

THE IMPACT OF ENHANCED ACCESS TO MODERN ANTINEOPLASTIC DRUGS FOR BREAST CANCER TREATMENT ON MORTALITY AND ECONOMIC DEVELOPMEN

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BACKGROUND

- In 2019 Russia launched Federal project «Cancer Control». Its main objective is to reduce cancer mortality from **202.0** to **195.1** cases per 100 000 people from 2018 by 2024.
- Over **13.3 billion US dollars** have been designated for the Project, with the allocation of **10.4 billion US dollars** dedicated to delivering contemporary medical care to cancer patients based on modern clinical guidelines. The dominant utilization of this funding is for the acquisition of antineoplastic drugs.

OBJECTIVES

- The aim of this work was to assess impact of using modern antineoplastic drugs indicated for treatment of breast cancer (BC) on cancer mortality in Russia during 2019 - 2024.

METHODS

- Using clinical guidelines as our reference, we identified high-cost drugs approved for BC treatment in Russia that have demonstrated overall survival benefits compared to standard of care in randomized clinical trials, indirect comparisons, real-world evidence, or other reliable sources.
- The following innovative antineoplastic drugs and indications were considered (Table 1):

| Drug | Indication | Considered standard of care | Source of overall survival data |
|--------------------------------------|--|-----------------------------|--|
| Trastuzumab | HER2+ adjuvant therapy | Observation | HERA ¹ |
| Trastuzumab + CT | | CT | Slamon, D. J., et al, 2001 ² |
| Pertuzumab + Trastuzumab + Docetaxel | HER2+ mBC | Trastuzumab + Docetaxel | CLEOPATRA ³ |
| Ribociclib + Letrozole | | Letrozole | MONALEESA-2 ⁴ |
| Palbociclib + Letrozole | HR+ HER2- mBC | Letrozole | Considered equal to Palbociclib + Letrozole ⁵ |
| Abemaciclib + Letrozole | | Letrozole | MONARCH 3 ⁶ |
| Ribociclib + Fulvestrant | | Fulvestrant | MONALEESA-3 ⁷ |
| Palbociclib + Fulvestrant | | Fulvestrant | Considered equal to Palbociclib + Fulvestrant ⁸ |
| Abemaciclib + Fulvestrant | | Fulvestrant | |
| | | Fulvestrant | |
| Eribulin | Previously treated with an anthracycline and a taxane mBC | TPC/CAP | Twelves, C., et al, 2014 ⁹ |
| Trastuzumab emtansine | HER2+ locally advanced or mBC previously treated with a taxane and trastuzumab | Lapatinib + Capecitabine | EMILIA ¹⁰ |

Note: CT – chemotherapy; mBC – metastatic BC; TPC – treatment of physician’s choice; CAP – capecitabine.

Table 1. Considered drugs and indications.

- By examining the drug procurement data from 2018 to 2021, we made an estimate of the patient count that received these medicines. Procurements were assumed to remain constant from 2021 until 2024.
- Then, we calculated the potential reduction in the number of deaths in 2019 - 2024 due to enhanced access to new drugs, compared to 2018, and their overall survival benefits, compared to the standard of care (see Figure 1):
 - For instance, if 5,102 more patients were to receive innovative therapy, 127 deaths could be prevented in the first year.
 - By the end of the second year 4,282 patients would still be alive in the innovative drug group, resulting in 476 deaths during that year. In the current practice group, there would be 4,081 surviving patients, with 550 deaths in the second year. Consequently, the innovative drug cohort would experience 74 fewer deaths. However, a new cohort would start treatment in the second year, and an additional 127 deaths would be prevented if they were treated with the innovative drug. Thus, the cumulative impact in the second year would be 201 prevented deaths.
 - This estimation was conducted for each annual cohort of patients receiving innovative drugs instead of standard of care during 2019 – 2024.

