

# The exciting potential for ChatGPT in obstetrics and gynecology



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Natural language processing—the branch of artificial intelligence concerned with the interaction between computers and human language—has advanced markedly in recent years with the introduction of sophisticated deep-learning models. Improved performance in natural language processing tasks, such as text and speech processing, have fueled impressive demonstrations of these models' capabilities. Perhaps no demonstration has been more impactful to date than the introduction of the publicly available online chatbot ChatGPT in November 2022 by OpenAI, which is based on a natural language processing model known as a Generative Pretrained Transformer. Through a series of questions posed by the authors about obstetrics and gynecology to ChatGPT as prompts, we evaluated the model's ability to handle clinical-related queries. Its answers demonstrated that in its current form, ChatGPT can be valuable for users who want preliminary information about virtually any topic in the field. Because its educational role is still being defined, we must recognize its limitations. Although answers were generally eloquent, informed, and lacked a significant degree of mistakes or misinformation, we also observed evidence of its weaknesses. A significant drawback is that the data on which the model has been trained are apparently not readily updated. The specific model that was assessed here, seems to not reliably (if at all) source data from after 2021. Users of ChatGPT who expect data to be more up to date need to be aware of this drawback. An inability to cite sources or to truly understand what the user is asking suggests that it has the capability to mislead. Responsible use of models like ChatGPT will be important for ensuring that they work to help but not harm users seeking information on obstetrics and gynecology.

**Key words:** artificial intelligence, cesarean delivery, chatbots, ChatGPT, ethics, gynecology, home birth, informed consent, maternal-fetal medicine, obstetrics, oncology, preeclampsia, prematurity, preterm birth, progesterone, reproductive medicine, short cervix, vaginal progesterone

## Introduction

Natural language processing (NLP)—the branch of artificial intelligence (AI) concerned with the interaction between computers and human language—has advanced markedly in recent years with the introduction of sophisticated deep learning models.<sup>1</sup> Improved performance

in NLP tasks such as text and speech processing have fueled impressive demonstrations of these models' capabilities. This has captured the public imagination by seemingly imbuing computers with the ability to write “complex, syntactically coherent thoughts.”<sup>2</sup> Perhaps no demonstration has been

more impactful to date than with the introduction of the publicly available online chatbot ChatGPT in November 2022 by AI Lab OpenAI based on an NLP model known as a Generative Pretrained Transformer (GPT). With a simple “text in, text out” interface,<sup>3</sup> ChatGPT is a very accessible language model informed by a data set that includes at least 57 billion words and 175 billion parameters from the “internet, books and other sources.”<sup>4</sup> The breadth of this data means that ChatGPT can handle prompts across a wide range of domains, including medicine. It can be asked to perform language-based tasks ranging from writing articles<sup>5</sup> to answering clinical questions,<sup>6</sup> although there have been complaints that it may produce seemingly credible but incorrect responses, such as that it is inventing terms that it needs to be familiar with.<sup>7</sup> The *Journal of the American Medical Association* recently implemented guidelines for their publications regarding the use of chatbots.<sup>8</sup> ChatGPT's potential use as a clinical tool is easy to see because it has demonstrated an ability to answer clinical questions accurately in clear and plain English, which can be understood by both healthcare providers and patients. While observing its capability, it is important to characterize its limitations. ChatGPT is only as good as its derived training data. These data are potentially biased, unreliable, and are not necessarily up to date. According to OpenAI, the model has “limited knowledge of world and events after 2021.”<sup>3,7</sup> The cost- and time-intensive process of training the model suggests that in the short term, there will always be some lag in the information it provides. Users must take its responses with a degree of faith because it does not list sources for its information. A seemingly satisfactory ChatGPT risks misleading without proper warning. With a series of informed questions relating to obstetrics and gynecology, we

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sought to assess the current capability of ChatGPT.

### Objective

The objective of this publication was to assess answers given by ChatGPT, a large language model, in response to a spectrum of questions conceived by 4 physicians about obstetrics and gynecology and that were then entered as prompts by 2 physicians in February 2023. The questions are highlighted as subtitles, the ChatGPT responses were entered in quotations, and we comment on the ChatGPT responses.

