landscape.

KEYWORDS: Dragon Copilot, Dragon Medical One, DAX Copilot, Cognitive Load

I. INTRODUCTION

The healthcare industry still faces significant challenges related to the clinical workflow and documentation. Work time is finite, and clinicians are assigned many bureaucratic obligations related to documentation in addition to treating patients. This results in shorthand documentation being completed because many cut and paste statements from either fillable, or template-based notes that lack sufficient clinical context, and therefore provide an inadequate level documentation for compliance, coding and claims denial purposes. The increased documentation void is further exacerbated by the poor working relationship between the coding team and the physician team, as coders constantly have to decipher ambiguous notes from the clinician adding to the administrative waste. The talent pool of medical coding professionals and clinical documentation improvement experts continues to shrink, which presents a new dimension of operational strain. In addition, incorporating new documentation solutions is increasingly difficult as the existing documentation solutions are somewhat limited in their capabilities regardless of the vendor solution and require manual adjustments omitting incredibly important clinical detail. Regulatory affairs and billing compliance burden an already burdensome process that increases clinician burnout and detracts from the patient experience. Healthcare documentation incentivizes the billing of services and the time it takes to evaluate and implement services and does not incentivize quality of care. The current model exacerbates payment and continuity of service and extends from value of care [1]. A new model and approach to clinical practice stems from an urgency to improve patient outcomes, clinician satisfaction, and access to care, especially in the light of the many burdens of unnecessary administration. Excessive documentation creates a significant burden in the delivery of care and is best defined by being rigorous, complex and time consuming, with clinicians creating additional burnout and productivity in documentation versus care. AI will fundamentally evolved the way we generate documentation about complex clinical encounters. AI will continue to document without clinicians intervene or leave their direct care process. AI will eliminate or offload all other cognitive burden and increase the validity of documentation to aid the completeness of the record for coding validity for reimbursement and compliance.

AI enhances clinical intelligence by providing decision support in real-time risk stratification, and predictive analytics, which support clinicians while also enabling personalized, proactive patient care. AI is also a data synthesizing technology that enables early identification of illness and improves care pathways between care settings. AI eases

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constraints by performing some of the complexity of clinical operations, including order processing, coordinating referrals, reducing administrative costs, and documentation to close gaps in workforce capacity. In short, the implementation of AI within healthcare means moving care from retrospective, paperwork nipping, and ongoing burden on clinician thought and judgement tape, to a data-informed, patient-centered clinical approach that is not burdened by a lengthy documentation process, and enables clinicians to return to doing what they do best; providing quality patient care. One example of this approach is Dragon Copilot, an AI-Powered clinical solution that improves clinician satisfaction, improves efficiency for the organization, and ultimately improves patient health outcomes. [2]

In order to assess clinical AI safety and regulatory compliance, the first step is to clarify the use case and regulatory question, which includes stating the clinical problem AI would address, as well as context of use (e.g., risk prediction, diagnostic support) so a more comprehensive assessment can be conducted that will satisfy safety and efficacy regulatory requirements. Next, an assessment of the AI model risks to patient safety, data privacy, or any harm from erroneous outputs needs to take place, noting that with higher risk use, controls need to be proportionally tighter. Afterward, a credibility assessment plan should be developed which will clarify how to assure that the AI model will be verified for reliability, safety, and performance, with a plan to report results of performance measures and verification criteria. In addition, adequate testing and validation will need to take place with both prospective and retrospective clinical data including how the AI will show applicability to practice and will monitor for bias, uncertainty, and error.

Lastly after reaching deployment, risk monitoring and risk mitigation, including alert mechanisms for unexpected or unusual outputs and human oversight for when performance issues or patient safety issues were identified, is of critical importance. Comprehensive documentation of all procedures and processes surrounding development, testing, and compliance will need to be created, and regulatory filings will need to be prepared for regulatory authorities such as the FDA and EMA. Furthermore, it is necessary to engage with regulatory authorities throughout the AI lifecycle to clarify requirements and facilitate approval. Lastly, there must be an acknowledgment of the need to undergo continual lifecycle management, because clinical AI must adapt to new clinical standards, new technologies, and new regulations through ongoing updates and compliance checks throughout the AI lifecycle [3].

