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Original scientific paper

Malignant Neoplasms of Male Genital Organs (C60-C63) in the Osijek-Baranja County, Croatia

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A B S T R A C T

Cancers of male genital organs (C60-C63) and in particular, prostate cancer, represent one of the most frequent cancer groups among males in economically developed countries and growing cancer group in developing countries. The Institute of Public Health of the Osijek-Baranja County in collaborate with different county institutes provide updated information on the cancer occurrence and trends in the Osijek-Baranja County (OBC). The aim of this article is to provide information on the tendencies relating to this cancer group in the OBC during the period from 2001 to 2009, which will be the first report on these cancer sites on a county level in Croatia. This article processes data on cancer incidence and mortality, appertaining age distribution, median age at diagnosis and at death, cancer survival and length of stay in hospital in the OBC. From 2001 to 2009, a total of 891 males were diagnosed with cancers of male genital organs and treated in either of the two OBC hospitals. These cancers accounted for 6.2% of all registered cancers and for 12.5% of all registered cancers among males. Overall age-standardized incidence rate was 60.9/100,000 and it growing strongly during the nine-year period. Although the mortality rate increased too (overall rate was 30.5/100,000), the increase was not as huge as the one in the rate of incidence. Overall median ages at diagnosis and at death were 67.1 years and 74.6 years, respectively. The 5-year relative survival rate was estimated to be 53.4%. This report reveals weak reduction in the average length of stay in hospital per patient in the 9-years period (from 11.8 to 11.3 days) and at the same time, the number of admissions almost tripled (from 84 to 221), which is a consequence of the same rise in the number of newly registered cases. During the course of the illness, an average patient was hospitalized 1.6 times and the average length of hospital care was 11.0 days. All the indicators of the quality of the health care provided to C60-C63 cancer patients in the OBC suggest that further advancement in raising the level of diagnostics and treatment should and can be expected in order to reach the corresponding EU standards. An increased incidence and mortality rate from C60-C63 cancers leads to the conclusion that great efforts should be invested into raising the awareness of the male population over 45 years of age on the recognition of the first symptoms of this cancer group and on early preventive examination as to decrease the mortality rate and increase the survival rate and the quality of life of patients suffering from this cancer group.

***Key words**: cancer, age-standardized mortality rate, age-standardized incidence rate, 5-year relative survival, median age at diagnosis, median age at death, age distribution, length of stay in hospital, malignant neoplasms of male genital organs, C60-C63, C61, prostate cancer, Croatia, Osijek-Baranja County*

Introduction

The group of cancers of male genital organs (C60-C63), particularly prostate cancer (C61), is one of the most frequent cancer groups among males in economically developed countries. Its incidence is several times higher than in developing countries, which is a result of variations in a disparate set of risk factors and diagnostic practices. The highest incidence rates have been recorded in developed countries of Oceania, Europe and North America. In contrast, males of African descent from the Caribbean region are characterized by the highest prostate cancer mortality rates in the world[1]. The incidence and mortality rates are rising in several Asian, Central and eastern European countries[2,3]. The well-being of males with prostate cancer is of high public health significance and interest. Unfortunately, there are side effects of different kinds of treatment of prostate cancer

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and these include urinary incontinence, bowel and erectile dysfunction[4]. From 2005 to 2009, the median age at diagnosis and at death in from prostate cancer the USA was 67 and 80 years, respectively, Among all registered patients, only 0.6% of cases referred to patients under 45 years of age (no cases under 35 years of age) while 2/3 of prostate cancer patients in the USA were diagnosed between 55 and 74 years of age. The overall age-adjusted incidence and mortality rate in males were 154.8/100,000 and 23.6/100,000 in males per year, respectively. The overall 5-year relative survival rate from this cancer in 18 SEER geographic areas was 99.2% in the period from 2002 to 2008[5]. Within the EU, the prostate cancer age-standardized incidence rate was 86.7/100,000 in 2006 and the highest rates are estimated in Ireland (183/100,000) and the lowest ones Greece (28/100,000)[6,7]. In the EU as a whole, the prostate cancer mortality rate showed a modest decline from the 1990–1994 period to the 2000–2004 period (from 14.9 to 14.3/100,000, –4% at all ages and from 5.9 to 5.5/100,000, –7% at age 35–64). In Western Europe, peak mortality rates were observed in the 1990s[8]. A decreasing trend of prostate cancer mortality was observed in France, Germany and the UK in the last decade of the 20th century whereas rates went up in Russia, Baltic countries, Poland and other central and eastern European countries[9]. In Croatia, it was the third most common male cancer after lung and colorectal cancer. The age standardized rate for prostate cancer was 67.8 in 2006 and mortality rate was 27/100,000[6,10]. Interpretation of trends in the incidence and survival from this cancer are complicated by the increasing impact of prostate-specific antigen (PSA) testing. It is not clear whether changes in the prostate cancer incidence and mortality result from earlier diagnosis (PSA testing), improved treatment or some combination of these or other factors. Older age, race (black), and family history remain the only well-established risk factors in this view[11,12].