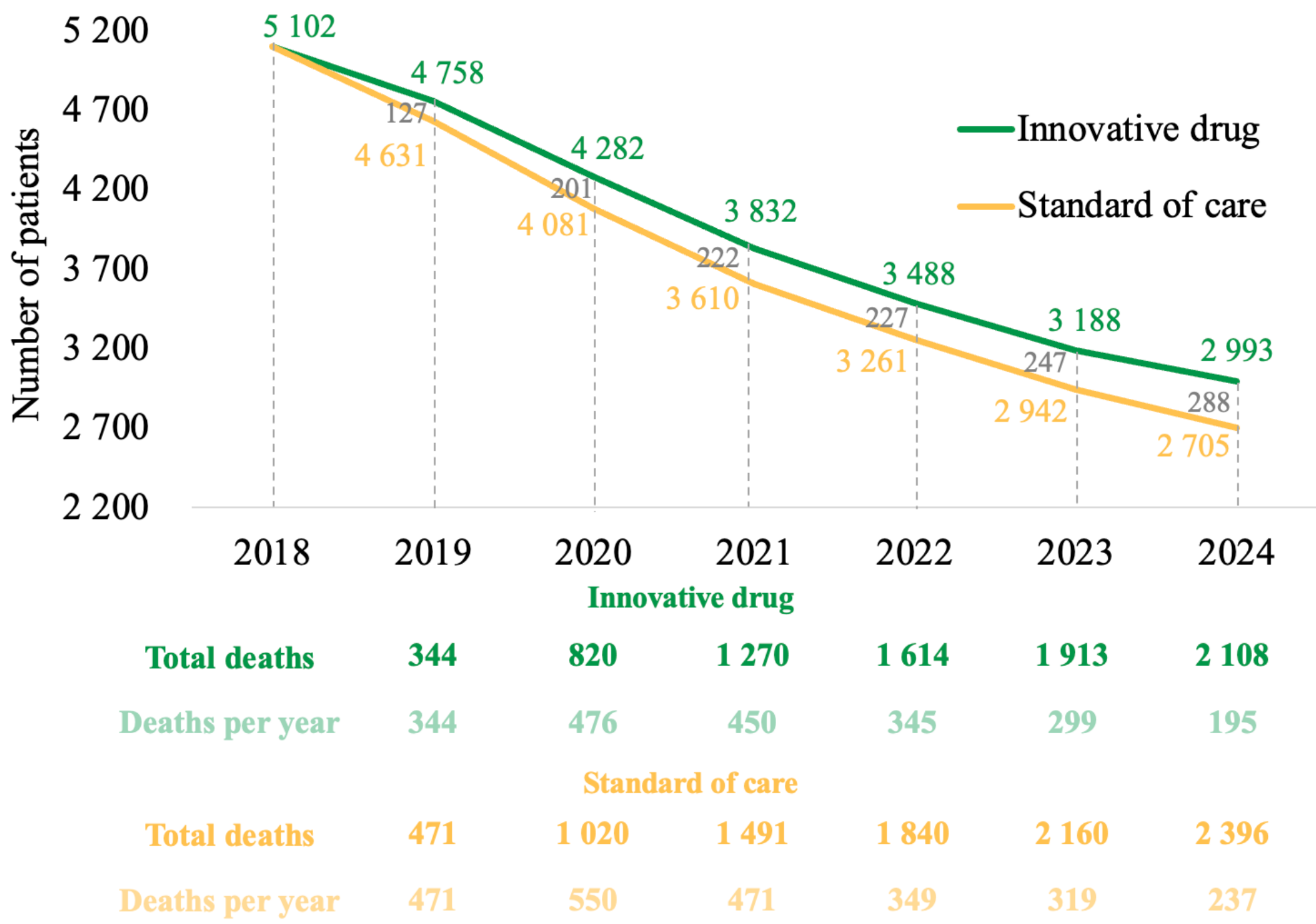


Figure 1. Estimation of avoided deaths due to the use of innovative drug (example for 2019 cohort)

- We also assessed economic impact of using innovative drugs versus standard of care. Additional medication costs and GDP growth due to prevented deaths during 2019 – 2024 were considered. Economic impact was evaluated using human capital theory, incorporating data on age and gender employment distribution in Russia.

