Alexa's Artificial Intelligence Paves the Way for Big Tech's Entrance into the Health Care Industry -- The Benefits to Efficiency and Support of the Patient-Centric System Outweigh the Impact on Privacy

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ALEXA'S ARTIFICIAL INTELLIGENCE PAVES THE WAY FOR BIG TECH'S ENTRANCE INTO THE HEALTH CARE INDUSTRY – THE BENEFITS TO EFFICIENCY AND SUPPORT OF THE PATIENT-CENTRIC SYSTEM OUTWEIGH THE IMPACT ON PRIVACY

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Time is the most valuable commodity bought and sold in our society. In the health care industry, time is always at a premium, and even in areas with a high concentration of physicians, patient needs are often unmet. With the rising popularity of artificial intelligence in private homes, the Big Five tech companies, Facebook, Amazon, Apple, Microsoft, and Google (FAAMG), are making strides to enter the health care industry and revolutionize it. Using Amazon's partnership with electronic health record company, Cerner, this article will discuss how Big Five artificial intelligence technology will revolutionize the health care sector and create efficiency and greater access to health care. This article will also address future plans to fully integrate Alexa artificial intelligence technology into primary health care settings. There are many legitimate privacy concerns with integrating the always-listening artificial devices into sacred private spaces like the doctor's office. The benefits of this systematic evolution of the health care sector, however, will outweigh the risks to privacy through improvements to efficiency, reductions to physical workload, and improved doctor-patient relationships. Society should support entry of artificial intelligence into health care and promote development of regulations as needed to mitigate concerns with how health data is stored and utilized. Ultimately, our existing health data privacy system is equipped to handle this AI integration. Ensuring FAAMG will not misuse data for advertising and granting the FTC the support it needs to enforce company policies will protect consumers.

I.   INTRODUCTION

The doctor-patient relationship is the cornerstone of medicine, "and the resultant communication is the heart and art of medicine and a central component in the delivery of health care."[1] Physicians are dependent on the strength of this communication to have the data they need to provide effective health care and legitimately improve the lives of their patients.[2] Many physicians struggle to effectively communicate to patients.[3] Time constraints pose an additional hurdle to connecting with patients, as many feel rushed and ignored during patient interactions when the physician strives for efficiency.[4] Physicians carry responsibilities for entering notes into

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[1] Jennifer Fong Ha & Nancy Longnecker, *Doctor-Patient Communication: A Review*, 10 OSCHSNER J. 38, 38 (2010), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3096184/ [https://perma.cc/9YTM-PMHN].

[2] *See generally id.*

[3] *See generally id.*

[4] *See id.*

patient charts, and often these administrative duties overwhelm the ability to connect with patients.[5] In addition to these tasks, physicians must keep up to date on recent medical advancements, new pharmaceuticals, and treatment techniques. "There has been relatively little study of physician time as a resource. Yet both as a contribution to health care costs and as a key element in patient-doctor relationships, there is reason to believe that it deserves more attention."[6]

Artificial intelligence (AI) technology integrated into health care appointments may dramatically change how the average patient experiences medical care. In December 2019, Amazon Corporation[7] entered into a new agreement with Cerner[8], one of the nation's top two electronic health record (EHR) software companies.[9] The Amazon-Cerner agreement will allow Cerner to integrate its software patents into Amazon's AI technology, namely Alexa, for a trial run in a Boston hospital, allowing AI to streamline patient care.[10] Not only will Alexa document patient encounters for physicians, but it will also analyze the data to identify common medical diagnoses for physicians.[11] While there are many concerns

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[5] Note: the trial intended to be run by Cerner and Amazon will take place in a Boston hospital setting. *See* James Paton, *Amazon Brings AI Expertise to Drug Industry in Novartis Pact*, BLOOMBERG L. (Dec. 4, 2019), https://www.bloomberglaw.com/product/blaw/document/XF0IFA04000000?criteria_id=35b38d4400d9e74a3d790e99655a509a&searchGuid=a01e7da5-58bb-4b6c-bfb7-2f028cba4262&bna_news_filter=bloomberg-law-news [https://perma.cc/3KPT-UJHN]. However, this article will focus on the concept of integrating AI technologies into a primary-care setting, which this author believes is the natural progression from this trial.

[6] David C. Dugdale, Ronald Epstein & Steven Z Pantilat, *Time and the Patient-Physician Relationship*, 14 J. GEN. INTERN. MED. S34, S34 (Jan. 1999), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1496869/ [https://perma.cc/2FW8-HCPR].

[7] *See generally About Amazon*, AMAZON, https://www.aboutamazon.com [https://perma.cc/N3XA-GSR7] (last visited Jan. 16, 2020).

[8] *See generally* CERNER, https://www.cerner.com [https://perma.cc/3RXW-H9XB] (last visited Jan 16, 2020).

[9] Jeff Green, *Who are the Largest EHR Vendors*, EHR IN PRACTICE, https://www.ehrinpractice.com/largest-ehr-vendors.html [https://perma.cc/8AT7-9C22] (last visited Mar. 28, 2020).

[10] Paton, *supra* note 5.

[11] *Id*.

surrounding the omnipresence of AI devices like Alexa in our everyday lives, specifically concerning consumer data privacy,[12] it would be foolish for society to eschew the benefits and improvements this technology could provide to the health care system. AI technology has developed rapidly since Alexa's first introduction to the market in 2014.[13] As Amazon stated in its own birthday post for Alexa, "Five years ago, Alexa only knew how to do 13 things; today she can do so much more, from planning a night out to identifying grocery items for visually impaired customers, . . . [Alexa] has more than 100,000 skills from developers . . . [and communicates] in 8 languages."[14]

This article argues that the intense entrance of the Big Five[15] tech companies, Facebook, Amazon, Apple, Microsoft, and Google, or FAAMG as coined by Goldman Sachs,[16] into the health care industry will create greater efficiency and expanded access to care. Using the Amazon-Cerner partnership as a case-study for the efforts each member of FAAMG is making to integrate into health care, this article will demonstrate the benefits of using AI tech in the health care sector outweigh the risks, as the risks can be mitigated with supplemental legislation to our existing structure.

FAAMG encompasses as much as 13 percent of the "S&P500 by market capitalization" and "are the . . . leading companies that bring sociocultural evolution at a big scale and drive social change

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[12] Mary Meehan, *Data Privacy Will Be The Most Important Issue In The Next Decade*, FORBES (Nov. 26, 2019), https://www.forbes.com/sites/marymeehan/2019/11/26/data-privacy-will-be-the-most-important-issue-in-the-next-decade/#5cb56fe71882 [https://perma.cc/M492-N25E].

[13] Ava Mutchler, *Voice Assistant Timeline: A Short History of the Voice Revolution*, VOICEBOT.AI (July 14, 2017), https://voicebot.ai/2017/07/14/timeline-voice-assistants-short-history-voice-revolution/ [https://perma.cc/A28V-JDHU].

[14] Tom Taylor, "*Alexa, Happy Birthday*," AMAZON (Nov. 5, 2019), https://blog.aboutamazon.com/devices/alexa-happy-birthday [https://perma.cc/E2DJ-3TV7].

[15] Nicolas Lekkas, *The Big Five Tech Companies & Their Big Five Acquisitions*, GROWTH ROCKS (Apr. 16, 2019), https://growthrocks.com/blog/big-five-tech-companies-acquisitions/ [https://perma.cc/8MQJ-QXHY].

[16] *Id*.

at full speed."[17] Their technology backgrounds could lead them to metamorphize the health care industry into the mythical specter of broad efficiency and access our society sorely needs. While many are decrying the speedy entrance of this technology as dangerous and predicting apocalyptic consequences for our personal data privacy due to the amount of data owned by tech giants and security risks surrounding that data,[18] these arguments often discount the innovation AI technology brings to the health care sector. While data privacy concerns are legitimate and should be addressed, especially in health care, society at large should be encouraging tech companies to initiate revolutions in efficiency, that might ultimately lead to better health care.

Part II of this article will briefly discuss what AI technology is, how it was developed, and how it works. Part III will address the efforts of FAAMG entering the health care industry and potential ultimate goals of these movements by using Amazon's partnership with Cerner as an example of how AI, machine learning, and cloud computing technology systems may be integrated into health care. Part IV will detail the current state of health data privacy in the United States, with specific attention for how AI and health data collection by AI devices might be incorporated. Finally, Part V of this article will address the treatment of health data and its future role in the health care technology space. Ultimately, despite the data privacy concerns, FAAMG's integration of AI systems into the health care system will benefit society by improving how health care is distributed and accessed. Allowing these companies to utilize their capacity for efficiency and personalized services to revolutionize how physicians interact with patients, document visits, and analyze care will lead to greater access to health care. Although there are regulatory gaps that need to be addressed, the benefits to the system outweigh the risks to privacy.

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[17] *Id.*

[18] Charlie Warzel & Sarah Jeong, *The Internet Security Apocalypse You Probably Missed*, N.Y. Times (May 21, 2019), https://www.nytimes.com/2019/05/21/opinion/internet-security.html [https://perma.cc/4F25-FLMM].

II.   THE DEVELOPMENT OF AI AND HOW IT WORKS

Although AI has been integrated into the average household only within the last decade,[19] its development began[20] in 1943 when Warren S. McCulloch and Walter Pitts, two mathematical prodigies,[21] published a paper likening biological processes in the brain to electrical circuits.[22] In the 1950s and 1960s, the U.S. Department of Defense attempted to develop AI technology to mimic basic human reasoning.[23] While AI was originally conceived as a way to manufacture human intelligence, the innovation shifted

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[19] *See* Mutchler, *supra* note 13.

[20] There were several mathematical and philosophical developments attributable to Ramon Llull, Gottfried Liebniz, Thomas Bayes, Jonathon Swift, George Boole, Nikola Tesla, and more, such as the concept of including knowledge in mechanical equations utilizing complex layering of equations to complete tasks and the overall concept of machines equipped to adapt and learn to the situation presented to them. However, 1943 marked the first peer-reviewed article discussing artificial intelligence as a neural network modeled after the neurons of the human brain, which became the basis for the development of the technology we have today. *See* Gil Press, *A Very Short History of Artificial Intelligence (AI)*, FORBES (Dec. 30, 2016), https://www.forbes.com/sites/gilpress/2016/12/30/a-very-short-history-of-artificial-intelligence-ai/#4e56a66b6fba [https://perma.cc/3LTG-UDMN].