General information on the C60-C63 cancer group in Croatia has so far existed only on the national level while this information on county levels has been scarce[13]. Data on the status of this cancer group in the Osijek-Baranja County (OBC) have never been published (OBC). Therefore, this paper is aimed at providing general information on malignant neoplasms of male genital organs in the OBC and on the burdens of the health care system caused by this cancer. This is the first paper that deals with this issue on a county level in the Republic of Croatia.

Materials and Methods

Data source

Although the representativeness of their data might be challenged, mandatory county hospitals data reports, county bureaus of statistics and the County Register of Deaths still represent the only available source of information on the profile of cancer in the OBC. All data from the 2001–2009 period originate from these institutions. The cohort studied in this article included all people with cancer who were registered as the patients in one of two hospitals in the OBC in the time period from 1996 to 2010. Based on these sources, a database of people who were hospitalized in the area of the OBC for any reason whatsoever (including cancer) has been generated[14,15]. The data on each of the hospitalized patients have been supplemented with data obtained from the Register of Deaths.

Data on every person with cancer are accompanied with their chronological order of illness and hospitalization. The database involved all hospitalizations and all data on ONKO or BSL forms (mandatory statistical patterns for all hospitalized patients in Croatia). The ONKO form is mandatory statistical reports on every hospitalized cancer patients in Croatia. The BSL form is a mandatory statistical report on every hospitalized person, regardless of the causes of hospitalization. All cancer patients coming from this area are hospitalized in state-owned (public) hospitals since there are still the only hospitals here.

Statistical analysis

The cancers were classified according to the International Statistical Classification of Diseases and Related Health Problems (ICD-10), codes C60-C63. The cancer incidence and mortality estimates in the period from 2001 to 2009 were prepared for all cancers based on gender and for age groups 0–19, 20–44, 45–64, 65+ by the year at cancer diagnosis. Based on the 2001 census, the analysis covered a total population of 330.506 people in the OBC. The Croatian National Health Insurance is a universal health insurance that covers all or almost all costs (depending on a personal choice of the type of insurance) of treatment of Croatia citizens and provides them with the same chances recovery and health care. Therefore, this article can be said to comprise the entire population of cancer patients treated in the OBC.

Descriptive statistics were used for both age and gender. The survival rates denote the outcome up to 5 years after diagnosis. This applies to cancer patients who were diagnosed with cancer during the 2001–2005 period. All survival estimates were age-adjusted on the basis of four age groups. The analyses were conducted using age-specific rates, the age-standardization-direct method and 95% confidence intervals (95% CI). The standardized incidence and mortality rates as well as the 95% confidence intervals were computed for C60-C63 pursuant to the year at cancer diagnosis. Also, both rates were stratified according to the year at cancer diagnosis, age and gender. The median age is the observation ranked in the middle; that is 50% of patients are diagnosed at an older age and 50% are diagnosed at a younger age compared to the median. The EU standard population was used in the analysis[16]. The length of stay was determined according to the date of admission and to the date of discharge with regard to the index admission. The SAS statistical package (version 9.1, SAS Institute INC., Cary, NC, USA) was used for the statistical analysis[17] and Microsoft® Office Excel® 2007.

