

COMMENTARY

Ambient Artificial Intelligence Scribes: Learnings after 1 Year and over 2.5 Million Uses

Aaron A. Tierney, PhD, Gregg Gayre, MD, Brian Hoberman, MD, MBA, Britt Mattern, Manuel Balleasca, MD, Sarah B. Wilson Hannay, MD, MEd, Kate Castilla, Cindy S. Lau, MD, Patricia Kipnis, PhD, Vincent Liu, MD, MS, Kristine Lee, MD

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The burden of clinical documentation has become an enormous challenge for health care systems, contributing to clinician burnout, job dissatisfaction, and impaired physician–patient interactions that are linked to lower quality of care. In a prior report, the authors described how a large-scale pilot implementation of novel technology — ambient artificial intelligence (AI) scribes that leverage generative AI — reduced documentation burden and improved physician–patient communication. In this commentary, the authors build on that prior work and produce novel insights about the sustainability and effectiveness of ambient AI scribes implemented in The Permanente Medical Group following the initial pilot phase. In the 1 year since initial deployment, the volume of interactions in which the AI scribes were used increased linearly, with the top third of users by volume disproportionately accounting for the majority of uses. The authors found that standard physician characteristics, such as age and years since graduation, were not associated with the likelihood of adopting the ambient AI scribes. A majority of physicians reported a highly positive experience with AI scribes, with all patients reporting a positive to neutral impact of AI scribe usage on the quality of their visit. Over this period, The Permanente Medical Group also transitioned between AI scribe vendors as part of an enterprise-wide implementation and found that usage remained consistent with rapid adoption of the new platform and prior usage patterns predicting future use. AI scribes continue to demonstrate efficacy in reducing physician workload, in aggregate producing estimated time savings in documentation of more than 15,700 hours for users — equivalent to 1,794 working days —

compared with nonusers, over 1 year of use. Given the tremendous benefits experienced by those using AI scribes, strategies to promote additional engagement of nonusers and facilitate customization for individual users are likely to further enhance the benefits of AI scribes. Further analyses are needed to understand the impact and utility of AI scribes across various clinical scenarios and physician and patient demographic groups.

The burden of clinical documentation has become an enormous challenge for health care systems and produces clinician burnout, job dissatisfaction, and impaired physician–patient interactions that are linked to potentially worsened quality of care.¹⁻¹¹ Ambient artificial intelligence (AI) scribes have great potential to address these challenges, but different implementations have had mixed results, and the health care sector as a whole is still nascent in its understanding of the potential promise of this technology.¹²⁻¹⁵

In a previously described evaluation, The Permanente Medical Group (TPMG) enabled ambient AI technology for 10,000 physicians across diverse settings and specialties.¹³ During this 10-week period from October to December 2023, the AI scribe was used in 303,266 encounters by 3,442 physicians and successfully facilitated improved physician–patient communication.¹³ The response from physicians and patients was very favorable due to the technology’s capability to reduce the burden of after-hours clerical work, facilitate enhanced patient interactions, and produce high-quality clinical documentation for physician editing.

In the evaluation described in this report, we build on our prior assessment and set out to answer some key questions about the sustainability and effectiveness of ambient AI scribes in our health care system in the 1 year after pilot implementation. We describe the analyses of AI scribe adoption metrics, impacts on key documentation workload metrics, and physician and patient experience survey responses, extending analyses from our prior work.¹³ During this period, our health care system also transitioned to a new ambient AI scribe vendor, allowing us to compare early usage patterns across vendors. Although insights from these analyses are critical to improving the sustainable and effective use of AI scribes in our organization, we believe they are also of high interest to other health system leaders seeking to adopt and adapt these technologies to enhance care delivery in their settings.

Growth in AI Scribe Usage

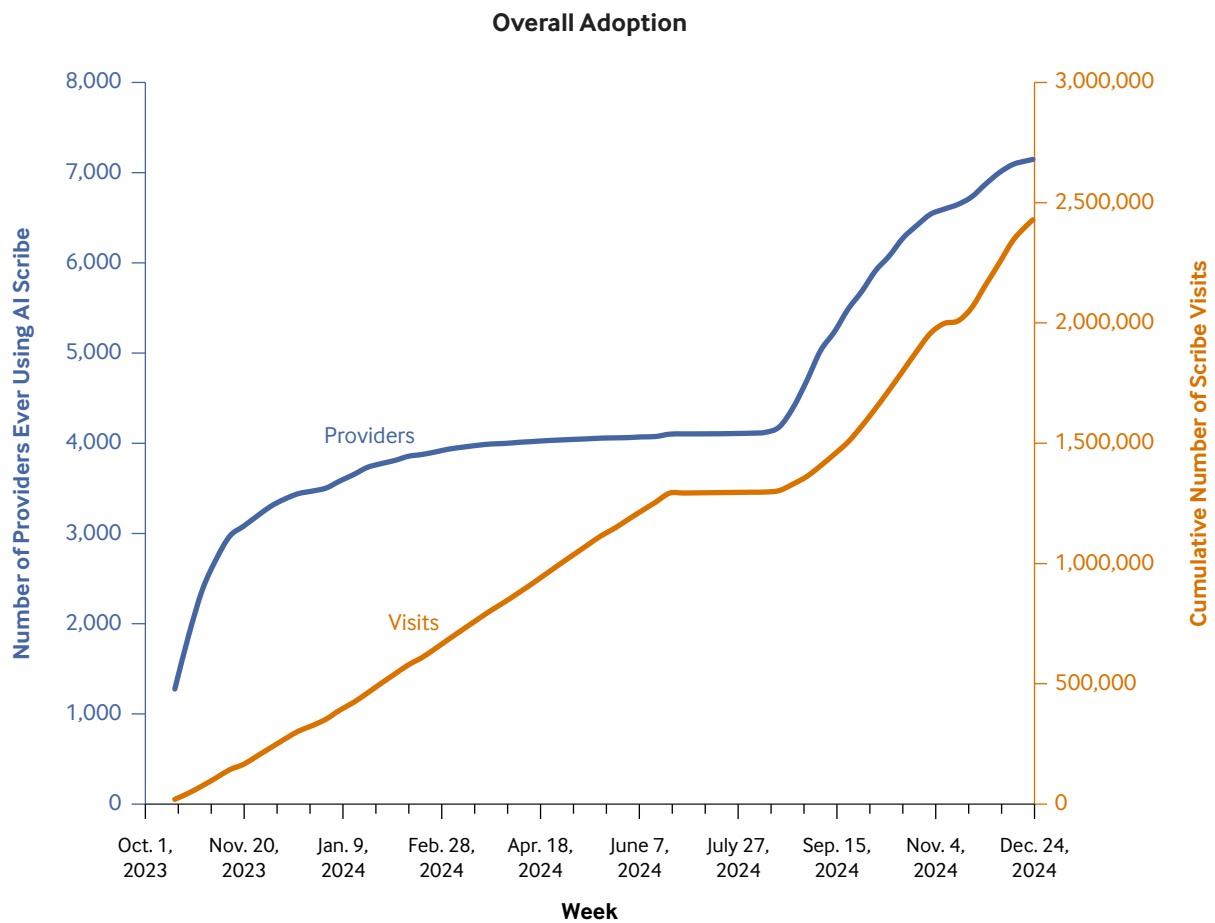
In the 63 weeks since implementation between October 16, 2023, and December 28, 2024, ambient AI scribes have been used by 7,260 TPMG physicians to assist in 2,576,627 patient encounters across a wide array of medical specialties and locations ([Figure 1](#)). In total, 3,447 physicians used ambient AI scribes in at least 100 patient encounters, with the top physician user having activated it to assist in close to 7,000 encounters.

