

Home-monitoring of late effects after breast cancer to enable early detection

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BACKGROUND

Problem

- Number of cancer survivors increasing
- >90% breast cancer patients experience late effects
- Late effects highly negative impact on QoL, social/work participation and society
- Despite scheduled visits, high unmet needs

Solution treatment through early limely ____ surveillance can reduce the burden and prevent worsening. eHealth and monitoring have great potential here. Aim of this study was to identify possibilities for non-invasive home-monitoring of late effects after breast cancer.

METHODS

Based on a literature review (PubMed, Google Scholar, Scopus) and the study of de Ligt et al.¹, an made for effects per late overview was physiological subsystem. Factors included were monitoring options, symptoms, prevalence, behavior over time, prevention and treatment options, and risk factors. An oncologist was interviewed to determine benefit of early detection.

Overview of late effects

Late effects that benefit from early detection

> Late effects that can be monitored

Late effects that can be monitored in the home setting

¹ 1 de Ligt, K., Heins, M., Verloop, J., Smorenburg, C. H., Korevaar, J. C., & Siesling, S. (2019). Patient-reported health problems and healthcare use after treatment for early-stage breast cancer. The Breast, 46, 4-11.

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RESULTS



the 11 physiological subsystems, main For categories (figure below) and their specific complaints (not shown) were identified.

Breast area:

syndrome

Psychological:

- Post-traumatic stress disorder
- General anxiety disorder
- Cognitive impairment
- Insomnia
- Depression
- Fear of recurrence

Fatigue/stamina:

- Fatigue
- Lack of stamina

Respiratory tract,

- pulmonary toxicity:
- Pneumonitis (ILD)
- Fibrosis (ILD)
- Acute Respiratory Distress Syndrome (ARDS)

Gastro-intestinal tract

- Injury of intestines (enteritis/colitis)
- Nausea/vomiting
- Diarrhea
- Hepatoxicity
- Oral mucositis
- Dermatological: • Skin/nail problems
- Alopecia

Reproductive system: Menopausal symptoms Fertility problems Sexual dysfunction

Possibilities for monitoring include measuring the respiratory rate, mean arterial blood pressure, circulatory information and ECG data using wearables, and behavioral markers through mobile phone use and self-reporting.

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 Changes of the breast Post-mastectomy pain

Nervous system:

- Peripheral - Peripheral neuropathy - Plexopathy
- Central
- Encephalopathy
- Cerebrovascular disease
- Cerebellar dysfunction
- Spinal cord syndromes

Cardiac tract, cardiotoxicity: Palpitations

- Chest pain
- Left ventricular disfunction. heart failure
- Myocardial
- ischemia/infarction
- Hypertension
- Bradycardia

Musculoskeletal system: Myalgia

- Rotator cuff tendonitis
- Frozen shoulder
- Osteoporosis
- Lymphedema
- Arthralgia

Reno-urinary tract:

- Nephrotoxicity
- Urine infection
- Incontinence

Two promising examples for home-monitoring are cardiotoxicity and depression:

CARDIOTOXICITY

- cardiovascular risks.
- palpitations and shortness of breath).

DEPRESSION

- Relevance: depression complicating cancer, of mental disorders.
- using a smart phone or watch

CONCLUSIONS

TECHNED

CENTRE

We identified possibilities for monitoring and early detection of late effects after breast cancer. This overview can be used to prioritize research for prediction of late effects, after which high-risk patients could be selected for home-monitoring. Future should explore integration of digital research biomarkers in monitoring, providing innovative solutions for personalized survivorship care.

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• *Relevance*: Chemotherapeutic agents, including anthracyclines and targeted therapies can lead to cardiotoxicity. Similarly, radiation therapy poses

• Monitoring: self-reporting (e.g., chest pain and fluid retention) and unobtrusive monitoring (e.g.,

frequently accompanies management. clinical Prevalence estimated to be between 10-20% and is likely to be underestimated due to under detection K

• Monitoring: self-reporting and digital phenotyping