### Why are prematurity rates in the United States much higher than other high-income countries?

“The reasons for higher prematurity rates in the United States compared to other high-income countries are complex and multifactorial. Some of the factors that contribute to higher prematurity rates in the United States include:

1. Lack of access to quality prenatal care: Many women in the United States, especially those from low-income or minority populations, do not have access to adequate prenatal care, which can increase the risk of premature birth.
2. Higher rates of multiple births: The increased use of assisted reproductive technologies (ART) in the United States has led to a higher rate of multiple births, which are associated with a higher risk of prematurity.
3. Higher rates of maternal obesity: The high prevalence of obesity in the United States is associated with an increased risk of premature birth.
4. Higher rates of maternal smoking: Despite declines in smoking rates, smoking during pregnancy remains a significant contributor to premature birth in the United States.
5. Lack of policies to support maternal and infant health: The United States is one of the few high-income countries without paid maternity leave, which can contribute to stress and financial insecurity for expectant mothers, increasing the risk of premature birth.

6. Health disparities: Health disparities based on race, ethnicity, and socioeconomic status contribute to higher rates of premature birth in the United States.

Addressing these factors through policies, programs, and initiatives aimed at improving access to quality prenatal care, reducing maternal and infant health disparities, and promoting healthy lifestyles can help reduce prematurity rates in the United States.”

### Comments

The answer that ChatGPT gave to the question of why United States preterm birth rates are so high (“The reasons for higher prematurity rates in the United States ... are complex and multifactorial ...”), is right on point. The list of possible reasons (prenatal care access, multiple births, maternal obesity, maternal smoking, lack of policies to support maternal and infant health) is complete and helps to better understand the reasons for the increased preterm birth rate in the United States. Especially its last point that mentions health disparities as a major contributor and that has been mentioned repeatedly as a contributing cause of the increase in preterm births and other factors in the United States. This is a nuanced answer to a complex question.<sup>9,10</sup>

### Provide a list of the most important interventions which physicians can do to monitor, prevent, and treat premature births?

“Here is a list of the most important interventions that physicians can use to monitor, prevent, and treat premature births:

1. Early and regular prenatal care
2. Identifying and managing medical conditions
3. Cervical length measurement
4. Progesterone supplementation
5. Cerclage
6. Avoiding unnecessary interventions
7. Administering corticosteroids
8. Magnesium sulfate

These interventions can be used in various combinations and tailored to the

individual needs of each patient to help reduce the risk of premature birth and improve outcomes for both mother and baby.”

### Comment

Monitoring, preventing, and treating preterm labor and birth are among the top priorities in obstetrics and gynecology. The ChatGPT response provides a general overview of how to monitor and prevent premature birth. However, the answers are incomplete and fail to mention other means such as differential approaches in patients with a short cervix, multiple gestations, or a history of preterm births.<sup>3</sup> It fails to address additional issues that increase preterm births such as racial disparities, work conditions, and stress. It also fails to include more complex approaches to preterm birth prevention such as the use of aspirin prophylaxis, which has been found to significantly reduce preterm birth in certain conditions.<sup>11–16</sup>

### Is vaginal progesterone effective and safe to prevent preterm birth in women with a short cervix in the midtrimester?

“Vaginal progesterone has been shown to be effective and safe in preventing preterm birth in women with a short cervix in the midtrimester. The use of vaginal progesterone in this population is supported by several large randomized controlled trials, including the PREGNANT study, which showed a significant reduction in preterm birth in women with a short cervix who received vaginal progesterone compared to placebo.

A 2017 Cochrane review of 31 randomized controlled trials, including over 10,000 women, found that vaginal progesterone was associated with a significant reduction in preterm birth, neonatal morbidity, and mortality in women with a short cervix in the midtrimester. The review concluded that vaginal progesterone is a safe and effective treatment for women at risk of preterm birth due to a short cervix.

The use of vaginal progesterone is generally considered safe, with minimal side effects reported. However, some studies have reported a slightly increased risk of maternal vaginal discharge or

irritation. Additionally, the optimal duration and dose of vaginal progesterone therapy for the prevention of preterm birth in women with a short cervix is not well-established, and further research is needed to determine the optimal treatment protocol.

In summary, vaginal progesterone is considered an effective and safe treatment for the prevention of preterm birth in women with a short cervix in the midtrimester. Women at risk for preterm birth due to a short cervix should discuss the use of vaginal progesterone with their healthcare provider.”

