Introduction

In this paper, I argue that artificial intelligence (AI) should be employed to diagnose and treat hospital patients. Artificial intelligence refers to machines or systems that mimic natural intelligence to solve problems and make decisions. The emergence of AI has shown great potential to transform existing fields and systems, including the healthcare system. The current healthcare system is facing growing demands and needs a serious reform to continue meeting the needs of patients. Although the application of AI has demonstrated significant advantages in healthcare, patients are still reluctant to trust decisions made by AI (Yokoi et al., 2020). Therefore, I will be addressing the concerns towards employing AI to diagnose and treat hospital patients by providing evidence that shows that the advantages far outweigh the disadvantages.

Commented [PMM1]: Wow 😊

I support my position with the following four arguments. First, I argue that employing AI can accelerate the speed of diagnoses and treatments. AI can analyze large amounts of data at once, which provides AI with an advantage at diagnosing patients when compared to human physicians (Topol, 2019). Second, employing AI can increase the accuracy and precision of diagnoses and treatments. Numerous studies have shown that the capabilities of AI in diagnosing patients and administering the correct treatment is just as accurate as physicians (Liu et al., 2019). Third, employing AI can reduce stressful working conditions in hospitals by automating tasks. The prevalence of hospital violence and overworking has increased in recent years and employing AI would help combat both those issues to provide an optimal working environment (Kong et al., 2019). Fourth, employing AI in hospitals is cost-effective. By employing AI, inefficiencies in systems current systems such as care delivery failures will be minimized and accordingly reduce costs (Topol, 2019). Employing AI will not only save costs for larger healthcare organizations, but also enables smaller clinics to provide quality healthcare to their patients.

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I also consider alternative positions against employing AI to diagnose and treat hospital patients. These positions include that diagnoses made by AI are not as accurate as

human physicians (Jussupow et al., 2021) and that AI can-not have a patient-doctor relationship (Yokoi et al., 2020). While these positions have merit, I present current advancements in the field of AI to show that employing AI is to diagnose and treat patients is advantageous. For example, I refute the claim that AI is not as accurate as human physicians when diagnosing patients. I have found numerous studies that show that diagnoses made by various AI systems are more accurate than physicians (Liu et al., 2019). In addition, I provide a rebuttal to the argument that AI can-not have a patient-doctor relationship because studies have demonstrated an alternative that is just as beneficial as the traditional patient-doctor relationship (Barrett et al., 2019).

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This paper is important because in an age of revolutionary technology, it is unwise to ignore the applications of these technologies to improve existing systems. The healthcare system impacts the entire global population and is necessary for any developing society. Based on what has been demonstrated in numerous studies, AI has the potential to revolutionize the current healthcare system (Topol, 2019). This paper is of interest to healthcare researchers and providers because it will highlight the current state of AI in healthcare and encourage further development and deployment. The greatest challenge of employing AI in healthcare is ensuring that both healthcare providers and patients trust and take full advantage the AI systems. Therefore, it is important to spread awareness on the benefits of employing AI in hospitals to ensure that we reap the full benefits of this revolutionizing technology.

Commented [PMM5]: THAT … was impressive!

😊

Discussion of Sources

Source 1

Barrett, M., Boyne, J., Brandts, J., Brunner-La Rocca, H., De Maesschalk, L., De Wit, K., … Dixon, L. (2019). Artificial intelligence supported patient self-care in chronic heart failure: A paradigm shift from reactive to predictive, preventive, and personalized care. *EPMA Journal*, *10*(1)**,** 445–464. https://doi.org/10.1007/s13167-019-00188-9

