

The breast-conserving surgery of women with breast cancer in Podlaskie Voivodeship (Poland). Population study

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Abstract

Introduction. The results of breast cancer treatment depend mainly on better detection in mammography screening and, consequently, a higher proportion of women with early stage of the disease. They depend also on a better access to health care services and the effectiveness of oncological treatment. One of the methods of breast cancer control is a breast-conserving surgery. With a proper patients' classification for the treatment, the results of the breast-conserving surgery do not differ in relation to mastectomy. That's why, the availability of breast-conserving surgical methods is particularly important, especially in a population in which a population screening is conducted.

Objective. The analysis of the selected aspects of the breast cancer treatment's standard in Podlaskie Voivodeship.

Patients and methods. In years 2001–2002, 709 cases of women with breast cancer were reported to the Voivodeship Cancer Registry in Białystok. 659 women were diagnosed with a primary invasive breast cancer. Based on a cohort of 499 women treated with radical methods the following indicators, recommended by WHO for the evaluation of the breast-conserving surgery's availability, were calculated: a percentage of patients with whom breast-conserving surgery was used, a proportion of breast cancer cases receiving post-operative breast radiotherapy after breast-conserving surgery and a proportion of breast-conserving surgery in pT1 cases.

Results. The breast-conserving surgery has been used much less frequently in Podlaskie Voivodeship than in Western Europe, but more frequently than in Poland in general.

Conclusion. It should be aimed to provide a surgical treatment with the use of breast-conserving surgical methods to the highest possible percentage of patients. The increase of the percentage of patients treated with breast-conserving surgery methods can be a result of an effective screening realisation.

Key words

breast cancer, breast-conserving surgery, cancer control, population-based study

INTRODUCTION

The results of breast cancer treatment depend mainly on better detection in mammography screening and, consequently, a higher proportion of women with early stage of the disease. They depend also on a better access to health care services and the effectiveness of oncological treatment [1, 2]. A diagnostic standard defines methods that are characterised by the highest possible sensitivity and specificity. The standard of the oncological treatment is a procedure that has the most beneficial effect on the prolongation of the patient's survival or on the patient's quality of life improvement with the lowest possible risk of complications [3]. The standards should be a result of the progress in medical technologies and stem from the knowledge and experience of people responsible for planning and organising the treatment of patients with cancer.

In order to standardise the oncological proceedings for patients with breast cancer in Poland, recommendations

elaborated with the use of Polish and other leading cancer centres' experience, have been published several times [3, 4, 5]. Currently binding recommendations for patients with breast cancer with a cancer diagnosed in early stage are: a primary use of a surgical treatment, if needed, in combination with radiotherapy or a primary use of a systemic therapy in combination with a surgical treatment and/or radiotherapy [3].

The objective is to ensure that the highest possible percentage of patients was treated surgically with the use of breast-conserving surgery methods that have been known for a long time. G. Keynes used this specific breast cancer treatment method in Great Britain already in 1924 and V. Peters used it in Canada in 1939 [6, 7]. In Poland T. Koszarowski started using the breast-conserving surgery in the mid-50s of the 20th century. Since the first application of this method, its demand has been increasing. The frequency of the use of the breast-conserving surgery should increase in the population in which population screening is conducted, because there is a higher percentage of cancers diagnosed in an early stage.

The currently binding recommendations include the use of radiotherapy as a component of the breast-conserving surgery

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or as a supplementary treatment method. The effectiveness of radiotherapy in an early and advanced breast cancer treatment has been confirmed by numerous randomised clinical trials [8, 9, 10, 11].

It's worth underlining that a breast-conserving surgery of the patients with a cancer diagnosed in early stage is equivalent to the modified radical mastectomy [12, 13, 14]. It is less burdensome for the patient and gives more possibility for the use of the restoration treatment than mastectomy. However, it requires a highly qualified medical personnel and facilities and should be performed in highly specialised oncological centres. In view of these recommendations, in Podlaskie Voivodeship in years 2001–2002 this procedure was performed in one centre.

The indicators used to monitor the frequency of modern and recommended methods' application, including the breast-conserving surgery, were defined during the realisation of the *European Cancer Health Indicator Project* (EUROCHIP) which was carried out under the auspices of the *International Agency for Research on Cancer/World Health Organization* (IARC/WHO). The indicators' list, among others, includes: cancer epidemiology, knowledge about carcinogenic factors, data on the effectiveness of the screening studies and information on the treatment standard [15, 16, 17].