[21] While McCulloch came from a background of highly educated academics and lawyers, Pitts was a homeless runaway, sneaking into college classes to learn about logic and mathematical theories. When they were introduced in 1941, their combined intellects and backgrounds led to their groundbreaking joint publication, drawn from the work of their joint hero, Leibniz. *See* Amanda Gefter, *The Man Who Tried to Redeem the World with Logic*, NAUTILUS (Feb. 5, 2015), http://nautil.us/issue/21/information/the-man-who-tried-to-redeem-the-world-with-logic [https://perma.cc/M6L5-MSPY].

[22] *See* Press, *supra* note 20. *See generally* Warren S. McCulloch & Walter Pitts, *A Logical Calculus of the Ideas Immanent in Nervous Activity*, 5 THE BULLETIN OF MATHEMATICAL BIOPHYSICS 115, 115–33 (1943), https://link.springer.com/article/10.1007/BF02478259 [https://perma.cc/7YH9-44PA].

[23] SAS, *Artificial Intelligence: What it is and why it matters- Artificial Intelligence History,* SAS, https://www.sas.com/en_us/insights/analytics/what-is-artificial-intelligence.html [https://perma.cc/NKR9-S8U2] (last visited Feb 11, 2020); *see also* Darrel M. West, *What is Artificial Intelligence?*, BROOKINGS (Oct. 4, 2018), https://www.brookings.edu/research/what-is-artificial-intelligence/ [https://perma.cc/DHU5-GNHP].

to generating programs capable of completing specific tasks.[24] Tech development evolved from attempting to mimic human biology to specific task-based services such as "computer vision, speech recognition, machine translation, social network filtering, playing board and video games, and medical diagnosis."[25] The push to invest in AI surged in 2010 with advancements in computer learning techniques, and increasingly powerful computing.[26] Today AI learns and develops like humans to improve efficiency of tasks and adapt to new inputs.[27]

AI systems currently on the market perform a single task, and are therefore known as "narrow AI" as opposed to "general AI" which functions like a human brain evaluating a myriad of situations to determine which task to complete.[28] Alexa's AI technology, while composed of many skills, is not general AI that would develop into a more sophisticated technology, such as an autonomous robot.[29] Amazon's Alexa system is composed of both the cloud-based voice service and the actual hardware device, known as the Echo.[30] When the average consumer purchases an Alexa-enabled device, it arrives with basic skills, or task-based abilities. Consumers can then

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[24] SAS, *Neural Networks: What They Are and Why They Matter*, SAS, https://www.sas.com/en_us/insights/analytics/neural-networks.html [https://perma.cc/9Q34-TZUS] (last visited Feb. 11, 2020).

[25] *Id*.

[26] NAT'L SCI. & TECH. COUNCIL COMM. ON TECH., PREPARING FOR THE FUTURE OF ARTIFICIAL INTELLIGENCE 6 (2016), https://obamawhitehouse.archives.gov/ sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_fut ure_of_ai.pdf [https://perma.cc/PCP6-4BE2].

[27] *See* SAS, *supra* note 24.

[28] Max Tegmark, *Benefits & Risks of Artificial Intelligence*, FUTURE OF LIFE INST., https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/ [https://perma.cc/5HR8-HH6K] (last visited Jan. 17, 2020); *see also* Leah Davidson, *Narrow vs. General AI: What's Next for Artificial Intelligence?*, SPRINGBOARD BLOG (Aug. 12, 2019), https://www.springboard.com/ blog/narrow-vs-general-ai/ [https://perma.cc/C7NA-AYX2].

[29] *See* Richard Baguley & Colin McDonald, *Appliance Science: Alexa, How Does Alexa Work? The Science of the Amazon Echo*, CNET (Aug. 4, 2016), https://www.cnet.com/news/appliance-science-alexa-how-does-alexa-work-the-science-of-amazons-echo [https://perma.cc/9UDW-UABE].

[30] Lauren Bass, *The Concealed Cost of Convenience: Protecting Personal Data Privacy in the Age of Alexa*, 30 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 261, 271–72 (2019).

download thousands of "skills" or third-party developed add-ons similar to applications that allow Alexa to do other tasks.[31] Amazon also invites companies to utilize its base technology and cloud service, known as Amazon Web Services,[32] to develop more skills and innovate their technology.[33]

Amazon holds many patents and trade secrets that keep the majority of details about the technology proprietary.[34] Although patents are intended to widely distribute information to the public, combining a patented process with completely confidential trade secret key components, like the algorithm, prevents others from utilizing or analyzing that patent in the same way Amazon can.[35] At a basic level, Alexa functions by recording speech and "convert[s] the recording into commands that it interprets."[36] AI technology listens and collects massive amounts of data, which is then fed through Amazon's proprietary algorithm to predict future behavior, marketing, and user activity.[37]

> Alexa has evolved . . . to a ubiquitous and trusted household presence tasked with the responsibility of unlocking the front door, turning on the lights, regulating the thermostat, ordering dinner, assisting the kids with their homework, cleaning the house, and at the end of a long day, even helping one to drift off into a quiet slumber.[38]

The black box around the specifics of how Alexa works and silently collects information causes concern as society is increasingly willing to allow access to personal data to improve our

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[31] *Id.* at 275.

[32] Amazon Web Services, https://aws.amazon.com/?nc2=h_lg [https://perma.cc/VUF7-HVA2] (last visited Jan. 18, 2020).

[33] *Amazon Alexa*, Amazon, https://developer.amazon.com/en-US/alexa [https://perma.cc/ZF8W-JM62] (last visited Jan 17, 2020).

[34] Bass, *supra* note 30, at 271–76.

[35] *See* Michael R. McGurk & Jia W. Lu, *The Intersection of Patents and Trade Secrets*, 7 Hastings Sci. & Tech. L.J. 189, 211 (2015) ("Each patent is limited to one invention, and in practice, each patent may only cover a limited aspect of each invention. Thus, a patent needs only to provide a written description and an enabling disclosure for the invention *claimed,* and not all information needed to explain how to make and use the entire broad invention.").

[36] Baguley & McDonald, *supra* note 29.

[37] Bass, *supra* note 30, at 271–76.

[38] *Id.* at 271 (citations omitted).

daily lives.[39] Alexa technology is just one example of AI developed by FAAMG. Since each company that makes up FAAMG develops its own competing products, the products are all similarly proprietary in nature, despite each company providing limited services to the public to utilize its tech and innovation.

III.   FAAMG'S ENTRANCE TO THE HEALTH CARE INDUSTRY

The Big Five technology companies dominating the market, FAAMG,[40] are all independently making efforts to enter the health care industry.[41] Some of these efforts involve simply acquiring health care businesses or start-up tech companies.[42] Other endeavors involve active partnerships to integrate cloud-based and AI technology into existing health care industries.[43] This section will discuss how FAAMG has made moves in health care and what impact these shifts might have on the future of our health care industry. This section will also utilize Amazon's efforts to integrate along the entire delivery system pipeline as a case study in how each company in FAAMG will revolutionize the health care industry. The Amazon partnership with Cerner as an EHR company, one example of how AI is being integrated into health care, is closely connected to many of the regulatory concerns related to this technology.

A. Facebook, Apple, Microsoft, and Google.

Facebook is unique in that it has focused more on developing research teams into AI than selling its AI technology. Facebook AI is the company's research platform in which the company constantly solicits new employees and promotes AI progress in numerous diverse areas. These efforts include traditional areas such as natural language processing, to more social-media focused areas such as

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[39] *Id.* at 281.

[40] Lekkas, *supra* note 15.

[41] Angela Chen, *As Tech Companies Move into Health Care, Here's What to Watch in 2019*, VERGE (Jan. 3, 2019), https://www.theverge.com/2019/1/3/ 18166673/technology-health-care-amazon-apple-uber-alphabet-google-verily [https://perma.cc/NGC9-7FHS].

[42] *Id.*

[43] *Id.*

"integrity" and "ranking & recommendations."[44] Additionally, Facebook has developed some AI tools that it markets to other AI developers.[45] Within health care, Facebook has leveraged its power to connect people and communities.[46] For several years, Facebook has conducted its Blood Donation program, which alerts people when there are local blood shortages and informs them of locations where they can donate.[47] This program has been successful in India and Brazil, leading to "20% of voluntary, walk-in blood donors" originating from Facebook's program.[48] Recently Facebook launched a program called Preventative Health, which is focused on giving generalized health recommendations to users based on their basic demographic data.[49]

Apple has also been making strides in the health care sector by creating third party health applications, like Apple Health, which are automatically integrated into Apple watches and continuously collect data on the wearer.[50] A popular heart rate app on the Apple Watch has recently struck headlines for saving lives and alerting

[44] *See* FACEBOOK ARTIFICIAL INTELLIGENCE, https://ai.facebook.com/research/ integrity [https:// perma.cc/KVG6-YGV4] (last visited Feb. 16, 2020) (describing "Integrity" as "building AI solutions to keep people safe on social platforms" and "Ranking & Recommendations" as "connecting people to what's most meaningful").

[45] *See Tools for Advancing the World's AI*, FACEBOOK ARTIFICIAL INTELLIGENCE, https://ai.facebook.com/tools/ [https://perma.cc/T43J-HM9G] (last visited Feb. 16, 2020).

[46] Freddy Abnousi, *Connecting People with Health Care Resources*, FACEBOOK (Oct. 28, 2019), https://about.fb.com/news/2019/10/connecting-people-with-health-resources/ [https://perma.cc/6U2C-G9PR].

[47] *Id.*

[48] *Id.*

[49] Jonathan Shieber, *Facebook Unveils its First Foray into Personal Digital Healthcare Tools*, TECH CRUNCH (Oct. 28, 2019), https://techcrunch.com/ 2019/10/28/facebook-unveils-its-first-foray-into-personal-digital-healthcare-tools/ [https://perma.cc/TY2N-DRKW]. The service targets the three most common health care risks: cancer, heart disease, and influenza. *Id.* The program also provides recommendations for preventative health checks, such as mammograms and cholesterol tests that will be determined by the user's self-disclosed demographics. Abnousi, *supra* note 46. This program "allows people to mark when tests are completed, set reminders to schedule future tests . . . and find affordable places to receive care." *Id.*

[50] Chen, *supra* note 41.

wearers to potential health conditions, with one Austin, Texas, cardiac surgeon stating, "I would say probably at least once or twice a week someone comes to me solely because their watch said, hey you've got a serious problem."[51] The tech giant also obtained Food and Drug Administration clearance to include an electrocardiogram monitoring system on its Apple Watch device.[52] Apple has additionally been investing in different health care and tech companies, and has conducted a longitudinal Apple Health Study with Stanford University as well as opening its own medical clinics.[53] These medical clinics are intended for employees only and seem to be attempts at increasing autonomy from existing medical systems.[54]

Microsoft has also entered into the AI marketplace.[55] Similar to the other large tech companies, Microsoft has worked to integrate AI with their existing product base as well as introducing new tools.[56] As the classic office software company, Microsoft is marketing its AI platform, known as Azure[57], as a business tool.[58] Additionally, Microsoft has invested in artificial intelligence companies, such as its 2018 acquisition of Bonsai, a company that

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[51] Aaron Holmes, *A Texas man says his Apple Watch saved his life by detecting problems with his heartbeat,* BUSINESS INSIDER (Nov. 25, 2019), https://www. businessinsider.com/apple-watch-saved-mans-life-detected-heart-problems-2019-11 [https://perma.cc/TXL8-RL6U] (last visited Jan. 18, 2020).