This article was published in the peer-reviewed journal EPMA, a journal that provides insight on advances in healthcare regarding predictive diagnoses, prevention, and personalized medicine (PPMA). The authors of this paper include cardiologists, radiologists, and computer scientists who are aiming to bridge the gap between healthcare and technology. The article calls attention to the increased prevalence of heart failure and the lack of personalized treatment with the current approach being utilized by physicians. The authors propose an unorthodox approach to treating heart failure by implementing AI to provide personalized care to patients without the interference of healthcare professionals. The concept model that was proposed includes a combination of gamification and AI to improve patient engagement and treatment quality. In addition, the model demonstrates how AI can both improve the quality of healthcare while simultaneously reducing costs. The authors argue that although this concept will require supervision during the earlier stages of implementation, responsibility in treatment of the patient will end up shifting from physicians to exclusively AI. I will be using this article to support my argument that AI should be employed in hospitals due to their accuracy and precision and that AI is cost-effective. This article will also allow me to provide a rebuttal to the argument that AI cannot have a patient-doctor relationship because this article provides a different alternative to that traditional method. I enjoyed reading this article as the authors refrained from using confusing terminology and organized the paper in a way that was easy to understand. I would not change anything about this article as it was an interesting and engaging read.

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Source 2

Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H., & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present, and future. *Stroke and Vascular Neurology*, *2*(4), 230–243. https://doi.org/10.1136/svn-2017-000101

This article was published in the peer-reviewed journal Stroke and Vascular Neurology, a journal that supports the proposal of controversial and unorthodox techniques in the field of healthcare. The authors of this article are specialized in either neurology or

statistics and are interested in the applications of AI to their respective fields. The aim of this article was to review two categories of AI, machine learning and natural language processing, and their applications to detect, diagnose, and assign treatments to patients. For the first category, machine learning, the authors explain the differences and similarities between the applications supervised and unsupervised machine learning. In addition, the authors promote the use of deep learning, an extension to the neural networks used in machine learning, for diagnosing patients. For the second category of AI, the authors promote the usage of natural language processing to extract information from text, such as physical examinations. To demonstrate both categories of AI, the authors provide examples where AI, using machine learning, natural language processing, or both, was used to accurately diagnose and prognose strokes in patients. The authors believe that the combination of machine learning and natural language processing will lead to a successful AI system. I will be using this article to support my arguments that AI can increase the speed and accuracy of diagnoses and treatments. I will also be using the evidence in this article to provide a rebuttal to the argument that AI is not as accurate as human physicians. I found this article boring to read because of the excessive use of jargon and acronyms that were difficult to follow. Despite the confusing language, I liked the organization of this article.

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Commented [PMM7]: LOL
I know that feeling 😊

Source 3

Jussupow, E., Spohrer, K., Heinzl, A., & Gawlitza, J. (2021). Augmenting medical diagnosis decisions? An investigation into physicians' decision-making process with artificial intelligence. *Information Systems Research*, *32*(3), 713-735. https://doi.org/10.1287/isre.2020.0980

This article was published in the Information Systems Research journal, a peer-reviewed journal that publishes research on innovative information systems to advance utilization of information technologies in different fields. The authors Ekaterina Jussupow, Kai Spohrer, and Armin Heinzl are all specialized in the field of information systems and Dr. Joshua Gawlitza is specialized in radiology and pulmonology. The purpose of this article is to

understand the challenges of augmenting AI into decision making processes, specifically clinical diagnoses. An experiment was conducted where novice physicians made diagnostic decisions regarding pulmonary function values from a CT scan with the support of an AI system that provided both correct and incorrect advice. The authors found that there are numerous factors that might lead physicians to make an incorrect diagnosis provided with incorrect AI advice such as experience, belief in the capabilities of AI, and validation conflict. In addition, the authors found that decision augmentation is significantly more accurate than making decisions without augmentation if the decision makers reconsider their own assessment using by both self-monitoring and system-monitoring. The authors suggest that further research should be conducted to investigate and extend the information found in this experiment as there is potential for great success in a clinical setting. I will be using this article to support the arguments that AI can increase both the speed and accuracy of diagnoses. I will also be using this article to elaborate more on the counter argument that AI is not as accurate as physicians when making clinical diagnoses. I thought that this source was not very engaging and could have been more straightforward when explaining the experiment. However, I found the written assessments of the decision-making patterns of the physicians interesting.

