

LEARNING PROGRESS OF ARTIFICIAL INTELLIGENCE IN ANSWERING CLINICAL-PHARMACEUTICAL QUESTIONS

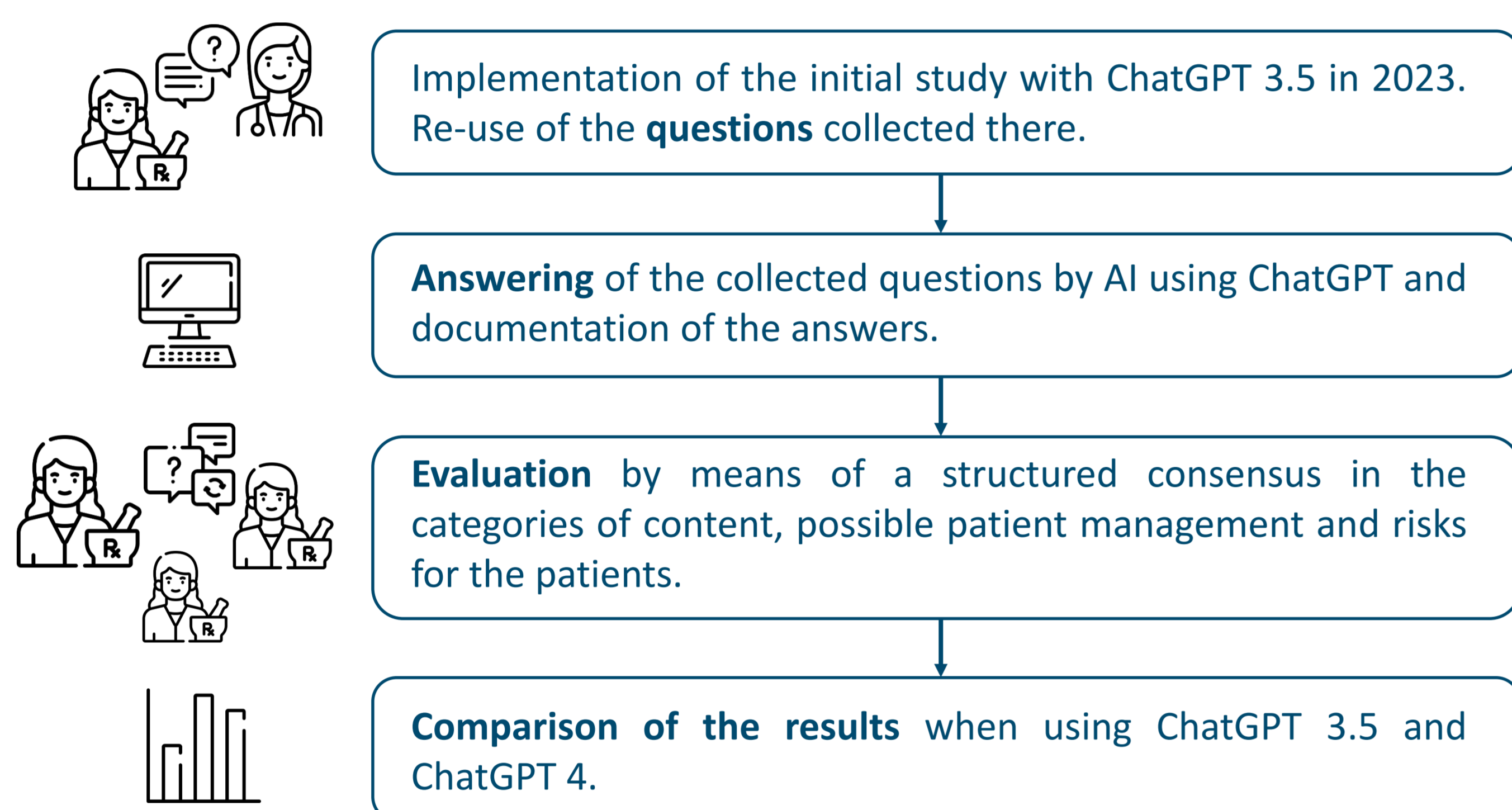
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Background / Aim and Objectives

Pharmaceutical drug information is an important and responsible field for pharmacists in hospitals in order to ensure safe and efficient drug therapy. Among other things, hospital pharmacists perform this task by advising doctors and nursing staff or accompanying ward rounds. This study investigates the possibility and safety of using Artificial Intelligence (AI)-based ChatGPT (Chat Generative Pre-Trained Transformer) as a supportive tool for answering clinical-pharmaceutical questions.

