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# Evaluation of the impact of indirect factors (age, mode of operation and the time from diagnosis to surgery) on the scope of surgical procedures performed in patients with colorectal cancer who underwent surgery at the District Hospital in Wołomin

# Ocena wpływu czynników pośrednich (wieku, trybu operacji i czasu od rozpoznania do operacji) na zakres wykonywanych zabiegów operacyjnych u chorych na raka jelita grubego operowanych w Szpitalu Powiatowym w Wołominie

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S u m m a r y

**Introduction.** The results of treatment of colorectal cancer in Poland are among the worst in Europe. The detection of cancer in the late stages of development results in high recurrence rate and a low 5-year survival.

**Aim.** The aim of this study was to assess the impact of indirect factors (age, mode of admission and time from diagnosis to surgery) to the extent of surgery, thus its radical, in patients treated in the District Hospital in Wołomin.

**Material and methods.** The material was a group of 105 patients operated on colorectal cancer in the Department of General Surgery at the District Hospital in Wołomin in the period from January 2010 to December 2012.

Method: Patients were divided into four groups corresponding to the four stages of cancer of the colon. The age, mode of operation, as well as the elapsed time from diagnosis to surgery for each group of patients were estimated. The number of palliative and radical operation for each stage and compared the four groups was calculated. Each group was compared in the terms of the impact described indirect factors on the number of palliative and radical surgery.

**Results.** The same number of palliative and radical operations for patients under 70 years old who were in stage IV of the disease was observed. In patients over 70 years old the number of palliative surgery was doubled.

High percentage of radical surgery remained among the elective patients, as opposed to surgery on the duty, where in stage III disease, the number of palliative radical surgery were equal, and stage IV the number of radical surgery significantly decreased.

**Conclusions.** 1. Indirect factor: age above 70 years old increases the number of palliative surgery in patients with stage IV cancer. 2. Indirect factor: the emergent operation increases the frequency of palliative operations in III and stage IV cancer. 3. Indirect factor: reducing the time from diagnosis to surgery less than 30 days does not increase the chances of radicalization of the surgery.

Key words: colorectal cancer, colon cancer prevention

S t r e s z c z e n i e

**Wstęp.** Wyniki leczenia raka jelita grubego w Polsce należą do najgorszych w Europie. Wysoki odsetek nawrotów i niski 5-letnich przeżyć związany jest przede wszystkim z wykrywaniem raka w późnym stopniu zaawansowania.

**Cel.** Celem pracy była ocena wpływu czynników pośrednich (wieku, trybu przyjęcia oraz czasu od rozpoznania do operacji) na zakres zabiegu operacyjnego, tym samym jego radykalność u chorych leczonych w Szpitalu Powiatowym w Wołominie.

**Materiał i metody.** Materiał stanowiła grupa 105 chorych operowanych z powodu raka jelita grubego w Oddziale Chirurgii Ogólnej Szpitala Powiatowego w Wołominie w okresie od stycznia 2010 do grudnia 2012 roku.

Metoda: Chorych podzielono na cztery grupy odpowiadające czterem stadiom zaawansowania nowotworu jelita grubego. Oceniano wiek, tryb operacji oraz czas, jaki upłynął od rozpoznania do operacji w każdej z grup chorych. Obliczono ilość

operacji paliatywnych i radykalnych dla każdego stopnia zaawansowania i porównano cztery grupy pod kątem wpływu, jaki miały opisane czynniki pośrednie na ilość operacji paliatywnych i radykalnych w każdej z grup.

**Wyniki.** W stopniu IV zaawansowania choroby, w grupie chorych poniżej 70 roku życia, liczba operacji radykalnych i paliatywnych była taka sama. W grupie chorych powyżej 70 roku życia liczba operacji paliatywnych wzrosła dwukrotnie.

Wśród operowanych w trybie planowym utrzymywał się wysoki odsetek operacji radykalnych, w odróżnieniu do operowanych w trybie ostrego dyżuru, gdzie w stopniu III zaawansowania choroby liczba operacji paliatywnych i radykalnych zrównała się, a w stopniu IV liczba operacji radykalnych znacznie zmalała.