The proportion of breast cancer cases receiving post-operative breast radiotherapy after breast-conserving surgery is one of the indicators that demonstrate the effectiveness of prevention measures and the ability to use modern treatment methods.

OBJECTIVE

The analysis of the selected aspects of the breast cancer treatment's standard in Podlaskie Voivodeship.

PATIENTS AND METHODS

Patients

The study material was based on information collected from the Cancer Registration Form MZ/N-1a from the Voivodeship Cancer Registry (CR) in Białystok. The CR in Białystok is one of the 16 registries whose activity is coordinated by the National Cancer Registry (NCR). During the study period the NCR was covering a Polish population of 38 218 531 people and CR in Białystok a population of 1 207 704 people in Podlaskie Voivodeship (urban – 711 300, rural – 496 404). The information collected from the CR in Białystok was complemented with additional data sources from the: patients' medical records, pathological laboratory documentations, specialist clinics, diagnostic centres, hospitals' registries of the medical services.

In years 2001–2002, 709 cases of women with breast cancer were reported to the CR in Białystok. A group of 659 women was selected for the analysis. All of these patients were diagnosed with a primary invasive breast cancer. Out of these 659 women with breast cancer, in Podlaskie Voivodeship, 499 patients, that is 75.5 %, were treated with a curative intent. In this cohort the following variables were known: place of living (urban/rural), date of birth, date of cancer diagnosis, stage of cancer, treatment's start date and treatment's method.

The following treatment methods were used in the study cohort: surgical treatment (mastectomy, breast-conserving surgery), chemotherapy, radiotherapy and hormonal therapy. In addition, the information on the complementary treatment methods of patients who underwent breast-conserving surgery was collected.

The characteristics of the study cohort are presented in Table 1.

Table 1. Characteristics of the study cohort (n=499)

	No. of patients	(%)
Age		
15–44	89	(17.8)
45–54	175	(35.1)
55–64	120	(24.0)
65–74	97	(19.4)
≥75	18	(3.7)
Stage by ENCR		
local	171	(34.3)
regional	275	(55.1)
metastatic	53	(10.6)
Method of the first treatment		
surgery	334	(66.9)
chemotherapy	153	(30.7)
radiotherapy	3	(0.6)
hormonotherapy	9	(1.8)
Place of living		
urban	367	(73.5)
rural	132	(26.5)

METHODS

In the cohort of 499 women treated with a curative intent the following recommended indicators used for an evaluation of the compliance with the best oncology practice suggested in the EUROCHIP Project were calculated: (I) a proportion of breast cancer cases receiving post-operative breast radiotherapy after the breast-conserving surgery and (II) a proportion of the breast-conservation surgery in pT1 cases.

The values of the indicators were calculated in total and for the groups of patients selected by age (15–44, 45–54, 55–64, 65–74, ≥75 and 15–49, 50–69, ≥70), disease stage (local, regional, metastatic) and place of living (urban/rural).

In the existing division among the age groups, a group recommended for screening was distinguished. In order to evaluate differences in tumour stage of development, a simplified classification recommended by the *European Network of Cancer Registries* (ENCR) for population registries (local, regional, metastatic) was used [18]. The information

about the stage and histological confirmation were known for all patients.

Additionally, the percentage of women with a breast cancer at a T1N0M0 stage who underwent the breast-conserving surgery with radiotherapy was calculated and compared with research results from the countries included in the EUROCARE-3 *high resolution study* (1996–1998) [19].

The test χ^2 was used to compare the distribution of the breast-conserving surgery among the groups of patients. The level of $p \leq 0.05$ was considered the level of statistical significance.

Data collection and analysis were in compliance with The Personal Data Protection Act of 29 August 1997 (Journal of Laws 1997, No. 133, item 883, as amended) as well as with the regulations and procedures of the National Cancer Registry.

The implementation of the study was approved by the Bioethics Committee of the Medical University of Białystok – Resolution No. R-I002/148/2008 of 24 April 2008.

RESULTS

Breast-conserving surgery

The breast-conserving treatment in the study cohort was a surgical breast-conserving treatment with a post-operative radiotherapy which was established accordingly to the recommendations. The breast-conserving surgery was performed on 86 patients, that is, on 17.2% of patients treated with a curative intent – Table 2.