#### Comments

Most infant deaths occur among babies born prematurely and it is therefore important for obstetricians to learn more about how to prevent and treat preterm births. This is an example of a question that, when asked clearly, provides a ChatGPT answer that answers the question accurately enough. Specifically, ChatGPT points to several select sources, namely the PREGNANT study<sup>17</sup> and a Cochrane review.<sup>18</sup> However, without providing additional information or mentioning which parts of these studies were relevant, these answers by ChatGPT raise the possibility that ChatGPT comes to one conclusion, whereas these or additional studies might come to other conclusions. We would have preferred better references to the studies that ChatGPT was referring to, more recent studies, and more specifics about the exact sources, and hopefully, future answers from ChatGPT will include more recent publications. The ChatGPT answer was mostly correct and addressed the impact of cervical length as an indication for vaginal progesterone.<sup>18–21</sup>

#### Is vaginal progesterone effective and safe to prevent preterm birth in women with a history of preterm birth but without a cervix of less than 25 mm

“Vaginal progesterone is an effective and safe treatment to prevent preterm birth in women with a history of preterm birth, regardless of cervical length. Several randomized controlled trials, including the Meis trial and the

PROLONG study, have shown that vaginal progesterone can reduce the risk of preterm birth in women with a history of preterm birth.

In these trials, women who received vaginal progesterone had a lower incidence of preterm birth, as well as a lower risk of neonatal respiratory distress syndrome and other complications. The benefit of vaginal progesterone in preventing preterm birth is thought to be related to its ability to reduce inflammation and improve the integrity of the fetal membranes.

Although the benefit of vaginal progesterone in preventing preterm birth is well-established in women with a history of preterm birth, it is not clear whether it is effective in women with a history of term births who are at risk of preterm birth due to other factors. However, some studies have suggested that vaginal progesterone may be beneficial in this population as well.

The use of vaginal progesterone is generally considered safe, with minimal side effects reported. However, as with any medication, there is a small risk of side effects, such as vaginal irritation or discharge.

In summary, vaginal progesterone is an effective and safe treatment to prevent preterm birth in women with a history of preterm birth, regardless of cervical length. Women with a history of preterm birth should discuss the use of vaginal progesterone with their healthcare provider to determine if it is a suitable treatment option for their individual situation.”

#### Comments

In this instance, we added a more complex question about whether vaginal progesterone is effective and safe to prevent preterm birth in women with a history of preterm birth but without a cervix of less than 25 mm. ChatGPT here pointed to several publications, a study from 2003<sup>22</sup> and a more recent one from 2020.<sup>23</sup> ChatGPT, appropriately, was able to separate progesterone indications between short and long cervical findings but as mentioned previously, citing a few select studies without clear references can be misleading.

#### Why are maternal mortality rates in the United States so high and how can we prevent it?

“Maternal mortality rates in the United States are high due to a combination of factors, including systemic racial and economic disparities, lack of access to adequate prenatal care, and poor quality of care. Preventative measures include improving access to healthcare for all women, increasing diversity and cultural competency among healthcare providers, addressing social determinants of health, and implementing patient safety measures and data tracking systems to identify and reduce sources of medical error. Additionally, evidence-based practices, such as providing quality prenatal care, managing pregnancy and delivery complications effectively, and increasing support for postpartum care, have been shown to reduce maternal mortality rates.”

#### Comments

The ChatGPT answer appropriately and concisely highlighted the main reasons for the increased maternal mortality rates in the United States. Specifically, it listed systemic racial and economic disparities, lack of access to adequate prenatal care, and poor quality of care as main causes. A 2023 publication concluded that “...Racial and ethnic disparities in mortality among recently pregnant women were evident by cause of death...”<sup>24</sup> Considering that ChatGPT’s data collection stopped in 2021, ChatGPT was unable to include important additions to reasons for the increase in maternal mortality such as interpregnancy intervals, homicide, and suicide as important contributors to maternal mortality in the United States.<sup>24–27</sup>

#### Provide a list of what obstetricians can do to prevent preeclampsia

“Certainly! Here is a list of what obstetricians can do to prevent preeclampsia:

1. Identify and manage risk factors for preeclampsia, such as a history of preeclampsia, chronic hypertension, diabetes, kidney disease, or autoimmune disorders.