**Wnioski.** 1. Czynnik pośredni – wiek powyżej 70 roku życia wpływa na zwiększenie liczby operacji paliatywnych w grupie chorych z IV stopniem zaawansowania nowotworu. 2. Czynnik pośredni – operacja w trybie dyżurowym wpływa na zwiększenie częstości operacji paliatywnych w III i IV stopniu zaawansowania choroby nowotworowej. 3. Czynnik pośredni – skrócenie czasu od rozpoznania do operacji poniżej 30 dni nie zwiększa szans na radykalizację zabiegu operacyjnego.

Słowa kluczowe: rak jelita grubego, profilaktyka raka jelita grubego

## INTRODUCTION

The increase in morbidity and mortality from colorectal cancer is observed not only in Poland but throughout the world (1). The results of treatment of colorectal cancer in Poland belong to the worst in Europe (2). A large percentage of relapses and low 5-year survival rate is related to the detection of cancer in late stages of development. The main factor determining the resection is the stage of cancer. Indirect factors such as age, mode of adoption and the need for ad hoc surgery and the time elapsed from diagnosis to surgery are also of great importance. The common denominator for these interactors is the awareness of patients concerning the problem of colorectal cancer and their participation in prevention programs.

In the community living in the area of Wołomin District, which consists of mainly rural areas and small urban centers, the awareness of cancer prevention is very low, as evidenced by the high percentage of patients operated under emergency service and low social response to the proposed program of colorectal cancer prevention.

## AIM

The aim of this study was to assess the impact of indirect factors: age, mode of admission and time from diagnosis to surgery on the scope of surgery, thus its radicality, in patients operated due to colorectal cancer in the District Hospital in Wołomin.

## MATERIAL AND METHODS

Records were evaluated retrospectively in 105 patients (M – 60, F – 46) between the ages of 43 to 87 (mean age – 71 years) who underwent surgery for colon cancer in the Department of General Surgery at the District Hospital in Wołomin in the period from January 2010 to December 2012. Documentation of the prevention program concerning colorectal cancer in the District Hospital in Wołomin carried out in the years 2009-2012 was also examined for patients' participation in the program.

Patients were divided into four groups according to the stages of colon tumor classification AJCC/American Joined Committee on Cancer (3). AJCC Rating scale based on TNM result estimated by histopathological examination of the surgery preparation with complementary M feature basing on intraoperative examination, chest X-ray and pelvis and abdomen CT.

Age for admission and operations was estimated, as well as the elapsed time from diagnosis to surgery for each group of patients. Number of palliative and radical surgery for each stage was calculated. Operations were considered radical when considered right and left-side colon cut, tumor resection (transverse or sigmoid notch cut), front of the rectum cut, abdominoperineal rectal subtraction, Hartmann's operations (for patients with N0). Hartmann's operations were considered palliative (for patients with N1 or N2 feature) as well as digestive bypass, selecting a loop stoma of the small or large intestine.

Four groups were compared in terms of the impact of the described interactors on the amount of palliative procedures or resections in each of the four groups.

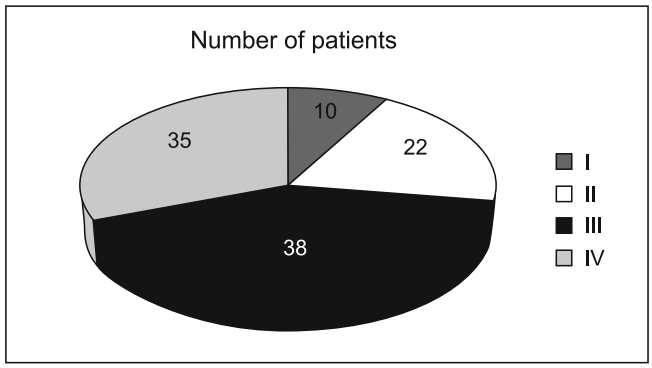
Taking into account the criterion of age, patients were divided into groups below and above 60 years of age and below and above 70 years of age, basing on the National Cancer Registry data, showing a significant increase in incidence in the 7th and 8th decade of life.