[52] Chen, *supra* note 41.

[53] *Id.*

[54] Alia Paavola, *Here's Why Amazon and Apple are Betting on Medical Clinics*, BECKER'S HOSP. REV. (Sept. 10, 2018), https://www.beckershospitalreview. com/facilities-management/here-s-why-amazon-and-apple-are-betting-on-medical-clinics.html [https://perma.cc/9A3H-5S65].

[55] Chris Neiger, *Here's How Microsoft Is Investing in AI*, MOTLEY FOOL (June 20, 2018), https://www.fool.com/investing/2018/06/20/heres-howmicrosoft -is-investing-in-ai.aspx [https://perma.cc/KAY5-ET3B].

[56] *See Microsoft Artificial Intelligence*, MICROSOFT, https://www.microsoft. com/en-us/research/research-area/artificialintelligence/?facet%5Btax %5D%5Bmsr-research-area%5D%5B0%5D=13556&sort_by=most-recent [https://perma.cc/L49W-5CTE] (last visited Jan. 27, 2020).

[57] *Azure AI*, MICROSOFT, https://azure.microsoft.com/en-us/overview/ai-platform/ [https://perma.cc/GQ8A-YSX9] (last visited Jan. 27, 2020).

[58] *Get your business AI-ready*, MICROSOFT AI, https://www.microsoft.com/en-us/ai/business?activetab=pivot1%3aprimaryr2 [https://perma.cc/572G-HSQW] (last visited Jan. 27, 2020).

focuses exclusively on developing deep learning tools.[59] Similarly, Microsoft has integrated its cloud-based and AI technology in a partnership with Apollo Hospitals, based in India, to prevent cardiovascular events.[60] Utilizing Microsoft Azure and its machine learning services, the technology identified twenty-one risk factors specific to Indian populations.[61]

Google is also anticipating integrating AI technology into its health care initiatives.[62] Google expects AI to assist in "disease detection, new data infrastructure, and potentially insurance."[63] Google, like the other tech companies, is taking advantage of the increasing digitization of health data into EHRs and is creating AI tech to process this information and potentially identify patterns and disease signs earlier than the human eye.[64] The company has also been acquiring and investing in smaller AI and tech companies in an effort to expand its diversity and reach.[65]

Overall, the push of each of these large and powerful companies to revolutionize the health care industry may ultimately lead to a

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[59] Kyle Wiggers, *Microsoft Acquires Bonsai to Enhance its Suite of AI Developer Tools*, VENTURE BEAT (June 20, 2018), https://venturebeat.com/2018/06/20/microsoft-acquires-bonsai-to-enhance-its-suite-of-ai-developer-tools/ [https://perma.cc/2G22-ZYHM].

[60] Jean-Philippe Courtois, *Harnessing the Power of AI to Transform Healthcare*, MICROSOFT BLOG (June 19, 2019), https://blogs.microsoft.com/blog/2019/06/19/harnessing-the-power-of-ai-to-transform-healthcare/ [https://perma.cc/2XG6-7GZS] ("Apollo clinicians and data scientist started by reviewing more than 400,000 patient records from its hospitals around the country . . . . [T]hey uploaded all the data they had collected to the cloud using Microsoft Azure and then worked with Microsoft Azure Machine Learning services to search for hidden correlations. The team started with 100 potential risk factors and 200 lab data points. Using the massive computing power of the cloud, they trained machine learning algorithms to find the statistical significance of each factor in the occurrence of future heart attacks. This enabled them to create a model that identified 21 risk factors in Indian populations.").

[61] *Id.*

[62] *How Google Plans to Use AI Technology to Reinvent the $3 Trillion US Healthcare Industry,* CBINSIGHTS, https://www.cbinsights.com/research/report/google-strategy-healthcare/ [https://perma.cc/5TTT-5LMS] (last visited Jan. 17, 2020).

[63] *Id.*

[64] *Id.*

[65] *Id.*

race to the finish and rapidly change how our health care industry functions. As each of the companies acquire more real estate in the market, they will increasingly compete for consumer access and foster continued innovation. Detailing a specific example of how AI can be integrated into the health care system will highlight where privacy and regulatory concerns are raised and also where the system can be benefited.

B. A Case Study with Amazon

Amazon has been hyper-focused on utilizing its AI and cloud-based services to enter the health care sector.[66] Although all five of these tech giants have made strong investments in health care, Amazon presents a unique case study due to their ubiquitous presence along the entire health care pipeline, including manufacturers, hospitals, consumer marketplaces, and pharmaceuticals.[67] Amazon's omnipresence in the marketplace of things combined with this engagement with the health care industry alludes to a future of direct to consumer medical care, manufacturing, and physician interaction that may foster the beginning of a true precision medicine patient-centered system.

In addition to other investments[68], Amazon has also been strongly engaging with the EHR space, a contentious area in the

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[66] Chen, *supra* note 41.

[67] *Amazon in Healthcare: The E-Commerce Giant's Strategy for a $3 Trillion Market,* CBINSIGHTS, https://www.cbinsights.com/research/report/amazon-transforming-healthcare/ [https://perma.cc/LB3Z-2LUY] (last visited Jan. 28, 2020) (discussing Amazon's particular market advantages in health care, including its access to 310M active consumers, over 100M of which have Amazon Prime subscriptions, its massive market capital which makes it capable of competing without attempting to make immediate profits, and its extensive infrastructure for data processing, supply, and distribution of products).

[68] These investments include a 2018 partnership with JP Morgan and Berkshire Hathaway that allowed Amazon to establish its independent health care company for its employees like Apple. Chen, *supra* note 41; Paavola, *supra* note 54. Amazon has also acquired pharmaceutical companies like PillPack which delivers prescriptions directly to consumers. Chen, *supra* note 41. Further, Amazon has entered a partnership with Novartis, a global pharmaceutical manufacturing company, with significant investment to use its AI technology to improve the supply chain system and simplify manufacturing. Shez Partovi & Ian Meyers, *AWS and Novartis: Re-inventing pharma manufacturing*, AWS (Dec. 4, 2019),

medical world, as the trend toward digitization and interoperability has temporarily created bottlenecks in receipt of medical care.[69] In the last decade, implementation of new EHR systems came with many back logs, such as overcoming the physician and administrative learning curve.[70] Atul Gwande is a well-known Harvard Medical professor, physician, author and CEO of the Amazon, Berkshire Hathaway and JP Morgan health care venture known as Haven.[71] He stated from his experience with EHR, "The software costs were under a hundred million dollars. The bulk of the [$1.6 billion] expenses came from lost patient revenues and all the tech-support personnel and other people needed during the implementation phase."[72] Physicians spend a significant amount of their time inputting, processing, organizing and analyzing data entered in their patients' EHR, during and after their many patient

https://aws.amazon.com/blogs/industries/aws-and-novartis-re-inventing-pharma-manufacturing/ [https://perma.cc/Z2FZ-C3A6]. This partnership is also aimed at allowing increased small-batch productions and precision care. Conor Hale, *Novartis' Digital Transformation Continues Apace with Amazon Supply Chain Tie-up*, FIERCE BIOTECH (Dec. 4, 2019), https://www.fiercebiotech.com/medtech/novartis-digital-transformation-continues-apace-amazon-supply-chain-tie-up [https://perma.cc/6DLE-ZMWR]. Precision medicine is "an emerging approach for disease treatment and prevention that takes into account individual variability in genes, environment, and lifestyle for each person." Genetics Home Reference, *What is Precision Medicine?*, NIH NAT'L LIBRARY OF MEDICINE, https://ghr.nlm.nih.gov/primer/precisionmedicine/definition [https://perma.cc/Z839-3ES7] (last visited Jan. 28, 2020). It allows more personalized care, could potentially involve personalized drugs and is one piece of a larger trend towards patient-centered, value-based health care, or a system of physician compensation based on outcomes rather than treatment decisions, which centers care on the patient's health rather than profitability. *See id.*; *see also* Eric K. Tseng & Lisa K. Hicks, *Value Based Care and Patient-Centered Care: Divergent or Complementary?,* CURRENT HEMATOLOGIC MALIGNANCY REPS. (June 4, 2016), https://link.springer.com/article/10.1007%2Fs11899-016-0333-2 [https://perma.cc/8B3X-NHHD].

[69] Atul Gwande, *Why Doctors Hate Their Computers,* THE NEW YORKER (Nov. 5, 2018), https://www.newyorker.com/magazine/2018/11/12/why-doctors-hate-their-computers?subId1=xid:fr1579361095628eeb [https://perma.cc/9ZDF-TXLS].

[70] *Id.*

[71] Atul Gwande, *About*, ATUL GWANDE.COM, http://atulgawande.com/about/ [https://perma.cc/2Z5L-28DS] (last visited Feb. 10. 2020).

[72] Gwande, *supra* note 69.

appointments with many different individuals.[73] Many physicians feel that the new digital system is not an improvement, as it requires more time and forces doctors to input information in specific ways.[74] While the paper health record system was cumbersome, and required physical documentations and maintenance by each individual office, it also allowed physicians to tailor their documentation specific to their needs. Having to conform to the demands of an electronic system that will not let a physician proceed without inputting specific terms, whether or not the physician deems them relevant, has been frustrating to some physicians.[75]

Amazon's developments in this space may address some of the EHR complaints. Amazon Comprehend Medical is a software tool that monitors and analyzes EHR, utilizing "a natural language processing service that makes it easy to use machine learning to extract relevant medical information from unstructured text."[76] Amazon claims that this software will allow physicians to easily retrieve "medication, dosage, strength and frequency from a variety of sources like doctors' notes, clinical trial reports, and patient health records."[77] Amazon's Transcribe Medical, a second and distinct application, is "a machine learning service that makes it easy to quickly create accurate transcriptions from medical consultations between patients and physicians . . . for use in clinical documentation applications."[78] Both of these applications are intended to be Alexa compatible.