Results

In terms of the entire C60-C63 cancer group, the median age at diagnosis (MADg) was 67.1 years (Table 1). The median age for prostate cancer (C61), the most common cancer in this group (86.9%), was 71.2 years. There was slightly decrease trendline in median age (R^2=0.029). The median age at death (MAD) was 74.6 years, which is

TABLE 1
THE OVERALL MEDIAN AGE AT DIAGNOSIS AND AT DEATH FOR MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60-C63) IN THE OBC, PERIOD 2001–2009, EU STANDARD POPULATION

			Overall median age (in years) at diagnosis		
ICD-10	Age group	OMA (years)	COD(S)	Strength	Trendline
C60		66.7	y=73.56x–0.09, R^2=0.195	Moderate	DW
C61		71.2	y=71.50x–0.00, R^2=0.029	Barely	DW
C62		33.2	y=34.84x–0.02, R^2=0.011	Barely	DW
C63		54.1	y=52.58x0.042, R^2=0.024	Barely	UW
C60-C63		67.1	y=67.93x–0.00, R^2=0.085	Weak	DW
			Overall median age (in years) at death		
C60		69.4	y=75.04x–0.07, R^2=0.199	Moderate	DW
C61		76.2	y=74.62x0.011, R^2=0.253	Moderate	UW
C62		47.8	y=64.30x–0.19, R^2=0.534	Strong	DW
C63		–	–	–	–
C60-C63		74.6	y=74.64x0.004, R^2=0.052	Weak	UW
			Overall median age (in years) at diagnosis (age groups)		
C60	45–64	47.9	y=60.44x–0.05, R^2=0.035	Weak	DW
	65+	68.7	y=71.28x0.041, R^2=0.081	Weak	UW
442 C61	45–64	60.6	y=60.76x–0.00, R^2=0.072	Weak	DW
	65+	73.7	y=73.52x0.002, R^2=0.029	Barely	UW
C62	0–19	17.4	y=15.27x0.066, R^2=0.578	Strong	UW
	20–44	31.0	y=30.17x0.026, R^2=0.117	Weak	UW
	45–64	51.3	y=54.63x0.018, R^2=0.013	Barely	UW
	65+	67.2	–	N/A	–
C63	20–44	38.6	–	N/A	–
	45–64	46.2	y=44.40x0.094, R^2=0.408	Moderate	UW
	65+	78.3	–	N/A	–
C60-C63	0–19	17.4	17.38493151	N/A	–
	20–44	31.6	y=31.02x0.012, R^2=0.021	Barely	UW
	45–64	59.3	y=59.55x–0.00, R^2=0.021	Barely	DW
	65+	73.7	y=73.47x0.002, R^2=0.067	Weak	UW
			Overall median age (in years) at death (age groups)		
C60	45–64	58.0	–	N/A	–
	65+	74.1	y=72.60x0.015, R^2=0.081	Weak	UW
C61	45–64	60.7	y=61.19x–0.01, R^2=0.057	Weak	DW
	65+	77.1	y=76.43x0.006, R^2=0.190	Moderate	UW
C62	20–44	31.9	y=33.01x–0.02, R^2=0.084	Weak	DW
	45–64	54.6	y=67.99x–0.11, R^2=0.876	Very Strong	DW
	65+	69.8	–	N/A	–
C60-C63	20–44	31.9	y=33.01x–0.02, R^2=0.084	Weak	DW
	45–64	59.5	y=61.77x–0.02, R^2=0.161	Moderate	DW
	65+	76.9	y=76.22x0.007, R^2=0.239	Moderate	UW

COD(S) – Coefficient of determination (strength), »–« or N/A – no cases or too small number of cases, not available, DW – downward, UW – upward, OMA – overall median age in period 2001–2009, R^2 – relationship

7.5 years later than the appertaining MADg. Patients with prostate cancer in the observed period dies in older median age (R^2=0.253).