2. Provide early and regular prenatal care to identify any potential risks or complications.
3. Monitor blood pressure at every prenatal visit and more frequently for women at high risk.
4. Check urine for protein at every prenatal visit and more frequently for women at high risk.
5. Recommend a low-dose aspirin to women at high risk of developing preeclampsia.
6. Consider calcium supplementation, particularly for women with low calcium intake.
7. Work with patients to manage hypertension during pregnancy.
8. Recommend a healthy diet and lifestyle, including regular exercise and weight management.
9. Advise patients to avoid smoking and alcohol.
10. Monitor fetal growth and well-being through ultrasound and other tests.
11. Consider delivery of the baby, even if it is premature, in severe cases of preeclampsia to protect the health of the mother.
12. Monitor the mother's health after delivery to ensure that any signs or symptoms of preeclampsia are detected and treated promptly.

Overall, preventing and managing preeclampsia requires a comprehensive and individualized approach that takes into account the specific needs and risk factors of each patient. Obstetricians play a critical role in identifying and managing these risks and providing appropriate interventions when necessary to ensure the best possible outcomes for both mother and baby.”

#### Comments

Prevention and treatment of preeclampsia is among the most important aspects and research items in obstetrics. ChatGPT appropriately included many diagnosis and prevention issues including the more recent recommendation to use aspirin in the prevention of preeclampsia.<sup>28–30</sup> This ChatGPT answer provides a concise overview of prevention and treatment of preeclampsia.<sup>31,32</sup>

#### List the safety of hospital births when compared to planned home births in the United States

“Research suggests that hospital births are generally safer than planned home births in the United States. Here are some factors to consider:

1. Access to medical interventions: Hospitals have immediate access to medical interventions such as cesarean section, vacuum extraction, or forceps delivery, which can be critical in emergency situations. These interventions may not be available or accessible in a home setting.
2. Management of complications: Complications during labor and delivery can arise suddenly and can be life-threatening for both mother and baby. Hospitals are equipped to manage and quickly respond to these emergencies.
3. Risk of infection: Hospitals have protocols in place to reduce the risk of infection for both mother and baby, including regular hand washing, sterilization of equipment, and appropriate use of antibiotics.
4. Monitoring of fetal and maternal health: Hospitals have the technology to continuously monitor fetal and maternal health during labor and delivery, which can help identify and manage potential problems.
5. Expertise of medical staff: Hospitals have medical professionals with years of training and experience in obstetrics and neonatal care. These professionals can provide expert care and advice during labor, delivery, and the postpartum period.

While planned home births may be an option for some low-risk women who desire a natural birth experience, it's important for women to carefully consider the potential risks and benefits and to work closely with a healthcare provider to make an informed decision. It's also important to note that not all births can be safely conducted at home, and any woman considering a home birth should first undergo a thorough evaluation by a healthcare provider to assess her individual risk factors.”

#### Comment

ChatGPT is correct in that hospital births are generally safer than planned home births in the United States. ChatGPT also correctly identified reasons for why hospital births in the United States are safer than home births (eg, access to medical interventions, management of complications, less infections, monitoring, and expertise). But ChatGPT failed to mention that women with high-risk conditions increase the risks and adverse outcomes of United States home births and that there is a high rate of high-risk pregnancies that are inappropriately being delivered by midwives who often are unlicensed and have inadequate training in United States home births.<sup>33–37</sup>

#### Is it ethically acceptable for an obstetrician in an emergency to do a cesarean delivery without a woman's informed consent to save the fetus or the mother?

“In emergency situations where a woman is unable to give her informed consent due to medical reasons and where immediate action is necessary to protect the life or health of the woman or the fetus, it may be ethically acceptable for an obstetrician to perform a cesarean delivery without a woman's informed consent. However, this is a complex and sensitive ethical issue, and the decision should be made by the healthcare team in accordance with established ethical principles and guidelines.

The healthcare provider should make every effort to involve the woman's family members or other surrogates in the decision-making process and to document the reasons for the emergency procedure. Informed consent is a fundamental aspect of medical ethics and is meant to protect a patient's autonomy and right to make decisions about their own healthcare. By performing a cesarean delivery without a woman's informed consent, the healthcare provider is taking a significant step that may have lasting physical, emotional, and psychological consequences for the woman.

It is important to note that the principle of informed consent is an ongoing

process and not a one-time event. In emergency situations, the healthcare provider should make every effort to provide the woman and her family with appropriate information about the procedure and its risks and benefits as soon as possible after the event.”