Source 4

Kong, X., Ai, B., Kong, Y., Su, L., Ning, Y., Howard, N., … & Fang, Y. (2019). Artificial intelligence: A key to relieve China's insufficient and unequally-distributed medical resources. *American Journal of Translational Research*, *11*(5), 2632–2640.

This article was published in the American Journal of Translational Research, a peer-reviewed medical journal that publishes research aimed at converting clinical research results to practical applications. The authors of this article stem from various specialties, notably AI, big data, cancer research, and management. The authors argue that China has failed to properly manage and improve their medical care standards and resources and that a serious reform needs to be made to provide adequate and accessible healthcare to the population. The

authors reference several examples of violence towards medical workers and how that has impacted the enthusiasm and of younger medical students. To combat the insufficient and disproportionate distribution of medical resources, the authors suggest that AI should be applied to the current medical model. The authors argue that AI will provide ground-breaking advantages that are otherwise difficult to achieve with the current medical model, such as optimizing and saving medical resources. The authors also explain the challenges of medical AI and recommend that despite these challenges, China should strive to implement medical AI wherever possible to resolve the issues with the current medical model. I will use this article to provide evidence for my supporting arguments that employing AI in hospitals is cost-effective and can reduce stressful working conditions. In addition, I will use this article to provide a rebuttal for the counter argument that AI will cause a rise in unemployment for healthcare workers. I enjoyed reading this article because the authors were straightforward with their explanations. This article also shed light on how difficult it is to work as a doctor as I did not previously know how prevalent and severe hospital violence towards doctors is.

Source 5

Liu, X., Faes, L., Kale, A. U., Wagner, S. K., Fu, D. J., Bruynseels, A., … Denniston, A. K. (2019). A comparison of deep learning performance against health-care professionals in detecting diseases from medical imaging: A systematic review and meta-analysis. *The Lancet Digital Health*, *1*(6), 271–297. https://doi.org/10.1016/S2589-7500(19)30123-2

This article was published in The Lancet Digital Health, an internationally recognized journal that publishes research supporting the implementation of digital technologies in healthcare. The authors of this article stem from various backgrounds in both the field of healthcare and data science, with the main authors being Dr Xiaoxuan Liu and Livia Faes, ophthalmologists interested in the applications of machine learning to their field. The main purpose of the article is to identify and assess studies that compared the accuracy of diagnoses made by deep learning algorithms to those of physicians. The authors developed

and utilized a hierarchical model and a set of criteria to evaluate and narrow down thousands of articles to those relevant to the study. The result of the study was that deep learning algorithms have demonstrated their ability to diagnose patients is up to par, and sometimes more accurate, than those of physicians. The authors also noted that the number of high-quality studies being conducted regarding the comparison of diagnoses made by deep learning algorithms and physicians is mostly limited to studies that were not conducted in real clinical settings. This article will be an important source in my paper because it classifies analyzes numerous other studies that are relevant to my argument that AI should be used to diagnose and treat hospital patients. In addition, I will be using this article to refute the counter arguments that AI is too unreliable to accurately diagnose and treat hospital patients and that human physicians will always be better than AI. This source was an interesting read because the authors strategized a method to summarize around eighty studies into a chart that was easy to read. However, there were many confusing statistics and graphs that were difficult to understand, and I hoped there would be a clearer description for them.