Microsoft Dragon Copilot, will be a state-of-the-art artificial intelligence (AI) application that is meant to support healthcare providers with their workflow by decreasing the administrative load. Ambient listening and generative AI engage, allowing simultaneous recording and processing of clinical conversations, so clinicians can spend more time with patients instead of with paperwork. The system listens to multilingual conversations, creates multicomplex clinical notes that contain all important details and, based on specialty, generative AI can assist by editing notes and creating summaries. Clinicians can also personalize their tool experience using adaptive prompts and other devices settings.

The tool consolidates important patient data, i.e. test results, medical history, etc., into a single interface reducing inertia in decision making in the clinical encounter. The automation of clinical and administrative tasks allows for efficiencies in workflow. The integration of Dragon Copilot with top EHRs (i.e. Epic) supported secure and accurate data management and processing of clinical notes. After training on millions of clinical interactions, Dragon Copilot showed considerable benefits in reducing clinician burnout, improved documentation quality and improved patient experiences in healthcare encounters. If the developments to date are any early indicators, this AI application demonstrates the potential to disrupt healthcare delivery models for clinicians providing support that can lift cognitive load and further patient-centered solutions in care encounters along with appropriate protections of data and agreements of compliance of information intercepted by the AI application [4].

Clinical practice is changing but there are challenges with too much documentation, administrative work, and clinician burnout. Electronic Health Records (EHRs) are an essential part of clinical practice, but they often work against designs since they change the priorities of clinical staff members to be less involved in patient interactions and more absorbed in documentation for the purposes of legal record, which was an unproductive practice associated with physician dissatisfaction and poor patient experience [6]. The changing trajectory of technology in artificial intelligence (AI) might now disrupt clinical service delivery and advance in artificial intelligence (AI) through further machine learning, speech recognition, and natural language programming. Clinical encounters have also evolved over time, with different applications now utilizing AI to circumvent documentation constraints with documentation frameworks in mind to facilitate patient engagement. For example, the Microsoft product called Dragon Copilot is an example of a platform that is offering AI type functionality to enhance coordination of clinical encounters.

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Dragon Copilot has utilized multiple modalities including speech recognition, programming for ambient clinical listeners, and generative AI to streamline the clinical workflow such that physicians can voice dictate medical record documentation, provide clinical commands, and in some instances engage with patient data without unnecessary interruption. Dragon Copilot has fundamentally transformed clinical documentation from an exhausting daily chore to a clinically supportive tool that directly addresses some of the significant administrative burden on the healthcare system, which creates physician fatigue and dissatisfaction. As Dragon Copilot actively participates in real time physically enhancing physician-patient interactions and professionally documented encounters [5]. This study examines the Dragon Copilot to add another layer of complexity for clinical encounters in a hospital-based environment and determine downstream outcomes that provide value to clinicians for activities including documentation, reducing usage time of EHR, alleviating cognitive load, and improving clinician satisfaction, among others.

II. RELATED WORK

Evaluative studies of AI tools in clinical documentation have thus far reported several technologies that improve efficiency through clinical data organization, note annotation, documentation evaluation, identifying trends, and error detection. The emergence of the AI real-time digital or ambient scribe, offers the ability to reduce typing time, enabling the physician time to contribute to more patient care. By recording interactions, speaking audibly and transcribing to create notes. While AI tools show improvements on efficiencies, duplicates of inaccuracies, clinical monitoring and discrepancies in experiences in use from speciality to speciality exist. Studies have investigated the range of AI documentation tools impact on productivity efficiencies and documentation quality by input of AI-enabled tablets improved accuracy and efficiency of documentation through audio transcription and generating notes from handwritten notes.

According to some research, the addition of speech recognition to EHRs significantly reduces documentation time (56%). While burnout reduction is not universally supported, there is some evidence of improved provider-attentiveness with ambient AI scribes. Leading AI clinical assistants (such as Nuance Dragon Medical One) have been tested for their abilities to increase documentation speed, accuracy, and clinician engagement (i.e., improved eye contact) during the patient encounter. Regardless of potential effectiveness, these tools require further examination for biases, ethics, the need for robust medical responsibility, and the variability of AI documentation. Research demonstrates that balancing efficiency with safety, quality, and clinician acceptance when implementing AI as part of the clinical documentation will be necessary if we are fully realign AI's promise to change these jobs [7].

