

## Original Article

# Mitigating the Burden of Meningitis Outbreak; ChatGPT and Google Bard Recommendations for the General Populations: General Practitioners and Pediatricians

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## Abstract

### Introduction

ChatGPT and Bard are large language models, both are artificial intelligence designed to understand natural language and generate human-like responses to text-based inputs. The aim of this study is to assess the ChatGPT and Bard Recommendations for the general populations; general practitioners and pediatricians for reducing the burden of meningitis outbreaks.

### Methods

We asked ChatGPT PLUS and Bard, on 5 April 2023 for their advice and recommendations in controlling the meningitis outbreak, the same question was repeated three times, one for the general population, one for the general practitioners, and the last one for the pediatricians. The responses were recorded, compared assessed.

### Results

ChatGPT and Bard replied to the three questions with general advice including early recognition of the disease, insisting on the vaccination, strict hygiene, infection control strategy, and staying up to date about the latest developments regarding the outbreak.

### Conclusion

ChatGPT and Bard have the potential to be valuable tools for the general population during outbreaks of infectious diseases. However, advanced information for professionals might be impossible to be provided by ChatGPT PLUS and Google Bard at the time being.

## 1. Introduction

Meningitis is a serious and potentially life-threatening disease that is caused by inflammation of the protective membranes surrounding the brain and spinal cord [1]. It can be caused by bacterial, viral, fungal, or parasitic infections and is typically spread through respiratory or oral secretions. Outbreaks of meningitis can occur in various settings, including schools, colleges, and other institutions where people live in close proximity to each other.

Meningitis outbreaks can have serious consequences and require rapid public health interventions to contain the spread of the disease [1].

Viral meningitis is caused by viral infections and is usually less severe than bacterial meningitis. While most cases of viral meningitis are mild and resolve on their own, some cases can be more severe and lead to complications. Symptoms of viral meningitis include fever, headache, stiff neck, sensitivity to light, and nausea [2]. Treatment typically involves supportive care to manage symptoms, such as pain relief and hydration. While viral meningitis can affect people of all ages, it is most common in children and young adults [3].

Chat Generative Pre-Trained Transformer (ChatGPT) and Google Bard are large language models developed by OpenAI and Google, respectively. They are artificial intelligence (AI) designed to understand natural language and generate human-like responses to text-based inputs [4,5].

ChatGPT and Bard are capable of a variety of language tasks, including text generation, question answering, and language translation. They have been trained on a large corpus of text from the internet, allowing them to learn patterns and relationships between words and phrases. As language models, they can be used in a wide range of applications, including chatbots, virtual assistants, content generation, and even more. Their ability to understand and respond to natural language makes them valuable tools for businesses and developers looking to automate language-based tasks, this may be transformed to medical issues [4,5].

The aim of this study is to assess the generated response of ChatGPT PLUS and Google Bard, the same question for three different lines of disease control.

## 2. Methods

In view of the recent outbreak of meningitis in our region, we asked ChatGPT PLUS and Bard, on 5 April 2023 for their advice and recommendations in controlling the outbreak, the same question was repeated three times, one for the general population, one for the general practitioners, and the last one for the pediatricians:

- North of Iraq faces an outbreak of meningitis, what is your advice for general populations?
- North of Iraq faces an outbreak of meningitis, what is your advice for general practitioners?

- North of Iraq faces an outbreak of meningitis, what is your advice for pediatricians?

## 3. Results

Human authors: "North of Iraq faces an outbreak of meningitis, what is your advice for general populations?"

ChatGPT PLUS: "If you are a member of the general population in the north of Iraq, there are several things you can do to help prevent the spread of meningitis and protect yourself and your family. Here are some general pieces of advice that may be helpful:

- Be aware of the signs and symptoms of meningitis, which can include fever, headache, neck stiffness, and a rash. If you or someone you know develops these symptoms, seek medical attention right away.
- Ensure that you and your family members are up-to-date on their vaccinations. Vaccines are available that can protect against some types of meningitis, including *Haemophilus influenzae* type b (Hib) and pneumococcal meningitis. Contact your healthcare provider or local health department to find out more information about vaccination options.
- Practice good hygiene habits, such as washing your hands regularly with soap and water, covering your mouth and nose when coughing or sneezing, and avoiding close contact with people who are sick.
- If you are caring for someone with meningitis, make sure to follow proper infection control procedures, such as wearing gloves and a mask, and washing your hands frequently.
- Stay informed about the latest developments regarding the outbreak of meningitis in the north of Iraq. Follow guidance from local health authorities and international organizations such as the World Health Organization (WHO) on prevention and treatment.

Remember that meningitis can be a serious and potentially life-threatening disease. By taking these steps, you can help protect yourself and your loved ones, and help prevent the spread of meningitis in your community."

Human authors: "North of Iraq faces an outbreak of meningitis, what is your advice for general practitioners?"