In order to investigate the performance of ChatGPT in drug information with regard to safety and risks, 50 clinical-pharmaceutical questions were answered using Artificial Intelligence and evaluated regarding content, possible patient management and risks for the patients. The study was conducted in January 2023 using ChatGPT 3.5 and repeated with the same questions in January 2024 using ChatGPT 4. This allowed the learning progress of the Artificial Intelligence to be assessed.

Materials & Methods



The study was carried out by pharmacists at the hospital pharmacy of Heidelberg University Hospital (tertiary care hospital, >2000 beds).

Evaluation Criteria:

Content: complete and correct, incomplete, incorrect
Patient management: possible, insufficient, impossible
Risks for the patient: no risk, minor risk, high risk



Fig. 1: Investigation process

Results

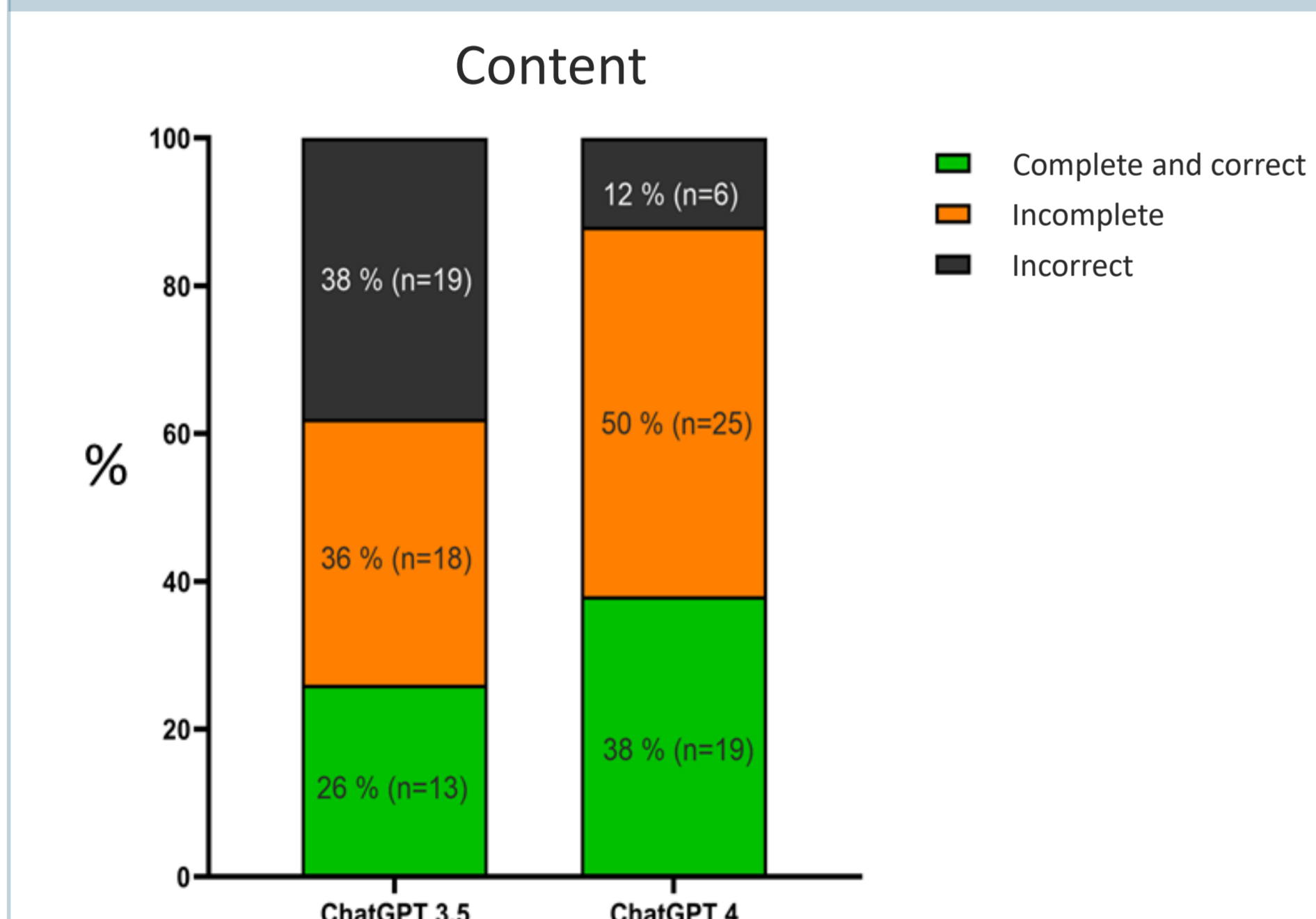


Fig. 2: Answer quality regarding content

In terms of complete and correct content, the answer quality of ChatGPT 4 improved compared to the previous version. The new version answered more questions correctly (n= 19 to n= 13) and significantly fewer questions incorrectly (n= 6 to n= 19).