Data available prior to our switch in vendors showed that AI scribe use was most frequent in the mental health, emergency medicine, and primary care physician groups, where it was used in approximately 50%, 36%, and 34% of visits, respectively, in specialties with at least 15 active users

FIGURE 1

Growth in AI Scribe Usage

This chart shows the overall adoption of providers using an AI scribe and the cumulative number of AI scribe visits, from October 2023 through December 2024.



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of the tool (and based on the number of provider-level ambient AI uses divided by the number of patient encounters in the same week). Mental health (42%), primary care (32%), and emergency medicine (32%) physicians had the highest adoption by the percentage of total clinicians using the AI scribe, followed by allergy (21%) and cardiology (20%).

“*The highest adoption rates occurred in departments that typically suffer from the highest levels of documentation burden and burnout.*”

Physician users were, on average, 47 years old and an average of 19 years out of their training, but neither of these factors was associated with higher usage of AI scribes. Users tended to represent a higher proportion of women than our overall population, but the departments with the highest rates of usage also tended to have a higher proportion of women physicians.

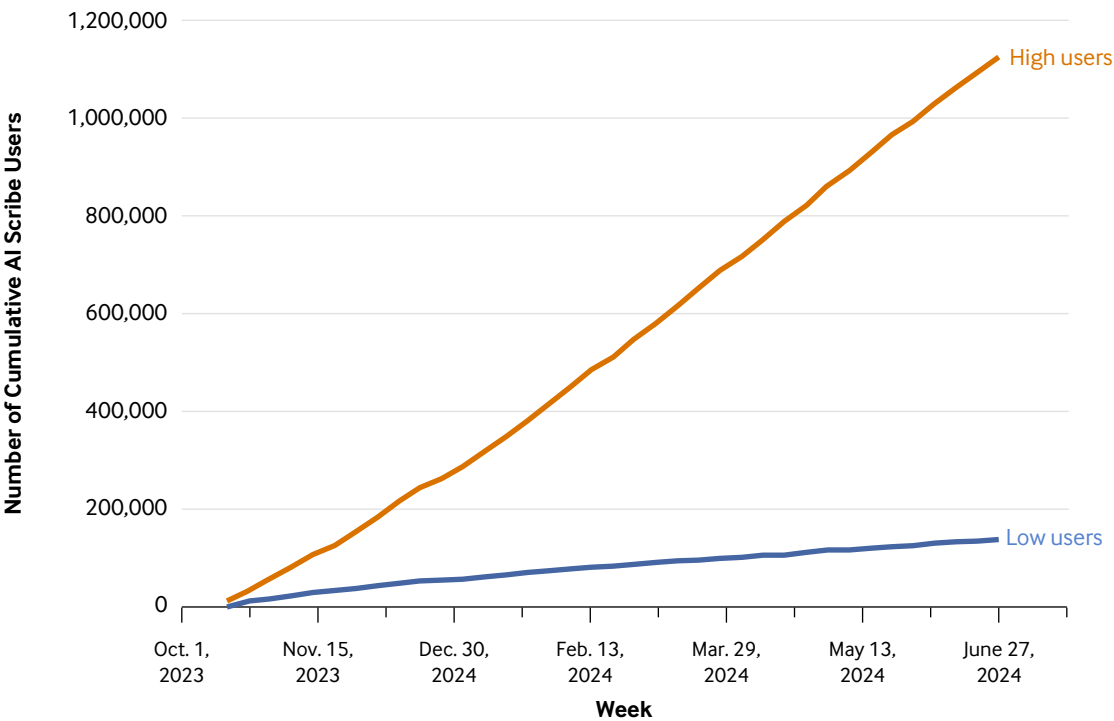
We evaluated for a dose–response relationship in AI scribe usage and benefit, based on the concept that the maximum benefit would be concentrated among the highest users,¹⁶ by comparing results among the top third of AI scribe users by volume (high users) to the bottom two-thirds (low users). High users comprised the vast majority (89% of the total) of ambient AI scribe activations (Figure 2). High users also tended to have more time spent in notes, orders, and clinical review per appointment, while having fewer visits per day, on average, prior to ambient AI scribe deployment. AI scribes had the highest adoption among clinicians who were experiencing the highest documentation burden prior to going live in October 2023, maximizing potential impact (as detailed below).

