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Original article

Have actual waiting times been reduced by introducing the DILO reform for cancer patients in Poland?

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Introduction. Relative 5-year cancer survival rates in Poland are around 10% lower than the average of the whole EU. One of the likely factors for poorer treatment outcomes in Poland may be the long times between when cancer is suspected to starting treatment. This study has thus aimed to determine whether the introduced oncology reforms have succeeded in reducing such times.

Materials and methods. The study survey was undertaken at 6 oncological centres on patient subjects before (n = 1373) and after (n = 431) the oncological reform (*DILO*) had been introduced. Data was obtained from an in-house devised questionnaire together with patient interview and their medical history. The following waiting times were estimated: A) from suspicion of cancer, (date of first doctor visit due to appearance of symptoms, screening/ /follow-up or prevention), to diagnosis (date of histopathological confirmation), B) from suspicion of cancer to the start of treatment and C) from diagnosis to starting treatment before and after the *DILO* reform had been introduced.

Results. The median waiting time between suspicion of cancer and treatment was 11 weeks before the *DILO* reform but was not significantly shortened after its introduction; the reduction being barely 3 days. This waiting time was however increased by 8 days in those patients without *DILO* cards. Before the *DILO* reform, the median time from diagnosis was 5.9 weeks, but was reduced by 8 days in patients bearing the *DILO* card and indeed increased in those without the *DILO* card by over 2 weeks.

Conclusions. Cancer treatment waiting times in Poland is still somewhat long (over 9 weeks in most cases). Introducing the oncological reform has not significantly impacted on shortening the waiting times in cancer patients for receiving oncological treatment.

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Introduction

Cancer constitutes a serious health problem in Poland and the world. At present it is the second commonest cause of mortality, whilst in women aged between 30 and 69 years it is the first [1]. Within the backdrop of the European Union (EU), Poland is a country with a relatively low cancer incidence but with a high mortality. This low incidence rate is likely because of incomplete reporting of new cancer diagnoses made to the National Tumour Registry (KRN) by healthcare providers. In terms of mortality rates, Poland occupies second from last place after Hungary. According to the latest analyses of EUROCARE 5, the five-year relative survival in Poland is around 10% lower than the EU average [2–4]. One likely reason for this may be a late detection

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of cancer in Poland; often already made at advanced stages. Another factor causing such worse outcomes in Poland, when compared to the EU, may be the low funding for medical services, resulting in reduced access to diagnostic and therapeutic services, thereby increasing the time for starting cancer treatment. Expenditure for cancer treatment per capita in Poland is about one third of the EU average (respectively 37 and 102 euros per annum). The ratio of mortality to morbidity is over 0.6 in Poland and it is one of the highest in the EU; as is also the case for Romania and Greece. In countries where funding for cancer treatment is higher, then this ratio becomes close to 0.4 [2]. The effectiveness of a given cancer therapy is most probably affected by waiting time as variously supported by published studies, although conclusions have not always been unequivocal. A Dutch study [5] found that prolonging waiting time of up to 3 months after a diagnosis of head and neck head cancer reduced 5 year overall survival by 18% and significantly increased mortality risk after 2 months from diagnosis. A meta-analyses showed similar findings [6], where prolonged waiting times for treatment from the first signs of breast cancer (< 3 vs 3–6 months) reduced the 5-year survival by 5–7%.

Our study aim was to determine whether the oncological reform introduced in Poland actually shortened the real waiting time for diagnoses and treatment in cancer patients.

Materials and methods

Study subjects were 1373 patients treated for cancer prior to the advent of the oncological cancer reform (22.05.2014 to 19.02.2015) and 431 cancer patients after the reform (from 17.11.2015 to 06.06.2016); at 6 cancer centres in Poland. Originally 11 cancer centres had been invited to participate, differing in geographic location, size, organisation and financing of their medical services. Six centres were approved for the study, three of which are regional oncological centres funded by the National Health Fund (IA–C) and the other 3 being privately funded; of the latter, one centre was funded by the National Health Fund (IIA) and two centres were owned by an investor who covers the costs of medical services (IIIA–B). The study was sponsored by the Oncology Foundation 2025.

An in-house questionnaire was developed for the survey and such data was supplemented by patient medical histories. The questionnaire had been previously validated by a twice repeated pilot study on 50 patients before and after 2 weeks. Reply concordance was tested by the Cohen kappa coefficient.

Our study received approval from the Bioethics Commission at the University of Warmia and Mazury in Olsztyn. All respondents agreed to participate in the study and have their medical records at our disposal.