Cerner is one of two leading electronic health record companies in the United States.[79] While Cerner and Amazon have partnered

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[73] *Id.*

[74] *Id.*

[75] *Id.*

[76] *Amazon Comprehend Medical*, AMAZON WEB SERVS., https://aws.amazon.com/comprehend/medical/ [https://perma.cc/5PJX-4M8E] (last visited Jan 18, 2020).

[77] *Id.*

[78] *Amazon Transcribe Medical*, AMAZON WEB SERVS., https://aws.amazon.com/transcribe/medical/ [https://perma.cc/W53B-S3GA] (last visited Jan. 30, 2020).

[79] Green, *supra* note 9; CERNER, *supra* note 8. Epic Systems Corporation is the other leading EHR company. EPIC, https://www.epic.com [https://perma.cc/2XRY-977D] (last visited Jan. 18, 2020).

since 2018 to allow the EHR company to utilize Amazon's cloud-based services,[80] the recent Amazon-Cerner Agreement is focused on applying Cerner's 500th patent, "featuring voice-activated documentation, captur[ing] important details shared between the clinician and patient."[81] Cerner stated in a press release that one of its goals in entering into the partnership is to lead the way for consumer's increasing expectation for "high-quality, accessible health care balanced with affordable costs and increased transparency", a tenet of personalized medicine.[82] The December 2019 expanded partnership between Amazon and Cerner is focused on utilizing similar software that the two companies have developed in conjunction with Alexa's AI technology.[83] Combining Cerner's Digital Virtual Scribe, Amazon's Comprehend Medical, and Amazon's Transcribe Medical could lead to an effective and beneficial nuanced tool for streamlining patient care.

Cerner's goals are to reduce patient readmissions and improve the health care system by significantly reducing the time physicians spend documenting patient visits.[84] Additionally, Cerner is developing an intelligent platform fully integrating AI into its EHR

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[80] Linda Wilson, *Cerner Aims to Expand its Reach with Use of Amazon Web Services*, HEALTH DATA MGMT., https://www.healthdatamanagement.com/news/cerner-aims-to-expand-its-reach-with-use-of-amazon-web-services [https://perma.cc/FFN2-L8PM] (last visited Jan. 18, 2020).

[81] *AWS Work to Reduce Patient RE-Admissions and Time Spent Documenting Patient Visits*, CERNER, https://www.cerner.com/blog/cerner-aws-work-to-reduce-patient-re-admissions-and-time-spent-documenting-patient-visits [https://perma.cc/66YD-78J4] (last visited Jan 9, 2020). Cerner's Digital Virtual Scribe "captures doctor-patient interactions with speech recognition and can suggest and categorize allergies, as well as, medications using AWS' machine learning-powered service for natural language processing." John Glaser, *Build. Repeat. Scale. Creating an Open world of health care*, CERNER (Dec. 2, 2019), https://www.cerner.com/blog/build-repeat-scale-creating-an-open-world-of-health-care [https://perma.cc/8AUT-M4F7].

[82] *Cerner Leads New Era of Health Care Innovation*, CERNER (July 30, 2019), https://www.cerner.com/blog/cerner-leads-new-era-of-health-care-innovation [https://perma.cc/B98H-GB7T].

[83] Glaser, *supra* note 81.

[84] *AWS Work to Reduce Patient Re-Admissions and Time Spent Documenting Patient Visits*, CERNER (Dec. 3, 2019), https://www.cerner.com/blog/cerner-aws-work-to-reduce-patient-re-admissions-and-time-spent-documenting-patient-visits [https://perma.cc/66YD-78J4].

to assist patients, composed of chatbots[85] to help patients understand their medical records, and decision-making and processing to make the system more efficient.[86] The combination of these new technologies coalesces to a future of medical visits in which Alexa is stationed in patient exam rooms. Physicians would meet with patients speaking directly to them about their conditions, without any nurse present and without constantly looking into a computer screen to input information. Following the visit, both physician and patient, after physician review, can log onto the patient's EHR and access findings, automatically documented by the AI device. The EHR would help patients understand basic findings surrounding their medical record, such as a recommendation on improving bad cholesterol scores, or recommended diets for diabetics. The physician does not have to remember details of conversations hours later, or spend valuable time inputting and processing data points. Potentially, the physician could see several more patients that day and with fewer instances of human error. [87]

This vision represents a future in which Amazon has integrated AI into virtually every aspect of patient care. While Alexa devices in homes may collect health data as it is offered by their owners, this system of automatically cataloguing physician interactions involves

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[85] Chatbots are prominent players in telehealth or telemedicine, that use machine learning algorithms to interact with patients or consumers and recommend diagnoses. The impact and prevalence of these chatbots and artificial intelligence in general in telemedicine and telehealth is and the liabilities associated with this use is discussed artfully in my colleague's publication in this same issue. *See* Mousa Alshanteer, *A Current Regime of Uncertainty: Improving Assessments of Liability for Damages Caused by Artificial* Intelligence, 21 N.C. J.L. & TECH. 27, 34 (2020).

[86] *Cerner CEO Unveils Next-generation Cognitive Platform in Health Conference Keynote*, CERNER (Oct. 8, 2019), https://www.cerner.com/blog/cerner-ceo-unveils-next-generation-cognitive-platform-in-health-conference-keynote [https://perma.cc/AC9Q-FUL6].

[87] *See* Abby Norman, *Your Future Doctor May Not be Human. This is the Rise of AI in Medicine.*, FUTURISM (Jan. 31, 2018), https://futurism.com/ai-medicine-doctor [https://perma.cc/896A-Y3K2] ("While various techniques and tests give . . . [physicians] all the information they need to diagnose and treat patients, physicians are already overburdened with clinical and administrative responsibilities, and sorting through the massive amount of available information is a daunting, if not impossible task.").

intentionally placing a wealth of protected health information (PHI) into the black box of Amazon's proprietary algorithms. Although there are many concerns about the consequences of giving big tech this data, such a system could dramatically improve the lives and practices of physicians and ultimately lead to higher quality health care, as physicians will be able to dedicate more time to the practice of medicine as opposed to the administrative duties of medicine.[88]

IV.   HEALTH DATA PRIVACY AND THE REGULATION OF AI

As with any technological development that becomes intimately integrated into our personal lives, there have been media warnings against privacy violations.[89] Indeed, integration of these technologies trigger legitimate and salient privacy concerns, as legislatures are once again trailing behind the speed of technological advancement.[90] These recent developments represent the beginnings of integrating AI into what the Health Insurance Portability and Accountability Act (HIPAA)[91] and other health privacy laws designate PHI or "all individually identifiable health information held or transmitted by a covered entity or its business associate."[92] It is crucial to understand how Amazon and Cerner plan to integrate AI technology within the current health data privacy system, as it will determine which existing regulations apply and where there are gaps that may need to be supplemented with further regulations.

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[88] *Id.*

[89] Dorian Lynskey, *"Alexa, are you Invading My Privacy?" – The Dark Side of Our Voice Assistants*, GUARDIAN (Oct. 9, 2019), https://www.theguardian.com/technology/2019/oct/09/alexa-are-you-invading-my-privacy-the-dark-side-of-our-voice-assistants [https://perma.cc/WB52-QPNP].

[90] Madhumita Murgia & Siddarth Shrikanth, *How Governments are Beginning to Regulate AI*, FIN. TIMES (May 29, 2019), https://www.ft.com/content/025315e8-7e4d-11e9-81d2-f785092ab560 [https://perma.cc/VEP5-C2W5].

[91] Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191, 110 Stat. 1936 (1996).

[92] U.S. DEP'T OF HEALTH AND HUMAN SERVS., OCR PRIVACY BRIEF: SUMMARY OF THE HIPAA PRIVACY RULE 3 (2003), https://www.hhs.gov/sites/default/files/privacysummary.pdf [https://perma.cc/4LYS-7FJ2].

A. Health Data Privacy Laws and Regulations

The U.S. has a "sectoral approach" to privacy regulation, "in which governmental interference is minimal, and the various industrial marketplace stakeholders dictate and determine internal oversight and governance on an as-needed basis . . . . [E]ach policy is based on the *type* of data collected and the *entity* responsible for aggregating and maintaining that collected data."[93] HIPAA is the strongest control mechanism in health data privacy, but its control is limited to what are termed "covered entities" under the regulation and their business associates.[94] Covered entities include health plans, health care clearing houses, and any health care provider that electronically transmits health information in connection with health care transactions.[95] A business associate is "a person or organization . . . that performs certain functions or activities on behalf of, or provides certain services to, a covered entity that involve the use or disclosure of [PHI]."[96] The Office for Civil Rights (OCR) within the U.S. Department of Health and Human Services is responsible for enforcing HIPAA.[97] This system places the burden on consumers to report complaints with data privacy, although in cases of large-scale breaches, requires the entity itself to report.[98] Regulation of an entity essentially occurs only after a breach.[99]

Despite whether the covered entity is handling health data and therefore bound under HIPAA, all consumer-facing entities are subject to the Federal Trade Commission (FTC) Act.[100] The FTC Act

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[93] Bass, *supra* note 30, at 287, 288

[94] U.S. DEP'T OF HEALTH AND HUMAN SERVS., *supra* note 92, at 2.

[95] *Id.*

[96] *Id.* at 3.

[97] *Health Information Privacy: HIPAA Enforcement*, HHS.GOV, https://www.hhs.gov/hipaa/for-professionals/compliance-enforcement/ index.html [https://perma.cc/A24Z-Q4HF] (last visited Jan. 28, 2020).

[98] *Health Information Privacy: How OCR Enforces the HIPAA Privacy & Security Rules*, HHS.GOV, https://www.hhs.gov/hipaa/for-professionals/ compliance-enforcement/examples/how-ocr-enforces-the-hipaa-privacy-and-security-rules/index.html [https://perma.cc/9WYL-NPWC].