Based on use with our first vendor, mental health (55%), primary care (47%), and emergency medicine (37%) physicians had higher percentages of high users compared with other specialties,

FIGURE 2

AI Scribe Visits, Low and High Users

This chart shows cumulative AI scribe users for low and high users weekly, from October 2023 to June 2024.



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while there were lower percentages of high users in urology (9%), obstetrics/gynecology (6%), and infectious disease (0%).

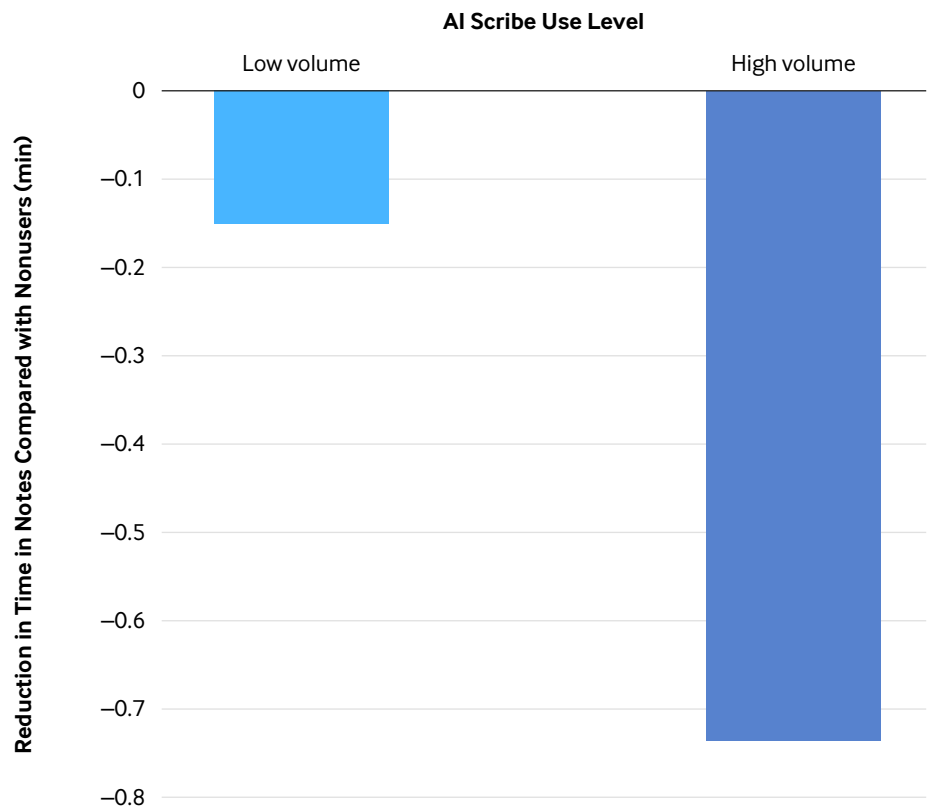
Across both vendors, high users saw significantly greater savings for time spent in notes per appointment: a reduction of 0.7 minutes per note for high users compared with 0.15 for low users, relative to nonusers (Figure 3). In aggregate, the time savings on time spent in notes for users, compared with nonusers, was estimated to be 15,791 hours or roughly 1,794 8-hour working days in the year following implementation.

It is interesting to note that, when evaluating high users compared with other users in time in notes per note (Figure 4), high users were spending substantially more time in notes prior to AI scribe deployment. However, after the deployment of our first AI scribe vendor, the gap in time spent in notes closed compared with other physicians. In addition, after the deployment of the second vendor product, high users were spending significantly less time than others in notes

FIGURE 3

Dose–Response Relationship for Time in Notes by AI Scribe Use Level

This chart shows AI scribe use levels at low and high volume and the reduction in time for note-taking compared with nonusers, in minutes.

