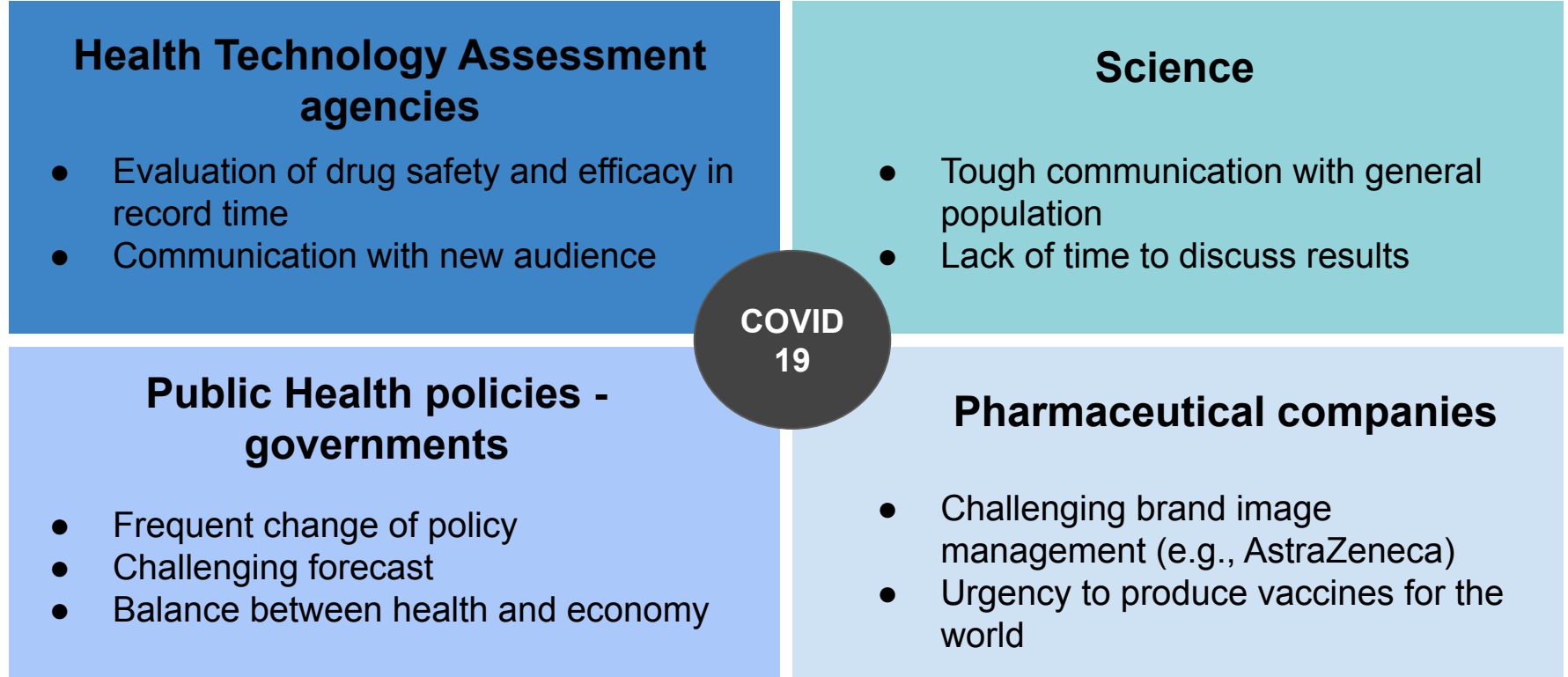


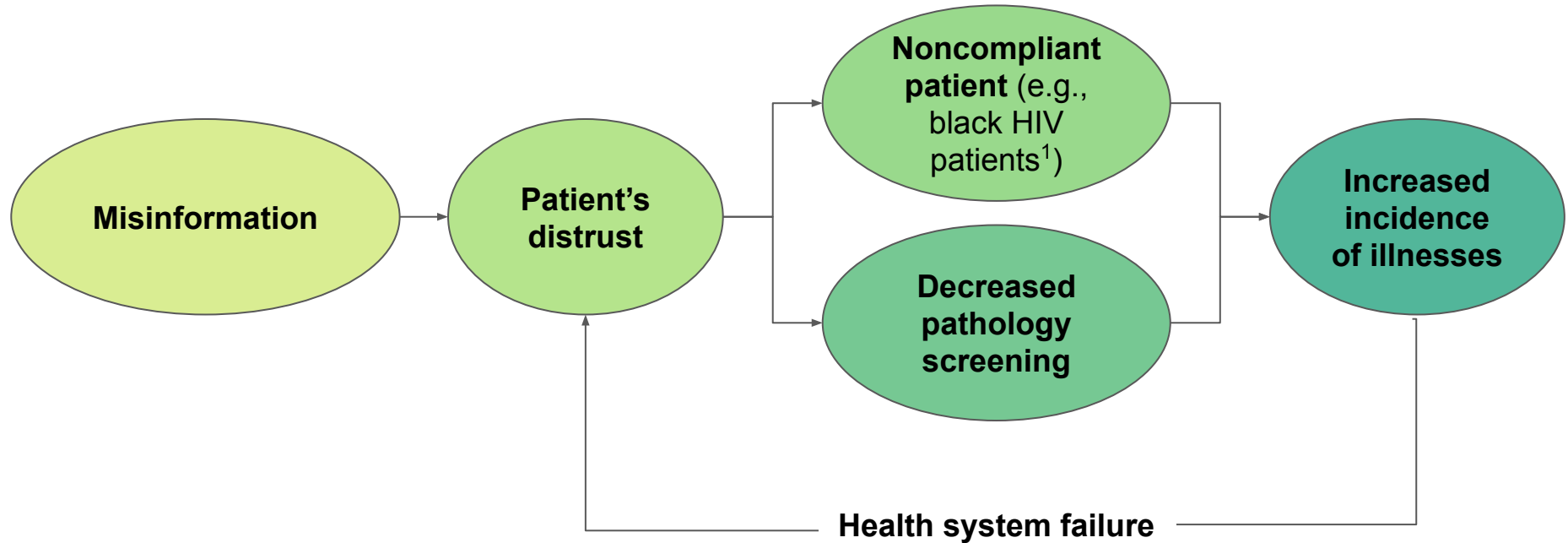
What's the impact of COVID-19 crisis on the trust towards healthcare providers and population willingness to use IA for healthcare-related matters ? Are open source AI tools reliable when it comes to diagnosis?

Final presentation - Friday 28, 2024

The COVID-19 crisis created a sense of urgency that ultimately led to distrust among people



Trust towards healthcare providers and healthcare systems is key to maintain its performance



Research methodology

Google survey

Impact of misinformation during the COVID-19 pandemic on trust towards healthcare systems

This survey has two purposes :

- To better understand the impact of COVID-19 on trust of patients towards healthcare professionals (nurses, doctors, pharmacists...) and health systems in general
- To determine the willingness of the general public to trust and/or use artificial intelligence to spot misinformation regarding health-related matters

Please note that this survey is anonymous so please answer as honestly as possible.

Thank you for taking the time to help us on this project!

Jean-Baptiste Poinot & Thomas Pietrobelli

b00794663@essec.edu [Changer de compte](#)

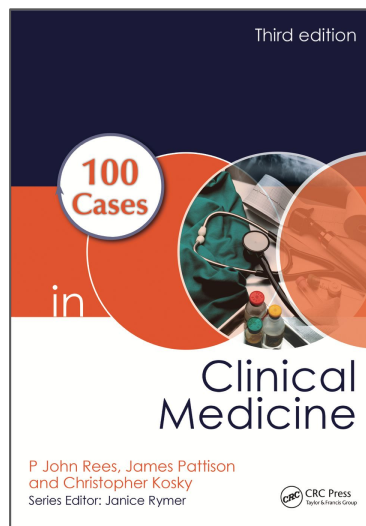
Non partagé

* Indique une question obligatoire

1st part : general information

This part will enable us to better understand the pool of respondents.