Mode of admission and operations, and the date of diagnosis were assessed on the basis of the source documentation of patient hospital stay associated with surgery. The time from diagnosis to surgery was calculated taking into account the data of colonoscopy, considering the date of diagnosis being the date of the result of pathological examination of slices taken during colonoscopy. In the study group, the elapsed time between diagnosis and surgery was between 0 and 144 days (the mean 72 days). The limit of time differentiating groups with respect to the "time from diagnosis to surgery" was set at 30 days, considering that this is the time allowing, in diagnosed outpatients, for vaccination, completing examinations necessary to determine the stage (staging) and oncologist consultation and planning therapy. All patients with rectal cancers were treated systematically, had received radiation called

"short path", which did not affect the waiting time for surgery more than up to 30 days. For obvious reasons, patients operated under emergency department were excluded from the assessment for the parameter "time from diagnosis to surgery", their diagnosis date is the date of operation.

## RESULTS

The stage of cancer in the group of patients treated in the years 2010-2012 is shown in figure 1.

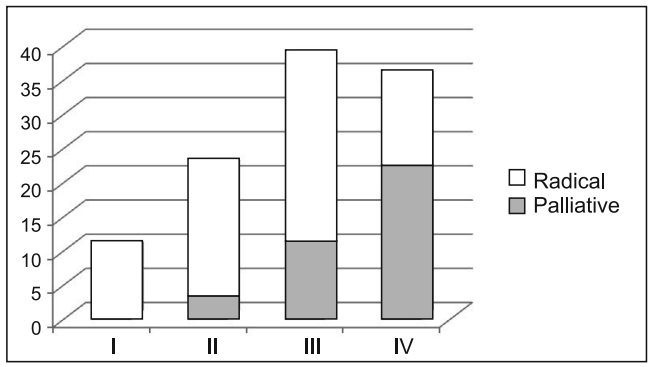



| The stage of cancer at the AJCC scale | Number of patients | % |
|---|---|---|
| I | 10 | 9.52 |
| II | 22 | 20.95 |
| III | 38 | 36.19 |
| IV | 35 | 33.33 |

Fig. 1. The incidence of various degrees of severity of cancer in the study group.

Patients with stage I and II (without N + feature in the pTNM assessment) were a group of 32 patients (30.5%), there were 73 patients in the third and fourth stages of development of cancer (69.5% of the study group). The scope of surgery in patients with colorectal cancer at the District Hospital in Wołomin included palliative and radical operations, and the main factor determining the disease severity was assessed by the surgeon during the procedure. Among patients who underwent elective operations the decision on the scope and radicality of surgery was based on an assessment of the general condition of the patient and evaluation of all the results of additional examinations, among patients operated under emergency department decisions were also taken on the basis of the state of the patient before and during treatment, local conditions in the case of obstruction or the degree of peritoneal cavity contamination with intestinal contents in complicated cases.

In the whole group 70% underwent radical operations. In patients with early progression of cancer (stage I and II) radical operations were performed in 16 cases (94% of patients < 60 years old). Number of radical surgery in patients with advanced stage III twice outnumbered palliative surgery. An exactly opposite dependency can be observed in patients with stage IV of the disease (fig. 2).




| Type of operation | | The advancement of cancer in the AJCC scale | | | |
|---|---|---|---|---|---|
| | | I | II | III | IV |
| | Total | 10 | 22 | 38 | 35 |
| Palliative | 32 | 0 | 2 | 10 | 21 |
| Radical | 73 | 10 | 20 | 28 | 14 |

Fig. 2. The number distribution of palliative and radical procedures performed in different stages of cancer in the study group.