Table 2. Breast-conserving surgery in the study cohort

Treatment method	No. of patients	(%)
Breast-conserving surgery	23	(4.6)
Breast-conserving surgery + RT	63	(12.6)
Other treatment methods	413	(82.8)

In the existing age group division, the frequency of the use of the breast-conserving surgery as a standalone method decreased with age. The breast-conserving surgery was most frequently used in the age group of 14–44 years and 45–55 years, that is, respectively for 21.3% and 20.6% of patients. Among the oldest patients (over 75 years old) the breast-conserving surgery was used for 11.1% of patients – Table 3.

Figure 1 presents the frequency of the use of the breast-conserving surgery, including a surgical treatment with radiotherapy, taking into consideration the age group recommended for screening (50–90 years). In the age group of 50–69 years the breast-conserving surgery was used more often than in other age groups. The breast-conserving surgery was performed on 18.9% of these patients.

The frequency of the application of the breast-conserving surgery depending on the place of living was presented in Table 4.

The proportion of patients who underwent the breast-conserving surgery was more favourable in urban areas than in the rural ones. The breast-conserving surgery was performed on 19.3% of women living in urban areas and on 11.4% of rural area residents.

Table 3. Breast-conserving surgery by the age group of the study cohort

	Treatment method	No. of patients	(%)
15–44		89	(100.0)
	breast-conserving surgery	5	(5.6)
	breast-conserving surgery + RT	14	(15.7)
	other treatment methods	70	(78.7)
45–54		175	(100.0)
	breast-conserving surgery	10	(5.7)
	breast-conserving surgery + RT	26	(14.9)
	other treatment methods	139	(79.4)
55–64		120	(100.0)
	breast-conserving surgery	5	(4.2)
	breast-conserving surgery + RT	16	(13.3)
	other treatment methods	99	(82.5)
65–74		97	(100.0)
	breast-conserving surgery	1	(0.1)
	breast-conserving surgery + RT	7	(7.2)
	other treatment methods	89	(91.7)
≥75		18	(100.0)
	breast-conserving surgery	2	(11.1)
	breast-conserving surgery + RT	0	(0.0)
	other treatment methods	16	(88.9)
			$p=0.22$

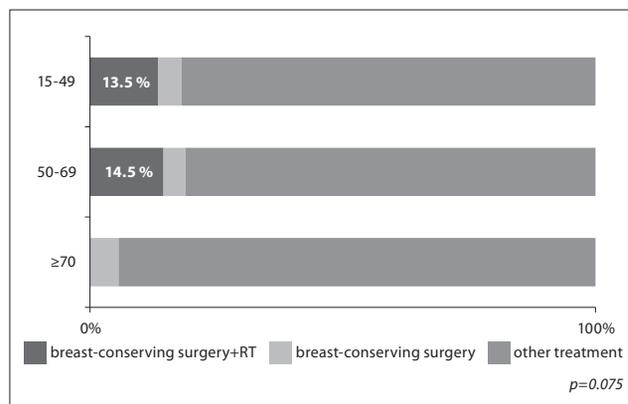


Figure 1. Breast-conserving surgery by an age group in the study cohort

Table 4. Breast-conserving surgery by the place of living in the study cohort

	Treatment method	No. of patients	(%)
urban		367	(100.0)
	breast-conserving surgery	18	(4.9)
	breast-conserving surgery + RT	53	(14.4)
	other treatment methods	296	(80.7)
rural		132	(100.0)
	breast-conserving surgery	6	(4.5)
	breast-conserving surgery + RT	9	(6.8)
	other treatment methods	117	(88.7)
			$p=0.07$

Breast-conserving surgery with radiotherapy

The breast-conserving surgery with radiotherapy was applied in 63 patients' cases, that is, for 12.6% – Table 2.

In the existing age group division, the frequency of the use of the breast-conserving surgery with radiotherapy decreased with the age.

The breast-conserving surgery with radiotherapy was most frequently used in the age group of 14–44 years and 45–55 years, that is, respectively for 15.7% and 14.9% of patients. In the age group of 65–75 years this rate equalled 7.2%. For the oldest patients (over 75 years old) the breast-conserving surgery was used for 11.1% of patients and there were no patients additionally treated with radiotherapy among them – Table 3. In the age group of 50–69 years the breast-conserving surgery with radiotherapy was used for 14.5% patients – Figure 1.