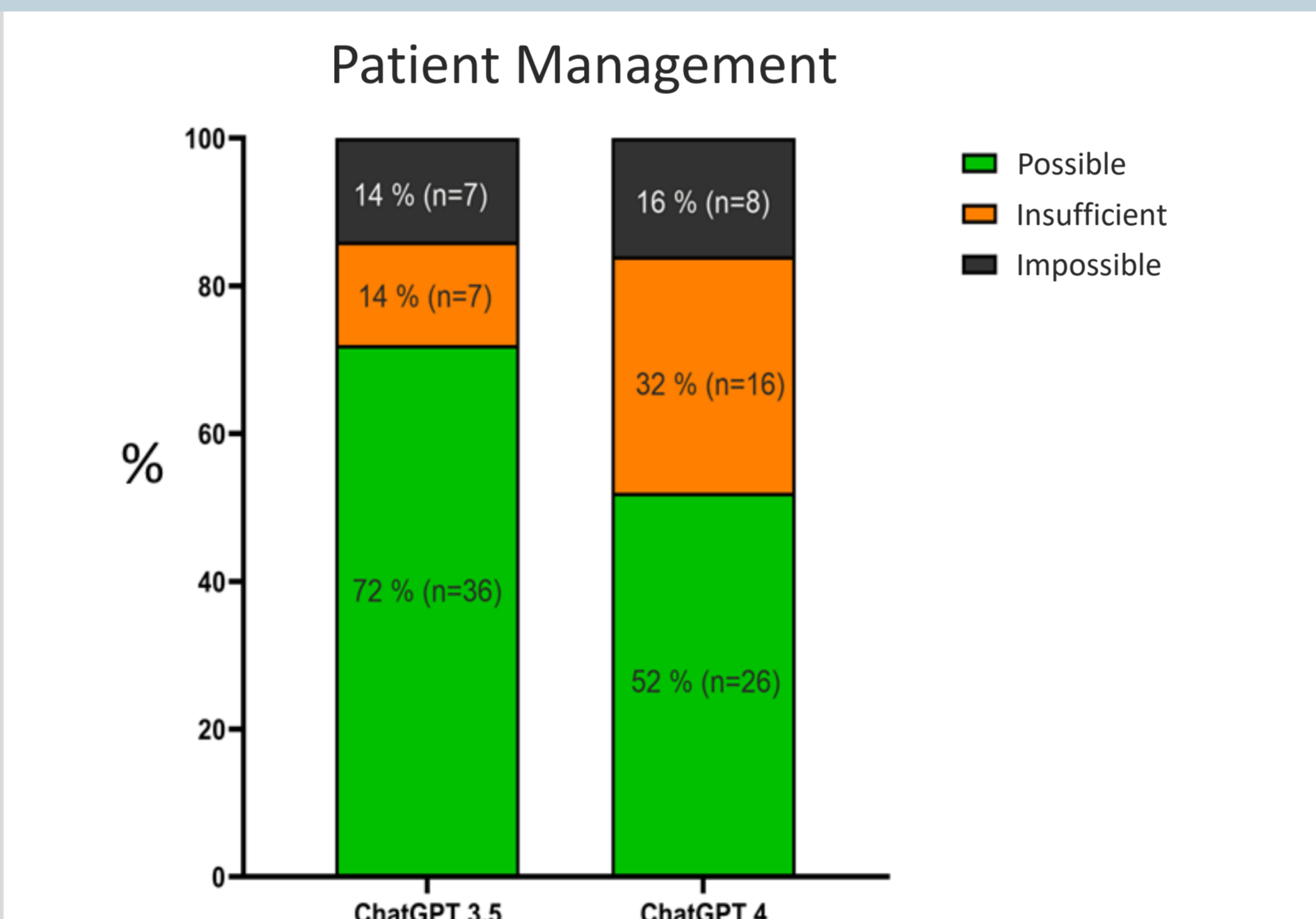


Fig. 3: Answer quality regarding patient management

The number of questions for which patient management would be possible decreased. With ChatGPT 3.5, 72 % of the answers were possible and 14 % were impossible. When answering the questions with version 4, management was possible in 52 % of the cases and impossible in 16 %.