RESULTS

- Since the launch of the Federal project, overall number of patients provided with the considered innovative drugs, increased from **9,149 people** in 2018 to **15,828 people** in 2019, **18,195 people** in 2020, and **17,081 people** in 2021.

- Considering only the specific indications analyzed in our study, the coverage increased from **5,910 individuals** in 2018 to **13,791 individuals** in 2021 (Table 2 and Figure 2).

| Indication | Drug | 2018 | Increase from 2018 up to | | |
|--|--------------------------------------|-------|--------------------------|--------|--------|
| | | | 2019 | 2020 | 2021 |
| HR+ HER2+ BC | Palbociclib + Fulvestrant | 111 | +458 | +1 145 | +1 923 |
| | Ribociclib + Letrozole | 9 | +280 | +769 | +1 253 |
| | Palbociclib + Letrozole | 59 | +242 | +606 | +1 018 |
| | Ribociclib + Fulvestrant | 6 | +181 | +497 | +809 |
| | Abemaciclib + Letrozole | - | - | - | +228 |
| | Abemaciclib + Fulvestrant | - | - | - | +142 |
| HER2+ mBC | Pertuzumab + Trastuzumab + Docetaxel | 146 | +470 | +682 | +925 |
| | Trastuzumab + CT | 264 | +146 | +150 | +31 |
| Adjuvant therapy of HER2+ BC | Trastuzumab | 4 860 | +2 690 | +2 769 | +572 |
| Previously treated with an anthracycline and a taxane mBC | Eribulin | 368 | +444 | +424 | +498 |
| HER2+ locally advanced or mBC previously treated with a taxane and trastuzumab | Trastuzumab emtansine | 87 | +190 | +368 | +483 |
| Total | | 5 910 | +5 102 | +7 411 | +7 882 |

Table 2. Increase of innovative drugs coverage in considered indications due to the implementation of the Federal Project, number of people.

