EVALUATION OF THREE CONVERSATIONAL ARTIFICIAL INTELLIGENCE AGENTS IN DEFINING COMMON END-OF- LIFE TERMS.

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BACKGROUND

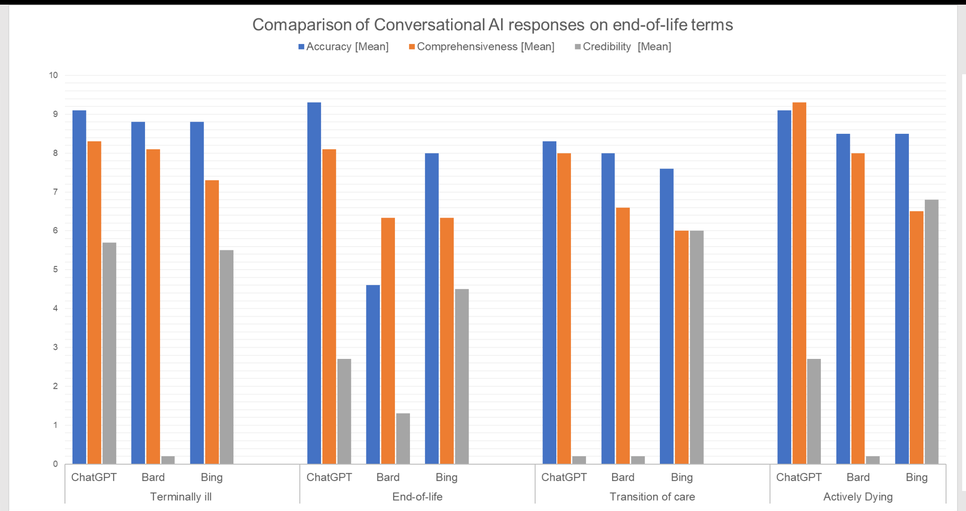
- Conversational-Artificial Intelligence applications are increasingly embedded in mainstream internet search engines and are sources of online health information.
- Conversational Artificial Intelligence is understudied in the context of End-of-Life Care and Palliative care.
- Precise terminology in End-of-Life care prevents misinformation and guides clinical decisions and interdisciplinary collaboration.
- Evaluation of Conversational Artificial Intelligence generated content in area of End-of-Life Care is essential.

AIM

To evaluate accuracy, comprehensiveness, credibility, and readability of chatbot generated definitions for key end-of-life terms: "terminally ill", "end of life", "transition of care", and "actively dying".

METHODS

- ChatGPT, Google's Bard, and Microsoft's Bing were evaluated on the ability to generate definitions for End-of-Life terms.
- Prompts: Each chatbot asked to define the four terms and provide three references.
- Evaluation: Six board-certified palliative physicians scored outputs (0-10) for:
  - Accuracy
  - Comprehensiveness
  - Credibility (references)
- Readability: Flesch-Kincaid Reading Ease (FRE) & Grade Level FKGL) were used to assess readability.
- Descriptive statistics summarized mean ± Standard Deviation scores.



Example of Conversational Artificial Intelligence Output for the term "Actively Dying"

Output #1: (ChatGPT)
Actively dying refers to the final stage of life when a person is approaching death, typically within days or hours. During this time, the body begins to shut down, and the person may experience physical, emotional, and spiritual changes. Signs of actively dying may include decreased consciousness, decreased appetite, difficulty breathing, changes in body temperature, and changes in skin color and appearance. It is important to note that actively dying is a natural part of the dying process and can be accompanied by a range of emotions and experiences. Supportive care, including pain management and emotional support, can help ease discomfort and improve quality of life for both the person who is dying and their loved ones.

1. Hospice Foundation of America. (2017). Understanding the Dying Process. Retrieved from https://hospicefoundation.org/Hospice-Care/Understanding-the-Dying-Process
2. National Institute on Aging. (2022). End-of-Life Care for People with Dementia. Retrieved from https://www.nia.nih.gov/health/end-life-care-people-dementia
3. American Cancer Society. (2021). Caregiving Near the End of Life. Retrieved from https://www.cancer.org/treatment/caregivers/caregiving-near-the-end-of-life.html

Output provides time interval, physical signs, psychological changes, and emphasizes multidisciplinary supportive care. Lacks relevant references.