[99] *Id.*

[100] 15 U.S.C. § 45(a)(2) (2012); Fed. Trade Comm'n, *Federal Trade Commission Act*, FTC, https://www.ftc.gov/enforcement/statutes/federal-trade-commission-act [https://perma.cc/YXW5-TR4X] (last visited Jan. 18, 2020).

in § 5 allows the FTC to enforce adherence to the company's privacy policy.[101] Because the FTC can enforce adherence to any statements made by the corporation regarding privacy or use of consumer data even without a privacy policy, it is important for companies to adhere to anything they publish.[102] The FTC § 5 sanctions companies for unfair or deceptive practices.[103] An unfair practice is defined as having "caused or is likely to cause substantial injury to consumers which is not reasonably avoidable to consumers themselves and not outweighed by countervailing benefits."[104] Deceptive practices are "a material representation, omission or practice that is likely to mislead a consumer acting reasonably under the circumstances."[105] Similar to HIPAA, however, FTC § 5 policies are only enforced after a violation has occurred.[106]

Other regulatory measures include the Confidentiality of Substance Use Disorder Patient Record, a federal regulation, administered by the Substance Abuse and Mental Health Services Administration (SAMHSA), specifically protecting the transfer of substance abuse and addiction health data between providers.[107] When this regulation applies, patients must grant consent to the transfer of their health data that may indicate they have a substance use disorder.[108] The regulation, however, only applies to federally assisted programs, which include activities "manage[d] by a federal office or agency, receipt of any federal funding, or registration to

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[101] 15 U.S.C. § 45(a)(2); *see* FED. TRADE COMM'N, SHARING CONSUMER HEALTH INFORMATION? LOOK TO HIPAA AND THE FTC ACT 1 (2016), https://www.ftc.gov/system/files/documents/plain-language/pdf-0219_sharing-health info-hipaa-ftcact.pdf [https://perma.cc/RM2H-YA7Z].

[102] *See* FED. TRADE COMM'N, *supra* note 101, at 2.

[103] 15 U.S.C. § 45(a)(2); *see* FED. TRADE COMM'N, *supra* note 101, at 2.

[104] 15 U.S.C. § 45(n).

[105] *A Brief Overview of the Federal Trade Commission's Investigative, Law Enforcement, and Rulemaking Authority*, FTC (Oct. 2019) https://www.ftc.gov/about-ftc/what-we-do/enforcement-authority [https://perma.cc/9N92-B9J6].

[106] Bass, *supra* note 30, at 294.

[107] 42 C.F.R. § 2.2(a) (2018).

[108] THE OFFICE OF THE NAT'L COORDINATOR FOR HEALTH INFO. TECH., DISCLOSURE OF SUBSTANCE USE DISORDER PATIENT RECORDS: DOES PART 2 APPLY TO ME 2, https://www.samhsa.gov/sites/default/files/does-part2-apply.pdf [https://perma.cc/4BJD-CG34], (last visited Jan. 18, 2020).

dispense controlled substances related to the treatment of [substance use disorders]."[109] The program must "hold itself out" to provide treatment or diagnosis of a substance use disorder.[110] Therefore, whether or not a physician has an obligation under SAMHSA is dependent on who they are and where they work, and not that their patient has substance abuse related medical information.

B. Health Application Regulations

Although there are no formal regulations for health-related applications, often termed third-party applications, whereby individuals independently choose to download, and upload their personal data, the U.S. Department of Health and Human Services (HHS) has distributed guidance on applying existing regulations to these applications.[111] Alexa's tools are developed by independent creators and are marketed like any other smart phone application. Therefore, existing HHS guidance on applications should apply to them. If a health application is not "creating, receiving, maintaining or transmitting protected health information (PHI) on behalf of a covered entity or a business associate[,]" the app itself is not a business associate under HIPAA.[112] Even if the application interacts with a health care provider, even to the extent of accessing EHR from a physician's office, as long as the consumer is initiating the contact with the app and directing service, the application is not considered a business associate under HIPAA and is not bound by the regulation.[113]

When a health care provider, a covered entity under HIPAA, contracts with a third-party application vendor for services and directs a patient to utilize it or integrates that app into its EHR, the company creating the app becomes a business associate with the

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[109] *Id.* at 1 n.2.

[110] *Id.* at 1 n.3.

[111] U.S. DEP'T OF HEALTH AND HUMAN SERVS., *HEALTH APP USE SCENARIOS & HIPAA* 1 (2016), https://hipaaqsportal.hhs.gov/community-library/accounts/92/925889/Public/OCR-health-app-developer-scenarios-2-2016.pdf [https://perma.cc/6TXH-5XLJ].

[112] *Id.* at 2.

[113] *Id.*

covered entity.[114] This indicates that Amazon and Cerner's ultimate goal of utilizing Alexa in the patient exam room would make Amazon a business associate and Alexa AI tech would be regulated by HIPAA.[115] As third-party developers get more engaged with PHI and consumers initiate contact more frequently, it may be necessary to regulate this space more specifically. The European Union (EU), for example, has taken a more directed approach at protecting health data that has already influenced California laws and points to a direction health data might evolve in the future. These innovative policies could act as a model for future legislation.

C. The Evolving Health Data Privacy Landscape

On May 25, 2018, the EU implemented its General Data Protection Regulation (GDPR), the most comprehensive and stringent data privacy regulation in the history of the EU.[116] The GDPR is intended to place greater control into the hands of the individual producing data.[117] This is a natural development of the EU countries' belief in "individual privacy as a fundamental human right."[118] The regulation is accompanied by staggering fines "of up to €20,000,000[119] or four percent of a firm's global turnover

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[114] *Id.* at 3.

[115] *See also* Rebecca L. Williams, *Privacy Please: HIPAA and Artificial Intelligence – Part 2*, DAVIS WRIGHT TREMAINE LLP (June 21, 2018), https://www.dwt.com/blogs/artificial-intelligence-law-advisor/2018/06/privacy-please-hipaa-and-artificial-intelligence [https://perma.cc/QZ7R-VEPF] (discussing HIPAA applicability to AI technologies and other application-based technologies and interpreting guidance from OCR).

[116] Matt Burgess, *What is GDPR? The Summary Guide to GDPR Compliance in the UK*, WIRED (Jan 21, 2019), https://www.wired.co.uk/article/what-is-gdpr-uk-eu-legislation-compliance-summary-fines-2018 [https://perma.cc/SSW6-D2Y3].

[117] *Id.*

[118] Bass, *supra* note 30, at 284.

[119] This translates to over 22,000,000 USD in fines at a minimum.

(whichever is greater)."[120] It is yet unclear how the GDPR applies to entities acting outside of the EU.[121]

Similar to the objectives of the GDPR, California, a leader of progressive regulation at the state level, implemented the California Consumer Privacy Act (CCPA) in January 2020, to increase the rights of individuals regarding their data.[122] This law requires California businesses to comply and allow individuals "the right to see the categories of personal data, like smartphone locations or voice recordings, that a company has on them."[123] In addition to this, consumers will have the right to delete the information they find has been collected, and the right to opt-out of the sale of personal data.[124] California is granting consumers control of their data, a trend not supported by other American policy to date. There is a strong belief, however, that other states will begin to follow California's lead.[125] Copy-cat versions of the CCPA have been introduced in Congress and states such as New York, Illinois, and Washington, are expected to draft parallel laws in 2020.[126]

As consumer-control models of data privacy have begun to gain momentum in the United States following the implementation of the GDPR, our sector-specific patchwork system of laws may evolve

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[120] Matt Burgess, *What is GDPR? The Summary Guide to GDPR Compliance in the UK*, WIRED (Mar. 24, 2020), https://www.wired.co.uk/article/what-is-gdpr-uk-eu-legislation-compliance-summary-fines-2018 [https://perma.cc/SSW6-D2Y3].

[121] Ben Wolford, *GDPR Compliance Checklist for US Companies*, GDPR.EU, https://gdpr.eu/compliance-checklist-us-companies/ [https://perma.cc/P9G7-C2JZ] (last visited Feb. 16, 2020) ("GDPR applies to companies outside the EU because it is extra-territorial in scope. Specifically, the law is designed not so much to regulate businesses as it is to protect the data subjects' rights. A 'data subject' is any person in the EU, including citizens, residents and even, perhaps, visitors.").

[122] Jill Cowan & Natasha Singer, *How California's New Privacy Law Affects You*, N.Y. TIMES (Jan. 3, 2020), https://www.nytimes.com/2020/01/03/us/ccpa-california-privacy-law.html [https://perma.cc/QRR9-9NAN].

[123] *Id.*

[124] *Id.*

[125] Jedidiah Bracy, *With the CCPA now in effect, will other states follow?*, IAPP (Jan. 2, 2020), https://iapp.org/news/a/with-the-ccpa-now-in-effect-will-other-states-follow/ [https://perma.cc/C7YS-BBM2].

[126] *Id.*

and tech companies will be saddled with more responsibilities. For example, Amazon could be forced to "delete" information it has collected about a consumer and issue comprehensive reports on its data, which could potentially reveal specifics about the operation of its algorithm. If the United States data privacy system shifts to a consumer-focused model like the GDPR, American policy would be refocused toward the concept of data ownership in the hands of consumers, not the corporations that collect it.

D. *Existing AI Laws and Regulations*

Although there is a dearth of AI regulation in the United States, there is not a complete absence.[127] Federal legislators have focused on the integration of AI technology into vehicles, namely innovations that allow cars to "sense" what is in front of them or in parallel lanes, and have self-driving features.[128] So far, approximately 60 percent of state legislatures have adopted some form of autonomous vehicle legislation.[129] The Obama Administration's National Science and Technology Council (NSTC) Committee on Technology, a council that has only recently been revived since the start of the Trump Administration,[130] addressed the development of AI technology and very optimistically outlined the ways in which continued innovation and investment in AI could benefit society.[131] Although the majority of the recommendations concerned automating industry and autonomous vehicles, the Council did briefly address the integration of AI into

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[127] *Regulation of Artificial Intelligence: The Americas and the Caribbean*, LIBRARY OF CONGRESS, https://www.loc.gov/law/help/artificial-intelligence/americas.php [https://perma.cc/LM2P-7GP8] (last visited Jan. 19, 2020).

[128] *Id.*

[129] *Id.*

[130] FYI Team, *Trump Reconstitutes the President's Council of Advisors on Science and Technology*, AM. INST. OF PHYSICS (Mar. 27, 2020), https://www.aip.org/fyi/2019/trump-reconstitutes-president's-council-advisors-science-and-technology [https://perma.cc/APE5-EK33].