#### Comment

Obtaining informed consent before a cesarean delivery is an essential element of perinatal ethics and is part of strengthening a woman’s autonomy. Almost always in clinical obstetrics, autonomy-based obligations to the pregnant woman and beneficence-based obligations to the maternal and fetal patients are synergistic. In very rare emergency situations (eg, correctly diagnosed placenta previa in labor) enforcing beneficence-based obligations override autonomy-based obligations. ChatGPT correctly identified the issues of informed consent and cesarean delivery. It provided a nuanced answer and balanced discussion of a controversial issue including the role of emergency cesarean delivery without informed consent.

ChatGPT correctly emphasized the importance of maternal capacity and legal issues.<sup>38–43</sup>

#### How should obstetricians and gynecologists screen for domestic abuse and intimate partner violence in pregnancy?

“Obstetricians and gynecologists play an important role in screening for domestic abuse and intimate partner violence (IPV) during pregnancy. Here are some general guidelines that they can follow to screen for domestic abuse and IPV:

1. Establish a trusting and non-judgmental relationship with the patient, so that they feel comfortable disclosing any concerns they may have about domestic abuse or IPV.
2. Use open-ended questions to encourage the patient to talk about their relationship and any potential signs of abuse or violence. Some examples of questions include:
  - ‘Do you feel safe at home?’
  - ‘Are you ever afraid of your partner?’

- ‘Has your partner ever hurt you physically or emotionally?’
  - ‘Are there any aspects of your relationship that worry you?’
3. Use standardized screening tools to assess for domestic abuse and IPV. Several validated screening tools are available, such as the Abuse Assessment Screen, the HITS (Hurt, Insult, Threaten, Scream) screening tool, or the Partner Violence Screen.
  4. Understand the signs and symptoms of domestic abuse and IPV, which may include physical injuries, emotional distress, and behavioral changes.
  5. Provide resources and support to patients who disclose domestic abuse or IPV, including referrals to local shelters, hotlines, or community services that can offer assistance.
  6. Document any concerns, disclosures, and screening results in the patient’s medical record, and follow up with the patient to monitor their safety and well-being.

Overall, screening for domestic abuse and IPV in pregnancy is an important part of prenatal care, as it can help identify women who may be at risk for harm and provide them with the support and resources they need to stay safe.”

#### Comment

This is an appropriate overview of an important question. ChatGPT answered the question of how an obstetrician-gynecologist should screen for IPV and listed several established tools and questions that obstetricians and gynecologists can use to help with IPV screening. It correctly listed steps to take when domestic abuse has been identified by healthcare providers. Although ChatGPT cannot assess which are the best tools, it listed many of the important ones.<sup>44–51</sup>

#### Should women freeze their eggs and at what age?

“The decision to freeze eggs is a personal one and should be made in consultation with a qualified healthcare professional and after careful consideration of the individual’s circumstances and goals.

In general, the American Society for Reproductive Medicine (ASRM) recommends that women consider egg freezing when they are younger, as the quality and quantity of a woman’s eggs decline with age. Women in their 20s and early 30s tend to have the highest success rates when using frozen eggs to achieve pregnancy.

However, there are many factors that can impact a woman’s decision to freeze her eggs, including her age, medical history, and family planning goals. Some women may choose to freeze their eggs earlier in life due to career or personal circumstances, while others may wait until later in life when they are ready to start a family.

Ultimately, the decision to freeze eggs is a personal one and should be made in consultation with a qualified healthcare professional who can take into account the individual’s specific needs and circumstances. This can help ensure that the woman receives the most accurate information and guidance and can make an informed decision about her reproductive health.”

#### Comment

ChatGPT appropriately characterized the personal nature of deciding to undergo oocyte cryopreservation and led with a statement that a “qualified healthcare professional” should be consulted. Interestingly, the model cited the ASRM in offering a very general statement about the optimal age to undergo this procedure.

The ASRM’s patient facing reproductive facts website notes, “...egg freezing typically works best for those in their 20s to early 30s...” consistent with ChatGPT’s answer. Impressively, the model’s response was further qualified by the various plausible factors that can influence a woman’s decision to freeze their eggs and a second warning to consult a healthcare professional.<sup>52–54</sup>

#### What are the risks and benefits of menopause hormone replacement therapy?

“Menopause hormone replacement therapy (HRT) is a treatment option for women who are experiencing symptoms

related to menopause, such as hot flashes, night sweats, and vaginal dryness. The therapy involves taking hormones (estrogen and/or progesterone) to replace the hormones that are no longer being produced by the ovaries.