Evaluations studying Dragon Copilot and AI clinical documentation technologies impact on workflow, clinician experience, and patient outcomes use multiple methods. Interventional clinical trials, such as the Dragon Ambient eXperience (DAX) Copilot Evaluation study, involved recruitment of physicians from different specialties, measuring outcomes such as EHR time, documentation time, documentation completion rates, and provider satisfaction via surveys and qualitative interviews over ten months. The analyses of quantitative metrics used objective measurements, including EHR usage logs and documentation length relative to the total amount time save before and after AI implementation within clinical environments, to determine impacts on financial concerns, and time before and after implementation. Qualitative analyses centered on clinicians' subjective experiences, cognitive load due to the AI, and barriers to implementation initiated using semi-structured interviews and focus-groups as well as recommendations intended for iterative modifications of AI tools. Observational analyses provide information during real clinical deployments of workflow patterns and communication with patients and adequacy of documentation. Evaluated studies, assess AI and performance metrics against specifications for the manual documentation and provide a means for supporting regulatory specifications but assists in developing some trust in the technology from users [8].

III. SYSTEM ARCHITECTURE

The architectural design of the Dragon Copilot system enables the seamless usage of Electronic Health Records (EHR) and operates on Microsoft Cloud for Healthcare to create a scalable, safeguarded, and compliant clinical workflow setting. It has been explicitly designed to use ambient AI listening technology that allows multiple clinicians to record multiparty clinical conversation audio as documentation in the EHR without involvement of the clinician-and-clinician conversation. Throughout its architecture, Dragon Copilot integrates real-time audio, recording, and processing of multiparty conversation audio and encompass transforming conversations into categorized clinical notes that leverage

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generative AI and natural-language processing. Clinicians gain access to one consolidated AI workspace that is available as stand-alone apps or as a voice-first interface embedded in the EHR, while also utilizing natural language requests for a variety of functions. The integration to EHR systems specifically eliminates breakage to the data flow in the recording as well as maintains both the continuity of the clinician's own workflow and clinical documentation. The platform satisfies enterprise-grade compliance and security standards including HIPAA compliance, as well as extensibility through developer tools and partner integrations. In addition to its recording functionalities, Dragon Copilot also has built-in feedback loops and version controls for audit-worthy documentation, while experienced clinicians can manage many recordings and improve AI-generated documented outputs. In summary, Dragon Copilot will facilitate enhanced collaboration between clinicians, present data that is always synchronized, and continue to fine-tune AI models to improve clinician experience and meaningfulness to the clinical context.

A quasi-experimental pre-post intervention design was used to understand the clinical impact of Dragon Copilot on clinician behavior and outcomes among 100 physicians across multiple specialties, following three phases of observation and intervention. The first phase was a two-week baseline observation phase in which clinicians used their usual documentation practice, which was primarily voice dictation or manual entry, to document variables including documentation time and patient-facing time. The second phase, weeks three and four, introduced Dragon Copilot and aided observation with in-depth training on the technology, including voice recognition and generative AI. The final phase, weeks five through twelve, involved both active and observation periods in which clinicians were observed to use Dragon Copilot to document in real-time with data collected from logging systems and direct observation. The longitudinal design provided a rigorous design to assess changes in documentation efficiency, clinician cognitive load and clinician satisfaction; further, it provided content surrounding the short-term and longer-term effects of artificially intelligent clinical documentation, while also representing educational research that more accurately modeled the complexities of a clinical context.

Dragon Copilot boosts clinical documentation and workflow efficiency, improving clinical documentation across a variety of its powerful capabilities. The Ambient AI and Speech Recognition Module records multi-lingual conversations between patient and doctor to create clinical workflow and realtime data flow without interrupting workflow, even offline.

- The Natural Language Processing (NLP) and Generative AI Engine takes unstructured audio and converts it to structured documentations, providing automatic documentation of relevant information and synthesis, editorial support, intelligent reminders, and decreased cognitive load while increasing accuracy of documentation.
- The AI Extensibility Framework uses APIs and cards to integrate with partner systems and invite multiplatform extensibility and interoperability, offering real time opportunities for clinical decision-making and recognition of customizable workflows through integration of knowledge specific to healthcare.
- With automated documentation tasks, the opportunity to expose patient information at key decision-making points, and support for voice-first interactions, Dragon Copilot shifts the physician time spent in focus on care of the patient instead of administrative burden.