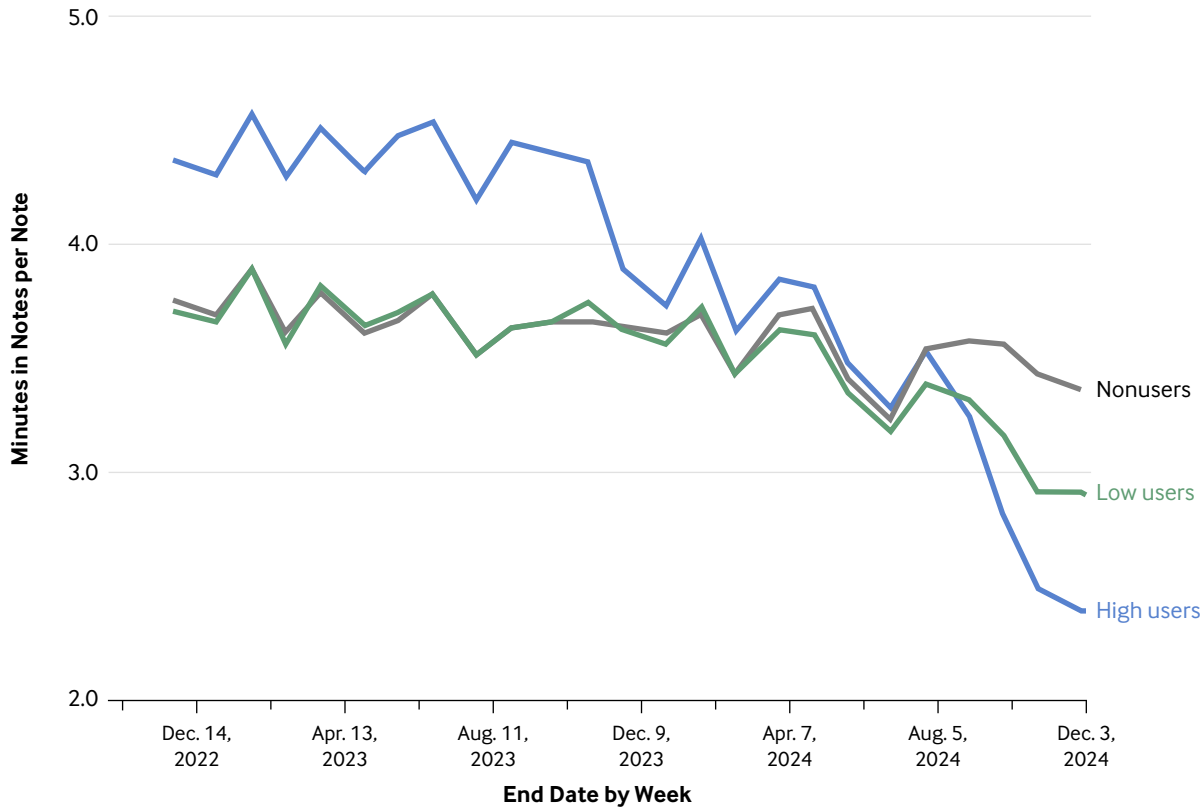


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FIGURE 4

Time in Notes per Note for all Physicians by AI Scribe Usage Level

This chart shows the time spent on AI scribe notes, in minutes per note, for nonusers, low users, and high users from December 2022 to December 2024.



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activities by December 2024. Low users and nonusers also recorded similar time spent in notes per note until the implementation of our second vendor, with decreasing time among low users, while there was no notable change in nonusers' time in notes.

Physician and Patient Experience with AI Scribes

The highest adoption rates occurred in departments that typically suffer from the highest levels of documentation burden and burnout.¹⁷ This is likely because physicians in these departments had the most need for ambient scribes, and, thus, assisted documentation would have the highest perceived impact on their workloads. Because our most impacted departments adopted this technology first, we are likely to see larger impacts of ambient scribe rollout in our health system.

“Overall, 84% of physicians felt that using AI scribes had a positive impact on their visit interactions.”

Our primary measures of physician workload are (1) time spent in electronic health record (EHR)-related activities (“pajama time,” time on unscheduled days, time outside 7 a.m. to 7 p.m.); and (2) time spent in appointment-related activities (time in clinical review, in-basket, notes, and orders per appointment). Using a within-physician difference-in-differences analysis, we compared changes in these metrics among AI scribe users relative to changes among nonusers, to adjust for secular changes in workload measures and practices not attributable to AI scribes. Positive coefficients in the difference-in-differences analyses indicate time savings, whereas negative coefficients indicate increases in time in the postimplementation period compared with preimplementation.

From October 16, 2023, through December 28, 2024, compared with nonusers, AI scribe users observed statistically significant reductions in minutes of pajama time (1.03, $P=0.02$), time outside 7 a.m. to 7 p.m. (1.83, $P<0.001$), time in notes per appointment (0.40, $P<0.001$), and time in orders per appointment (0.07, $P=0.01$; [Figure 5A](#)). On the other hand, AI scribe users also observed a small increase in time in the in-basket per appointment (-0.10 , $P=0.008$; [Figure 5B](#)).

After the rollout of the AI scribe tool, we conducted focused surveys among our adult and family medicine physicians, as these specialists were expected to be most highly impacted by the use of the technology. Surveys assessed physicians’ typical charting workloads and perceptions about time spent interacting with their patients and spent on the EHR. We also asked physicians to describe whether they had ever used the AI scribe and, if so, to assess the impact of AI scribes on their interactions with patients and their work satisfaction, answered on a scale from “much worse” to “much better.”

Based on 102 responses from physicians, we found that 66% of adult and family medicine physicians reported using the AI scribe 5 or more days in an average week; 12%, 4 days per week; and 5% each for 3, 2, and 1 day(s) ([Figure 6](#)). Of the respondents, 8% had never used an AI scribe. The majority (63%) used the AI scribe in every one of their in-person visits, with another 29% reporting using it during most visits. Usage was modestly lower during telemedicine encounters, with 44% of respondents saying that they used an AI scribe during every telephone visit and 41% of respondents using it during every video visit.

Overall, 84% of physicians felt that using AI scribes had a positive impact on their visit interactions. The most common barriers to AI scribe use described were respondents who noted that there was no direct integration with their practice of note template documentation ($n=3$) and those who felt that they could type faster than the time it took to edit the AI-generated note ($n=2$). Overall, 82% of physicians reported that using AI scribes had a positive effect on their work satisfaction, although two physicians reported AI scribes producing a “somewhat worse” effect.