#### Benefits:

1. Relief of menopausal symptoms: HRT can effectively alleviate the symptoms of menopause and improve quality of life for women.
2. Prevention of osteoporosis: HRT can help to prevent osteoporosis (a condition in which bones become weak and fragile) by maintaining bone density.
3. Reduced risk of colon cancer: HRT may reduce the risk of colon cancer.
4. Improved cardiovascular health: HRT may improve cardiovascular health by reducing the risk of heart disease.

#### Risks:

1. Increased risk of breast cancer: HRT has been linked to an increased risk of breast cancer.
2. Increased risk of stroke: HRT may increase the risk of stroke, particularly in women who smoke or have high blood pressure.
3. Increased risk of blood clots: HRT may increase the risk of blood clots, which can lead to serious health problems such as deep vein thrombosis and pulmonary embolism.
4. Increased risk of endometrial cancer: HRT may increase the risk of endometrial cancer in women who take only estrogen, without taking progesterone.

It is important to note that the risks and benefits of HRT vary depending on several factors, including age, health status, and individual risk factors. Women should discuss the risks and benefits of HRT with their healthcare provider, to determine if HRT is a suitable option for them.”

#### Comment

ChatGPT accurately identified the symptoms for which a women with menopause might initiate

HRT.<sup>55</sup> It provided an organized overview of the risks and benefits of treatment, however, ChatGPT did not state how the specifics of the route, dose, or combination of “estrogen and/or progesterone” might affect this. Assessing the accuracy of ChatGPT is not possible without this information. A few statements raise questions. A lower risk for coronary heart disease may only be true for estrogen-only HRT, whereas an increased risk for breast cancer was only seen in the combined estrogen and progesterone HRT population in the Women’s Health Initiative.<sup>56</sup> Of note, the model prompted consulting a provider to determine the suitability of HRT.

#### How do abortion bans in the United States affect women’s health and lives?

“Abortion bans in the United States have a significant impact on women’s health and lives. When abortion is illegal or highly restricted, women may be forced to seek unsafe, illegal abortions or carry unwanted pregnancies to term. Here are some ways that abortion bans can affect women:

1. Unsafe abortions: When abortion is illegal or difficult to access, some women may turn to unsafe, back-alley abortions, often performed by untrained individuals using unsafe methods. Unsafe abortions can cause serious health complications and even death.
2. Delayed care: When women are unable to access abortion services due to restrictive laws, they may delay seeking care, which can result in more complicated and costly procedures. In some cases, women may be unable to obtain an abortion at all, even if their health is at risk.
3. Economic impact: For low-income women, who are more likely to seek abortions, being unable to access abortion services can have a significant financial impact. They may be unable to afford travel to another state or pay for the procedure out of pocket.
4. Mental health: Being unable to access a desired abortion can have a negative impact on women’s mental health,

leading to depression, anxiety, and trauma.

5. Reproductive rights: Abortion bans limit women’s reproductive rights and autonomy, forcing them to carry unwanted pregnancies to term and denying them control over their own bodies.

Overall, abortion bans have serious consequences for women’s health, well-being, and reproductive rights. Access to safe, legal abortion services is essential for women’s health and the ability to make informed decisions about their own lives.”

#### Comment

This ChatGPT answer provided an appropriate concise summary of how abortion bans can have a significant impact on women’s health and lives. However, it is missing several important answers, such as how abortion bans affect cases of rape and cases with serious maternal medical issues. There is extensive literature that goes into extensive detail on factors such as the effect of delays in care, interference with medications, threats to privacy issues, genetic testing, confidentiality, and training in medical schools.<sup>57–61</sup>

#### Should complex hyperplasia atypia surgery only be performed by a Gyn oncologist?

“Complex hyperplasia with atypia is a type of abnormal growth in the uterus that can increase the risk of developing uterine cancer. In general, it is recommended that women with this condition receive care from a specialist with expertise in the diagnosis and treatment of gynecological cancers.

Gynecologic oncologists are medical specialists who have completed advanced training in the diagnosis and treatment of female reproductive cancers, including complex hyperplasia with atypia. They have extensive experience in complex surgical procedures, such as hysterectomies, and are well-equipped to handle any potential complications that may arise during the procedure.