Source 6

Topol, E. J. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine*, *25*(1), 44–56. https://doi.org/10.1038/s41591-018-0300-7

This article was published in the peer-reviewed journal Nature Medicine which publishes research articles concerning all the various aspects of medicine. The author, Eric Topol, is a cardiologist who is widely known for his extensive work in analyzing the future of medicine. Topol has written over a thousand peer-reviewed articles and published three books about the future of medicine. In this article, Topol (2019) argues that there are notable deficiencies in the current state of healthcare, including diagnostic errors and inefficiencies in workflow, that could be compensated for by the implementation of AI. Topol (2019) begins by providing evidence from numerous studies across different fields of medicine, such as dermatology and ophthalmology, to demonstrate the flexibility of the applications of AI in

the medical field. Topol (2019) also considers and weighs the advantages, disadvantages, and challenges to analyze the current and future state of applications of medical AI. Topol (2019) believes that the potential for AI, despite the risks, is promising and will only be the foundation for the technology that follows. I will be using this article to support my argument that employing AI can increase the speed and accuracy of diagnoses and treatments along with the argument that AI is cost effective. I will also be using this article to provide evidence for the counter argument that AI is susceptible to security risks. In addition, this article will be of great use to me as it will allow me to provide background evidence for AI being applicable in various healthcare sectors. This article was quite boring to read because there is an overwhelming amount of evidence that is difficult to understand all at once. However, this article also increased my interest in the topic as the author brought forth many applications of AI that I did not consider before.

Source 7

Yokoi, R., Eguchi, Y., Fujita, T., & Nakayachi, K. (2020). Artificial intelligence is trusted less than a doctor in medical treatment decisions: Influence of perceived care and value similarity. *International Journal of Human-Computer Interaction, 37*(1), 981-990. https://doi.org/10.1080/10447318.2020.1861763

This article was published in the International Journal of Human-Computer Interaction, which specializes in the publication of articles related to designing innovative systems and technologies that humans can interact with. The authors of this article are Ryosuke Yokoi, a psychologist who studies the psychology of human-computer interaction, Yoko Eguchi, a researcher specialized in neuropsychology, Takanori Fujita, a researcher who focuses on the application of artificial intelligence to healthcare, and Kazuya Nakayachi, a professor of psychology. This article aims to investigate whether people were willing to trust an AI system with regards to medical treatment. The authors conducted an online experiment in which people were surveyed about scenarios regarding options of treatment in a hospital. The authors of the survey took into consideration various variables that might impact the

participants results so that the survey would solely compare the trust of the participants towards AI and human physicians. The results of the study demonstrate that humans were overall less likely to trust an AI system than a human physician, despite both providing the same treatment options. I will use this information to support the counter argument that AI is incapable of having a trusting patient-doctor relationship like humans do. I enjoyed reading this article because of the simplicity, yet effectiveness of the experiment conducted. However, I found reading some of the explanations for the statistics in determining the trust value of the participants confusing.

Commented [PMM8]: Truly impressive – wow!

PLEASE minor in English 😊

Outline

Section 1: Introduction

Par. 1: Thesis + Background for AI in the medical field

1/ In this paper, I argue that Artificial Intelligence (AI) should be employed to diagnose and treat hospital patients.

2/ What is AI?

3/ How can AI be implemented in healthcare?

Par. 2: Supporting Arguments

1/ Employing AI in hospitals can increase the speed of diagnoses and treatments.

2/ Employing AI in hospitals can increase the accuracy and precision of diagnoses and treatments.

3/ Employing AI in hospitals can reduce stressful working conditions in a hospital by automating tasks.

4/ Employing AI in hospitals is cost-effective.

Par. 3: Counter Arguments

1/ AI is susceptible to security risks.

2/ Employing AI will lead to a rise in unemployment for healthcare workers.

3/ AI can not have a patient-doctor relationship like humans do.

4/ AI is not as accurate as human physicians when diagnosing and treating patients.

Par. 4: Importance (who cares?)

1/ “This paper is important because …”

2/ The healthcare system needs improvement to meet the demands of patients. AI can revolutionize the healthcare system.

3/ The advantages of employing AI in hospitals outweighs the disadvantages.

Section 2: Body Paragraphs

Support

1/ Argument 1: Employing AI can increase the speed of diagnoses and treatments.

1/How does AI analyze data and make decisions?

1/ The different types of AI (Jiang et al., 2017).