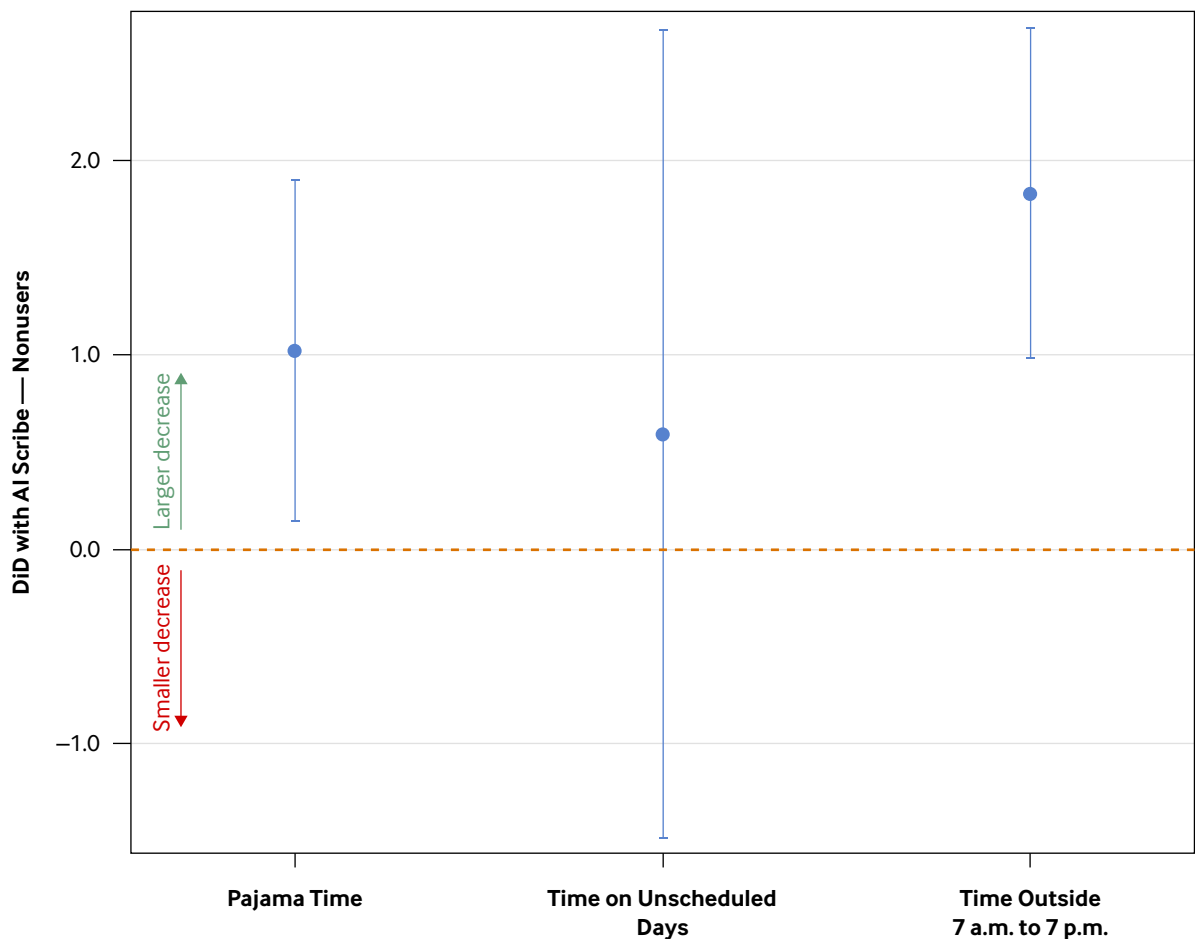
“A majority of patients (56%) said that the ambient AI scribe had a positive impact on the quality of their visit, with the rest citing no impact.”

We also surveyed patients drawn from the panels of adult and family medicine physicians to understand patient reactions to AI scribes, using direct outreach to patients immediately after

FIGURE 5A

Pre-to-Post Difference-in-Differences in Time Spent per Appointment between AI Scribe Users and Nonusers

This chart shows the pre-to-post difference-in-differences in appointment time for users and nonusers, showing smaller decreases and larger decreases in pajama time, time on unscheduled days, and time outside 7 a.m. to 7 p.m.



DiD = Difference-in-differences

Source: The authors

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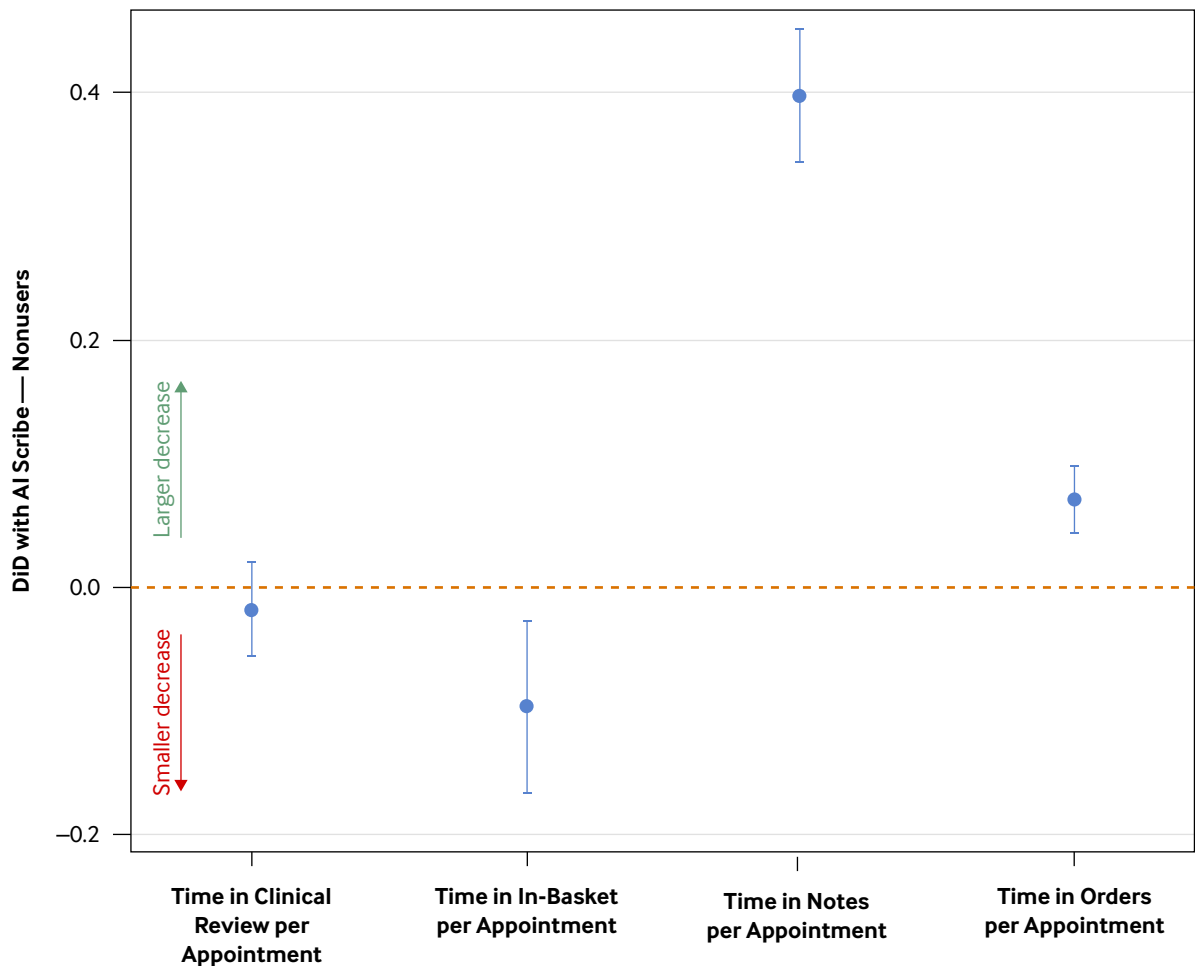
their visits. The survey asked patients to evaluate differences in the time the physician spent speaking directly with them and looking at their computer screen (from “less time than usual” to “more time than usual”). The patients were also asked if they felt the ambient AI scribe had an impact on the quality of their visit (from “much worse” to “much better”). Finally, we asked patients about their comfort with AI being used in the medical appointment (from “very uncomfortable” to “very comfortable”).