The design of the system adheres to healthcare bi-partisan data privacy regulations and can be deployed in a wide variety of device and care settings. Microsoft Dragon Copilot is targeted towards improving clinical operations by embedding advanced AI functionalities. It incorporates ambient AI technology to unobtrusively listen and record conversations during patient appointments and interacts with patients in real-time, without stopping the communication process. The system is built on a high quality natural language voice recognition engine that accurately converts recorded audio into text, regardless of language or accent. Once the conversation is transcribed, the system has advanced natural language processing (NLP) pipelines and generative AI technologies to auto-generate draft clinical notes, extract relevant information, and organize transcripts into documents by specialty. Dragon Copilot is also able to present real-time ongoing patient context information for patient-centered decision-making, including relevant clinical guides and evidence-based recommendations. It will automate the insertion of the generated notes and other documents into the electronic health record systems and improve continuity of the workflow process while ensuring compliance.

Healthcare professionals can access the system through a shared interface on several platforms, which allows the clinician to modify the AI-generated content as well as provide feedback that can assist AI in improving over time. The technology is hosted on a secure cloud that is built upon Microsoft® Cloud for Healthcare, is scalable and can be

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integrated into our partner ecosystem, and meets Organization, Enterprise Grade Security standards and HIPAA compliance [9] illustrated below in Figure 1 is the data flow architecture that enables clinicians to offload administrative burdens and facilitate documentation and care delivery improvement through the integration of ambient AI documentation, voice recognition, clinical insights and EHR automation.

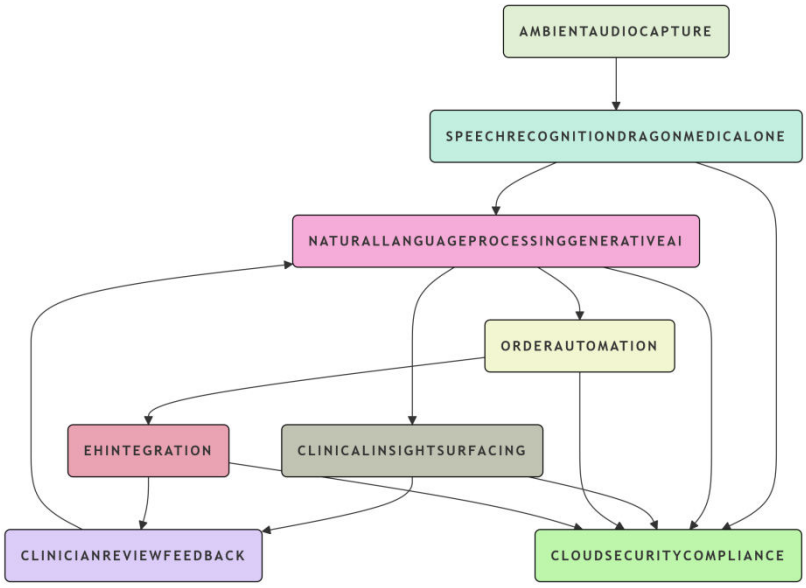

Figure 1: Dragon Copilot Data Flow Architecture

1. Ambient Audio Capture: The artificial intelligence engine of Dragon Copilot records multiparty discussions between patients and doctors without any prompt in clinical settings, allowing for complete recording of therapeutic communication.
2. Speech Recognition and Transcript Generation: The Dragon Medical One engine listens to audio and transcribes it into a multilingual transcription to document clinical information.
3. Natural Language Processing and Generative AI: Recorded transcripts are examined with natural language processing and generative AI models that have been trained on clinical data, and converted into systematic clinical notes, integrating notated elements like symptoms and diagnosis.
4. 4. Clinical Insight Gathering and Decision Support: The AI framework integrates seamlessly into partnership ecosystems, and gathers relevant patient data, lab findings and clinical recommendations into the clinician workflow leveraging adaptive cards and decision prompts.
5. 5. Order Automation and Workflow Integration: Automated order creation based on discussions minimizes human error and moves prescribed medications and lab tests into designated electronic health records environments such as Epic Order Entry.
6. 6. User Review and Learning Loop: Clinicians review and amend AI-formed content through one integrated experience across multiple devices incorporating clinician feedback that trains AI models.
7. Cloud-based Security and Compliance: Patient data is securely transferred and stored on the Microsoft Cloud for Healthcare with secure logging and protects all standards of HIPAA privacy.