ChatGPT vs. GEMINI

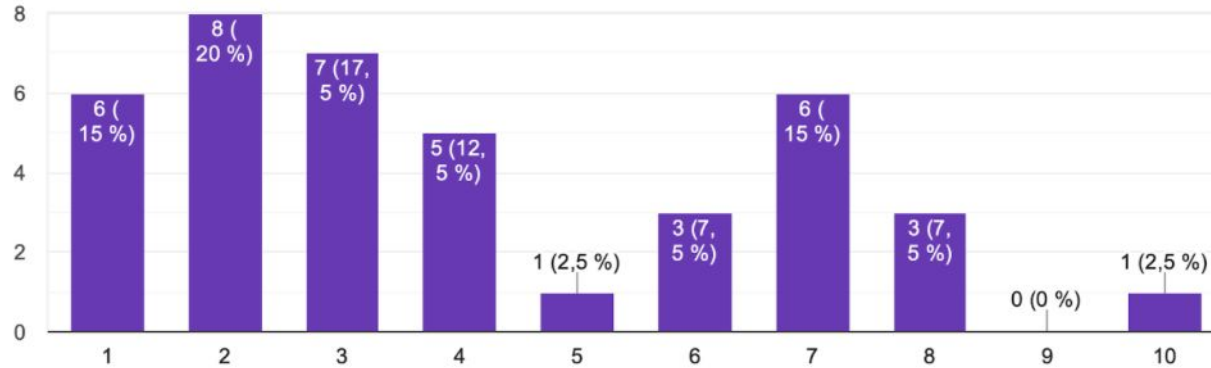


96 cases were used

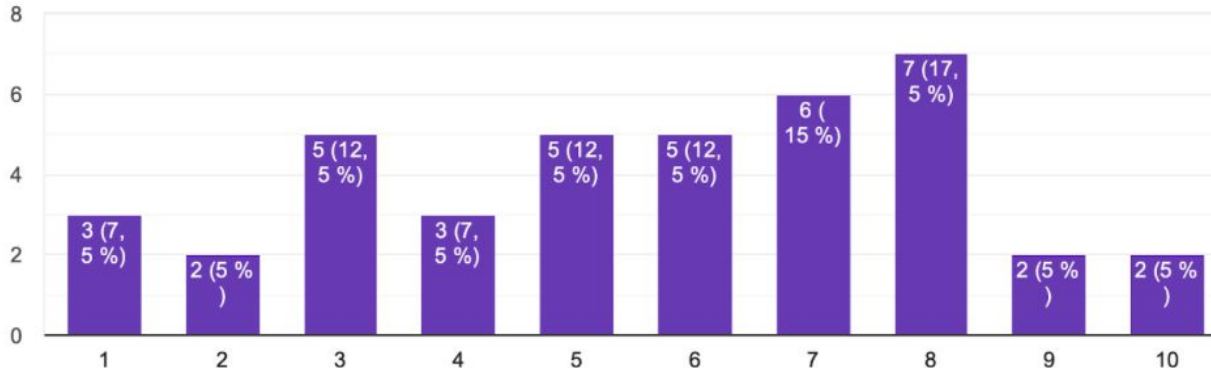


Objective : Assess AI tool's ability to accurately provide diagnosis

Trust towards healthcare systems has been more affected than the one towards HCP



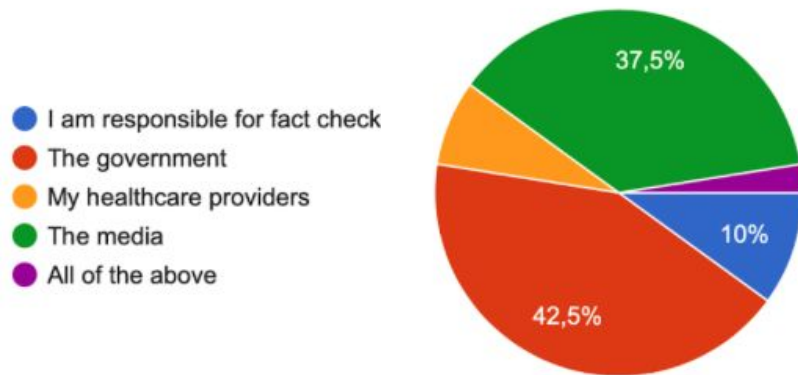
HCP
Median = 3



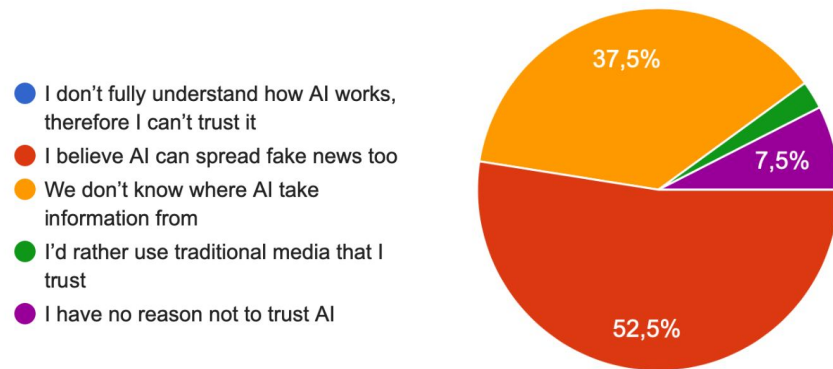
Healthcare systems