The average annual incidence of cancers of male genital organs in the whole 9-year study period was 99 cases/year (a total of 891 cases, 6.2% of all registered cancers and 12.5% of all registered cancers among males in the OBC). The overall age-standardized incidence rate (ASIR) was 60.9/100,000 (using the EU standard population, SD±6.1 CI 48.91–72.86). The ASIR of the C60-C63 cancer group increased strongly (R^2=0.559), particularly in the years 2004 and 2005 (Table 2). The changes in the incidence rates in the entire cancer group of C60-C63 directly dependent on changes in the rate of prostate cancer (C61) because its share is 86.9% (Tables 2 and 3, Figures 1 and 3). The ASIR moderate increased in all age groups except for the age group up to 20 years

In the same period, there were average annual of 50 (a total of 446 cases) deaths from cancers of male genital organs (5.2% of all registered deaths and 8.9% of all registered deaths among males). While the change in the incidence rate was strong, the increasing change in the age-standardized mortality rate (ASMR) of C60-C63 cancers was moderate (R^2=0.402, Table 2, Figure 2). The overall ASMR was 30.5/100,000 (using the EU standard population, SD±4.3 CI 21.99–38.92). The share of deaths from prostate cancer is 95.0%. The ASMR moderate increased only in the age group 65+ years, while it slightly decreased in the age group 45–64 years (Tables 2, 4 and 5, Figure 4).

The overall 5-year relative survival (after cancer diagnosis) from cancer group C60-C63 was estimated to be 53.4% (Table 6, Figure 5). Two most common cancer sites, the malignant neoplasm of prostate (C61) and the malignant neoplasm of testis (C62) were followed by the 5-year survival rate of 48.5% and 88.6.8%, respectively.

The results in Tables 7.3 and 8.3 and Figure 6 clearly indicate that new cases of C60-C63 cancers and deaths from them mostly referred to patients aged 65+ (71.2% and 89.2%, respectively). Only 9.0% of new cases were registered in patients aged 0–44 except for prostate cancer (C61, 0.0%). Only 1.3% of deaths were registered among patients aged 0–44 (Tables 7 and 8).

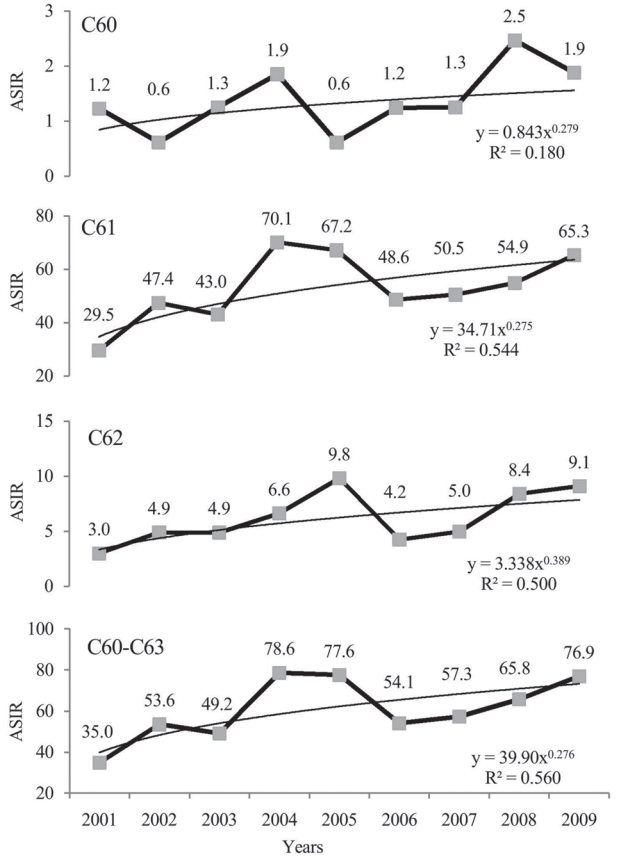

Fig 1. The cancer age-standardized incidence rate (ASIR) for C60--C63 (selected cancer sites) in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The upward trendline suggests that a moderate relationships exist for C60 (malignant neoplasm of penis, R^2=0.180) and a strong relationships exist for C61 (malignant neoplasm of prostate), C62 (malignant neoplasm of testis) and for whole cancer group C60-C63 (R^2=0.544, R^2=0.500 and R^2=0.560, respectively) (R^2>0.48<0.81).