Microsoft's Dragon Copilot platform has three AI constituents that support clinical documentation. In Dragon Medical One, physicians can dictate their notes in real time via speech-to-text transcription directly into the electronic health record (EHR). DAX Copilot can record clinical conversations passively, and it can quickly generate draft documentation using ambient listening technologies. Generative AI allows for EHR interfacing by generating letters of recommendation, visit summaries, and executing commands made in natural language via voice. We gathered data from three hospitals in which the Cerner and Epic EHRs are utilized. This data afforded us the ability to analyze all data using a configurable Clinical Efficiency Dashboard which tracked time spent on documentation, length of time

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providers were in patient interaction, and the turnaround time to complete applicable chart work off hours. We examined user satisfaction and system usability with the System Usability Scale (SUS), whereas perceived cognitive load was evaluated through the NASA Task Load Index (NASA-TLX). To obtain qualitative insights into the practical application and user experience of the Dragon Copilot, we completed semi-structured interviews with physicians [10].

The automation of clinical documentation is powered by ambient conversation recording and processing with DAX Copilot, which passively listens to multiparty conversations taking place in the patient visit while capturing the full therapeutic space, including the same in multilingual settings. The Dragon Medical One speech recognition engine is integrated into the solution to transcribe audio into accurate and real-time transcripts, which generates advanced AI and natural language processing for clinical notes, treatment plans, and diagnostics, all tied to the established rich, specialty-specific, clinical texts. Clinical insights from advanced AI and natural language processing appear in the clinician's workspace to facilitate clinical decision-making with minimal interruption to the clinician workflow. The automation improves workflows by pre-populating and sending orders to EHR modules, while simultaneously reducing the burden on clinicians in relation to documentation errors and cognitive load, and while keeping patients engaged.

The customizable clinical documentation tools within Dragon Copilot enable clinicians to personalize their documentation where possible. The user can adjust the specific sections of documentation (e.g. History of Present Illness, Allergies, Assessment) bullets or sections through the option of selecting from available templates or styles. Using suggested content or user-defined content, the added AI Elements personalization template would structure a professionally organized specialty-specific clinical summary. Clinicians can not only use templates of outlines that document automatically - to relegating information when warranted or desired to a limited degree to maintain a quality process or standardized expectations. Users may also oversee and maintain a personal library of AI-assisted prompts generated from clinical prompts and frequently used terms, which assist in the completeness personalization of clinical notes. This also leads to better quality notes with shorter edits, increased expectation of consistency in clinical notes.

In addition, AI-supported note-taking would identify the basic clinical information in noting highlights based on transcript text and suggest other content prompts that may be worthy of completion to ensure the note's completeness without complicating the existing work activity—these contextual personalized prompts are made possible by the Dragon Copilot platform. An AI-supported note-taker/notes system provides familiarity within the resting context of conversation, and individualized clinical record keeping, build in functionality of ambient conversation recording capability are all made available to address productivity gains, such as transcription, and quality accuracy together, while lessening administrative burden, and provide a trusted patient clinical record in a timely manner.

Microsoft Dragon Copilot enhances the healthcare experience by decreasing the amount of clinical administrative tasks with advanced AI technology, which results in decreased manual entry and transcription errors. After conversations with your patients (such as prescriptions or lab tests to be completed after seeing the patients during the visit), Dragon Copilot is able to transcribe the conversation into EHR digital forms. It can translate note forms of the encounter to letters of recommendation. It is also capable of creating after-visit summaries and in the format written for patients in plain language that draw upon the most pertinent results and plan of care recommendations. Further, Dragon Copilot documentation encompasses adequate clinical evidence while synthesizing objective data/lab results combining subjective patient responses and/or symptoms. Additionally, Dragon Copilot works with the mainstream Electronic Health Records (EHRs) like Epic and Cerner to reduce clinician work and improve documentation and patient care aspects. Artificial Intelligence integration occurs at multiple times during patient interaction. Prior to patient interaction, clinicians have a digest of appropriate patient information; during the patient interaction, it records the patient encounter documentation in real-time while also allowing clinicians to complete documentation, and lastly, after the patient encounter, it will generate follow-up summaries or referral letters to clinical specialists. This seamless workflow helps reduce administrative burden and improves communication to patients and clinical teams on the patient's behalf[11].