The breast-conserving surgery with radiotherapy was used for 14.4% of urban women and for 6.8% of rural women – Table 4.

Breast-conserving surgery in pT1 cases

104 patients were diagnosed with a pT1 stage breast cancer, that is 20.8%. The proportion of patients treated with the use of the breast-conserving surgery in this group equalled 40.4%.

The percentage of patients with pT1 stage breast cancer who underwent the breast-conserving surgery, taking into consideration the age group recommended for screening was presented in Figure 2.

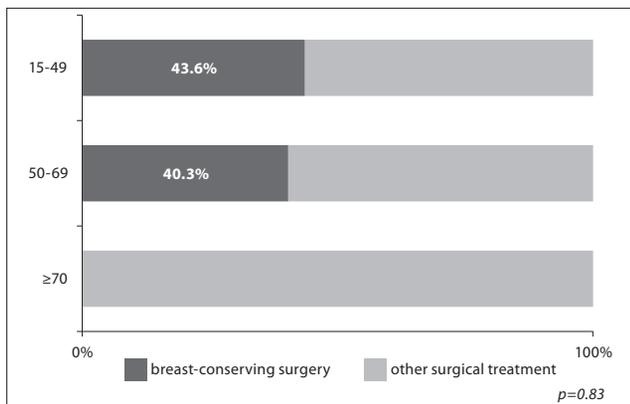


Figure 2. Percentage of pT1 cases receiving the breast-conserving surgery

Patients in the age group of 50–69 years equalled 59.6% of patients with pT1 stage cancer. The percentage of patients who underwent the breast-conserving surgery equalled 40.3%. Younger women were treated with the breast-conserving surgery more frequently, since the value of the indicator was 43.6%.

The indicator that demonstrates the proportion of patients with breast cancer in the pT1 stage, who were treated with a use of the breast-conserving surgery, by place of living was presented in Table 5.

Table 5. Number and percentage of pT1 cases receiving the breast-conserving surgery by place of living

		urban	rural
pT1 cases	No. of patients (%)	85 (100.0)	19 (100.0)
breast-conserving surgery in pT1 cases	No. of patients (%)	34 (40.0)	8 (42.1)
			$p=0.98$

Taking into consideration the place of living, the frequency of the use of the breast-conserving surgery for pT1 cases was similar. The breast-conserving surgery was performed on 40.0% of urban and on 42.2% of rural women.

Breast-conserving surgery in T1N0M0 cases

In the analysed cohort, there were 104 patients diagnosed with stage T1N0M0. On all of these patients a breast-conserving surgery was performed. The breast-conserving surgery was used for 86 patients, that is 82.7% and mastectomy was performed on 18 patients, that is 17.3%.

The percentage of patients treated with the breast-conserving surgery with radiotherapy in the surgically treated group of patients with stage T1N0M0, taking into consideration the place of living was presented in Figure 3.

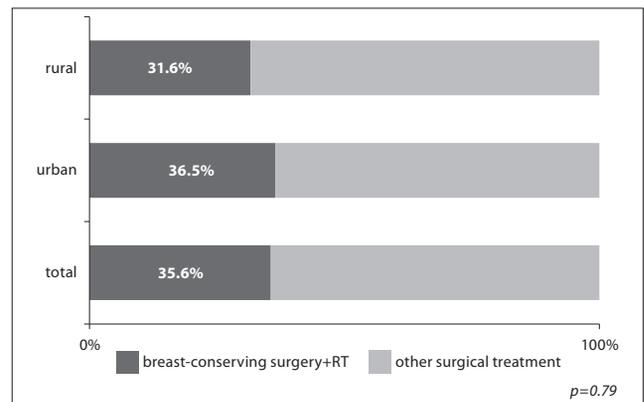


Figure 3. Percentage of T1N0M0 cases receiving the breast-conserving surgery with radiotherapy by place of living

The breast-conserving surgery with radiotherapy was performed on 37 patients, that is 65.6% of patients with T1N0M0 stage. The proportion of the use of this treatment procedure in urban areas equalled 36.5% and 31.6% in rural ones.

DISCUSSION

In Polish literature the results of the research on the breast-conserving surgery use, based on the screening data, are not published. The only published results refer to clinical series. The studies of A. Nowicki *et al* carried out on the group of patients treated in years 1999–2003 in the Specialist Hospital in Torun showed that among 270 breast cancer patients the breast-conserving surgery was performed on 75 of them, that is on 28.8% [20].