median = 6

Respondents believe media are primarily responsible for debunking fake news and fear that AI can spread fake news too

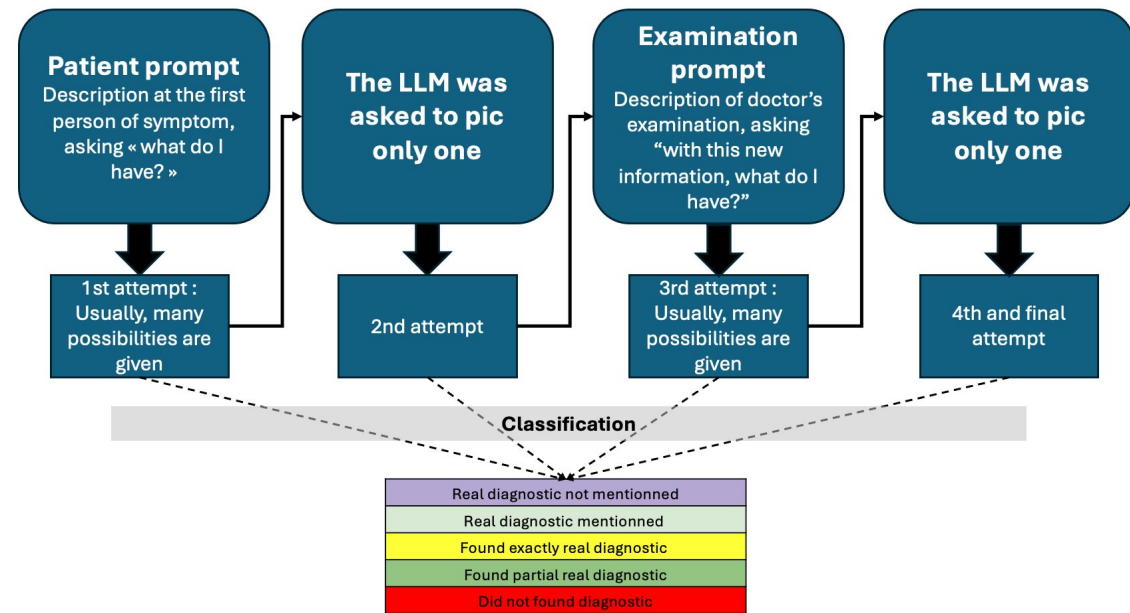
In your opinion, who should be mainly responsible for debunking medical misinformation and fake news?



Which is the main element that may restrain your trust in AI to spot medical misinformation or fake news?



