

aScribe.AI

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Industry Context and Problem Statement

The need for efficient and reliable documentation of patient information has never been greater. With the advent of electronic health records, there has been an increasing emphasis on timely and accurate documentation in the current healthcare environment. Healthcare organizations are recognizing the value of granular patient-specific data that has been clinically validated, as the foundation for artificial intelligence (AI) powered applications. The caricature of the physician hastily scribbling illegible notes while simultaneously holding a distracted conversation with an irritated patient is thankfully fading into the past. Historical paper-based patient records require human interpretation and translation to files and formats usable by computers, but this process is also subject to biases that may overlook novel and unconventional data points and associations.

On a prospective basis, the collection of patient information should be ideally efficient and convenient to the front-line healthcare worker, and immediately usable and accessible by stakeholders in the organization. Most doctors will spend an excessive amount of time, estimated at 3-4 hours dailyⁱ, charting their interactions with patients. However, the near-universal adoption of the Electronic Health Record (EHR) has not been met by an equivalent innovation in medical record-keeping. Time-constrained physicians in busy environments like the emergency department have resorted to hiring human medical scribes to physically follow them from patient to patient, diligently entering clinical information and orders into a portable electronic tablet. While a convenience to the physician, this is an option that is not scalable and adds to the increasing global costs of healthcare delivery. Digital medical scribes have been introduced that attempt to document the physician-patient interview with varying success given the complexities of medical terminology and human language.ⁱⁱ There remains a distinct need for automated physician-controlled record-keeping of the clinical interaction, that is accurate and reliable, offers supplemental information to the physician, and can be incorporated seamlessly into the EHR.

Solution

Our solution is an AI-powered medical assistant that can listen to the conversation between the doctor and the patient to create a context-based record of the clinical encounter, supplemented with suggestions and recommendations that are physician-adjudicated and verified in real-time. The system listens to the conversation, using Natural Language Processing (NLP) to understand what is being said and in what context, and using this information, it automatically fills out the various sections of an EHR like patient metadata, history, symptoms, diagnosis, treatment plan, follow-up actions, etc. The system saves doctors a lot of time and effort while allowing them to capture a much higher quality of records, as opposed to rushing through records from memory at the end of the day.

In addition to creating records, the system also uses Machine Learning (ML) to issue helpful real-time reminders and suggestions for doctors to consider during patient encounters, like reminder to ask about something from medical history, or a recommendation to send patients for a specific scan based on their history as well as the actions other doctors have taken for patients with similar conditions. The system will also tie into real-time events and medical literature to watch for trends and fast-developing diseases like the coronavirus doctors may not be aware of. By using this information and the patients' symptoms and history, the system can make recommendations to doctors to send patients in for special screening.

The system allows doctors to accept or reject these suggestions. By using this feedback as well as doctors' actions, the system gets improved over time.

Our system is expected to make doctors more efficient and productive, thereby reducing the cost of medical care. With the additional time and focus available for doctors, we expect the system to enable better quality care for patients. And most importantly, we expect aScribe to be able to reduce biases, blind spots, and variances in patient care that may today be unintentionally be introduced because the patient care system is so dependent on individual doctors and their styles and preferences.

Monetization

The current solution utilized by most doctors and hospitals is to employ a medical scribe to follow doctors around, taking notes, and then manually transcribing them into the EHR system. There is substantial cost involved – in fact, given the management, certification, and training required, a whole industry has been built up around medical scribing totaling \$5B today. With continued rising costs of healthcare, this market is expected to grow to \$7.7B by 2025ⁱⁱⁱ. Taking even a small portion of this market can be lucrative. Additionally, a medical scribe in the USA costs \$45-60k fully loaded (\$30-40k base salary) – this is a very real expense for both doctors and hospitals that can be directly replaced and optimized with our solution. From surveying potential customers, we expect a strong willingness to pay from selling to both hospitals and doctors directly.

The cost to create our product is relatively low – the real differentiator will be the data used to train our algorithm. Initially, our product will be piloted through an expert network of doctors and clinics. They will receive our product for free, in exchange for providing feedback and helping to improve our product from the start rapidly. Also, their usage of the product will help to quickly generate vast amounts of data to help in further training, validating, and improving the algorithms.