[131] OFFICE OF SCIENCE & TECH. POL'Y, EXEC. OFFICE OF THE PRESIDENT, PREPARING FOR THE FUTURE OF ARTIFICIAL INTELLIGENCE, https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/micro sites/ostp/NSTC/preparing_for_the_future_of_ai.pdf [https://perma.cc/EMF7-93U2] (last visited Jan. 19, 2020).

medical systems, stating "given the current transition to electronic health records, predictive analysis of health data may play a key role across many health domains like precision medicine and cancer research."[132]

The Trump Administration also held a White House Summit on AI for American Industry in 2018, involving all major industry leaders including health care.[133] This summit indicated that placing "overly burdensome regulations" on AI innovation would send it overseas, and deregulating would promote American leadership in this emerging technology.[134] The report goes on to further assert the Administration's commitment to clearing the way for industry to develop unhindered, while also creating a Select Committee on Artificial Intelligence under the NSTC to "align interagency R&D priorities and improve planning and coordination of Federal AI investments."[135] President Trump subsequently issued an Executive Order on February 11, 2019, launching the American AI Initiative, stressing America's leadership in the field, tempered with the requirement for collaboration with foreign partners.[136] The Executive Order included a goal to "reduce barriers to the use of AI technologies to promote their innovative application," and also instructed the NSTC Select Committee on AI to regulate and provide guidance.[137] In the past several years, AI-related bills have

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[132] *Id.*

[133] OFFICE OF SCIENCE & TECH. POL'Y, EXEC. OFFICE OF THE PRESIDENT, SUMMARY OF THE 2018 WHITE HOUSE SUMMIT ON ARTIFICIAL INTELLIGENCE FOR AMERICAN INDUSTRY, https://www.whitehouse.gov/wp-content/uploads/2018/05/Summary-Report-of-White-House-AI-Summit.pdf [https://perma.cc/MH4D-TKRG] (last visited Jan. 19. 2020).

[134] *Id.* at 3.

[135] *Id.* at 9.

[136] Exec. Order No. 13859, 84 F.R. 3967 (2019) ("Maintaining American Leadership in Artificial Intelligence").

[137] *Id.*

been introduced in Congress[138] and state legislatures,[139] but few have left committee tables. It is unclear whether any will overcome the de-regulatory policy standpoint of the Trump Administration.

V.   IS INTEGRATING AI INTO HEALTH CARE INDUSTRY A GOOD THING?

There are many considerations to incorporate when evaluating whether integrating AI technology into the health care industry is going to produce a net positive result. While this article argues that the benefits outweigh the risks, those risks must be weighed seriously and assuaged by new regulations. The significant benefits of AI in healthcare create the context for weighing the risks of the technology .

A.   The Benefits of Integrating AI

There are many potential benefits to the integration of AI into the health care industry. The first major benefit is to simplify the electronic health record system for physicians and consumers. Facilitating more stream-lined patient encounters has several benefits including fostering a more intimate and complete doctor-patient relationship, something which has proven to lead to more frequent and earlier medical diagnoses and better health outcomes. Additionally, integrating AI technology like Amazon Transcribe Medical, and Cerner's Intelligent Platform and Digital Virtual Scribe could significantly decrease health care workers' administrative burdens. A 2016 study found that physicians spend about two hours doing computer work for every hour spent face to face with a patient—whatever the brand of medical software.[140]

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[138] *See* 116 H.R. 2202, Growing Artificial Intelligence Through Research Act; *see also* 115 H.R. 4625, Fundamentally Understanding the Usability and Realistic Evolution of Artificial Intelligence Act of 2017; 115 H.R. 5356 National Security Commission Artificial Intelligence Act of 2018; 116 S.1558 Artificial Intelligence Initiative Act; FUTURE of Artificial Intelligence Act of 2017, S. __, 115th Cong. (2017), https://www.cantwell.senate.gov/imo/media/doc/The%20FUTURE%20 of%20AI%20Act%20Introduction%20Text.pdf [https://perma.cc/234U-QHA7] (last visited Jan. 19, 2020).

[139] *AI Policy – United States*, FUTURE OF LIFE INST., https://futureoflife.org/ai-policy-united-states/ [https://perma.cc/H3WS-LBXP] (last visited Jan. 19, 2020).

[140] Gwande, *supra* note 69.

Often physicians in primary care either spend their patient appointments looking at a computer screen and typing, or employing an assistant to type up information during the meeting.[141] If AI technologies could not only transcribe the patient visit and enter it into the system, but also perform a low-level analysis for potential medical diagnoses, physicians would be able to see more patients per hour and personally engage with each one on a more human level. This would also reduce costs, by increasing profits per business day and requiring less personnel per patient visit.

AI integrated into health care could also reduce patient bias. Although all artificial intelligence technologies are taught patterns by humans and therefore retain some of society's influence,[142] low-level medical analysis might increase early-identification for disease, especially in the overworked and understaffed medical system. A study on family practitioners found that when physicians visited more than three patients in an hour, physicians sacrificed attention to "the performance of immunizations, the taking of medical history related to cigarettes, alcohol, and preventative care aimed at females."[143] African-American patients specifically receive less medical interventions than their white counterparts, regardless of "age, sex, disease severity, symptom expression, comorbidity, health insurance or payor, and physician specialty."[144] Similarly, pain management is significantly undertreated in African-American populations, with one study demonstrating "that only 35% of racial

[141] *Id.*

[142] Maurizio Santamicone, *Is Artificial Intelligence Racist? Racial and Gender Bias in AI, Medium-Towards Data Science*, MEDIUM (APR. 2, 2019), https://towardsdatascience.com/https-medium-com-mauriziosantamicone-is-artificial-intelligence-racist-66ea8f67c7de [https://perma.cc/ZNF7-G4AB].

[143] Dugdale et al., *supra* note 6.

[144] H. Jack Geiger, *Racial and Ethnic Disparities in Diagnosis and Treatment: a Review of the evidence and a Consideration of Causes, in* UNEQUAL TREATMENT: CONFRONTING RACIAL AND ETHNIC DISPARITIES IN HEALTH CARE 417–55 (Brian D. Smedley, Adrienne Y. Stith, & Alan R. Nelson, eds., 2003); s*ee also* Laura Joszt, *5 Things About Medical Mistrust*, AJMC (Aug. 9, 2019), https://www.ajmc.com/newsroom/5-things-about-medical-mistrust [https://perma.cc/5EMM-6ZC5] (discussing that histories of mistreatment, fear of continuing mistreatment and continuing implicit biases prevent minority patients from regularly coming to receive care).

minority patients received the appropriate prescriptions—as established by the World Health Organization guidelines—compared with 50% of nonminority patients."[145] These disparities could be due to physicians ignoring pain or disease in minorities because of unconscious implicit bias in their representations, or ignoring pain and disease consciously due to "concerns about noncompliance or access to health care."[146] AI could eliminate biases by evaluating symptoms, effectively circumventing physicians' implicit biases, and consistently highlighting reasonable interventions.

AI technology could also simplify EHRs by standardizing how diagnoses are documented. For example, one physician described how EHR has complicated medical treatment by involving every physician in the medical system in a patient's file:

> Three people will list the same diagnosis three different ways. Or an orthopedist will list the same generic symptom for every patient ("pain in the leg") which is sufficient for billing purposes but not useful to colleagues who need to know a specific diagnosis (e.g., "osteoarthritis in the right knee"). Or someone will add "anemia" to the problem list but not have the expertise to record the relevant details . . . that it's "anemia due to iron deficiency, last colonoscopy 2017."[147]

Reducing physician involvement in these patient records – perhaps allowing them to simply review what was recorded between patient encounters, instead of entering everything themselves, will reduce frustration and ultimately reduce physician burnout.[148] In a 2019 study by Medscape, which "surveyed more than 15,000 physicians across 29 specialties[,] . . . 44% reported that they felt

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[145] Kelly M. Hoffman, Sophie Trawalter, Jordan R. Axt, & M. Norman Oliver, *Racial Bias in Pain Assessment and Treatment Recommendations, and False Beliefs about Biological Differences Between Blacks and Whites*, PROCEEDINGS OF NAT'L ACAD. SCI. OF THE U.S. (Apr. 19, 2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4843483/ [https://perma.cc/GU99-KCLS] ("Beliefs that blacks and whites are fundamentally and biologically different . . . were championed by scientists, physicians, and slave owners alike to justify slavery and the inhumane treatment of black men and women in medical research.").

[146] *Id.*

[147] Gwande, *supra* note 69.

[148] *Id.*

burned out."[149] An overburden of bureaucratic tasks, such as updating records and inputting commentary and statements from patient interviews, was the most common reason reported for that burnout.[150]

Finally, AI might actually be smarter than physicians.[151] A recent study established that AI systems trained on almost 400,000 patient records predicted 7.6 percent more cardiovascular events than physicians, according to the current standard of care.[152] These systems also had less "false alarms," which are situations where unnecessary procedures and tests were ordered for patients.[153] Integrating AI technology into the diagnostic and treatment aspects of health care can save more lives and reduce medical waste, which both contribute to reduced cost.

B. The Risks of Integrating AI

There are several serious risks to integrating artificial intelligence technology into health care, and specifically in primary care. While some of these concerns stem from fears that this integration would be radically different from what is already taking place, a fear which may be exaggerated, other concerns can be managed with additional regulations.

i.   The Lack of Comprehensive Regulation

The largest concern looming over the coming integration of AI into the health care system is privacy. As the third-party application guidance from OCR states, AI tech like that contemplated by Amazon and Cerner, would be regulated under HIPAA and both companies would qualify as a business associate.[154] This is something both companies should expect and prepare for. Cerner, as an EHR company, is intimately familiar with business associate

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[149] *Physician Burnout in 2019, Charted*, ADVISORY BOARD (Jan. 18, 2019), https://www.advisory.com/daily-briefing/2019/01/18/burnout-report [https://perma.cc/ZA8R-RFQF].

[150] *Id.*

[151] *See* Norman, *supra* note 87.

[152] *Id.*

[153] *Id.*

[154] Williams, *supra* note 115.

agreements and the consequences of falling under the HIPAA umbrella.

Google was recently under fire for its partnership with Ascension Health, one of the largest health systems in the United States, known as Project Nightingale.[155] A component of the project was accessing the PHI of patients from over twenty-one states[156] to "analyze patient data and give health care providers new insights and suggestions for patient care."[157] After public outcry alleging violations of HIPAA, Google argued that its unconsented access to patient information was legal under the Business Associate Agreement Google entered into with Ascension, and was therefore HIPAA compliant.[158] Google argues the agreement is focused on efficiencies in the health care system and as such, the company is not utilizing or accessing health data inappropriately.[159] However, the public reaction to this arrangement was extremely negative as neither the patients nor the physicians were aware of the project.[160] Senator Amy Klobuchar released a statement urging HHS to investigate the Google-Ascension deal[161] and highlighting that Google has not addressed whether it plans to utilize the data for

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[155] Ahiza Garcia, *Google's 'Project Nightingale' Center of Federal Inquiry*, CNN Bus. (Nov. 15, 2019), https://www.cnn.com/2019/11/12/ tech/google-project-nightingale-federal-inquiry/index.html [https://perma.cc/F76E-CPMJ].