AI assessment in diagnosis

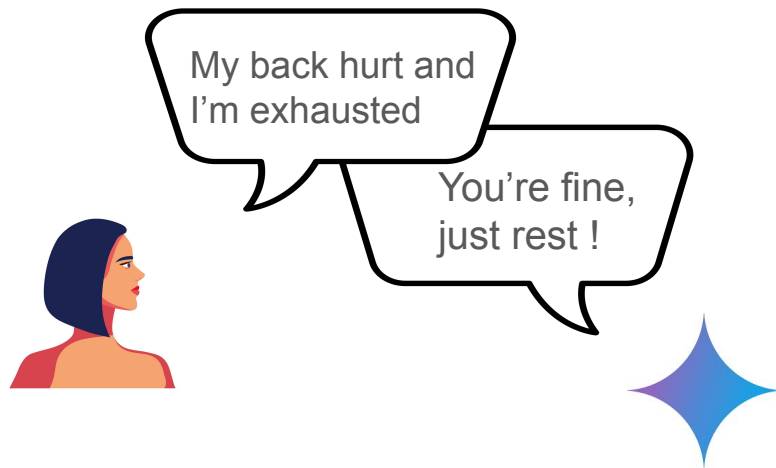


Prompt mechanism

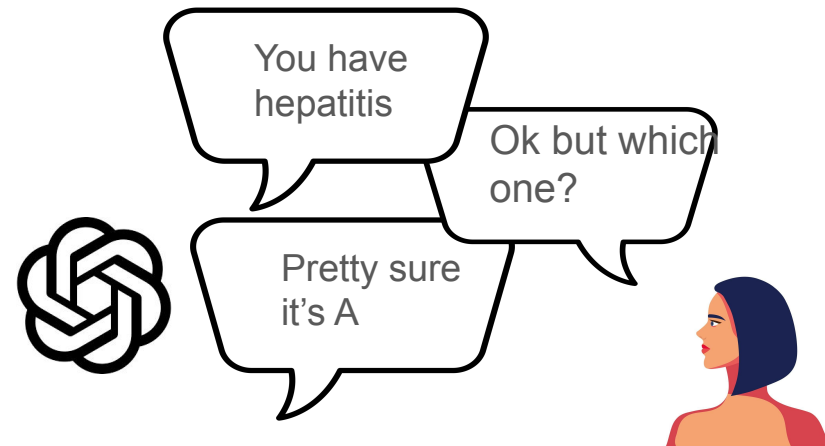
		ChatGPT	
		Diagnostic before exam	Diagnostic after exam
		Pick only one	Pick only one
a) I have an episode of dizziness and My doctor told me th	Input after examination	<p>Your symptoms of dizziness, lightheadedness, and episodes occurring primarily during exertion but sometimes while sitting, are concerning and warrant immediate medical attention. Several potential causes exist:</p> <p>1. Your symptoms could be related to low blood pressure, which can occur when standing up too quickly or during exertion.</p> <p>2. Anemia, a condition where the body lacks enough healthy red blood cells to carry adequate oxygen to its tissues, can cause dizziness.</p> <p>3. Inner ear problems, such as benign paroxysmal positional vertigo (BPPV), can lead to episodes of dizziness.</p> <p>4. Dehydration or low blood sugar levels can also contribute to dizziness.</p> <p>5. Medications, particularly those affecting blood pressure or the inner ear, can be a factor.</p> <p>6. More serious conditions like heart issues or neurological disorders could also present with dizziness.</p> <p>Given the new information, the symptoms and physical findings suggest a possible diagnosis of "benign paroxysmal positional vertigo (BPPV)". It is a common inner ear disorder that causes brief episodes of dizziness or nausea. It is caused by dislodged calcium crystals in the inner ear.</p>	Already picked one
	Image	Already picked one	Already picked one
b) I currently have acute chest pain in My doctor told me th	Input after examination	<p>Given your history of repeated chest infections, hospital admissions due to cough and purulent sputum, and ongoing production of sputum, a likely diagnosis is "bronchitis". This condition is characterized by inflammation of the bronchial tubes, which are the airways that carry air to and from the lungs.</p> <p>A persistent cough lasting for three months, unresponsive to amoxicillin, and accompanied by fatigue and sleep disturbances can be indicative of various conditions. It's essential to consult with a healthcare provider for a thorough evaluation.</p> <p>Based on the additional information provided, your symptoms are consistent with a diagnosis of "chronic bronchitis". Chronic bronchitis is characterized by a persistent cough lasting for at least three months, unresponsive to treatment, and accompanied by fatigue and sleep disturbances.</p>	Already picked one
	Image	Already picked one	Already picked one
c) I have repeated chest infections at My doctor told me th	Input after examination	<p>Given the new information about your chest infections, the most likely diagnosis is "chronic bronchitis". This condition is based on your history of repeated chest infections, hospital admissions due to cough and purulent sputum, and ongoing production of sputum.</p> <p>Based on the information provided, your symptoms are consistent with a diagnosis of "chronic bronchitis". Chronic bronchitis is characterized by a persistent cough lasting for at least three months, unresponsive to treatment, and accompanied by fatigue and sleep disturbances.</p>	Already picked one
	Image	Already picked one	Already picked one