1/ Machine learning (ML).

2/ Natural language processing (NLP).

2/ How do these types of AI make decisions?

2/ How would AI increase the speed of diagnoses and treatments?

1/ AI is capable of analyzing large amounts of data and variables in a short amount of time (Jiang et al., 2017).

2/ AI can accelerate tedious tasks such as analyzing CT scans (Topol, 2019).

3/ How does AI compare to the current speed of administering diagnoses and treatments?

2/ Argument 2: Employing AI can increase the accuracy and precision of diagnoses and treatments.

1/ How does the quality of the diagnoses and treatments made by AI compare to that of human physicians?

1/ Examples of studies conducted by researchers comparing the accuracy of AI and physician diagnoses (Liu et al., 2019).

3/ How can existing AI systems be improved to make more accurate diagnoses?

3/ Argument 3: Employing AI can reduce stressful working conditions in a hospital by automating tasks.

1/ What is the current state of hospital settings?

1/ Hospital violence and overworking are prevalent issues in current hospital settings (Kong et al., 2019).

2/ How can employing AI improve current hospital settings?

1/ Automating tedious tasks to reduce overworking.

2/ Allows doctors more time to interact with patients (REF).

3/ AI will accelerate the time it takes to diagnose and administer treatments which will allow more patients to be treated overall (Liu et al., 2019).

4/ Argument 4: Employing AI is cost-effective.

1/ How will AI save costs?

1/ AI is a one-time investment.

2/ AI minimizes clinical errors (Topol, 2019).

2/ AI will allow universal access to high-quality healthcare.

1/ Small clinics and areas that do not have access to doctors will be able to take advantage of AI (REF).

Counter

1/ Counter Argument 1: AI is susceptible to security risks.

1/ Data security and privacy is not assured.

2/ In addition, large scale hacking can alter the algorithms used by the AI systems and cause harm to patients (Topol, 2019).

2/ Counter Argument 2: Employing AI will lead to a rise in unemployment for healthcare workers.

1/ AI is capable of automating tasks that will negate several jobs in healthcare, such as administrative jobs (REF).

3/ Counter Argument 3: AI can not have a patient-doctor relationship like humans do.

1/ Current studies suggest that patients are more reluctant to trust AI than human physicians (Yokoi et al., 2020).

4/ Counter Argument 4: AI is not as accurate as human physicians when diagnosing and treating patients.

1/ Bias may be prevalent in the AI algorithms used to diagnose and treat patients (REF).

2/ AI does not account for an individual's unique characteristics like a human physician would (REF).

Refutations/Rebuttals/Acknowledgements (RRA):

1/ Several AI systems have demonstrated more accuracy in diagnosing and administering treats than human physicians (Liu et al., 2019).

2/ Although is it challenging for an AI system to demonstrate empathy like humans do, there are AI systems that provide an alternative to the traditional patient-doctor relationship (Barrett et al., 2019).

Section 3: Conclusion

The professor said leave this for now until we have read Chapter 15.

References

Commented [PMM9]: I've said it before
And I'll say it again

Wow 😊

Barrett, M., Boyne, J., Brandts, J., Brunner-La Rocca, H., De Maesschalk, L., De Wit, K., … Dixon, L. (2019). Artificial intelligence supported patient self-care in chronic heart failure: A paradigm shift from reactive to predictive, preventive, and personalized care. *EPMA Journal*, 10**,** 445–464. https://doi.org/10.1007/s13167-019-00188-9

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Topol, E. J. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine*, 25(1), 44–56. https://doi.org/10.1038/s41591-018-0300-7

Yokoi, R., Eguchi, Y., Fujita, T., & Nakayachi, K. (2020). Artificial intelligence is trusted less than a doctor in medical treatment decisions: Influence of perceived care and value similarity. *International Journal of Human-Computer Interaction*, 37, 981-990. https://doi.org/10.1080/10447318.2020.1861763