The median waiting times were estimated as follows: A) from suspicion of cancer, (date of first doctor's visit due to the appearance of abnormal symptoms suggesting cancer or if they are discovered whenever screening/follow-up or prevention tests were undergone and confirmed by tests after referral), to diagnosis (date of histopathological confirmation), B) from suspicion of cancer to the start of treatment and C) from diagnosis to starting treatment before and after the *DILO* reform had been launched.

From the cancer suspicion time to treatment, 112 patients were excluded from the study whilst in addition, 474 patients were excluded from the study in the groups: waiting time from suspicion to diagnosis and waiting time from diagnosis to starting treatment (Fig. 1).

Statistical analyses

The distribution of variables was tested by the Shapiro-Wilk test. As aforementioned the questionnaire was validated using the Kappa Cohen Coefficient. Differences in subgroup ratios were tested using the χ^2 test. The Mann-Whitney U test was used for comparing waiting times before and after the oncological reform. Statistical significance was assumed to be p < 0.05. Analyses were carried out using STATISTICA software (version 12.5) (StatSoft, Poland) and SPSS Statistics 23.0.

Results

There were 1266 and 426 patient subjects respectively in the study, (time from suspicion of cancer to starting treatment), before and after the Diagnostic and Treatment of Cancer (*DILO*) reform had been introduced. For the staging analysis, i.e. from suspicion of cancer to diagnosis and from diagnosis to treatment, there were respectively 890 and 328 patient subjects before and after the reform had been introduced; Figure 1 and Table I. Upon validating the questionnaire, the replies agreed very satisfactorily (kappa: 0.81–1.00; p < 0.0001) when the 'patient pathway' was started and for gender and age. Good agreement was seen (kappa: 0.61–0.80, p < 0.0001) when patients used private practice for diagnoses whilst moderate agreement was obtained (kappa: 0.41–0.60; p < 0.0001) for the date at which cancer was suspected. The distribution of the waiting time was non-parametric (p < 0.001).

The median waiting time from suspicion of cancer to starting treatment was 11 weeks before the oncological cancer reform had been launched. After the reform, this time was not significantly reduced in patients possessing a *DILO* card; the difference being only 3 days, p = 0.43. Nevertheless, in patients without a *DILO* card, the median waiting time between when cancer was suspected to treatment was longer by 8 days; p = 0.81 (Fig. 2A). The median waiting time for histopathological diagnosis from when cancer was suspected was 5.9 weeks prior to the oncological cancer reform. Within this period, the median duration of histopathological testing, as measured from the date of sample collection until the
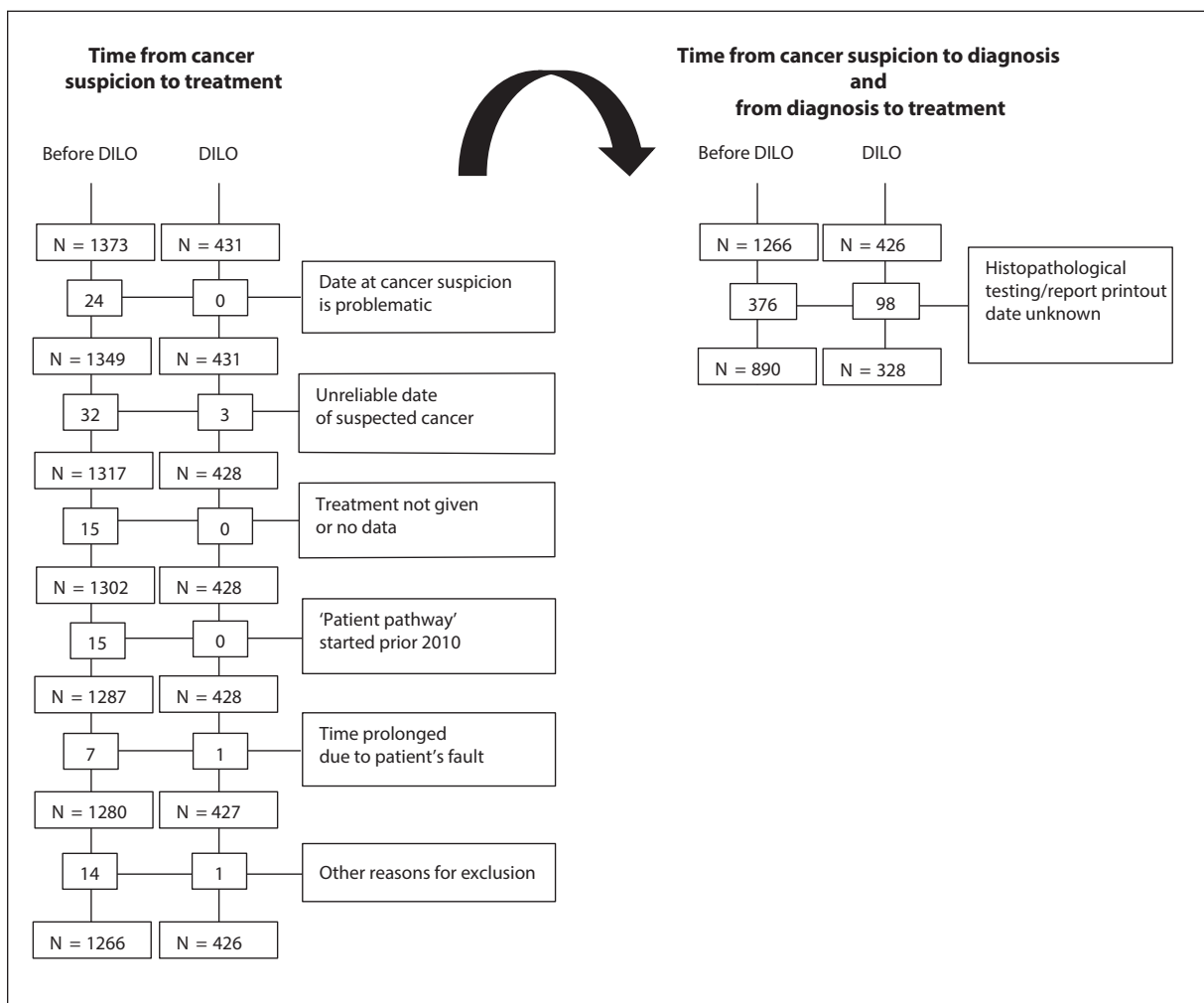
Figure 1. Study enrolment criteria for subject patients