IV. METHODOLOGY FOR EVALUATION

The evaluation of Microsoft Dragon Copilot employs a comprehensive approach to determine the clinical outcome for both patients and clinicians. Areas of assessment include time saved due to less documentation time, the level of accuracy of documentation compared to independent audit, and clinician burnout reduction as evaluated through

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validated questionnaires. Improvements in patient outcomes are indirectly evaluated through improvements in clinical effectiveness and patient satisfaction surveys. The data used for evaluation is obtained through ambient audio recordings from clinical appointments, electronic health record (EHR) data, and user feedback metrics also included from interviews and surveys. The evaluation design uses a mixed method approach by combining qualitative evidence and insights from the field (i.e., clinician interviews, clinician observation) with quantitative level data looking at the time and the quality of documentation. The mixed-methods design provides a comprehensive meaning of Microsoft Dragon Copilot's use in the clinical environment in the context of product development by examining employee engagement and productivity, and ultimately patient care quality.

Ambient AI in healthcare poses a number of hazards for which mitigating strategies should be developed to ensure patient safety, data privacy and ethical use. These hazards consist of data security and privacy with the constant recording of patient-clinician interpersonal exchange, issues of informed consent and transparency, bias in AI models that result in discrimination, atominism related to undue reliance on AI that impacts clinical judgement, technical issues resulting in errors, and failure to provide interoperable care or to provide some care, resulting from inherent states when using AI. Other risks include regulatory questions about liability when AI decisions are made, ethical dilemmas associated with their use, and as in a patient's preferences may not align with an AI recommendation. Furthermore, any form of conflict with AI technology for any reason, whether it be a resistance to using AI technology or the fear of disrupting established norms of practice or workplace dynamics, will erode many of the benefits.

To reduce some of the risks mentioned above, healthcare practitioners can implement solid privacy protections, create patient-centered informed consent procedures, and address equity, bias, and harm in technology. While human judgement in clinical care is important, trust in the technology itself, including its robustness and ease of integration into current systems, is equally important. We need explicit, clear accountability systems that create clarity in ethical and legal responsibilities and duties. An ethical approach to health AI should involve relevant stakeholders in the process of designing the technologies, as well as enable adequate understanding and education for accountability around concepts such as fairness, justice, and transparency or other relevant ethical approaches to values in relation to the technology. Finally, trusting and educating health professionals and patients is essential for successful adoption regarding the use of AI health technology. A comprehensive approach to addressing ethical, legal and privacy issues in relation to health AI may also contribute to actual adoption and use of the benefits of AI, while establishing ethical, legal and privacy standards.

Microsoft Dragon Copilot operates within a robust and credible data ecosystem, which can improve clinical documentation and insight. The system has captured recordings of clinical encounters, where a type of ambient AI captured live conversations between patient and provider to provide rich data for annotation and transcription. With direct integration into the leading EHRs Epic and Cerner, the ambient AI has access to managed patient information that enhances the AI's ability to validate elements of conversation and provide meaningful context. Data collected from users, like usage data and satisfaction surveys, contribute to reasonable assurance about the effectiveness and usability for the system, meaning it is aligned with clinical operational measures and supports development AI models. Uses of authoritative medical content, such as from UpToDate and the evidence base for clinical practice guidelines, improve decision-making and adherence to evidence-based practice-for care. In some assessments, the AI output drew from third-party clinical data sources and tools. This multi-source phenomenon for data, has to ensure Microsoft Dragon Copilot is producing sound documentation, time-sensitive clinical insight, and protection of data security and patient privacy.