Of a total of 118 patient responses, two patients did not recall their physician using an ambient AI scribe during their visit. Among the remainder, 39% reported their doctor was spending more time

FIGURE 5B

Pre-to-Post Difference-in-Differences in Time Spent per Appointment between AI Scribe Users and Nonusers

This chart shows the pre-to-post differences in difference-in-differences in appointment time for users and nonusers, showing smaller decreases and larger decreases in time spent in clinical review per appointment, time in the in-basket per appointment, time spent in orders per appointment, and time spent in notes per appointment.



DiD = Difference-in-differences.

Source: The authors

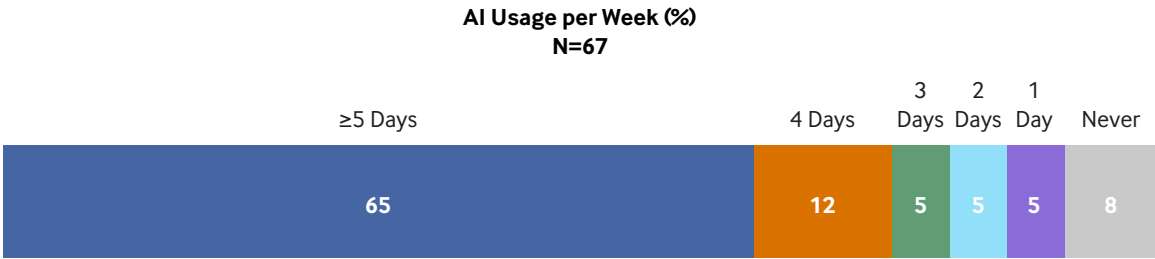
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than usual speaking directly with them, 56% reported no effect, and 5% reported less time than usual (Figure 7). In total, 47% of patients stated that their doctor spent less time looking at the computer screen, and 51% saw no difference. A majority of patients (56%) said that the ambient AI scribe had a positive impact on the quality of their visit, with the rest citing no impact. No patients said that the usage of the scribe made their visit worse. Overwhelmingly, 92% of patients expressed comfort with or were neutral to AI being used during their appointment, with 8% of patients reporting some level of discomfort.

FIGURE 6

Percentage of AI Usage per Week

This chart shows the percentage of AI usage per week broken down by the total number of days.



Source: The authors

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AI Scribe Vendor Effects and Considerations

Our organization switched ambient scribe vendors in 2024 for two primary reasons. The first was that the successful pilot of ambient scribes in Kaiser Permanente’s northern California locations spurred the decision to deploy the technology across all eight regions of Kaiser Permanente, facilitating enterprise reevaluation of vendors. The second was that the new vendor had direct integration within our EHR, allowing for improved workflows for both clinician users and evaluators of the ambient scribe’s performance within our health system.

The uptake of AI scribes by new unique users was rapid after the initial deployment of the tool and gradually plateaued, a finding consistent with other technology adoption curves. However, adoption saw an uptick again when the second vendor product was introduced.

We found that the adoption of ambient AI scribes was largely agnostic to the vendor selected, and prior usage patterns largely predicted subsequent usage patterns. Both AI scribe vendors continue to update, refine, and customize their products to improve their effectiveness. The continued excellent adoption of the second vendor was likely due to (1) our physicians’ favorable experience with ambient AI scribes using the first vendor; (2) increasing awareness of the technology within our health system, with mature technology leaders and channels for dissemination and support; and (3) features such as direct EHR integration that helped to further simplify workflows.