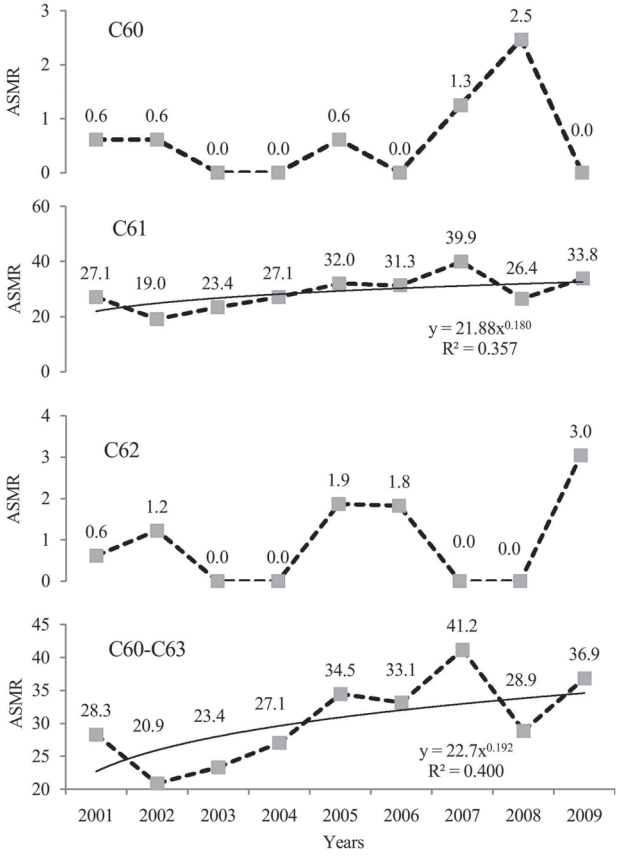

Fig 2. The cancer age-standardized mortality rate (ASMR) for C60-C63 in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The rising trendlines suggests that a moderate relationships exist between the ASMR and years for cancer site C61 and for whole cancer group C60-C63 (R^2=0.357 and R^2=0.400, respectively, R^2>0.16<0.49.)

TABLE 2
HISTORICAL DATA ON THE C60-C63 OVERALL CANCER AGE-STANDARDIZED INCIDENCE AND MORTALITY NUMBER AND RATES COVERING THE PERIOD FROM 2001–2009

C60-C63	Incidence rate		Mortality rate	
Year of data collection	N	ASR	N	ASR
2001	57	35.0	46	28.3
2002	87	53.6	34	20.9
2003	80	49.2	38	23.4
2004	128	78.6	44	27.1
2005	126	77.6	56	34.5
2006	88	54.1	54	33.1
2007	93	57.3	67	41.2
2008	107	65.8	47	28.9
2009	125	76.9	60	36.9
COD(S) – R^2=	0.559		0.402	
Trendline	UW		UW	
Overall in period 2001–2009	99	60.9	50	30.5

N – average number of cases per year, ASR – age-standardized rate (EU), UW – upward, COD(S) – Coefficient of determination (strength), ASR – age-standardized rate per 100,000 (using the EU standard population), R^2 – relationship

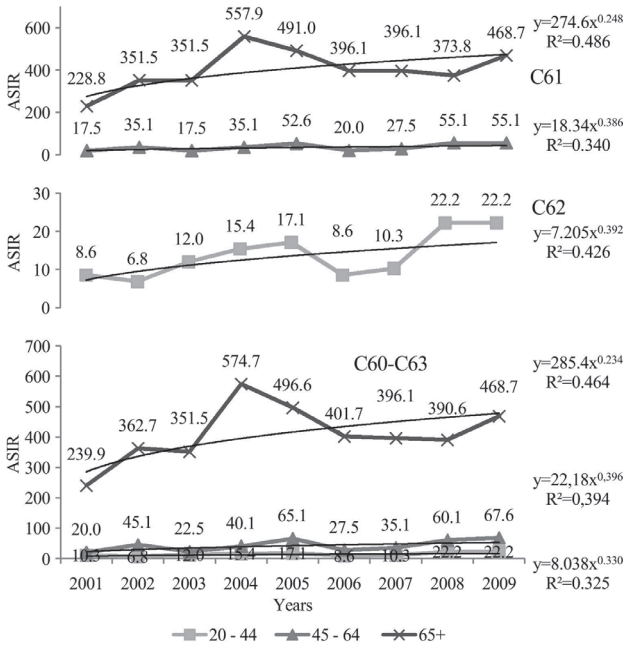

Fig. 3. The cancer age-standardized incidence rate (ASIR) for cancer group C60-C63 (selected cancer sites) in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The rising trendline suggest that a strong relationship exists for C61 in age 65+ between ASIR and years, R^2= 0.486 (R^2>0.48<0.81). For other cancer sites there were moderate upward trendlines.