As we start to commercialize our product, we will sell it as a software-as-a-service (SaaS) subscription, easily accessible on a mobile device (phone, tablet, etc.). Our business model is flexible and will offer different packages to different customer groups. For example, small clinics may be charged a fixed fee, hospitals may be charged per-user (per doctor), and independent doctors who want to purchase the product directly may be charged a per-patient fee. These fees will be substantially lower than the current cost of employing medical scribes, saving them money while improving accuracy and improving patient care.

Competition

Several startups are using AI technology to provide virtual assistance to doctors.^{iv}

First, Saykara was launched in 2015 by a team of experienced healthcare vets who previously pioneered speech recognition and machine learning for medical transcription at Seattle. Kara is the AI-powered healthcare voice assistant that can be used during a physician-patient encounter without any voice commands. In addition to AI capabilities, Saykara is supported on the back end by human feedback, enabling the system to train itself faster and to meet the mission-critical accuracy requirements of the healthcare space.^v Saykara is compatible with all major EHRs.^{vi} Second, the MDLog application was developed in 2008 at Youville Long Term Care(LTC) Facility in Cambridge, MA, aiming to improve practitioner efficiency. MDLog is a Certified Complete EHR for practitioners to use voices to document clinical notes with iPhone and auto-submit to billing. In 2010, MDops was formed to make MDLog available to the larger in-patient and LTC practitioner community.^{vii} Third, Notable was built in 2017 by several Silicon Valley entrepreneurs. Notable provides proprietary EHR integration and optimizes the routine tasks from appointment reminders to claim generation.^{viii} It gives notes, orders, medications as part of its out-of-the-box solutions, using wearables, voices, and AI to enrich patient-doctor interactions. Fourth, Sopris Health was founded in Colorado in 2015, providing the AI medical scribe technology to tackle clinical inefficiencies.^{ix} It gives a chat-style interface, quicker than dictation and more accurate than voice-only solutions. Its proprietary AI platform combines chat, chip, and choice to deliver a clinical note directly to the EHR.^x Last, Suki was founded in 2017 by the former senior executives of Google and Salesforce at Silicon Valley. It is an AI-powered, voice-enabled digital assistant for doctors.^{xi} Suki claims that its AI generates 100% accurate notes and gets smarter with each interaction. It partners with Google Cloud as one of the first clinical digital assistant partners and has an integration with EHR.^{xii}

While these players are starting to explore this market, none offer the full capacity of aScribe that incorporates real-time predictions and recommendations.

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- ⁱ Dr. Daryn McClure, Banner Health (personal communication, February 18, 2020).
- ⁱⁱ Quiroz, J.C., Laranjo, L., Kocaballi, A.B., et al. Challenges of developing a digital scribe to reduce clinical documentation burden. *npj Digit. Med.* 2, 114 (2019). <https://doi.org/10.1038/s41746-019-0190-1>
- ⁱⁱⁱ <https://www.marketwatch.com/press-release/at-55-cagr-medical-transcription-services-market-size-will-reach-7670-million-usd-by-2025-2019-03-06>
- ^{iv} <https://www.mobihealthnews.com/content/37-startups-building-voice-applications-healthcare>
- ^v <https://www.prnewswire.com/news-releases/saykara-launches-first-fully-ambient-ai-healthcare-voice-assistant-300874178.html> Saykara launches first fully ambient AI healthcare voice assistant, Jun 25, 2019
- ^{vi} <https://www.saykara.com/> accessed on Feb 2020
- ^{vii} <https://mdops.com/company/> accessed on Feb 2020.
- ^{viii} <https://notablehealth.com/> accessed on Feb 2020
- ^{ix} <https://www.bloomberg.com/profile/company/1658574D:US> accessed on Feb 2020
- ^x <https://www.soprishealth.com/> accessed on Feb 2020
- ^{xi} <https://www.linkedin.com/company/sukihq/about/> accessed on Feb 2020
- ^{xii} <https://www.suki.ai/> accessed on Feb 2020