The majority of the study group consisted of patients over 60 years of age (88 patients – 84%), there were 57 patients who were older than 70 (64%). In both groups tumors in the third and fourth stages of development predominated (> 60 – 59 patients, > 70 – 39 patients). In patients under 60 radical operations were performed in 94% of cases, in the group of patients over 60 radical operations were possible in 64% of cases (tab. 1).

Table 1. The frequency of resection and palliative operations performed in relation to the stage of cancer in the age groups below and above 60 years of age.

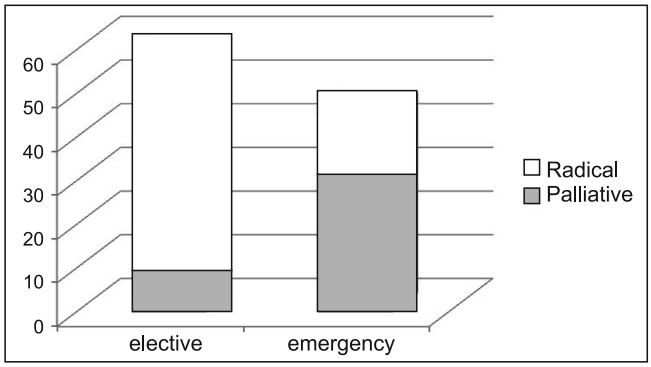
| Age | Stage | Number of patients | % | Radical surgery | Palliative surgery |
|---|---|---|---|---|---|
| < 60 | I | 1 | 1 | 16 patients (94%) | 1 patient (6%) |
| 17 patients (16%) | II | 2 | 2 | | |
| | III | 12 | 11 | | |
| | IV | 2 | 2 | | |
| > 60 years of age | I | 9 | 9 | 57 patients (64%) | 31 patients (36%) |
| 88 patients (84%) | II | 20 | 19 | | |
| | III | 26 | 25 | | |
| | IV | 33 | 31 | | |

Analyzing the group of patients in the next decade – older than 70 a similar proportional distribution of the number of resections and palliative surgery can be observed. In patients below and above 70 years of age for stages from I to III radical operations are more numerous. In stage IV of patients under 70 years of age the numbers of palliative are radical operations are the same (5 patients in both groups). In patients over 70 the number of palliative surgery significantly increased (palliative – 16 patients, radical – 9) (tab. 2).

Table 2. The frequency of resection and palliative operations performed in relation to the stage of cancer in the age groups below and above 70 years of age.

| The stage of cancer in the AJCC scale | Type of operation | Number of patients < 70 | % | Number of patients > 70 | % |
|---|---|---|---|---|---|
| I | Palliative | 0 | 0 | 0 | 0 |
| | Radical | 3 | 3 | 7 | 7 |
| II | Palliative | 1 | 1 | 1 | 1 |
| | Radical | 10 | 10 | 10 | 10 |
| III | Palliative | 5 | 5 | 4 | 4 |
| | Radical | 19 | 18 | 10 | 10 |
| IV | Palliative | 5 | 5 | 16 | 15 |
| | Radical | 5 | 5 | 9 | 9 |
| | Total | 48 | 46 | 57 | 54 |

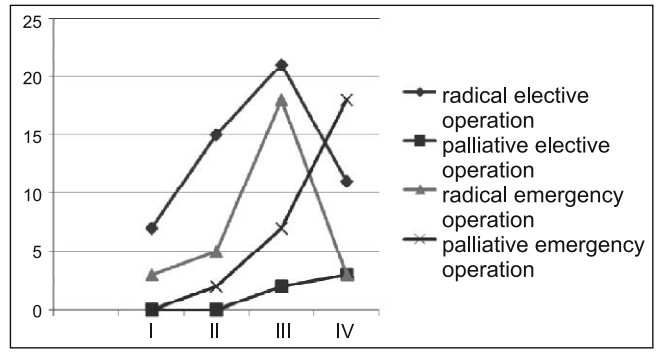
Figure 3 presents a summary of the number of patients treated electively because of the diagnosis of colorectal cancer and the number of patients treated in the emergency department due to obstruction of the gastrointestinal tract, bleeding from the tumor or other symptoms of cancer qualified for admission and emergency operations throughout the study group. In the group undergoing elective operations radical ones were performed ten times more often than palliative ones (54 patients – radical, 5 patients – palliative). The group operated in the emergency department 41% of patients were qualified for radical surgery.




| Type of operation | Mode of operation | |
|---|---|---|
| | Elective | Emergency |
| Palliative | 5 | 27 |
| Radical | 54 | 19 |

Fig. 3. The numerical distribution of palliative and radical surgery performed within elective and emergency procedures.