d) I have a persistent cough and am in My doctor told me th	Input after examination	<p>Based on the additional information provided, your symptoms are consistent with a diagnosis of "chronic bronchitis". Chronic bronchitis is characterized by a persistent cough lasting for at least three months, unresponsive to treatment, and accompanied by fatigue and sleep disturbances.</p> <p>Based on the information provided, your symptoms are consistent with a diagnosis of "chronic bronchitis". Chronic bronchitis is characterized by a persistent cough lasting for at least three months, unresponsive to treatment, and accompanied by fatigue and sleep disturbances.</p>	Already picked one
	Image	Already picked one	Already picked one
e) I have abdominal pain, yesterday 1 My doctor told me th	Input after examination	<p>Given your symptoms of right upper quadrant (RUQ) pain, nausea, and vomiting, a possible diagnosis is "gallstones". Gallstones are hard deposits that can form in the gallbladder, which is a small sac that stores bile. Symptoms include pain in the upper right abdomen, nausea, and vomiting.</p> <p>Based on the additional information provided, your symptoms are consistent with a diagnosis of "gallstones". Gallstones are hard deposits that can form in the gallbladder, which is a small sac that stores bile. Symptoms include pain in the upper right abdomen, nausea, and vomiting.</p>	Already picked one
	Image	Already picked one	Already picked one
f) I've been tired for 4 months with all My doctor told me th	Input after examination	<p>Based on the symptoms described, a likely diagnosis is "anemia". Anemia is a condition where the body lacks enough healthy red blood cells to carry adequate oxygen to its tissues. Symptoms include fatigue, weakness, and shortness of breath.</p> <p>Based on the additional information provided, your symptoms are consistent with a diagnosis of "anemia". Anemia is a condition where the body lacks enough healthy red blood cells to carry adequate oxygen to its tissues. Symptoms include fatigue, weakness, and shortness of breath.</p>	Already picked one
	Image	Already picked one	Already picked one
g) I've lost appetite and weight for 4 My doctor told me th	Input after examination	<p>Based on the new information provided by your doctor, your symptoms suggest a few possibilities:</p> <p>1. "Hypothyroidism": This condition occurs when the thyroid gland doesn't produce enough thyroid hormone, which can lead to weight gain, fatigue, and depression.</p> <p>2. "Major Depressive Disorder": Depression can significantly affect appetite and weight.</p> <p>3. "Diabetes Mellitus": Uncontrolled blood sugar levels can lead to weight loss and fatigue.</p> <p>4. "Celiac Disease": An autoimmune reaction to gluten that can cause weight loss and digestive issues.</p> <p>5. "Chronic Kidney Disease": Can lead to various symptoms including weight loss and fatigue.</p> <p>6. "Liver Disease": Can cause weight loss and fatigue.</p> <p>7. "Heart Failure": Can lead to weight gain and fatigue.</p> <p>8. "Lung Disease": Can cause weight loss and fatigue.</p> <p>9. "Autoimmune Disease": Can cause various symptoms including weight loss and fatigue.</p> <p>10. "Infectious Disease": Can cause weight loss and fatigue.</p> <p>11. "Cancer": Can cause weight loss and fatigue.</p> <p>12. "Chronic Pain": Can lead to weight loss and fatigue.</p> <p>13. "Substance Use": Can cause weight loss and fatigue.</p> <p>14. "Medication Side Effects": Some medications can cause weight loss and fatigue.</p> <p>15. "Nutritional Deficiencies": Lack of certain vitamins and minerals can lead to weight loss and fatigue.