[156] Rob Copeland, *Google's 'Project Nightingale' Gathers Personal Health Data on Millions of Americans*, Wall St. J. (Nov. 11, 2019), https://www.wsj.com/articles/google-s-secret-project-nightingale-gathers-personal-health-data-on-millions-of-americans-11573496790 [https://perma.cc/45US-CS8U].

[157] Garcia, *supra* note 155.

[158] David Feinberg, *Tools to Help Healthcare Providers Deliver Better Care*, Google Health (Nov. 20, 2019), https://blog.google/technology/health/google-health-provider-tools-launch/#!/%23click=https://t.co/4GSK17oVOc [https://perma.cc/QH4S-K5F2].

[159] *Id.*

[160] Copeland, *supra* note 156.

[161] *Klobuchar, Murkowski Urge Department of Health and Human Services to Examine the Collaboration between Google and Ascension Health System over Privacy Concerns*, Amy Klobuchar Senate (Nov. 13, 2019), https://www.klobuchar.senate.gov/public/index.cfm/2019/11/klobuchar-murkowski-urge-department-of-health-and-human-services-to-examine-the-collaboration-between-google-and-ascension-health-system-over-privacy-concerns [https://perma.cc/9Z4Z-UPXZ].

profit or research outside of HIPAA.[162] Klobuchar's bill "Protecting Personal Health Data Act" is a mandate for HHS to fill health regulatory gaps focused on third-party applications like Fitbit, yet does not create solutions, punting the specifics to administrative agencies.[163]

The FTC Act can enforce any statement that corporations attach to their usage of consumer data.[164] FTC handling of a recent privacy investigation with Facebook, however, has led to some doubting its ability to handle protecting consumer privacy on such a large scale.[165] While the fine imposed on Facebook was the largest in FTC history,[166] critics argue "the five billion-dollar fine, oversight reforms and compliance certifications measures" did not make an impact on such a large and powerful corporation like Facebook,[167] even though it represented nearly 7 percent of its annual profits.[168] As a result, critics feel "the FTC did not change Facebook's fundamental business model nor hold Mark Zuckerberg personally

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[162] Lauren Feiner, *Google's New Health Deals Trigger Privacy Concerns in Congress*, CNBC (Nov. 12, 2019), https://www.cnbc.com/2019/11/12/googles-new-health-deals-trigger-privacy-concerns-in-congress.html [https://perma.cc/SWP3-BWCQ].

[163] Maggie Miller, *Klobuchar, Murkowski Introduce Legislation to Protect Consumer Health Data,* THE HILL (June 14, 2019), https://thehill.com/policy/technology/448606-klobuchar-murkowski-introduce-legislation-to-protect-consumer-health-data[https://perma.cc/86X8-PJSF].

[164] *Federal Trade Commission: A Brief Overview of the Federal Trade Commission's Investigative, Law Enforcement, and Rulemaking Authority*, FTC (Oct. 2019), https://www.ftc.gov/about-ftc/what-we-do/enforcement-authority [https://perma.cc/P4RC-H46P].

[165] Chris Jay Hoofnagle, Woody Hartzog & Daniel J. Solove, T*he FTC Can Rise to the Privacy Challenge, but Not Without Help From Congress*, BROOKINGS (Aug. 8, 2019), https://www.brookings.edu/blog/techtank/2019/08/08/the-ftc-can-rise-to-the-privacy-challenge-but-not-without-help-from-congress/ [https://perma.cc/E4WP-NM55].

[166] Lesley Fair, *FTC's $5 Billion Facebook Settlement: Record-breaking and History-making*, FTC (July 24, 2019), https://www.ftc.gov/news-events/blogs/business-blog/2019/07/ftcs-5-billion-facebook-settlement-record-breaking-history [https://perma.cc/B28J-6RYT].

[167] Hoofnagle et al., *supra* note 165.

[168] J. Clement, *Facebook: Annual Revenue 2009-2019*, STATISTA (Feb. 3, 2020), https://www.statista.com/statistics/268604/annual-revenue-of-facebook/ [https://perma.cc/F54J-L6A5].

liable."[169] The FTC disagrees with this, noting the fine was accompanied by specific privacy policy requirements, such as notifying users of how their data will be used, and implemented increased monitoring.[170] Some legal scholars, though, argue that the FTC has the experience and authority to do their job as long as that is accompanied by the appropriate resources and support from Congress, which they currently lack.[171] A properly funded FTC given the latitude to act to the full extent of their abilities, should be equipped to regulate appropriately.

ii.   AI Discrimination

Although AI devices can reduce discriminatory effects by eliminating the specific biases of the treating physician, AI devices can be discriminatory themselves.[172] AI devices learn by patterns and repetition.[173] The process of training an AI device to evaluate medical information from a primary care appointment will likely involve the device analyzing how actual physicians have interpreted these basic pieces of information in the past. The AI will identify patterns, like an aggregation of symptoms. However, "algorithms can learn *too much*" and integrate the implicit biases of human practitioners.[174] For example, if black patients are consistently under-prescribed a diabetes management medication by physicians, the AI device might learn to continue that practice, despite all other variables being consistent. Additionally, research[175] has shown that AI technology "can learn word associations from written texts and that these associations mirror those learned by humans such as the connection between pleasantness and flowers or between

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[169] Hoofnagle et al., *supra* note 165.

[170] Fair, *supra* note 166.

[171] Hoofnagle et al., *supra* note 165.

[172] Santamicone, *supra* note 142.

[173] SAS, *Artificial Intelligence: What it is and Why it Matters- Artificial Intelligence History*, SAS, https://www.sas.com/en_us/insights/analytics/what-is-artificial-intelligence.html [https://perma.cc/NKR9-S8U2], (last visited Feb 11, 2020).

[174] Santamicone, *supra* note 142.

[175] Aylin Caliskan, Joanna J. Bryon, Arvind Narayanan, *Semantics Derived Automatically from Language Corpora Contain Human-like Biases*, SCI. (Apr. 14, 2017), https://science.sciencemag.org/content/356/6334/183 [https://perma.cc/V6ME-48XC].

unpleasantness and insects."[176] Due to the frequency with which African-American names and female names were surrounded by unpleasant connotations, the AI "bec[ame] prejudiced against black Americans and women."[177] This phenomenon means that AI notices and amplifies differences in how patients are treated. These studies assume that the AI is learning from the internet, or from potentially biased (e.g. human created) data-sets.[178] If AI devices intended to analyze basic medical information are trained without demographic identifiers and lack any sort of facial recognition software, it may be possible to 'neutralize' discriminatory effects. It is important, however, to reiterate that methodology for AI learning is highly proprietary.[179] Due to Amazon's patents, which likely cover only results rather than processes[180], and Amazon's trade secrets, consumers cannot know exactly how Amazon trained its AI devices and what implicit biases may be integrated into the company's analytical system.

iii.   High Probability of Data Security Breaches

Despite FAAMG regularly handling an incredible volume of consumer data, the companies have all struggled with data security and preventing data breaches.[181] Just in 2019, five independent breaches resulted in over 530 million consumer records being hacked.[182] The content of the hacked materials ranged from usernames and passwords to more personally identifying information such as phone numbers, social security numbers and credit card numbers.[183] Ultimately, complex data systems are difficult to completely protect from hackers. While each company uses evidence of a data breach to improve its privacy protections,

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[176] Santamicone, *supra* note 142.

[177] *Id.*

[178] *Id.*

[179] Baguley & McDonald, *supra* note 29.

[180] McGurk & Liu, *supra* note 35.

[181] *See generally* Megan Leonhardt, *The 5 Biggest Data Hacks of 2019*, CNBC (Dec. 19, 2017), https://www.cnbc.com/2019/12/17/the-5-biggest-data-hacks-of-2019.html [https://perma.cc/L3U9-QDLQ].

[182] This value was calculated by adding together estimated breaches from hacks to Quest Diagnostics, Houzz, Capital One, Dubsmash and Zynga. *See id.*

[183] *Id.*

consumer data are never truly secure. If it becomes commonplace for the Big 5 Tech companies to become virtual warehouses of millions of citizens' PHI, these companies will be targeted for inevitable security breaches. It is important, however, to acknowledge that our system already includes big players managing health data for millions of citizens. Cerner is one of two EHR providers, and as a business associate to several large medical centers, maintains billions of pieces of PHI.[184] Similarly, massive national health systems, like HCA Healthcare, based in Nashville, Tennessee,[185] which includes 185 hospitals and 31.2 million patient encounters annually, regularly handle incredible volumes of consumer data and bear the same risk of breach.[186] Keeping this in mind, tech companies themselves may ultimately be better equipped and experienced to fend off security risks.

C. *Balancing the Risks*

A key question when considering the integration of AI technology into the health care system is whether health data is truly different than other consumer data. Historically, we have placed higher protections over health data as it has implications on our ability to continue working, and our ability to obtain insurance. Unlike purchase history data or browsing data, health data can reveal information about an individual's ancestors and children as well as about themselves. Our current health data privacy system prioritizes the holder of the health data, not the data itself. Hospitals can maintain the same PHI about an individual as a third-party application, but only the hospital, as a covered entity, is bound by HIPAA. This regulatory reality seems discordant with people's viewpoints on health information. However, integrating AI into

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[184] *See generally* CERNER, *supra* note 8. Epic Systems Corporation is the other leading EHR company. *See* EPIC, *supra* note 79.

[185] *HCA Healthcare*, FORBES (May 15, 2019), https://www.forbes.com/companies/hca-healthcare/#437b55fc5945 [https://perma.cc/TU59-PHC3].

[186] Laura Dyrda, *100 of the Largest Hospitals and Health Systems in America, 2019,* BECKER'S HOSP. R. (Sept. 12, 2019), https://www.beckershospitalreview.com/largest-hospitals-and-health-systems-in-america-2019.html [https://perma.cc/NBS4-QFZQ].

primary care would place companies like Amazon clearly and solidly under existing HIPAA regulations.

Although there is a cultural belief that younger generations are unconcerned about privacy, this is not necessarily fully supported by data.[187] Millennials were half as likely to be concerned with data security than Gen Xers, or Baby Boomers.[188] Similarly, they were twice as likely to stay signed into their accounts on their devices.[189] This study belies a greater concern with privacy but a laxity on security.[190] This data indicates that every generation is concerned with privacy; members of each generation just take different levels of care managing and protecting access to their data.[191] As such, it is crucial to ensure that FAAMG are bound by existing health data privacy regulations, and the role of the AI device is clearly defined. Although the term "artificial intelligence" tends to connote some level of machine autonomy, this is a dangerous association to draw. Consumers will ultimately dictate how and when AI technology is integrated into our society.