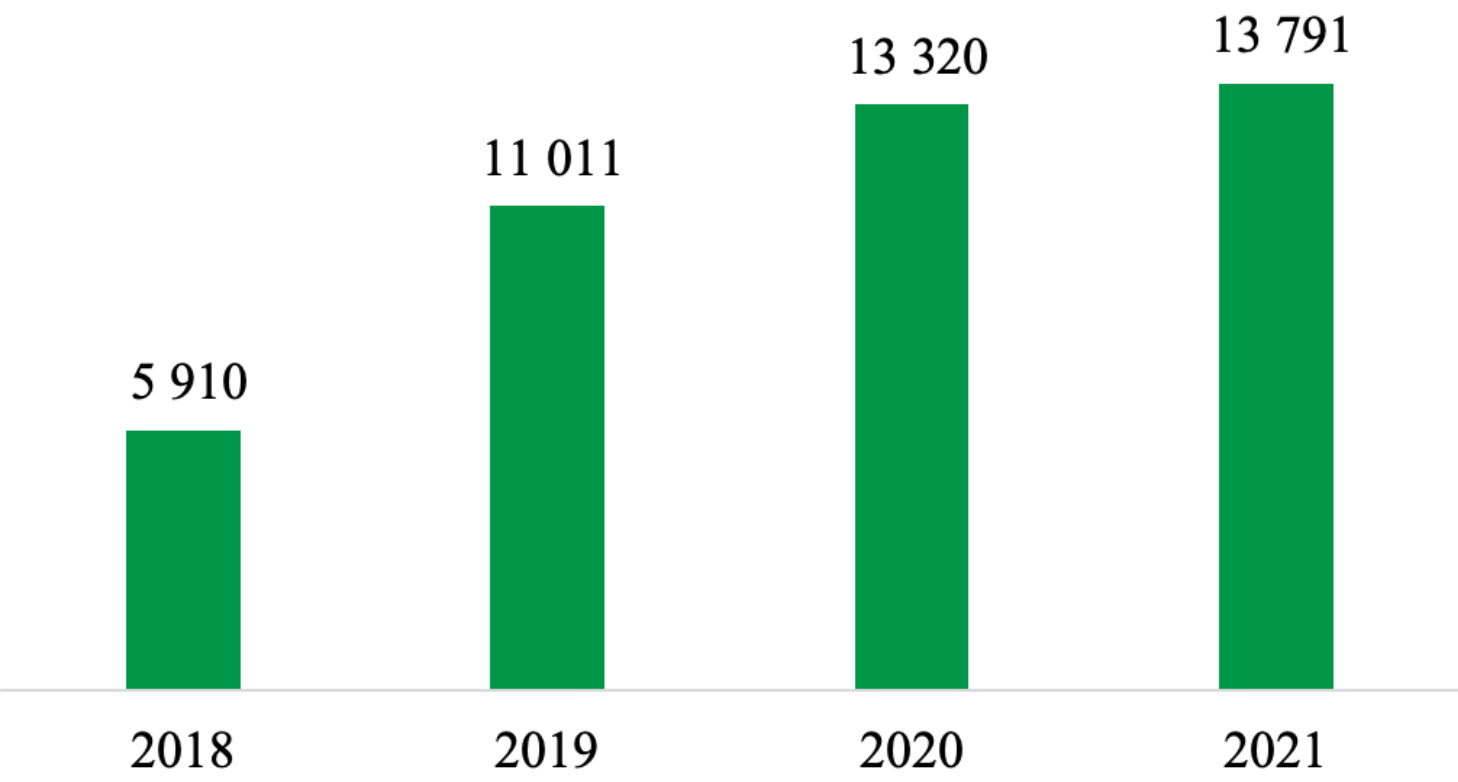


Figure 2. Total innovative drugs coverage in considered indications due to the implementation of the Federal Project, number of people.

- Total number of prevented deaths amounts to **2,459 cases**, including 724 deaths for the period of 2019-2021, 467 deaths in 2022, 582 deaths in 2023 and 687 in 2024. This is a 3% reduction in mortality from BC, compared to the baseline level of 2018.
- Among the considered innovative drugs, combinations of **palbociclib + fulvestrant** (for HR+ HER2- BC) and **pertuzumab + trastuzumab + docetaxel** (for HER2+ mBC) contribute the most to the mortality reduction (Table 3).
 - This can be attributed to a significant **advantage in overall survival** compared to standard therapy, as well as the **substantial increase in number of patients** who start therapy with these drugs.

| Indication | Drug | Prevented mortality | |
|--|--------------------------------------|---------------------|-------------------------------|
| | | From BC | Incl. patients of working age |
| HR+ HER2- BC | Palbociclib + Fulvestrant | 663 | 40 |
| | Ribociclib + Fulvestrant | 279 | 17 |
| | Ribociclib + Letrozole | 250 | 15 |
| | Palbociclib + Letrozole | 203 | 12 |
| | Abemaciclib + Fulvestrant | 38 | 2 |
| | Abemaciclib + Letrozole | 16 | 1 |
| HER2+ mBC | Pertuzumab + Trastuzumab + Docetaxel | 552 | 33 |
| | Trastuzumab + CT | 16 | 1 |
| HER2+ locally advanced or mBC previously treated with a taxane and trastuzumab | Trastuzumab emtansine | 203 | 12 |
| Adjuvant therapy of HER2+ BC | Trastuzumab | 165 | 10 |
| Previously treated with an anthracycline and a taxane mBC | Eribulin | 74 | 4 |
| Total | | 2 459 | 149 |

Table 3. Prevented mortality for the period 2019-2024, number of deaths.

- Reduction in BC mortality could potentially lead to a GDP increase of **\$11 million** from 2019 to 2024, with additional estimated expenditures of **\$1.4 billion** for drug procurements.
 - This relatively modest increase in GDP growth can be attributed to the lower employment rates among older women, who are primarily affected by BC-related mortality.

CONCLUSIONS

- Expanding the availability of modern drugs for BC treatment reduces cancer mortality.
- However, GDP increase resulting from this improvement is much lower than the additional expenses required for drug procurements.

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