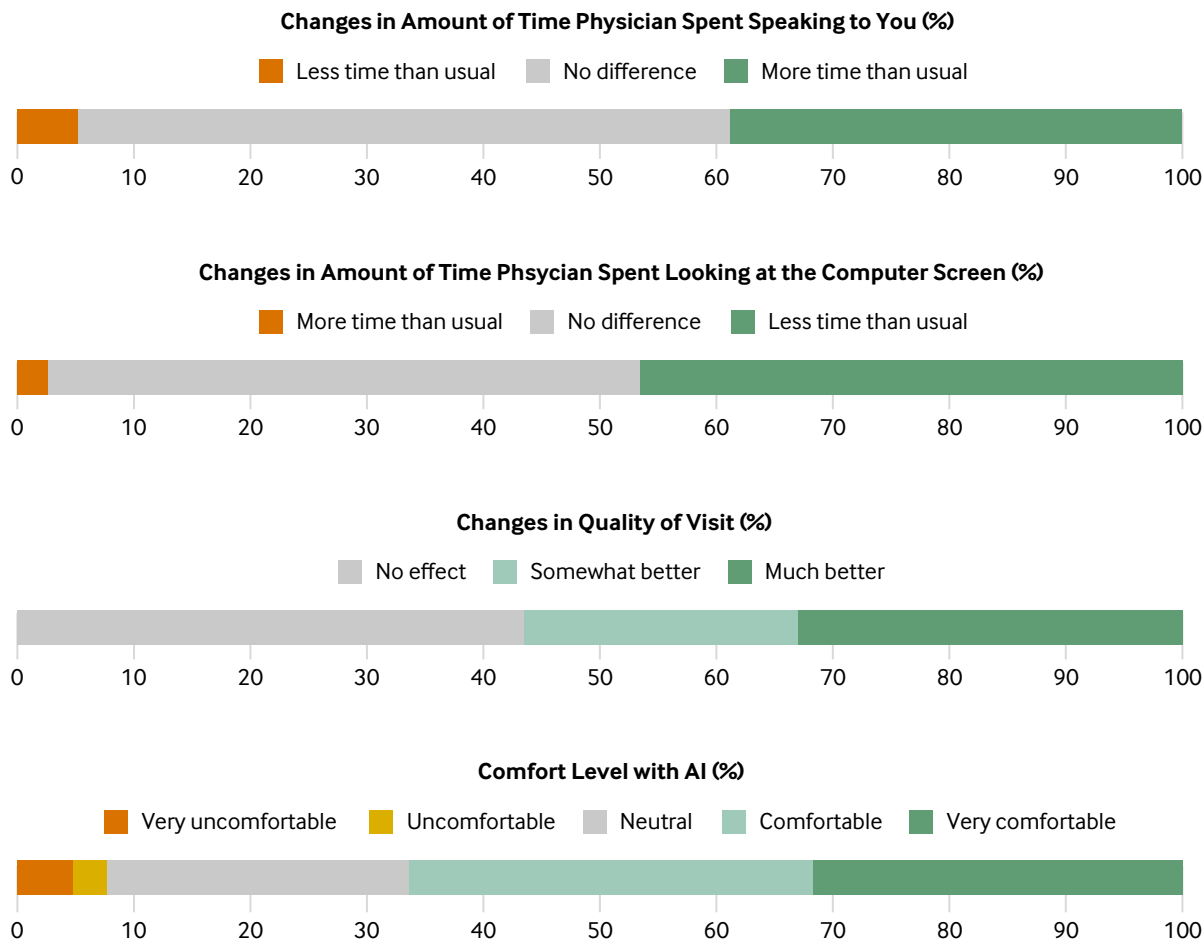
In total, 7,260 unique physicians accessed one or both AI scribe products. A total of 3,182 users did not adopt the technology until the second product was implemented. The slope of AI scribe usage after switching to the second vendor technology was steeper in the initial 23 weeks after going live than with the first vendor technology ([Figure 8](#)).

A total of 2,686 users used both ambient AI scribes. We found that prior ambient AI scribe usage predicted subsequent usage patterns. For the first 8 weeks after our second implementation, by tertiles, 78% of first-vendor high users remained in the top third posttransition, while 50% of users in the bottom third remained in the bottom third of users posttransition. Of those in the lowest third of users, 17% became high users with the second AI scribe implementation.

FIGURE 7

Patient Responses to Changes in Their Visit Due to the Use of an AI Scribe

These charts show patient responses in percentages for changes in the amount of time the physician spent speaking to the patient (less time than usual, no difference, more time than usual); changes in the amount of time the physician spent looking at the computer screen (more time than usual, no difference, less time than usual); changes in the quality of the visit (no effect, somewhat better, much better); and physician comfort level with AI (very uncomfortable, uncomfortable, neutral, comfortable, very comfortable).



Source: NEJM Catalyst
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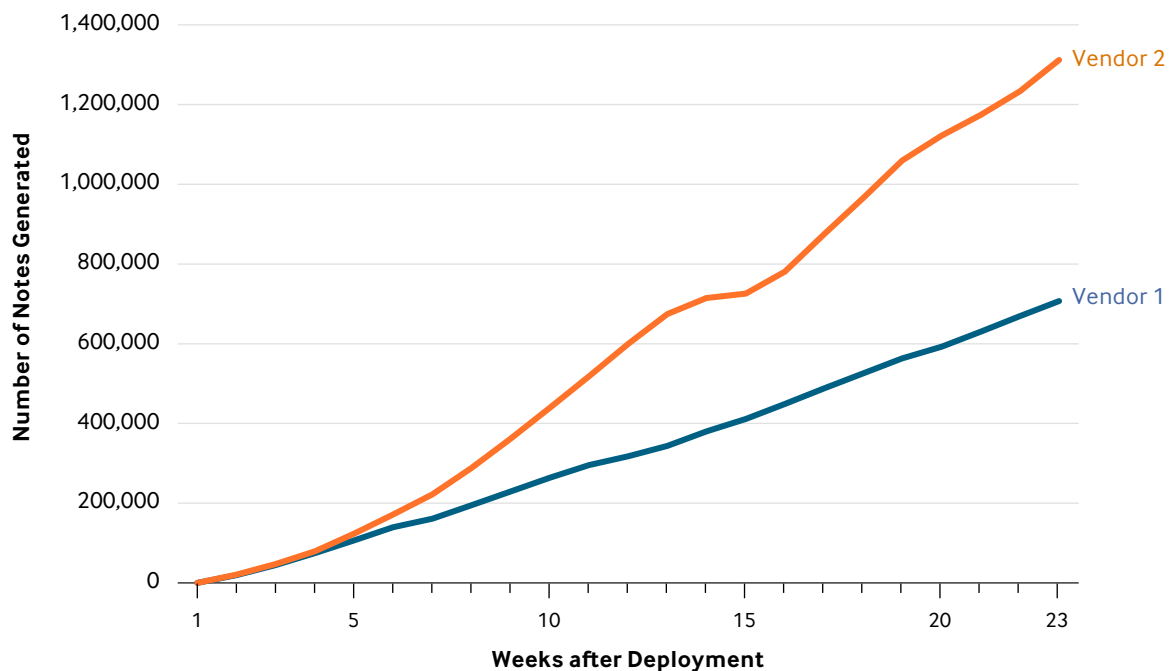
Summary Findings and Limitations

The volume of usage of the AI scribe tool continues to increase linearly in our organization. The overwhelming volume of usage has been driven by high users, and there has been a “dose-response” improvement in workload metrics with high users. However, we have also observed ongoing improvements in metrics for less frequent users.