</p> <p>16. "Stress": Chronic stress can lead to weight loss and fatigue.</p> <p>17. "Sleep Apnea": Can cause weight gain and fatigue.</p> <p>18. "Asthma": Can cause weight loss and fatigue.</p> <p>19. "Allergies": Can cause weight loss and fatigue.</p> <p>20. "Chronic Inflammation": Can cause weight loss and fatigue.</p> <p>21. "Hormonal Imbalances": Can cause weight loss and fatigue.</p> <p>22. "Genetic Factors": Some people are genetically predisposed to certain conditions that can cause weight loss and fatigue.</p> <p>23. "Environmental Factors": Exposure to toxins or pollutants can lead to weight loss and fatigue.</p> <p>24. "Psychological Factors": Anxiety and other mental health issues can lead to weight loss and fatigue.</p> <p>25. "Social Factors": Isolation and lack of social support can lead to weight loss and fatigue.</p> <p>26. "Lifestyle Factors": Poor diet and lack of exercise can lead to weight loss and fatigue.</p> <p>27. "Age-Related Changes": As people age, their metabolism slows down, which can lead to weight gain and fatigue.</p> <p>28. "Pregnancy": Can cause weight gain and fatigue.</p> <p>29. "Menstrual Cycle": Can cause weight fluctuations and fatigue.</p> <p>30. "Menopause": Can cause weight gain and fatigue.</p> <p>31. "Postmenopausal Syndrome": Can cause weight gain and fatigue.</p> <p>32. "Andropause": Can cause weight gain and fatigue.</p> <p>33. "Hypertension": Can cause weight gain and fatigue.</p> <p>34. "Hyperlipidemia": Can cause weight gain and fatigue.</p> <p>35. "Diabetes Mellitus": Can cause weight loss and fatigue.</p> <p>36. "Hypertension": Can cause weight gain and fatigue.</p> <p>37. "Hyperlipidemia": Can cause weight gain and fatigue.</p> <p>38. "Diabetes Mellitus": Can cause weight loss and fatigue.</p> <p>39. "Hypertension": Can cause weight gain and fatigue.</p> <p>40. "Hyperlipidemia": Can cause weight gain and fatigue.</p> <p>41. "Diabetes Mellitus": Can cause weight loss and fatigue.</p> <p>42. "Hypertension": Can cause weight gain and fatigue.</p> <p>43. "Hyperlipidemia": Can cause weight gain and fatigue.</p> <p>44. "Diabetes Mellitus": Can cause weight loss and fatigue.</p> <p>45. "Hypertension": Can cause weight gain and fatigue.</p> <p>46. "Hyperlipidemia": Can cause weight gain and fatigue.</p> <p>47. "Diabetes Mellitus": Can cause weight loss and fatigue.</p> <p>48. "Hypertension": Can cause weight gain and fatigue.</p> <p>49. "Hyperlipidemia": Can cause weight gain and fatigue.</p> <p>50. "Diabetes Mellitus": Can cause weight loss and fatigue.</p>	Already picked one
	Image	Already picked one	Already picked one
h) I've had malaise and anorexia for 1 My doctor told me th	Input after examination	<p>Given the combination of symptoms you've described, and the physical examination findings, a likely diagnosis is "Major Depressive Disorder". This is a common mental health condition that can significantly affect appetite and weight.</p> <p>Based on the additional information provided, your symptoms are consistent with a diagnosis of "Major Depressive Disorder". This is a common mental health condition that can significantly affect appetite and weight.</p>	Already picked one
	Image	Already picked one	Already picked one
i) I've had increased tiredness which My doctor told me th	Input after examination	<p>I'm not a doctor, but your symptoms could potentially indicate a serious condition that</p>	Already picked one
	Image	Already picked one	Already picked one