The breast-conserving surgery was used rarely also in Podlaskie Voivodeship, only for 86 patients, that is 17.6% of the patients treated with a curative intent. The low value of the calculated indicator in the group of stage pT1 cancer patients – 40.4%, was the result of the inadequate treatment standard of the patients with an early stage breast cancer in Podlaskie Voivodeship. The possibility of a breast-conserving surgery should have been considered for all patients with an early stage of breast cancer.

Taking into consideration current recommendations for the use of the radiotherapy after the breast-conserving surgery, it should be stated that this standard have been used very rarely in Podlaskie Voivodeship. Only 63 patients from the study cohort, that is 12.6%, were treated with use of the radiotherapy

after the breast-conserving surgery. This treatment scheme was more frequently used with women living in urban areas – 14.4% in comparison to the patients living in the rural areas – 6.8%. Low indicators of the proportions of patients treated with the use of the breast-conserving surgery and radiotherapy, especially in rural areas, may have resulted from a low proportion of patients with cancer in stage eligible for this treatment and from radiation infrastructure shortages [21].

In Podlaskie Voivodeship during the research period there was one specialist oncological hospital in which it was possible to perform on the patients a radiotherapy after the breast-conserving surgery. This fact and often large distances and long travel time to the place of the treatment, could have been the reasons of the rare use of the breast-conserving surgery with radiotherapy. The travel costs aren't insignificant either. The unfavourable impact of long distances to the hospital on the availability of the procedures and treatment standards were indicated by A. Jones *et al* [22].

In the study cohort the proportion of patients who underwent the breast-conserving surgery as an independent method or in combination with radiotherapy decreased with age. The research results from Podlaskie Voivodeship showed that older women received a poorer quality cancer care than younger women, which is reflected in lower values of the indicators, that assess this treatment standard, in older age groups. The study of S. Siesling *et al* carried out in Holland indicated similar trends that confirm poorer availability of breast-conserving surgical treatment for older patients [23].

The proportion of patients with stage pT1 who underwent the breast-conserving surgery was another indicator that was calculated in Podlaskie Voivodeship. The calculated rate equalled 40.4%. There were no significant differences in the indicator's value depending on the patients' place of living (urban/rural).

In the study cohort, among patients who were diagnosed with a pT1 stage cancer, women in the recommended for screening age equalled 59.6%. The breast-conserving surgery was performed rarely, because on 40.3% of patients at the age of 50–69.

In years 2001–2002 in Poland an organised population screening was not realised and in Podlaskie Voivodeship only occasionally, regional educational activities were carried out. They were aimed at an early detection and an increase of the women's knowledge about the risk factors. The low value of the indicator in the group of patients with a pT1 stage breast cancer is evidence to the lack of an effective programme whose goal is a detection of a cancer in an early stage. The calculated value is characteristic for populations in which early breast cancer detection programmes combined with coordinated activities, aimed to provide diagnosed patients with an access to the rapid and modern treatment, are not realised.

The evaluation of the breast-conserving surgery carried out with a help of a group of mentioned indicators that measure the standard of treatment, was supplemented by a factor which characterises the availability of the breast-conserving surgery and radiotherapy for T1N0M0 cases. This indicator was used in the EUROCORE-3 *high resolution study* (1996–1998) [19].

The percentage of T1N0M0 cases receiving the breast-conserving surgery with radiotherapy in Podlaskie Voivodeship (2001–2002) and in the countries included in the EUROCORE-3 *high resolution study* (1996–1998) were presented in Figure 4.

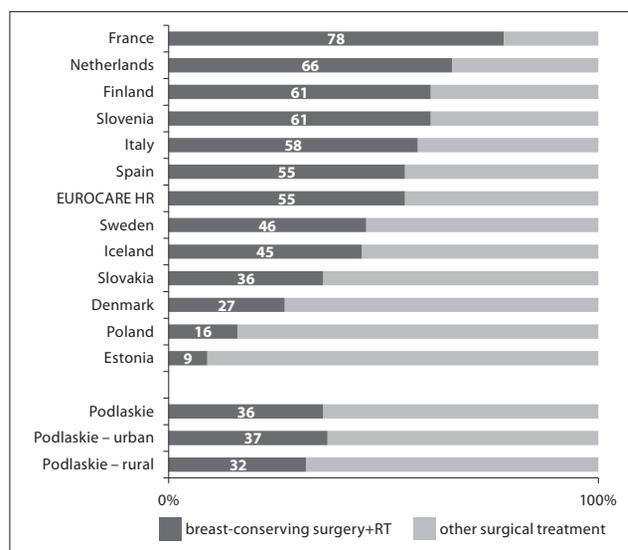


Figure 4. Percentage of T1N0M0 cases receiving the breast-conserving surgery with radiotherapy