ChatGPT PLUS: "Meningitis is a serious and potentially life-threatening disease, so it is important that general practitioners in the north of Iraq take appropriate measures to prevent its spread and provide prompt treatment to affected individuals. Here are some general pieces of advice that may be helpful:

- Be alert to the signs and symptoms of meningitis. These can include fever, headache, neck stiffness, and a rash. If you suspect that a patient may have meningitis, refer them for urgent medical care.

- Ensure that all patients in your care are up-to-date on their vaccinations. Vaccines are available that can protect against some types of meningitis, including *Haemophilus influenzae* type b (Hib) and pneumococcal meningitis.
- Encourage good hygiene practices among patients and their families, such as regular hand washing and covering coughs and sneezes.
- Consider implementing infection control measures in your practice, such as wearing personal protective equipment (PPE) when appropriate, disinfecting surfaces, and limiting exposure of patients to each other.
- Stay informed about the latest developments regarding the outbreak of meningitis in the north of Iraq. Follow guidance from local health authorities and international organizations such as the World Health Organization (WHO) on prevention and treatment.

Remember that meningitis can be a very serious condition, and early recognition and treatment are critical. If you have any concerns or questions, do not hesitate to seek advice from other healthcare professionals or relevant authorities.”

Human authors: “North of Iraq faces an outbreak of meningitis, what is your advice for the pediatricians?”

ChatGPT PLUS: “Meningitis is a serious and potentially life-threatening disease, so it is important that pediatricians in the north of Iraq take appropriate measures to prevent its spread and provide prompt treatment to affected individuals. Here are some general pieces of advice that may be helpful:

- Be alert to the signs and symptoms of meningitis. These can include fever, headache, neck stiffness, and a rash. If you suspect that a patient may have meningitis, refer them for urgent medical care.
- Ensure that all children in your care are up-to-date on their vaccinations. Vaccines are available that can protect against some types of meningitis, including *Haemophilus influenzae* type b (Hib) and pneumococcal meningitis.
- Encourage good hygiene practices among patients and their families, such as regular hand washing and covering coughs and sneezes.
- Consider implementing infection control measures in your practice, such as wearing personal protective equipment (PPE) when appropriate, disinfecting surfaces, and limiting exposure of patients to each other.
- Stay informed about the latest developments regarding the outbreak of meningitis in the north of Iraq. Follow guidance from local health authorities and international organizations such as the World Health Organization (WHO) on prevention and treatment.

Remember that meningitis can be a very serious condition, and early recognition and treatment are critical. If you have any concerns or questions, do not hesitate to seek advice from other healthcare professionals or relevant authorities.”

Human authors: “North of Iraq faces an outbreak of meningitis, what is your advice for general populations?”

Bard: “Meningitis is a serious infection of the membranes that surround the brain and spinal cord. It can be caused by bacteria, viruses, or fungi. Bacterial meningitis is the most serious type and can be life-threatening.

The following are some tips for the general population to protect themselves from meningitis:

- Get vaccinated. There are vaccines available for some types of meningitis, including meningococcal meningitis and *Haemophilus influenzae* type b (Hib) meningitis.
- Wash your hands often with soap and water. This is one of the best ways to prevent the spread of germs.
- Avoid close contact with people who are sick. If you are around someone who is sick, try to stay at least 6 feet away from them.
- Cover your mouth and nose when you cough or sneeze. Use a tissue or your elbow to cover your mouth and nose, and then throw the tissue away.
- Avoid touching your eyes, nose, and mouth. Germs can enter your body through these openings.
- Get plenty of rest. Your body needs rest to fight off infection.
- Eat a healthy diet. Eating a healthy diet helps to keep your immune system strong.
- Drink plenty of fluids. Staying hydrated helps to flush out germs from your body.

If you think you or someone you know may have meningitis, see a doctor right away. Meningitis is a medical emergency.”

Human authors: “North of Iraq faces an outbreak of meningitis, what is your advice for general practitioners?”

Bard: “Here are some tips for general practitioners in the North of Iraq during the meningitis outbreak:

- Be aware of the symptoms of meningitis. Meningitis can cause a variety of symptoms, including fever, headache, stiff neck, vomiting, and sensitivity to light. If you see a patient with any of these symptoms, it is important to consider meningitis as a possible diagnosis.
- Screen patients for meningitis. If you suspect that a patient may have meningitis, you should order a lumbar puncture (spinal tap) to test for the presence of bacteria or viruses in the cerebrospinal fluid.

- Treat meningitis promptly. Meningitis is a medical emergency and should be treated promptly. Treatment typically involves antibiotics or antiviral medications.
- Educate patients about meningitis. It is important to educate patients about the symptoms of meningitis and the importance of seeking medical attention promptly if they experience any of these symptoms.
- Work with public health officials. General practitioners should work with public health officials to identify and control the outbreak of meningitis. This may involve tracking cases, identifying risk factors, and implementing prevention measures.