While it may be possible for other types of gynecologists to perform the

surgery, it is generally considered best practice to consult with a gynecologic oncologist when complex hyperplasia with atypia is suspected or confirmed. This can help ensure that the patient receives the highest quality of care and the best possible outcome.

Ultimately, the decision on who should perform the surgery should be based on a discussion between the patient and her healthcare provider, taking into account the patient's individual circumstances and needs."

#### Comment

The clinical entity of complex atypical hyperplasia (CAH) can also be referred to as endometrial intraepithelial neoplasia (EIN) and it is accurately described here in plain terms as an "abnormal growth in the uterus."<sup>62</sup> Although recommendations for treatment approaches should be individualized, the consideration to receive care from a clinician experienced in gynecologic cancers is reasonable. In a show of the model's accessibility, the model accurately describes what a gynecologic oncologist is. The model impressively acknowledged that "other types of gynecologists" may be able to treat this condition, however, it jumps to the conclusion that surgery is necessarily indicated. A premenopausal patient seeking future fertility, for instance, may opt for medical therapy.<sup>63</sup> According to Shalowitz,<sup>64</sup> "Patients with atypical endometrial hyperplasia in the United States are commonly referred to a gynecologic oncologist, given a moderate risk of concurrent carcinoma." Chaiken<sup>65</sup> said that "... hysterectomy with a gynecologic oncologist for patients with EIN was associated with cost savings and increased quality-adjusted life years."

ChatGPT appropriately recommended that it is the best practice for these patients to consult a gynecologic oncologist.<sup>66–68</sup>

**Should we use the term "pregnant woman" or "pregnant person" or "pregnant patient" or "pregnant individual" or "birthing people" or "birthing individuals" and is it acceptable to continue using "pregnant woman"?**

"The terminology used to describe individuals who are pregnant and giving

birth can be a matter of personal preference and cultural context.

'Pregnant woman' is a commonly used term, but some individuals may prefer to use 'pregnant person' or 'pregnant individual' to avoid making assumptions about their gender identity. 'Pregnant patient' is a more medically specific term that can be used in a clinical context, but may not be the preferred terminology for all individuals.

'Birthing people' or 'birthing individuals' is another inclusive and gender-neutral term that can be used to describe individuals who are giving birth.

It is acceptable to continue using 'pregnant woman,' as it is a commonly used term and widely recognized. However, it is important to be mindful of and respect the language preferences of the individual. Health care providers should strive to create a welcoming and inclusive environment for all individuals, regardless of their gender identity, and use language that they feel comfortable with."

#### Comment

With the last question, we attempted to see how ChatGPT handles a complex human issue in the specialty. For a model that is nothing more than the product of its sources, ChatGPT provided a measured response. The authors agree with ChatGPT's assertion that the terminology used to describe individuals is a "matter of personal preference and cultural context." This response is all the more impressive given that ChatGPT is likely sourcing a significant amount of data that used outmoded and potentially offensive terminology. A PubMed search of the literature for 2022, for example, gathered 9789 references to "pregnant women," 759 references to "pregnant patients," 272 references to "pregnant people," and 80 references to "pregnant persons." Recognizing the lack of attention to this issue in the past, several leading organizations have recently made recommendations on how to use inclusive and gender-neutral language. The National Institutes of Health established a guide and stylebook for gender-neutral language and recommended that the use of binary language

that assumes that there are only 2 genders should be avoided.<sup>69</sup> The Centers for Disease Control and Prevention recommends to "...use terms that are inclusive of all gender identities such as 'pregnant person,' 'breastfeeding parent,' and 'lactating person' and has eliminated the use of 'pregnant woman' in their recent online publications,"<sup>70,71</sup> whereas the Royal College of Midwives stated "...we will always use women...,"<sup>72</sup> and the Royal College of Obstetrics and Gynecology (RCOG) said that they plan to preserve women-centered language.<sup>73</sup>

ChatGPT seemingly reflected these inclusive efforts in its response in this case. It is important to note, however, that answers will be subject to change over time and there will always be a possibility of harmful bias in its responses. We should remain vigilant in observing how the model handles sensitive topics such as this.

#### Conclusion

We believe that ChatGPT has the potential to be valuable to users who want preliminary information about virtually any topic in obstetrics and gynecology. Overall, its response to a wide range of questions about the specialty were nuanced, eloquent, informed, and had virtually no grammatical errors. This suggests that it may have a promising role to play in physician and patient education. It is important not to lose sight and to note that ChatGPT "lacks the ability to truly understand the complexity of human language and conversation."<sup>74</sup> Although its answers were often on target, it occasionally revealed an apparent lack of insight into the questions being asked. This means that when the algorithm does not work the way we would want it to, it has the potential to mislead.