Analyzing the impact of an indirect factor – the mode of operation on the type of surgery performed it can be seen that in the group of patients with stage III the number of palliative and radical operations performed under ER is comparable (8 and 7 patients respectively). Among patients who underwent elective surgery at the same stage (III) the number of radical operations remained at a high level and is much higher than palliative ones (21 radical surgeries and 2 palliative ones). This tendency also exists for patients with stage IV of the disease. In elective operations radical ones dominate (11 radical to 3 palliative), and in emergency – palliative ones (respectively 18 palliative and 3 radical). Summing up, among those undergoing elective surgery, regardless of the severity high share of radical operations is persistent, in contrast to patients who underwent surgery in the emergency department, where stage III palliative and radical surgery are equal and in stage IV the number of radical surgery significantly decreases (fig. 4).




| The stage of cancer in the AJCC scale | Type of surgery | Elective mode of operation | Emergency mode of operation |
|---|---|---|---|
| I | Palliative | 0 | 0 |
| | Radical | 7 | 3 |
| II | Palliative | 0 | 2 |
| | Radical | 15 | 5 |
| III | Palliative | 2 | 7 |
| | Radical | 21 | 8 |
| IV | Palliative | 3 | 18 |
| | Radical | 11 | 3 |
| | Total | 59 | 46 |

Fig. 4. The frequency of resections and palliative surgery with reference to the operation mode in patients with different degrees of severity of cancer.

During the study, there was no relationship between time (counted in days up to 30 and more) from the diagnosis to the operation and the number of radical and palliative surgeries in the study group. In both groups the numbers of radical and palliative surgeries within 30 days from the diagnosis were comparable. The longest time from diagnosis to surgery was 144 days.

For obvious reasons, patients operated under emergency department were excluded from the assessment, their diagnosis date is the date of operation (tab. 3). Similarly, no significant correlation was calculated separately for each group of different stages of cancer. The frequency of palliative and radical surgery in each group with the stage of cancer I-IV was comparable (tab. 4).

Table 3. Number of palliative and radical procedures performed in operated groups before and after 30 days from diagnosis.

| Type of operation | The time from diagnosis to surgery | |
|---|---|---|
| | < 30 days | > 30 days |
| Palliative | 5 | 5 |
| Radical | 31 | 28 |

Table 4. Number of palliative and radical procedures performed in patients before and after 30 days from diagnosis in relation to particular groups of tumor stages from I-IV.

| The stage of cancer in the AJCC scale | Type of surgery | The time from diagnosis to surgery < 30 days | The time from diagnosis to surgery > 30 days |
|---|---|---|---|
| I | Palliative | 0 | 0 |
| | Radical | 2 | 5 |
| II | Palliative | 1 | 0 |
| | Radical | 6 | 8 |
| III | Palliative | 2 | 2 |
| | Radical | 10 | 9 |
| IV | Palliative | 4 | 2 |
| | Radical | 5 | 6 |
| | Total | 30 | 32 |

## DISCUSSION

Wołomin District is geographically the largest district in Poland. In 2012, its population exceeds 213 000, and the demographic structure shows a significant proportion of older people. The estimated number of people of working age and at retirement is a total of 170 000, which represents about 80% of the whole community (4). Wołomin District comprises mostly of rural areas. Given the incidence of cancer of colon in Poland amounting respectively for men and women to 22 incidents/100 thousand and 29 incidents/100 thousand it means that each year in the county, there are about 80 new cases. Prophylactic examinations have the greatest impact on reducing the interactors studied by the author: the age at which the disease is diagnosed and the mode of operation.