results were officially reported, was 7 days. In those patients with a *DILO* card, the diagnosis time was shortened by 8 days (p = 0.01), whilst the duration of histopathological testing remained unchanged. Patients without *DILO* cards however had an increased diagnosis time by more than 2 weeks (p = 0.03) and their median time of histopathological testing also increased (by 2 days). The time from histopathological diagnosis to starting treatment had not substantially changed since the *DILO* reform was introduced (Fig. 2B).

Discussion

Guidelines and regulations in many countries are in place which govern patient waiting times for oncological treatment. In the UK, this time is legally guaranteed; the maximum waiting time between a GP (General Practitioner) visit to a specialist physician appointment is 14 days, whilst the duration between the diagnosis of cancer to treatment is 31 days. The maximum waiting time between a GP/family doctor referral when cancer is suspected until starting treatment is 62 days. Similarly in Denmark, the first visit to an oncologist must be made within 2 weeks upon whence

a referral is issued, (referral to a specialist electronically provided, where the patient is also invited to visit by telephone or electronic means), whilst oncological treatment must begin no later than the ensuing 2 weeks. Waiting times for complementary chemotherapy or radiotherapy cannot be more than 4 weeks from the date that the referral was received. Very detailed recommendations are made for certain cancers, for example breast cancer, where the time from referral to imaging diagnostics and its completion cannot take more than 6 calendar days and that the diagnoses should be finished in the next 8 days, which includes histopathological findings. Oncological treatment must then begin no later than after another 13 days has elapsed; the total waiting time from when breast cancer is suspected to starting treatment is 27 days in this country. In Norway, the referral should reach a specialist and be considered within 5 working days, whilst treatment of at least 80% patients is expected to commence within 20 working days of the referral. In the Czech Republic, the maximum waiting time for computer tomography (CT) is 3 weeks, for magnetic resonance (MR) 5 weeks and 6 weeks for mammography [7].

