

APPLICATION OF ARTIFICIAL INTELLIGENCE IN SYMPTOM MONITORING IN ADULT CANCER SURVIVORSHIP: A SYSTEMATIC REVIEW

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Background:

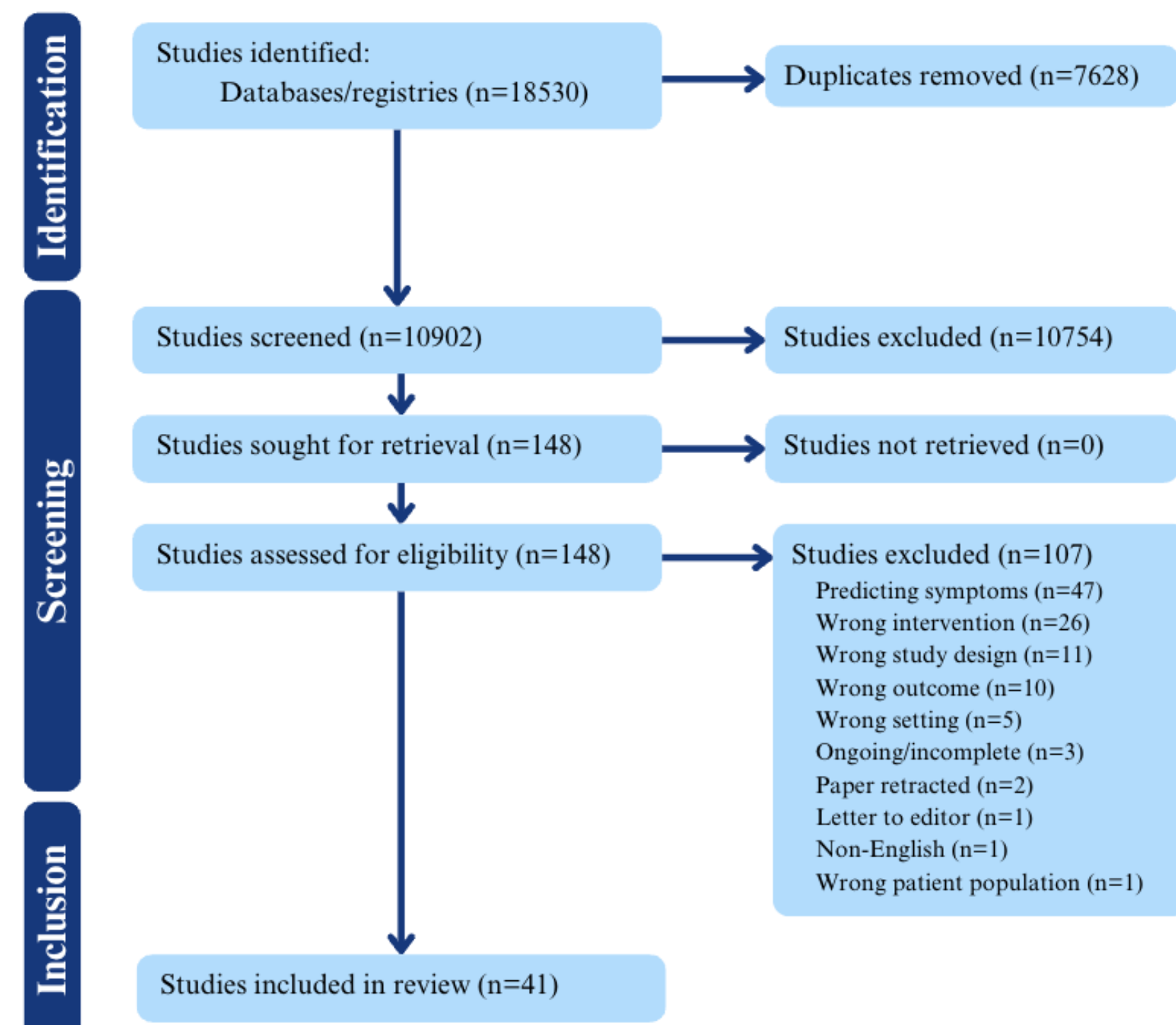
- It is expected that 38% of women and 44% of men will experience a cancer diagnosis at some point in their lives.
- Artificial Intelligence (AI) in healthcare may afford new avenues for the provision of personalized and patient-centred care.

Aim: to establish the state of science in terms of AI integration for symptom monitoring within the adult cancer survivorship trajectory.

Methods:

- A comprehensive search was done from 2013 to November 2023.
- Studies were included that reported the use of AI for symptom monitoring in adult cancer studies.

Figure 1. PRISMA chart



Conclusions

Findings suggest that AI has a promising potential to enhance symptom monitoring in diverse cancer settings by incorporating various data sources such as patient text, patient-reported outcomes, and physiological measurements.

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Results/Graphs/Data:

Most studies were published between 2021 and 2023 and the median sample size was 617.1, SD = 1401.4. **Study design:** Cohort designs (80.5%), cross-sectional designs (12.2%), randomized controlled trial (7.3%) **Most evaluated cancer types:** multiple tumor types* (31.7%), breast cancer (26.8%), Gastrointestinal cancers (9.8%), Various metastatic cancers (9.8%) **Outcome measure:** Pain (34.2%), quality of life (28.3%), fatigue (17.1%), nausea (17.1%)

Table 1. Application of AI in symptom monitoring

AI Models	Description	Studies	Symptoms or Domains Examined
Machine Learning Algorithms (n=18, 43%)	Using algorithmic approaches, trained on datasets, to develop models that may be used for prediction of specific outcomes and occurrences	Baker, L. (2021); Cilla, S. (2023); Horesh, D. (2022); Fu, M.R. (2018); Karademas, E.C. (2023); Kourou, K. (2021); Ni, R. (2022); Ranasinghe, W. (2018); Rossi, L.A. (2021); Saednia, K. (2020); Moscato, S. (2022); Shimada, K. (2023); Sipila, R. (2020); Ueno, T. (2022); Vallance, J.K. (2023); Van Dyk, K. (2022); Yashayeva, A. (2023); Chen, L. (2021)	Symptom documentation like depression, radiotherapy skin toxicity
Natural Language Processing (n=12, 29.3%)	Processes and model text or speech corpora, to facilitate categorization and outcome/ occurrence prediction	Aramaki, E. (2019); De Queiroz, D. (2023); Gries, K.S. (2020); Gupta, S. (2021); Heintzelman, N.H. (2013); Naseri H. (2021); Banerjee, I. (2018); Ismail, N.H. (2020); Leung, Y. (2023); DiMartino, L. (2022); Mashima, Y. (2022); Nishioka, S. (2022)	Analyzing patient-reported symptoms, clinical notes, documentation of pain
Decision Support Tools (n=4, 9.8%)	Processes and models information from multiple sources/inputs and provides output that facilitates informed decision making for all stakeholders	Mosa, A.S.M. (2021); Ranjan, R. (2021); Floricel, C. (2022); Zini, E.M. (2019)	Symptom monitoring/ grading, patient education
AI-driven Chatbots (n=7, 17.1%)	Broadly, these are models that allow people to communicate with it in a conversational manner	Gordon, B. (2023); Caru, M. (2023); Katoka, Y. (2021); Schmitz, K. (2023); Tawfik, E. (2023); Tzelios, C. (2022); Wu, D. (2023)	Patient engagement, symptom tracking in one study

Future Directions for Research:

1. Delve into **end-user experiences and the cost-effectiveness.**
2. Use of **randomized controlled trials.**
3. **Standardization** of outcome measurement across studies
4. Invest in **infrastructure and technology.**