It is important to note that meningitis is a serious disease, but it is treatable. With prompt diagnosis and treatment, most people who get meningitis make a full recovery."

Human authors: "North of Iraq faces an outbreak of meningitis, what is your advice for the pediatricians?"

Bard: "Here are some tips for pediatricians in the North of Iraq during the meningitis outbreak:

- Be aware of the symptoms of meningitis in children. Meningitis can cause a variety of symptoms in children, including fever, headache, stiff neck, vomiting, and sensitivity to light. In addition, children may also have a rash, a change in behavior, or a loss of appetite. If you see a child with any of these symptoms, it is important to consider meningitis as a possible diagnosis.
- Screen children for meningitis. If you suspect that a child may have meningitis, you should order a lumbar puncture (spinal tap) to test for the presence of bacteria or viruses in the cerebrospinal fluid.
- Treat meningitis promptly. Meningitis is a medical emergency and should be treated promptly. Treatment typically involves antibiotics or antiviral medications.
- Educate parents about meningitis. It is important to educate parents about the symptoms of meningitis and the importance of seeking medical attention promptly if their child experiences any of these symptoms.
- Work with public health officials. Pediatricians should work with public health officials to identify and control the outbreak of meningitis. This may involve tracking cases, identifying risk factors, and implementing prevention measures.

It is important to note that meningitis is a serious disease, but it is treatable. With prompt diagnosis and treatment, most children who get meningitis make a full recovery.

Here are some additional tips for pediatricians:

- Make sure that all of your patients are up to date on their vaccinations, including the meningococcal vaccine.
- Encourage parents to practice good hygiene, such as washing their hands frequently and avoiding close contact with people who are sick.
- Be aware of the risk factors for meningitis, such as crowded living conditions and travel to areas where meningitis is common.

If you have any concerns about a patient, don't hesitate to contact a specialist."

#### 4. Discussion

Artificial intelligence may have the potential to be a valuable tool for medical professionals during outbreaks of infectious diseases. The COVID-19 pandemic has highlighted the urgent need for new and innovative approaches to disease detection, diagnosis, and treatment, and AI could be a key component of this effort.

One potential use of AI during an outbreak may be for early detection. AI can be used to analyze large volumes of data from sources such as social media, news reports, and hospital records to identify patterns and trends that may indicate the emergence of a new disease outbreak. For example, researchers have used AI to analyze Twitter data to detect outbreaks of influenza and other respiratory illnesses [6]. By detecting outbreaks earlier, medical professionals can respond more quickly, potentially reducing the spread of disease.

Another potential use of AI during an outbreak is for diagnosis. AI can be used to develop algorithms that can help diagnose diseases more quickly and accurately, based on a patient's symptoms and other clinical data. For example, AI could be used to analyze chest X-rays to detect signs of pneumonia or to analyze blood samples to detect the presence of a specific virus or bacteria. In fact, AI has already been used in this way during the COVID-19 pandemic, with researchers developing AI-powered algorithms to help diagnose the disease based on chest X-rays and CT scans with reasonable accuracy [7].

AI may be used to assist with resource allocation during an outbreak. During an outbreak, medical professionals may need to make difficult decisions about how to allocate limited resources such as hospital beds, ventilators, and medical supplies. AI can be used to develop models that can help guide these decisions, based on factors such as the severity of the outbreak, the availability of resources, and the characteristics of the patient population. For example, researchers have used AI to develop a model to predict the number of hospital beds that will be needed during an influenza outbreak, allowing medical professionals to better prepare for the surge in demand [8].

In the context of an outbreak of meningitis in the north of Iraq (Kurdistan region), ChatGPT PLUS and Bard provided nearly similar advice to pediatricians, general practitioners, and the general population, but without some nuances that take into

account the unique needs and perspectives of each group. There are several pieces of advice that are common for all for instance, all three groups might be advised to practice good hygiene habits and stay informed about the outbreak, however, pediatricians might be given additional guidance on how to recognize and treat meningitis in children, while the general population might be given more basic information about the signs and symptoms of the disease and how to seek medical attention if needed. Without tailoring its responses to the specific needs and concerns of each group, ChatGPT PLUS and Bard can't ensure that everyone has access to the information they need to stay updated. Even common crucial information for all was missed like the preventive effect of breast milk in meningitis, especially enterovirus meningitis which is a long time being proven [9].

## 5. Conclusion

AI, ChatGPT PLUS, and Bard have the potential to be valuable tools for the general population during outbreaks of infectious diseases. By assisting with early control and preventing the spread of the causative agent. However advanced information for professionals might be impossible to be provided by ChatGPT PLUS and Bard at time being.

## Declarations

**Conflicts of interest:** The author(s) have no conflicts of interest to disclose.

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