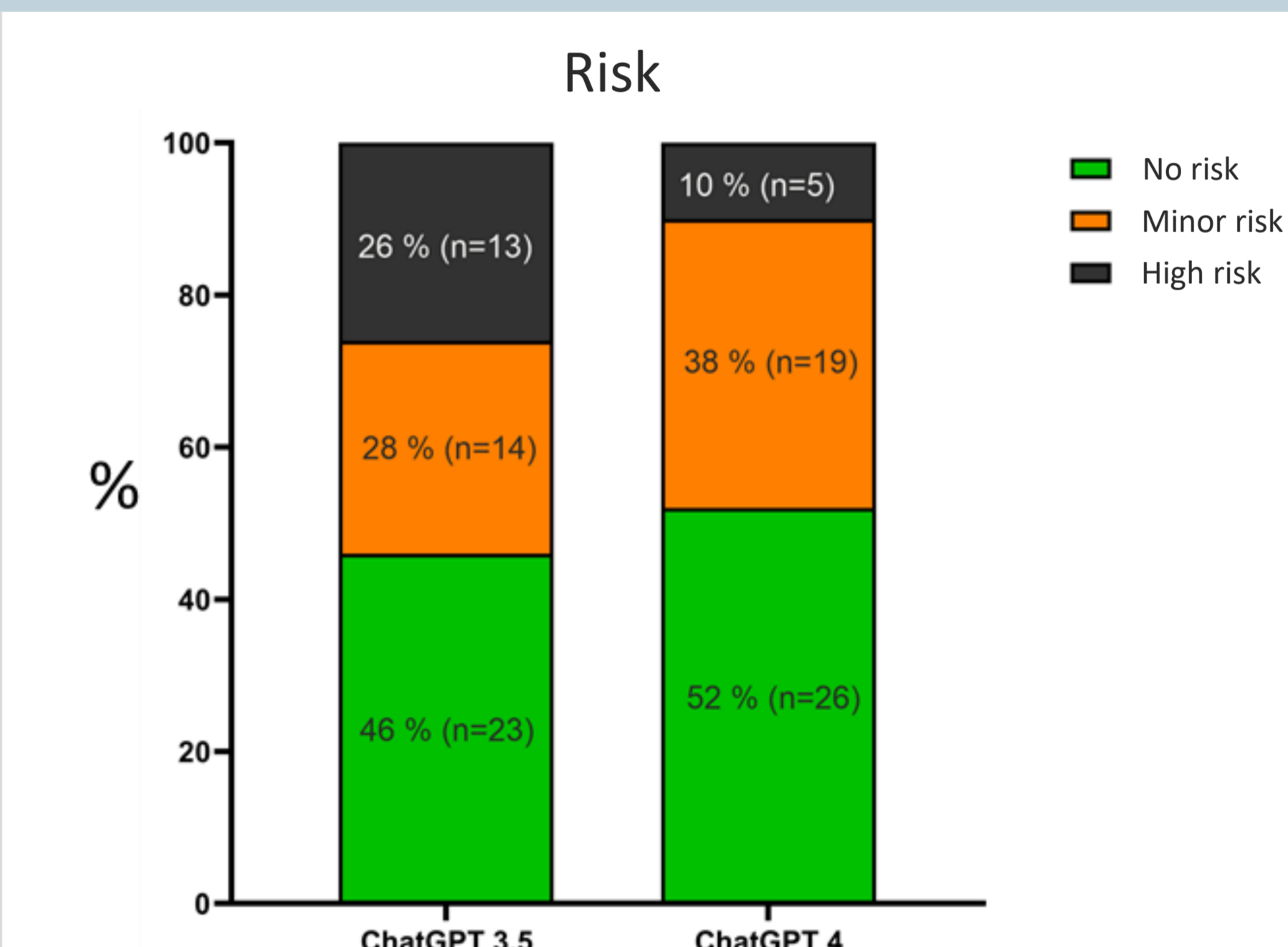


Fig. 4: Answer quality regarding risks for the patients

Lower risk of patient harm for the new version: when using ChatGPT 4, the risk was high in 10 % of the cases and there was no risk in 52 % of the cases, compared to 26 % (high risk) and 46 % (no risk) for the previous version.



Average number of words per answer:

ChatGPT 3.5: 112,6; σ : 40,05
ChatGPT 4: 217,6; σ : 78,21



Referenced answers:

ChatGPT 3.5: 0 % (n= 0)
ChatGPT 4: 8 % (n= 4)



Content complete and correct, possible management and no risk :

ChatGPT 3.5: 26 % (n= 13)
ChatGPT 4: 36 % (n= 18)



Incorrect content, possible management and high risk:

ChatGPT 3.5: 22 % (n= 11)
ChatGPT 4: 6 % (n= 3)

Conclusion

ChatGPT 4 answered more questions correctly and reliably in the content and risk categories. However, contrary to expectations, patient management was impossible more often than with the previous version. This was mainly due to the detailed but often unspecific answers. The amount of questions that led to a high patient risk due to incorrect content but possible management was decreased significantly with ChatGPT 4.

The results show that AI improves continuously and could therefore be used as a helpful and supportive tool in pharmaceutical drug information. However, the careless use of ChatGPT harbors risks, not least due to the lack of valid sources in most of the responses. Qualified review and assessment by pharmaceutical professionals is still required to ensure the safe use of AI.

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References:

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