It is also important to note that consistency in responses will always be an issue with models like ChatGPT. As OpenAI continues to update its training data and the model learns from user prompts, the same prompt may generate different answers over time and between different users. ChatGPT does not have the ability to reason. It will not understand when it conflicts with what it has

said in the past as a human might be able to do. This means variations in how ChatGPT responds can be consequential. An example would be asking the chatbot if a certain medication is safe for use during pregnancy. From the model's point of view, in general, both saying a medication is safe or not safe are highly probable responses given that it likely has many examples of both situations in its training data. As the model is updated or prompts are worded in different ways, similar queries may generate an appropriate response for one user and an inappropriate response for another.

OpenAI openly commented on the limitations of the model, acknowledging that "ChatGPT sometimes writes plausible sounding but incorrect or nonsensical answers and that it sometimes responds to harmful instructions or exhibits biased behavior."<sup>3</sup> Whether individuals heed these warnings remains a concern.

From a provider's perspective, initiatives to encourage responsible use will be important. There are concerns about plagiarism when using models like

ChatGPT for writing for medical journals.<sup>75</sup> It has the potential to help expedite the writing process—provided that authors check the accuracy of the text and references.<sup>75</sup> Journals such as the *Journal of the American Medical Association* recently implemented guidelines for their publications concerning the use of chatbots.<sup>8</sup> Healthcare professionals using ChatGPT who are unaware of its limitations could potentially harm patients. Users must be cognizant that ChatGPT sometimes writes incorrect answers.

Another significant drawback is that the data on which the model has been trained are not readily updated. The model assessed here does not reliably (if at all) source data after 2021. With an increasing number of papers being published each year, the current state of medical knowledge is continually evolving. Users of ChatGPT who expect data to be more up to date need to be aware of this drawback, although this is arguably not very different than consulting medical guidelines on professional websites. The American College of

Obstetricians and Gynecologists, for example, stated that, "The American College of Obstetricians and Gynecologists reviews its publications regularly; however, its publications may not reflect the most recent evidence."<sup>76</sup> Depending on what alternatives are being considered, ChatGPT's static training data may not be a big disadvantage.

From our initial experience that covered a limited range of subjects in obstetrics and gynecology, ChatGPT proved its potential to help users access clinically related information. For example, ChatGPT did well on a medical licensing examination.<sup>77</sup> We need to be aware that chatbots like these are a work in progress and users need to know their limitations. The model's performance will likely improve with more training. It is also possible that in the short term, updates and changes may produce worse answers for certain applications. In addition, new and competing models such as Google's recently announced Bard<sup>78</sup> may spur further innovations in this area. Enabling language models to cite sources would vastly augment its use in medicine. The authors believe that ChatGPT and the proposed new models to come have the possibility of adding a new dimension to our specialty.

Table shows a glossary of terms associated with AI as answered by ChatGPT. ■

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## TABLE

### Glossary of relevant chatbot terminology

Create a glossary of terms that defines relevant terminology for chatbots

"Here are some relevant terms related to chatbots and their definitions:

1. Chatbot: An artificial intelligence program designed to simulate conversation with human users, often used for customer service or information delivery.
2. Natural Language Processing: The ability of a computer program to understand human language as it is spoken, written or typed, and to interpret the meaning of words and phrases.
3. AI: The development of computer systems to perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.
4. Machine Learning: A subfield of AI that involves the development of algorithms that can learn from data and improve their performance over time without being explicitly programmed.
5. Response Time: The time it takes for a chatbot to reply to a user's message or query.
6. Intent Recognition: The ability of a chatbot to identify the purpose or intention of a user's message or query and provide an appropriate response.
7. Chat History: A record of past conversations or interactions between a user and a chatbot.
8. Application Programming Interface: A set of protocols and tools for building software applications, allowing different systems to communicate with each other and exchange information.
9. Entity Recognition: The ability of a chatbot to identify specific entities within a user's message or query, such as names, dates, locations, or products.
10. User Experience: The overall experience that a user has when interacting with a chatbot, including ease of use, speed, accuracy, and overall satisfaction."

AI, artificial intelligence.

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