Data compiling

AI being AI



➡ It was actually vertebral cancer metastasis

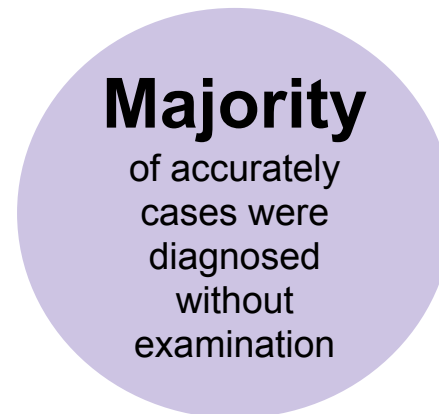
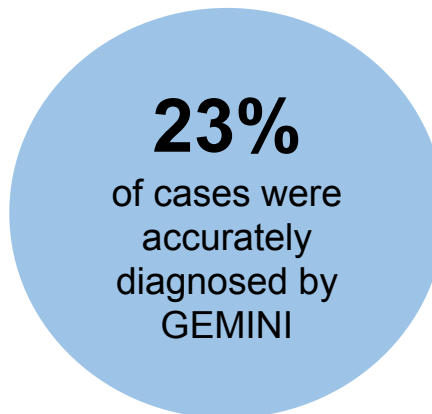
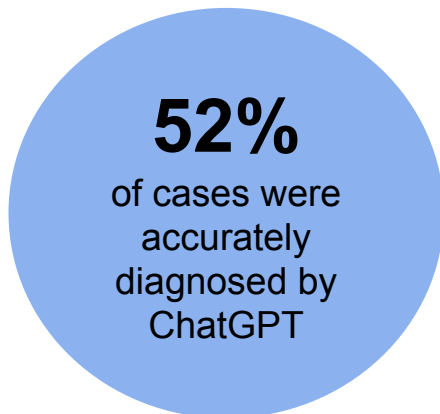


➡ It was hepatitis B, contrary to hepatitis A, it can cause chronic liver disease

ChatGPT is twice as good as GEMINI in diagnosing

	ChatGPT	GEMINI	In common	total
Total number of accurate diagnosis	50	22	19	53
Number of accurate diagnosis without examination	28	14	11	
Number of accurate diagnosis found with examination	22	8	6	

Table 1: Results of AI test for diagnosis



Prompt character length didn't impact accuracy of diagnosis outcome

	Patient prompt	Examination Prompt	Total prompt
ChatGPT	8,68%	-0,51%	2,72%
<i>t calculated</i>	0,947	-0,063	0,024
GEMINI	7,77%	0,46%	3,09%
<i>t calculated</i>	0,908	0,055	0,549

Table 2 : Difference in number of characters of prompt between accurate and inaccurate diagnosis. *t*-value used for significance is 1,99, with a degree of freedom of 95 and a significance degree of 5%.



I came back from the supermarket and then my legs hurt, also I felt like my knee was going to pop [...] and also I fell during an hiking in the austrian Alps a month ago [...] bla bla bla [...]

You can talk all you want, I'm still unable to diagnose you. See a doctor.



Conclusion and recommendations

Observation

Recommendations

Impact on trust

- COVID-19 had more impact on trust towards health systems
- Expectation of media and government to debunk misinformations



- Health systems need to **rebuild trust**
 - **Give tools** to population to spot misinformation and **raise awareness** on these issues
- Governments might consider to **implementing regulations** regarding misinformation and fake news

Willingness to use and trust AI

- Users are requiring sources outputs from AI tools
- People are mainly willing to use AI to spot misinformations



- In order to increase user's adherence to their tools, AI companies need to **improve disclosure of sources in outputs**
- **Development of AI to spot fake news should be increased** and available to all

AI accuracy on diagnosis

- AI tools have different efficiency when it comes to diagnosing
- Prompt size doesn't matter



- As of today, **mainstream AI tools should not be used by people to diagnose** as they can represent a danger (misdiagnosis)
 - **Awareness needs to be raised**
- **Improvement and sourcing needs to be developed**



Q&A