Output #2: (Bard)
Actively dying is the final stage of life. It is a time when the body is shutting down and the person is nearing death. There is no specific definition of actively dying, but it is generally characterized by the following signs and symptoms:

- Loss of consciousness: The person may become unconscious or semi-conscious. Changes in breathing: The person's breathing may become irregular, shallow, or noisy. Changes in heart rate: The person's heart rate may slow down or become irregular. Changes in body temperature: The person's body temperature may drop or rise. Changes in skin color: The person's skin may become pale, mottled, or discolored. Loss of bowel and bladder control: The person may lose control of their bowel and bladder.
- Increased pain and discomfort: The person may experience increased pain and discomfort.

It is important to remember that everyone experiences actively dying differently. There is no right or wrong way to die. If you are caring for someone who is actively dying, it is important to be supportive and to provide comfort. You can do this by:

- Being present: The most important thing you can do for someone who is actively dying is to be present with them. This means being there physically and emotionally. Hold their hand, talk to them, and let them know that you are there for them. Providing comfort: There are many things you can do to provide comfort to someone who is actively dying. These include:
- Managing pain: Pain can be a major problem for people who are actively dying. There are many medications that can help to manage pain. If the person is in pain, talk to their doctor about what can be done to help.
- Providing fluids: It is important to make sure that someone who is actively dying is getting enough fluids. You can do this by offering them sips of water or juice, or by using a sponge to moisten their lips and mouth.
- Providing rest: It is important for someone who is actively dying to get as much rest as possible. Help them to find a comfortable position and to relax.
- Providing emotional support: It is important to provide emotional support to someone who is actively dying. This means listening to them, talking to them, and letting them know that you care.

If you are caring for someone who is actively dying, it is important to remember that you are not alone. There are many resources available to help you through this difficult time. You can talk to your doctor, a nurse, a social worker, or a religious leader. You can also find support groups for people who are caring for loved ones who are dying.
cars2bike.com/accident-trauma-ptsd-symptoms-and-how-to-get-emotional-help/

Output lacks specific time interval, does not mention supportive care. Irrelevant reference. .

Output #3: (Bing)
Actively dying is the last stage of life prior to passing away. It is considered the final few days. Patients who are actively dying experience various end-of-life signs and symptoms. These could include things such as a person in a coma with an unexplained drop in their heart rate and blood pressure.
1. [All American Hospice](https://myallamericanhospice.com/what-is-actively-dying-its-signs-and-stages/)
2. [National Center for Biotechnology information](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3870193/)
3.[ScienceDirect](https://www.sciencedirect.com/science/article/pii/S0885392413002431)

Output lacks time interval, physical changes. Provides incorrect example as that of person in coma. Incorrect references.

RESULTS

Accuracy (mean): ChatGPT 9.0, Bing 8.3, Bard 7.5.
Comprehensiveness: ChatGPT 8.5, Bard 7.3, Bing 6.5.
Credibility: Mean 3 ± 1.8; only 3/26 references peer-reviewed; many links fabricated or irrelevant.
Readability: FRE 41.7 ("difficult"), FKGL 14.1 (college level)—well above recommended 6th-grade level.
Common Issues:

- Missing key time frames & symptom details.
  Example inaccuracy: Bing equated coma with actively
- dying.
  Fabricated CDC webpage, off-topic PTSD article cited
- by Bard.

CONCLUSIONS

- Even "high" accuracy scores mask clinically important errors.
  Inconsistent comprehensiveness makes gaps hard for patients to detect.
- Poor reference quality undermines trust; chatbots may lack access to guidelines behind paywalls.
  Readability of chatbot outputs far exceeded health-literacy recommendations, limiting patient understanding.
- Current chatbots are NOT reliable standalone sources for EOL definitions—clinician oversight is essential.

CLINICAL AND RESEARCH IMPLICATIONS

- Verify chatbot outputs that patients use for health information.
- Verify chatbot outputs before sharing with patients.
- Incorporate expert review & open access to authoritative resources into AI training.
- Future studies: longitudinal monitoring as models evolve, focus on enhancing health literacy.