As it can be seen from the data analysis of the program for colorectal cancer prevention conducted at the District Hospital in Wołomin only about 100 people a year choose to participate in such a program, which in the community of 170 thousand of people potentially suffering from cancer accounts for only 0.05%. In similar programs carried out for big cities, the number of people participating in prevention programs reach 500 people per year (data for Plock in 2009) (5). Taking into account the urban population (Plock – 124 thousand, as of 2012) participation in prevention programs affects approximately 0.4% of the population. In subsequent years the number of people participating in the prevention of the hospital in Wołomin did not increase, and the program has not resulted in less emergency treatments at this time. These results can be justified by the growing number of cases of cancer and continuously insufficient knowledge about colorectal cancer in this population, particularly in rural areas, for which access to programs conducted in the cities is particularly limited. Such a hypothesis is confirmed by studies on the correlation between the level of education of the respondents and potential consent to colonoscopy. As it was demonstrated in the work of Polish researchers, 87% of people with a university degree, compared to 71% with primary education are willing to submit to this examination after hearing its course (6).

The consequence of inadequate prevention is a high degree of severity of malignant cases at diagnosis. N feature is particularly important. According to data released by the American Cancer Society in 2010, in patients with no change in lymph nodes 5-year survival can be achieved in 90% of cases. The chance of 5-year survival with feature N (+) drops to 10% (7). According to the epidemiological data 50% of colorectal cancer are diagnosed in Poland in stage C and D at Dukes' scale, which corresponds to stage III and IV at AJCC (8). The data presented in the author's material show significantly higher (over 68%) proportion of subjects for whom, at diagnosis, the stage of cancer was estimated as the third and fourth. The difference between the literature data and the results presented in this study can be explained by the negligible participation of Wołomin residents in prevention programs, and a high percentage of patients undergoing emergency surgery because of indications of life. This indicates a high degree of baseline severity changes. During the study, patients who underwent surgery in the emergency department were a total of 46 people, representing 43% of the study group.

Specificity of the Polish health care system makes it necessary to treat tumors not only in reference centers for cancer diseases, working exclusively in elective mode, but also in the field centers. The mode of operation of the latter is based largely on the treatment of acute an ad hoc basis, as confirmed by the results presented by the authors. The material shows the real picture of the degree of advancement of colon cancer in the studied population, a non-distorted by the selection of patients resulting from elective operation centers, thus not covering emergency cases.

Analysis of the study group without division of the stage shows that radical operations were possible for 70% of patients, and palliative care for approximately 30% of cases. During the study, however, it was shown that significantly more, as many as ten times, radical operations were performed in patients operated electively. Emergency operations ended in palliative procedures twice as often.

Age is an independent predictor of the development of colon cancer. The incidence of cancer increases significantly after 60 years of age and reaches its peak in

the 7th and 8th decade of life. There have been reports of increasing incidence of the disease among people over 50 years of age for both sexes (9). According to the National Cancer Registry reported in 2009 a diagnosis of cancer was able to be put before the age of 60 years at 25% and before 70 years of age in 53% of patients suffering from colorectal cancer (10). The author's details: respectively – 16% of patients in whom diagnosis was before 60 years of age and 47% of patients in whom diagnosis was before 70 years of age, evidence moving towards the recognition of a group of patients over 70 years of age in the population from which patients treated at the District Hospital in Wołomin come. The district's location is not without significance for the described results, it is a short distance from Warsaw and a large number of patients will benefit from treatment in highly specialized centers, especially young people (under 60 years of age), healthier, less congested and operated mainly electively, which affects the possibility of radical treatment.