Table I. Characteristics of patient subjects before and after introducing the *DILO* oncological reform

Patient characteristics	*DILO* reform				χ^2 test
	BEFORE		AFTER		
	Number	(%)	Number	(%)	
	1266	100	426	100	
Age					
≤ 65 lat	870	(69)	253	(59)	p < 0.001
> 65 lat	396	(31)	173	(41)	
Gender					
Women	683	(54)	179	(42)	p < 0.001
Men	583	(46)	247	(58)	
Initial tumour localisation					
Breast	317	(25)	64	(15)	
Lung	224	(17)	73	(17)	
Large intestine	164	(13)	60	(14)	
Prostate gland	123	(10)	69	(16)	
Head and neck regions	123	(10)	39	(9)	p < 0.001
Female reproductive organs	119	(9)	34	(8)	
Upper gastro-intestinal tract	60	(5)	27	(7)	
Renal tract (excluding prostate)	40	(3)	15	(4)	
Brain	35	(3)	14	(3)	
Others	61	(5)	31	(7)	
Reasons for starting the 'patient pathway'					
Feeling illness/ /lesions noticed	993	(78)	310	(73)	
Screening/ /prevention testing	197	(16)	72	(17)	p = 0.006
Follow-up testing at cancer clinics	76	(6)	44	(10)	
Centre					
IA	386	(30)	152	(36)	
IB	267	(21)	101	(24)	
IC	149	(12)	109	(25)	p < 0.001
IIA	207	(16)	64	(15)	
IIIA	134	(11)	0	(0)	
IIIB	123	(10)	0	(0)	
Private sector health services					
Yes	281	(22)	96	(23)	
No	753	(60)	330	(77)	p = 0.066
No data	232	(18)	0	(0)	
Starting treatment methods					
Surgery	609	(48)	175	(41)	
Radiotherapy and/or chemotherapy	604	(48)	219	(51)	p = 0.004
Endocrine therapy	53	(4)	32	(8)	

Up until the 1st January 2015 in Poland, there had been no statutory maximum waiting time for oncological treatment. The reform introduced for rapid oncological diagnosis and treatment presupposes certain durations in which the various stages of diagnostics should occur. The statutory maximum time for initial diagnostics is 35 days (and 28 days from 2016) whilst the maximum time for in-depth diagnosis is 28 days. The time between consultation and starting treatment cannot exceed 14 days [8]. Nonetheless, the reform does not define the maximum time after a GP/ /family doctor referral, nor that of another specialist, between when cancer is suspected to when starting treatment. Most of the *DILO* card patients (56%) received specialist outpatient care (Polish *AOS*) after cancer had been diagnosed, but only 14% of *DILO* card patients *DILO* remained under primary healthcare physicians (Polish *POZ*). Unfortunately the NFZ data on how the *DILO* reform is performing is as yet incomplete and they do not reflect the real situation of waiting time for the diagnosis and treatment of cancer. This presented study has determined the actual patient waiting time for diagnosis and oncological treatment in Poland, both before and after introducing the oncological reform, and can thus be used to assess how effective such actions undertaken by the Ministry of Health have been.

Our study has shown that the real waiting time for treatment from the suspicion of cancer in Poland was, and is still, too long; in most patients exceeding 9 weeks, with the median time being about 11 weeks both before and after the reform. It should however be stated that when only *DILO* card data are analysed, as per the NFZ, the analogous median waiting time for the same respondents are 4 weeks; however this data is unreliable as it is solely based on the documentation but does not reflect the actual situation of the patients in reality. There are only a very few studies for determining the actually real waiting time for diagnosing and treating cancer, not only in Poland but elsewhere in the world. These have been attempts to analyze waiting times for diagnosis and treatment of patients suffering from the most common cancers, i.e. lung and breast cancers. A study from 2014 on the causes of delays in treating breast cancer patients (260 women from the Lublin region) demonstrated that the average time from the first physician visit to treatment was 3.2 weeks [9]. Another study by Sawicki et al. [10] on 300 patients diagnosed with lung cancer from the Department of Torque-Surgery in Lublin (January 2010 to 2011) showed that the median waiting time for treatment after the first physician visit was 12 weeks. In Finland, diagnosing lung cancer is a priority and treatment is usually given without undue delay. Based on the Finnish database, Salomaa et al. [11] estimated that the median waiting time between starting treatment and the first GP visit was 10.4 weeks in a group of 132 patients diagnosed with lung cancer in 2001. Yorio et al. [12] conducted a retrospective analysis of 482 pa-
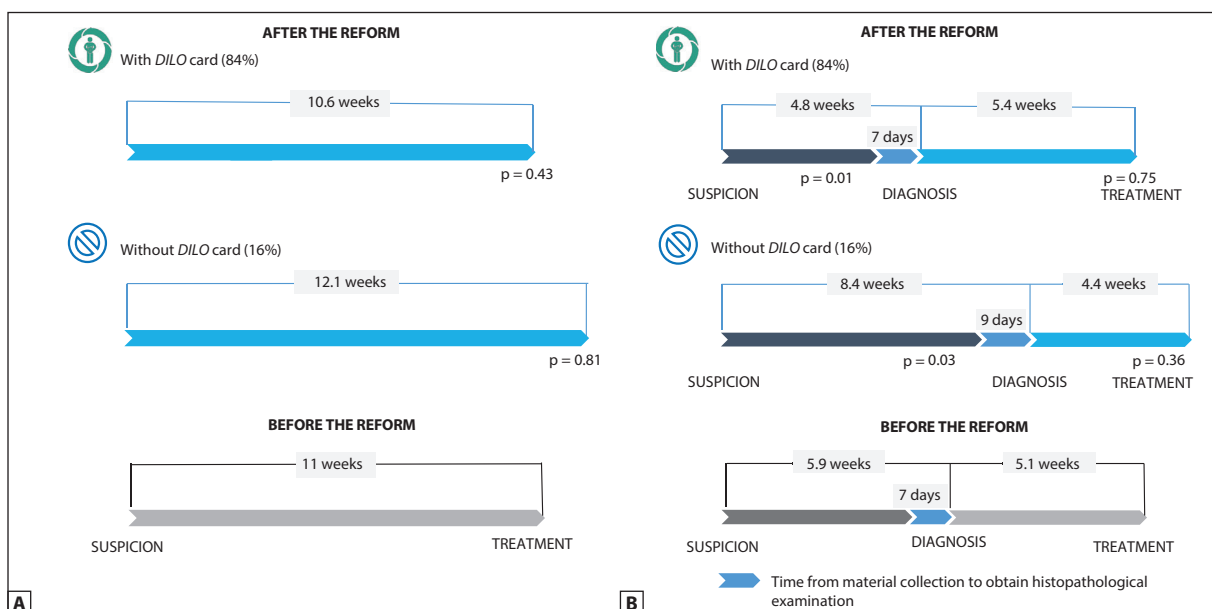
Figure 2. Waiting time (median) between starting treatment and cancer suspicion (**A**) and waiting time (median) between diagnosis and cancer suspicion along with waiting time between starting treatment and diagnosis (**B**) before and after introducing the *DILO* reforms

