Co-design of an AI-based decision support tool for arm lymphedema risk prediction and management in breast cancer patients

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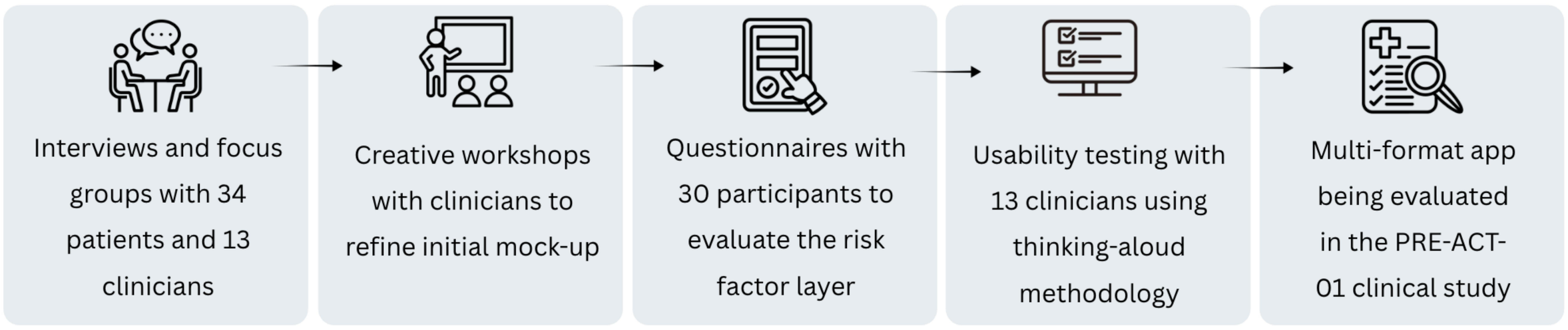
Background

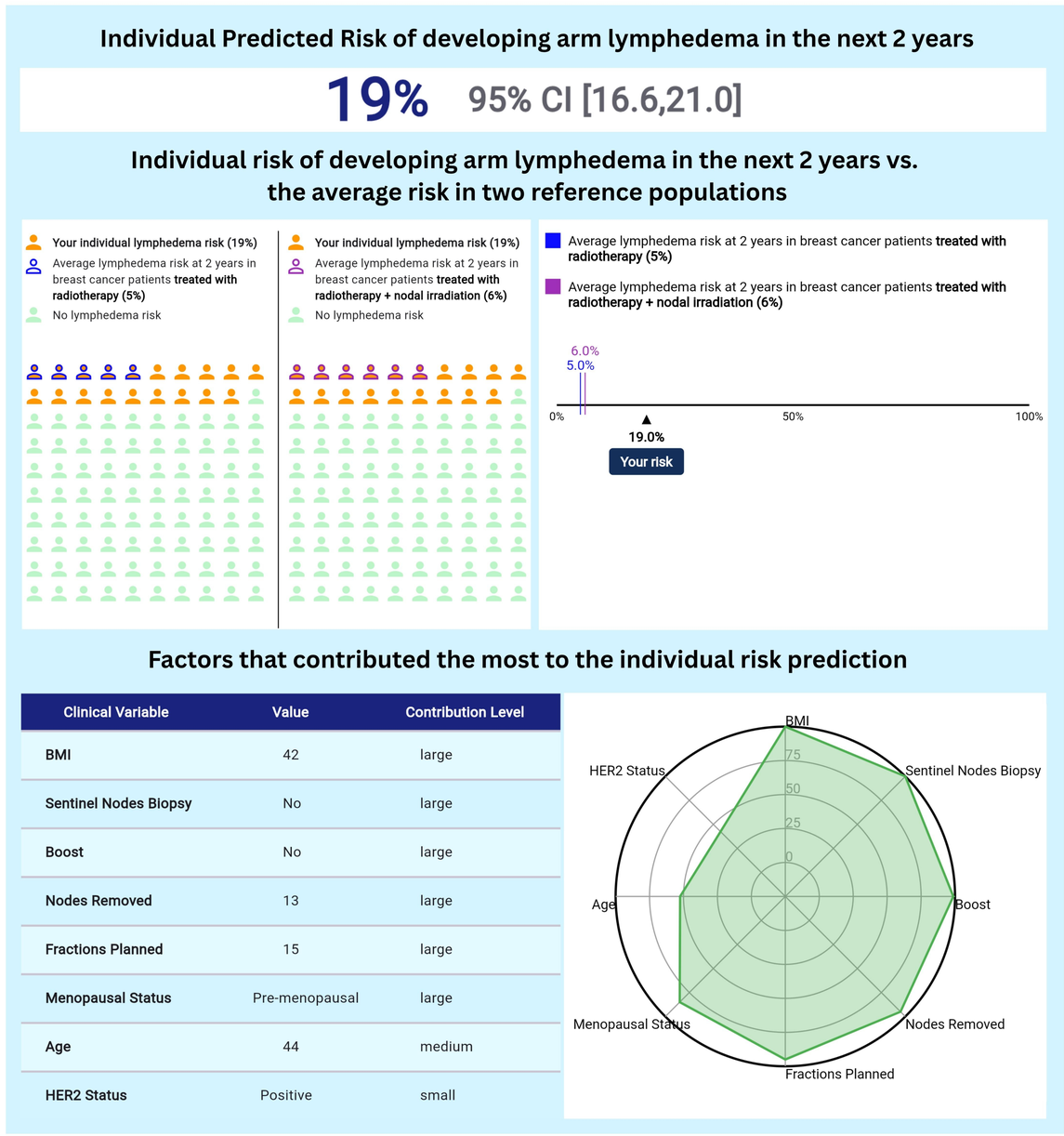
- **Co-design of an application** for clinicians and breast cancer patients to communicate AI-predicted arm lymphedema risk following regional nodal irradiation.
- The app is currently being **evaluated in the PRE-ACT-01 clinical study** to assess its impact on shared decision-making during radiotherapy treatment planning.

Methods



Results

- **Multimodal Risk Display:** Individual lymphedema risk is shown via percentages, linear charts, and icon arrays to cater diverse user needs.
- **Comparative Visuals:** Two graphics compare individual risk against two reference populations used in model training.
- **Explainability Layer:** Key factors contributing to the risk prediction are visualized in a table and a radar chart.
- **Informative Materials:** Tailored recommendations and guidance support for lymphedema prevention and daily management.
- **Model Transparency:** Direct access to raw outputs, training processes, and datasets provides the depth clinicians need during consultations, ensuring full model explainability.



Factors that contributed the most to the individual risk prediction

Clinical Variable	Value	Contribution Level
BMI	42	large
Sentinel Nodes Biopsy	No	large
Boost	No	large
Nodes Removed	13	large
Fractions Planned	15	large
Menopausal Status	Pre-menopausal	large
Age	44	medium
HER2 Status	Positive	small

Conclusions

Co-designed with patients and clinicians, the PRE-ACT application communicates AI-predicted arm lymphedema risk following regional nodal irradiation. It addresses diverse user needs through multi-format risk displays, key factor visualizations, and full technical transparency. The app addresses the clinical need to make an informed shared decision for radiotherapy treatment of breast cancer. The app is currently validated in the PRE-ACT-01 clinical study.

***Acknowledgments**: This work was conducted within the Horizon Europe project PRE-ACT and funded by the European Commission (Grant 101057746), the Swiss SERI (Contract 22 00058), and the UK government (Innovate UK 10061955). We thank the collaborating patient associations: Breast Cancer Now, Association Ruban Rose, Vivre Comme Avant, Patients en Réseau, and Borstkanker Vereniging Nederland.*

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