In Podlaskie Voivodeship the percentage of T1N0M0 cases receiving the breast-conserving surgery with radiotherapy equalled 20.8% and was lower than in the countries included in the mentioned studies in which it was approximately 30.0% [19].

In the studied cohort all patients with a cancer in the T1N0M0 stage were treated with breast-conserving surgery methods. The breast-conserving surgery was performed on 86 patients, that is 82.7% and an amputation was performed on 18 patients, that is 17.3%. The breast-conserving surgery with radiotherapy was performed on 37 T1N0M0 patients, that is 35.6%. Among urban women, the proportion of patients treated with the analysed procedure equalled 36.5% and was better than the one among rural women where it was 31.6%.

The analysis of the frequency of the use of the breast-conserving surgery in Podlaskie Voivodeship in comparison to the EUROCORE-3 *high resolution study* results proved that the standard of the oncological care in Podlaskie Voivodeship during the period of the study was lower than in many European countries. In mentioned studies, the highest indicator was recorded in France – 76%, the lowest in Estonia – 9%. In Podlaskie Voivodeship during the period of the studies (2001–2002) the situation was better than the general situation in Poland during the EUROCORE-3 *high resolution study* (1996–1998), when the indicator for Poland was 16%. The data for Poland included Warsaw and Krakow [19].

The result of the analysis of the breast-conserving surgery's clinical and economic effectiveness should encourage to more frequent use of this treatment standard. The clinical studies' results have confirmed that with the correct classification of patients for the treatment, the results are not different from the mastectomy ones [12, 13, 14]. However, the research carried out by W. Barlow *et al* in years 1990–1997 in the United States has shown that the breast-conserving surgery and medical care's costs are lower than the total expenditure to fund the treatment with mastectomy [24]. J. Campbell *et al* analysing the results of the study on the treatment of patients with a breast cancer in Great Britain in years 1985–2007, showed that in the long term perspective the costs related to the patients' treatment do not differ depending on the

use of the breast-conserving surgery or the radical breast amputation [25]. Some studies have proven that the cost of treatment and medical care of patients that underwent mastectomy are lower than the costs related to the breast-conserving surgery. The cost calculations were carried out in the 80s and 90s of the 20th century. However, they were based on the observations on a few groups and the level of treatment and medical care costs varied [26, 27, 28].

In summary, decisions related to the funding and organisation of the breast-conserving surgery availability should be based on long term health and economic results' evaluations. These evaluations show that health results of the breast-conserving surgery should encourage to a frequent application of this standard and that economic reasons shouldn't be an indication to step away from the economically efficient methods.

CONCLUSION

The analysis that has been made allowed the evaluation of indicators that measure the frequency of the use of the breast-conserving surgery of patients with a breast cancer in Podlaskie Voivodeship which gives evidence to the existing possibilities for a systematic conduct of such research.

The results of the carried studies showed that modern treatment methods: breast-conserving surgery and breast-conserving surgery with radiotherapy in the Podlaskie Voivodeship were applied much less frequently than in Western Europe countries, as it was demonstrated by the EUROCORE study. The rarely used breast-conserving surgery was a consequence of a low proportion of early breast cancer cases in Podlaskie Voivodeship in comparison to the same EUROCORE study. It is worth mentioning that the use of these procedures in Podlaskie Voivodeship was more frequent than in Poland.

The insufficient availability of the breast-conserving surgery in Podlaskie Voivodeship, especially in rural areas, may have been a result of an insufficient number of centres in which it was possible to carry out the breast-conserving surgery and non-implementation of an effective screening programme.

It should be aimed to provide a surgical treatment with the use of breast-conserving surgical methods to the highest possible percentage of patients. The increase of the percentage of patients treated with breast-conserving surgery methods can be a result of an effective screening realisation.

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