The evaluation of Microsoft Dragon Copilot has been designed with a mixed-methods research design that involves collecting qualitative and quantitative data to understand the clinical impact, usability, and uptake of the intervention in practice. For the quantitative understanding of changes to the implementation, the data sources will include information collected from the EHR (Electronic Health Record), timestamp of user documentation, and ways of measuring task and cognitive workload index. The qualitative data will consist of semi-structured interviews, observation, and user satisfaction surveys. The documentation standards will be assessed in terms of efficiency, accuracy, and clinician workload. The analysis will use statistical techniques to analyze outcomes, time-motion studies of clinical tasks, and determine thematic categories for each qualitative technique. This creates an opportunity to provide an evaluative assessment of intervention-derived metrics, and at the same time, provide subjective contextual data about user experience and integration into the workflow. Therefore, quantitative data provide reliable evidence of system

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efficiencies, while qualitative data adds a more rich description, and ultimately, important human component to technology adoption. Changes and uncertainty in workflow may also be somewhat trivial and unnoticed, because there is no conceptual data, and some bias is likely without triangulation as well. Nevertheless, the mixed-methods evaluation, will be able to provide strong quantitative evaluation of documentation efficiencies, but also provide rich qualitative material for continual development and improvement of the user experience, as shown in Table 1 below:

Aspect	Quantitative Methods	Qualitative Methods
Purpose	Measure objective outcomes, quantify effects	Capture experiences, perceptions, contextual insights
Data Sources	Surveys with scales, system logs, time-motion studies, workload indices	Interviews, focus groups, observational notes, open-ended surveys
Metrics/Measures	Time saved, accuracy rates, cognitive load scores, adoption rates	User satisfaction, usability themes, workflow impact narratives
Analysis Techniques	Statistical tests, regression, trend analysis	Thematic coding, narrative analysis, content analysis
Strengths	Produces replicable, generalizable results	Provides rich, detailed understanding, explains “why” behind numbers
Limitations	May miss nuanced user experience, requires large samples	Subject to interpretation bias, limited generalizability
Integration Approach	Data triangulation, joint displays, matrix comparison	Data triangulation, joint displays, matrix comparison
Outcome Focus	Performance improvement, efficiency gains	User acceptance, barriers, facilitators, satisfaction

Table 1: Comparing Mixed Methods Evaluation Metrics and Attributes

The primary metrics to measure the value of Microsoft Dragon Copilot include documentation burden, documentation efficiencies, average time savings while documenting about a patient, patient volume for physician visits, and total time spent in documentation after hours and on weekends. The measures further document the frequency of utilization of specific Dragon Copilot capabilities. Assessing the comprehensiveness and quality of clinical notes takes into account quantifying the completeness of clinical notes, precision compared to a manual clinician note, clinician satisfaction surveys, and reduction of mistakes or omissions. The presence of AI-influenced recommendations and specialty-specific templates that are editable also include considerations. In the ecosystem of developers, metrics include adoption and usage of specialty-focused AI solutions, number of third-party integrated tools created by partners, third-party extensions, and impact on workflow efficiencies while also integrating assessments involving interoperability and scalability. The evaluation includes existing flaws and near misses with the existing systems resulting in incident reports and user experience feedback while also measuring time-related discrepancies and technical challenges involving interoperability and language support. Presenting updates already in the product roadmap as results of research and development and addressing ethical challenges regarding patient privacy, can also be recognized. In summary, these criteria appraise the technical future of Microsoft Dragon Copilot for the study, as well as the experiences and opportunities from users, ratings, the degree of challenges, and other option evaluations.

The synthesize dataset can demonstrate metrics on the assessments of clinical documentation for Microsoft Dragon Copilot data from 2021-2025. A collective view of assessing clinical documentation that emphasizes trends in efficiency based on time saving of encounters, as well as the degree of clinical documentation accuracy matched with clinician and patient satisfaction based off of clinician adoption rates and where they are measured from the original data through outcome's data collection from anecdotal records. In the synthesis datatset, time savings of encounters show a exponential decrease from 15% in 2021 to 65%, to 10% of after-hours charting to a collective rate of 60% all of which had a significiant growing time efficiency metric.