tients diagnosed with stage I–III non-small cell lung cancer in the United States between 2000 and 2005 and showed an 8.4 week median time between the first imaging test when cancer was suspected to when the treatment started.

Our study has shown that the median waiting time from histopathological diagnosis to suspicion of disease was 5.9 weeks and was decreased by around one week following the introduction of reforms in the *DILO* card bearing patients, but increased by more than 2 weeks in patients without this card. In Finland, the aforementioned Salomaa et al. [11] study demonstrated that the median waiting time for patients with lung cancer from the first GP visit to diagnosis was 52 days (7.4 weeks). We have shown that the median waiting time between starting treatment from histopathological diagnosis was 5.1 weeks prior to the oncological cancer reform, which remained substantially unchanged after the introduction of the *DILO* reform. Indeed, this median was similar to the statutory maximum waiting time set in the UK, at 31 days [7].

The aforementioned Yorio et al. [12] study from the USA, showed that the median waiting time between treatment and histopathological confirmation of lung cancer was 33 days. Based on a Canadian database of over 5,000 patients diagnosed with lung, breast and colorectal cancer between 1992 and 2000, the median waiting time to radiotherapy was defined and found to vary according to the type of cancer. In lung cancer, the median time from diagnosis to radiotherapy was 6 weeks, but it was 16 weeks for breast and colorectal cancers [13]. A Dutch study [5] found that the median waiting time of patients with head and neck tumours between histopathological testing to the onset of treatment was 37 days.

Determining the waiting time for oncological treatment is difficult, because defining the date of the first doctor visit when cancer symptoms actually appear is subjective. Also, the retrospective character of this study is linked to the already existing medical documentation of patients, sometimes unfortunately incomplete. Nevertheless, our survey is the largest, in terms of sample size and geographical coverage, of the real waiting time waiting between diagnosis of cancer and oncological treatment as yet undertaken so far in Poland. It also allows statutory public health initiatives to be realistically assessed for their effectiveness. Various studies have proved the likely impact of waiting time on the effectiveness of therapy and thus shortening the waiting time for oncological treatment may turn out to be one of the factors improving survival rates for those patients suffering from cancer in Poland.

Conclusions

1. The waiting time between treatment and when cancer is suspected in Poland was, and is still too long; in most patients (60%) this exceeds 9 weeks.
2. Introducing the oncological reform has not significantly reduced waiting times for cancer patients with cancer; a 3 day reduction for those with *DILO* cards but an 8 day increase for those without.
3. The waiting time reported by the *DILO* card data does not reflect actual waiting times.

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