TABLE 3
THE OVRALL AGE-STANDARDIZED INCIDENCE RATE (ASIR) IN THE OBC FOR MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60-C63) PER 100,000 USING EU STANDARD POPULATION, PERIOD 2001–2009

ICD-10	Overall ASIR, 2001–2009	COD(S)	Trendline	Strength
C60	1.4	y=0.843x0.279, R^2=0.180	UW	Moderate
C61	53.0	y=34.71x0.275, R^2=0.544	UW	Strong
C62	6.2	y=3.338x0.389, R^2=0.500	UW	Strong
C63	0.3	y=0.992x–0.24, R^2=0.573	DW	Strong
C60-C63	60.9	y=39.90x0.276, R^2=0.560	UW	Strong

COD(S) – Coefficient of determination (strength), DW – downward, UW – upward, R^2 – relationship

TABLE 4
THE OVERALL AGE-STANDARDIZED MORTALITY RATE (ASMR) IN THE OBC FOR MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60-C63) PER 100,000 USING EU STANDARD POPULATION, PERIOD 2001–2009

ICD-10	Overall ASMR, 2001–2009	COD(S)	Trendline	Strength
C60	0.6	y = 0.490x0.509, R^2 = 0.529	UW	Strong
C61	28.9	y = 21.88x0.180, R^2 = 0.357	UW	Moderate
C62	1.0	y = 0.662x0.653, R^2 = 0.954	UW	Very Strong
C60-C63	30.5	y = 22.70x0.192, R^2 = 0.400	UW	Moderate

COD(S) – Coefficient of determination (strength), DW – downward, UW – upward, R^2 – relationship

TABLE 5
THE AGE-STANDARDIZED INCIDENCE AND MORTALITY RATES IN RELATION WITH AGE OF THE OBC CANCER PATIENTS OF MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60-C63) IN THE PERIOD 2001–2009, EU STANDARD POPULATION

	Incidence rate				Mortality rate			
Age	2001–2009	COD(S)	Trendline	Strength	2001–2009	COD(S)	Trendline	Strength
0–19	1.3	R^2=0.107	UW	Moderate	0.0	–	–	–
20–44	13.9	R^2=0.325	UW	Moderate	1.1	N/A	–	–
45–64	42.6	R^2=0.394	UW	Moderate	10.6	R^2=0.001	DW	No
65+	409.2	R^2=0.464	UW	Moderate	249.2	R^2=0.471	UW	Moderate

COD(S) – Coefficient of determination (strength), R – Relationship, DW – downward, UW – upward, »–« or N/A – no cases or too small number of cases, not available

TABLE 6
THE FIVE YEARS RELATIVE SURVIVAL RATES FOR C60-C63 CANCERS IN THE OBC, PERIOD 2001–2005

	C60-C63 – % (number of survival cases)									
ICD-10	0–19		20–44		45–64		65+		All ages	
C60	–	–	100.1	(1)	101.0	(2)	71.1	(4)	78.8	(7)
C61	–	–	–	–	67.8	(51)	46.4	(149)	48.5	(200)
C62	100.1	(2)	97.3	(34)	50.5	(5)	106.6	(1)	88.6	(42)
C63	–	–	100.1	(1)	101.0	(1)	106.6	(1)	101.3	(3)
C60-C63	100.1	(2)	97.4	(36)	67.0	(59)	47.2	(155)	53.4	(252)