FIGURE 8

Adoption of AI Scribe by Usage Volume across Two Vendors

This chart shows the number of notes generated in the weeks after deployment for AI scribe vendors 1 and 2.



Source: NEJM Catalyst

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Although there were over 2.5 million activations of AI scribes over a 1-year period, further enhancements and customization will likely continue to improve the uptake of the tool, particularly among nonusers. AI scribes are likely to have their greatest positive impact on physician burden when applied strategically to the most highly impacted areas, but also when use is customized and targeted by the physicians themselves, based on the scenarios and patients for which AI scribes can be most useful.

“The volume of usage of the AI scribe tool continues to increase linearly in our organization. The overwhelming volume of usage has been driven by high users, and there has been a ‘dose-response’ improvement in workload metrics with high users. However, we have also observed ongoing improvements in metrics for less frequent users.”

We see particular challenges in promoting adoption among departments with high levels of inpatient visits and specialties that traditionally have history-taking and documentation practices

that differ from primary care or that often have specific templated documentation styles. As with all new technology, integration within a new workflow continues to be perceived as a large undertaking by some, with the result that some physicians never try to use the ambient scribe in their practice. We continue efforts led by physician champions to encourage their peers to try using ambient scribes if they have not done so previously.

Physicians have had an overwhelmingly positive experience with ambient AI scribes, largely due to the impact on time savings and cognitive load, with the AI scribes helping them to remember details of conversations. Patients also reported a generally positive impact of AI scribes on their care experiences. Some patients who reported no change in their experience stated that they were supportive of their continued use of AI scribes if it helped their doctor. A small percentage of patients were uncomfortable with AI being used in their care, highlighting the need to further investigate the reasons for this discomfort, educate patients about the use of AI scribes in their care, and obtain permission from patients to use the tool during visits.

There is a high rate of physician burnout in the United States, with experience of burnout largely attributable to documentation responsibilities.^{17,18} High levels of burnout have led directly to equally high levels of turnover among physicians, which results in a considerable loss of resources in both the experience of physicians who leave the profession and the high training costs of replacement physicians for an organization.¹⁹⁻²¹ The results presented in our analysis demonstrate that AI scribes are a valuable investment in supporting the physician workforce to improve the sustainability and effectiveness of their care.

Although this evaluation was conducted in a large, integrated health system and incorporated data from more than 7,000 physicians, results may differ across other health care settings and vendor products. Because of the transition between vendors, we were unable to directly match usage data across time periods. We were also limited in our ability to evaluate more detailed metrics, such as the proportion of the draft note text edited by physicians over the entire evaluation period. Furthermore, we did not link physician and patient experience surveys with demographic data, limiting our ability to analyze whether or not there were differential experiences by various sociodemographic groups of ambient AI scribes.

Future analyses should include a qualitative component to elicit the experiences of physicians and patients with the AI scribe based on sociodemographic features. In particular, physician-patient communication is often of poorer quality for patients of underrepresented backgrounds, creating potential gaps in outcomes.²²⁻²⁵ We are still uncertain about how effectively ambient AI scribes succeed in capturing interactions with patients with disabilities, especially disabilities that may impact speech. AI scribes should be analyzed along health equity-related dimensions, including trust, which is planned but currently outside the scope of this analysis.

The Future of Ambient AI Scribes

AI scribes continue to show great promise in reducing physician workload and warrant organizational investment to support workforce retention and efficient use of resources. Rapidly adopting and responsibly integrating AI technologies has the potential to improve the effectiveness and sustainability of health care and can be used to maintain organizational

competitiveness.²⁶ Operational teams and researchers should investigate the potential usefulness of ambient AI scribes for their settings, including specific customizable features of scribes that could enhance effectiveness. Further analyses are needed to assess the impact and utility of AI scribes across various clinical scenarios and physician and patient demographic groups.

Aaron A. Tierney, PhD

Staff Scientist, The Permanente Medical Group, Kaiser Permanente Division of Research, Pleasanton, California, USA

Gregg Gayre, MD

Chief Technology Officer and Ophthalmologist, The Permanente Medical Group, Oakland, California, USA

Brian Hoberman, MD, MBA

Executive Vice President of Information Technology and Chief Information Officer, The Permanente Medical Group, Oakland, California, USA

Britt Mattern

Managing Director, Kaiser Permanente HealthConnect, The Permanente Medical Group, Oakland, California, USA

Manuel Ballesca, MD

Internal Medicine Physician, The Permanente Medical Group, Oakland, California, USA

Sarah B. Wilson Hannay, MD, MEd

eConsult Application Physician Lead, and OB/GYN Hospitalist, The Permanente Medical Group, Oakland, California, USA

Kate Castilla

Senior Program Manager, The Permanente Medical Group, Oakland, California, USA

Cindy S. Lau, MD

Family Medicine Physician, The Permanente Medical Group, Oakland, California, USA

Patricia Kipnis, PhD

Principal Statistician, The Permanente Medical Group, Kaiser Permanente Division of Research, Pleasanton, California, USA

Vincent Liu, MD, MS

Chief Data Officer, Regional Director of Hospital Advanced Analytics, Research Scientist, and Intensivist, The Permanente Medical Group, Kaiser Permanente Division of Research, Pleasanton, California, USA

Kristine Lee, MD

Associate Executive Director of Virtual Medicine and Internal Medicine Physician, The Permanente Medical Group, Oakland, California, USA

Dr. Tierney can be contacted at aaron.a.tierney@kp.org.

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