Integrating AI tech into the health care industry is not as sharp a detour from the status quo as it appears. Fears of the technology developing beyond our control are significantly less realistic than hacking or a corporation profiting off of big data, like some hospital systems have already begun to do.[192] Sloan Kettering hospital in New York City entered a deal with Paige.AI "to sell its pathography

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[187] Nikki Dance, *New Study Finds Millennials Concerned about Privacy, But Lax on Security*, CISION PR NEWSWIRE (Feb. 21, 2019), https://www.prnewswire.com/news-releases/new-study-finds-millennials-concerned-about-privacy-but-lax-on-security-300799596.html [https://perma.cc/F2CH-AB5T].

[188] *Id.* Millennials are aged 25, 35, Gen Xers are between 40–55 years old and Baby Boomers are 55 years and older. *See* Kasasa, *Boomers, Gen X, Gen Y, and Gen Z Explained*, KASASA (July 29, 2019), https://www.kasasa.com/articles/generations/gen-x-gen-y-gen-z [https://perma.cc/9R9X-F95Q].

[189] Dance, *supra* note 187.

[190] *Id.*

[191] *Id.*

[192] *See* Craig Klugman, *Hospitals Selling Patient Records to Data Brokers: A Violation of Patient Trust and Autonomy*, BIOETHICS.NET (Dec. 13, 2018), http://www.bioethics.net/2018/12/hospitals-selling-patient-records-to-data-brokers-a-violation-of-patient-trust-and-autonomy/ [https://perma.cc/23BA-VGBH].

samples and records . . . to develop artificial intelligence to help in treating cancer."[193] These types of deals are not uncommon.[194] Health care systems frequently sell de-identified data to private corporations who utilize it for research and profit.[195] This may be interpreted as a violation of trust to the average patient, impacting patient autonomy and ultimately the doctor-patient relationship, but is a perfectly legal use of health data.[196] While sharing deidentified data is legal, integrating an AI system into the doctor's office, and obtaining patient consent for the practice is a more transparent and patient-centric approach. Ethicists argue hospitals should inform patients of their intent to profit off of patient data, in a separate consent form to those utilized for obtaining care, in order to foster complete transparency.[197] Highlighting the presence of an Alexa device in the exam room would give the patient an opportunity to ask questions, and perhaps decline its use.

As Jeff Bezos, Amazon's founder and CEO, famously stated in an interview "We never throw away data."[198] Devices like Amazon's Alexa are constantly recording information, "listening" to and analyzing their surroundings. Amazon's proprietary algorithms are what transform average everyday observations into a profitable and efficient consumer assistant. Due to Amazon's patents and trade secrets surrounding its AI technology, consumers may never know what they are doing with the data they collect. The "generated, proprietary data . . . is stored in perpetuity within personalized digital dossiers on Amazon's servers."[199] There are legitimate concerns surrounding one virtually trillion-dollar corporation controlling that magnitude of data and "hid[ing] behind the

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[193] *Id.*

[194] Adam Tanner, *How Data Brokers Make Money Off Your Medical Records*, SCI. AM. (Feb. 1, 2016), https://www.scientificamerican.com/article/how-data-brokers-make-money-off-your-medical-records/ [https://perma.cc/48E9-A962].

[195] *Id.*

[196] *Id.*

[197] *See* Klugman, *supra* note 192.

[198] Madanmohan Rao, *Big Data at Work: Key Lessons From Startups and Large Firms*, YOUR STORY (May 31, 2014), https://yourstory.com/2014/05/big-data-at-work [https://perma.cc/BQ87-V5GG].

[199] Bass, *supra* note 30, at 280.

impenetrable black box of algorithms and trade secrets . . . ."[200] Amazon is a powerful corporation and its "algorithms are designed to serve up things that best serve Amazon, steering us to some books and not others."[201] How successfully the product is advertised through the algorithms and whether it is "suggested" to consumers, or buried deep in pages of search results can make or break it.[202] To foster trust and allow society to benefit from AI technology, it may be necessary for legislators to step in to craft enforceable controls to how Big Tech can use the data they obtain.

Perhaps societal fears about massive corporations turning on us and betraying our need for convenience and efficiency can be assuaged by public statements about use of data.[203] Facebook has attempted to address privacy concerns with its Preventative Health program, by stating that personal health information will not be disclosed to third parties, "such as health organizations or insurance companies so it can't be used for purposes like insurance eligibility."[204] Furthermore the company has stated that it will not advertise to consumers based on their preventative health recommendations.[205] Assurances that the data will not be utilized for marketing are crucial for the successful integration of AI into our health care system. These public statements would be enforceable representations under the FTC Act, and if properly funded and supported, the FTC could monitor compliance.

The United States is one of only two nations in the world that allows pharmaceutical manufacturers to advertise directly to

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[200] *Id*. at 281–82.

[201] Olivia Solon & Julia Carrie Wong, *Jeff Bezos v the World: Why All Companies Fear 'Death by Amazon'*, GUARDIAN (Apr. 24, 2018), https://www.theguardian.com/technology/2018/apr/24/amazon-jeff-bezos-customer-data-industries [https://perma.cc/T89A-386Q] (quoting Stacy Mitchell, co-director for the Institute for Local Self-Reliance).

[202] *Id.*

[203] *See* Alexander Liebeskind, *Facebook Knows too Much About Us. So What?,* WALL ST. J. (Aug. 6, 2019), https://www.wsj.com/articles/facebook-knows-too-much-about-us-so-what-11565131496   [https://perma.cc/JE7X-CWEA] (discussing the impact of social media on the 2016 Presidential Election and Facebook's lack of acknowledgement of involvement).

[204] Abnousi, *supra* note 46.

[205] *Id.*

consumers.[206] It is crucial that America does not allow AI technology to become another opportunity for companies to inflate the costs of health care. Although Facebook has made assertions that it will not use any health information for marketing purposes, this assertion must be mandatory and legally enforceable. Specifically, catered advertising based upon private health data is likely a HIPAA violation, as it could potentially advertise individual's medical diagnoses to others who use their devices, and an ethical misuse of health data as the treatment provided to the patient through advertising might not be the most affordable or effective treatment, but rather the most profitable. HIPAA post-violation enforcement and penalties, however, may deter FAAMG from neglecting to pursue significant profits, evidenced by the impact FTC fines[207] have

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[206] This is important to the integration of AI to the health care industry as it indicates American willingness to continue to advertise medical needs. The cost of successfully bringing a drug to market is $2.6 billion. Rick Mullin, *Cost to Develop New Pharmaceutical Drug Now Exceeds $2.5B*, SCI. AM. (Nov. 14, 2014), https://www.scientificamerican.com/article/cost-to-develop-new-pharmaceutical-drug-now-exceeds-2-5b/ [https://perma.cc/NJ8U-DPTV]. This value was calculated from average out-of-pocket cost of $1.4 billion and $1.2 billion "in returns that investors forego on that money during the 10-plus years a drug candidate spends in development." *Id.* A long term study from Dartmouth, published in 2019, demonstrated that in the last two decades, "medical marketing has expanded substantially . . . with direct-to-consumer advertising for prescription drugs and health services accounting for most promotional spending." Lisa M. Schwartz & Steven Woloshin, *Medical Marketing in the United States*, JAMA (Jan. 8, 2019), https://jamanetwork. com/journals/jama/fullarticle/2720029?utm_campaign=articlePDF&utm_mediu m=articlePDFlink&utm_source=articlePDF&utm_content=jama.2018.19320 [https://perma.cc/5RKT-PW3B]. Big Pharma spent $30 billion on advertising and marketing in 2016. *Id.* These figures seem to indicate direct to consumer medical marketing is highly profitable and would further increase if the Big Five became tightly interwoven with the health care industry.

[207] Other than the 2019 Facebook fine amounting to $5 billion, the FTC has also imposed a $170 million fine on Google and YouTube for violating children's privacy laws by advertising directly to children. *See Google and YouTube Will Pay Record 170 Million for Alleged Violations of Children's Privacy Law*, FTC (Sept. 4, 2019), https://www.ftc.gov/news-events/press-releases/2019/09/google-youtube-will-pay-record-170-million-alleged-violations [https://perma. cc/9HA2-6TTU]. While these fines are significant, they are a small portion of the companies' total profits, and did not cripple the corporation for any measurable time, which may mean they are unlikely to act differently in the future.

had on these large, powerful companies, although the fines should be more significant. The FTC in collaboration with FAAMG may able to establish data security standards that would satisfy consumers' expectations.

It will be essential to construct specific stringent penalties, preferably financial, to supplement continued enforcement around the misuse of health data, similar to GDPR. The GDPR requires €22,000,000 or 4 percent of global turnover, whichever is greater. This is a well-crafted standard that deters misconduct for the vast majority of companies. However, for larger more powerful corporations like FAAMG, these fines can be insignificant. The $5 billion fine imposed by the FTC on Facebook in 2019 represented almost double what the GDPR would have imposed, which would have been $2.8 billion in fines. Amazon, which had a $281 billion turnover in 2018 would have had maximum GDPR fine of $11 billion. While still a significant amount of money, the FTC needs to maintain case by case flexibility and ensure they are not restricted to 4 percent of global turnover.

VI.   CONCLUSION

The patient exam room is often ground for extremely intimate personal conversations about lifestyle, health, and longevity. Inviting artificial intelligence systems into this sacred space raises legitimate privacy concerns, despite limited protections from existing laws and regulations. AI technology has the ability to truly revolutionize how data is collected, stored, analyzed and implemented in the health care sector. The existing health data privacy regulations can be applied to this new framework and supplemented with mandatory promises that the data will not be abused for marketing purposes. This will allow the FTC to enforce the use of data and impose hefty fines. AI technology will allow physicians to sit and communicate directly with patients without the distractions of a burdensome electronic health record system, leaving more time for the practice of medicine and the fostering of meaningful doctor-patient relationships. These benefits, combined with AI's abilities to streamline initial data analysis and identify relevant treatments for physicians to review will lead to better outcomes for patients. The increased efficiency will also allow

physicians to see more patients. Although AI systems are not free from bias, they can be developed to curtail some implicit biases from physicians. In addition, fostering a genuine human connection between doctors and patients will improve patient trust and adherence to treatment plans. Ultimately, these benefits outweigh concerns of data handling and privacy. AI technology should be supported and increasingly tech-savvy consumers will ensure regulations follow.