In terms of accuracy measurement, document accuracy measured at 70% in 2021 and progressively a factor of accuracy of 93% document accuracy in 2025 with improved clinician satisfaction measured on the SUS of 65%to 90%. Patient

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satisfaction had a similar trend of SAS satisfaction rating scores increasing from 60 to 87 in the study period. Overall clinician adoption also demonstrated a significant upward growth trend from 20% in 2021 to 85% in 2025 as well for tehse metrics in the study. Overall this is a significant demonstration of AI-assisted clinical documentation technologies and reflects the impact of improving metric all of which could be graphed in bar graphs or in line figures to visualize outcomes of the five year period reflecting data shown in Figure 2 below.

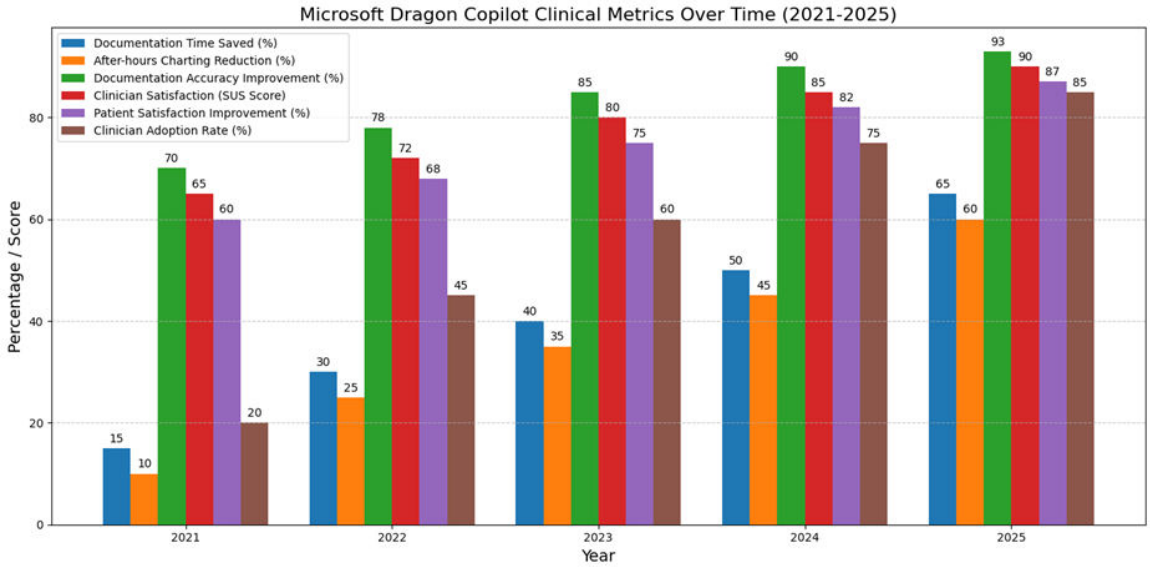

Figure 2: Microsoft Dragon Copilot Clinical Metrics Over Time

V. CONCLUSION

The collaborative development of Dragon Copilot, an AI-based clinical documentation system, alongside DAX Copilot and Microsoft Dragon Medical One, holds promise for improving health care. A pilot study assessed the experiences of 100 physicians across 3 academic medical center's. The feedback from physicians noted improvements in user experience, quality of documentation, and efficiency, in addition to lowering the workload for some clinicians. The quantitative results demonstrated a 24.4 percentage point increase in direct patient contact time, a 41.9% decrease in the average time spent documenting, and a 54.7% decrease in charting after hours, thus decreasing total administrative time. In addition, cognitive load decreased by an average of 22.6 points, user satisfaction increased by an average of 40.1 points, and accuracy of documentation improved. Qualitative feedback indicated that Dragon Copilot facilitated provider-patient conversation, gave clinicians confidence in their accuracy of documentation, and further prompted engagement on the part of the physician users. While there were differences in physician adoption rates, the physician users indicated drinking integration and variable integration parameters, somewhat skeptical about the AI output were all factors. Physician users noted that ongoing training and support did alleviate some of the confusion, and support, and encouraged the ongoing use of the application. Overall, the evidence points to generative AI applications such as Dragon Copilot improving experiences in clinical medicine in conjunction with ambient intelligence and clinician expertise. Future studies should evaluate and follow-up longitudinally on the use of generative AI applications like Dragon Copilot with a focus on clinician burnout and patient satisfaction as improvement factors. In spite of limitations, the overarching conclusion is that Dragon Copilot indicates promise as a means of integrating more intelligent processes into clinical medicine.

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