Analyzing the effect of age on the decision of the scope of treatment in the study group there is a tendency to radicalization of operations shown, both in patients below and above 70 years of age. According to data presented by the authors for the stages from I-III, the majority of patients underwent radical surgery in both age groups. In the fourth stage the number of palliative surgery significantly increased both for patients below and above 70 years of age. For patients younger than 70 the number of operations is equal to the number of palliative radical surgery, and among those over 70 the number of palliative surgery is already two thirds of all performed operations. Limited scope of surgery in patients older than 70 is associated not only with the presence of comorbidities, but also with the increased risk associated with the prolongation of treatment, increased blood loss, chills and unanticipated complications associated with healing.

The papers of Polish researchers including the analysis of the comparative period (years 2005-2008) showed that the percentage of radical surgery ranges between 85-88% (and is rising) (8, 11, 12). Quoted figures come from an analysis of cases throughout the country, and therefore cover a population of patients treated with both elective and emergency procedures, and the median age is similar to the study group. It can therefore be concluded that a lower percentage of radical surgery (70%) in the present material is due to a greater number of patients treated in stage IV of the disease and a greater number of patients aged 70+ in the study population.

Analyzing separately the group of patients who underwent emergency surgery it may be noted that the results presented by the author on how often palliative procedures happen are comparable with the results of papers published in Poland in the recent years (13-15). This confirms that decisions to limit treatment to palliative operations in ER mode are not dictated by the lack of skill of the surgeons, but rather a greater proportion of elderly patients and a high degree of severity of the disease.

Reducing the time from diagnosis to surgery to less than 30 days did not increase the chances of radicalization of the procedure in the presented material. There is no data in the literature on research or observations regarding the influence of time between diagnosis and surgery calculated for up to 30 days. The impact of postponing surgery or systemic therapy on the development of cancer is indisputable, nevertheless the limit of 30 days determined in the material, according to the observations carried out, did not affect the scope of the proposed treatment.

It seems that the results of treatment of patients, especially from the field centers, one cannot see through the prism of the number of radical procedures performed, 5-year survival and local recurrence. Age structure and public awareness as to the substance of cancer and its prevention has a significant impact on the possibilities of the proposed treatment, and this is directly reflected in the outcome. The key to therapeutic success seems to be supporting the programs of primary and secondary prevention.

In the Wołomin District the District Office of Wołomin has been for the last eight years conducting a prevention program for colorectal cancer at the District Hospital in Wołomin. It is the only program in the area. It includes consulting a surgeon, an interview, physical examination (with digital rectal examination) and qualifying for colonoscopy. The interest in participating in the program during the period between 2010-2012 was expressed by 318 people.

As surveyed in the prophylaxis group, three patients were patients in whom the diagnosis of cancer was after a preliminary proctologic study. The remaining respondents' diagnosis was based on colonoscopy, commissioned in outpatients on the basis of reported symptoms (59 patients treated electively) or during hospitalization after the adoption in the ER mode because of obstructive symptoms (46 patients). Among patients diagnosed in the prevention program all were treated radically.

The stage of colorectal cancer has a direct and major impact on the scope of treatment possible to be carried out. However, the indirect factors such as: mode of operation, the patient's age and knowledge in society about cancer prevention, is crucial. According to the comparative results of treatment one should take into account not only the severity but also the profile of the study group, which is significantly different for rural population (they are usually elderly, less aware of the risks of treatment and waiting for the "last moment") than for those treated in large cities, with better access to health services and being more prone to cancer prevention media campaigns.

Among patients with comparable severity of cancer from I to III, the decision on the radicality of treatment

is undertaken basing on the severity of the disease. In the group of patients with stage IV, age and the mode of the operation has an impact on the decision about the surgery. Therefore, the key to improving outcomes is the earliest detection of cancer and possible treatment of patients with elective procedures, after they are prepared. The main way to improve things is to streamline programs of primary and secondary prevention of colorectal cancer.

## CONCLUSIONS

1. Indirect factor – age over 70 increases the number of palliative surgery in patients with stage IV.
2. Indirect factor – emergency operation mode increases the frequency of palliative surgery in the III and IV stage of cancer.
3. Indirect factor – reducing the time from diagnosis to surgery to less than 30 days does not increase the chances of surgery radicalization.

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