»–« – no cases, 0.0 – no survival cases

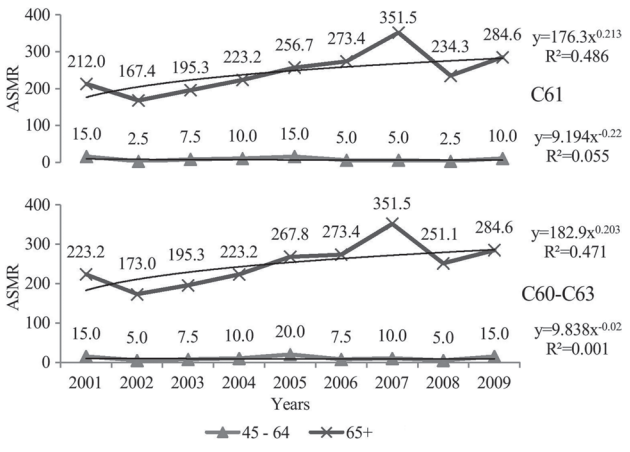

Fig. 4. The cancer age-standardized mortality rate (ASMR) for cancer group C60-C63 (selected cancer sites) in the period 2001–2009 in the OBC per 100,000 inhabitants using the EU standard population. The rising trendlines suggest that a strong relationship exists for C61 in age 65+ between ASMR and years, R^2= 0.486 (R^2>0.48<0.81).

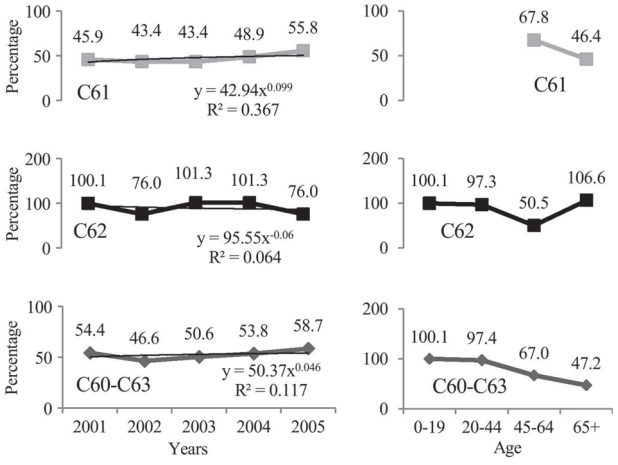

Fig. 5. The age-standardized 5-year relative survival rate for cancer group C60-C63 in the OBC in the 2001–2005 period. The rising trendlines suggest that a weak relationship exists between 5-years relative survival rates and years, R^2=0.117 (R^2>0.04< 0.16) and moderate relationship for cancer site C61 (R^2=0.367 (R^2>0164<0.48).

In the 2001–2009 period, a total of 891 patients were hospitalized in the OBC due to C60-C63 cancers with the average number of hospital admissions (NOAH) per patient of 1.6 times (moderate upward trendline, R^2=1.6). The average length of stay in hospital (LOSH) was 11.0 days (Table 9, Figure 7). The LOSH declined with the age. Patients aged 45–64 diagnosed from the most common cancer in this group, prostate cancer (C61), spent 0.6 days more in hospital than patients of the 65+ age group (11.2 and 10.6 days, respectively) (Tables 9 and 10).

The number of hospital admissions increased continuously for all age groups from 2001 to 2009, except for the 20–44 age group (Table 11). The increase trendline

TABLE 7
THE AGE DISTRIBUTION AT DIAGNOSIS FOR MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60–C63) IN THE OBC, PERIOD 2001–2009

TABLE 7.1

ICD-10	Age	2001–2009 (%)	Trendline	COD(S)
C60	20–44	5.0	-	N/A
	45-64	45.0	-	N/A
	65+	50.0	UW	R2=0.079
C61	45–64	19.5	UW	R2=0.052
	65+	80.5	DW	R2=0.083
C62	0-19	6.5	UW	R2=0.001
	20–44	78.3	DW	R2=1E-05
	45–64	14.1	DW	*R2=0.382
	65+	1.1	-	N/A
C63	20–44	20.0	-	N/A
	45–64	60.0	-	N/A
	65+	20.0	-	N/A
C60–C63	0–19	0.7	-	N/A
	20–44	8.3	-	R2=0.008
	45–64	19.8	-	R2=0.078
	65+	71.3	-	*R2=0.131

TABLE 7.2

C60	All ages	2.2	DW	R^2=1E–05
C61		86.9	DW	R^2=2E–05
C62		10.3	UW	*R^2=0.173
C63		0.6	DW	**R^2=0.0752

TABLE 7.3 The age proportion of each cancer site

	0–44	45–64	65+	All ages
C60	0.1	1.0	1.1	2.2
C61	0.0	16.9	69.9	86.9
C62	8.8	1.5	0.1	10.3
C63	0.1	0.3	0.1	0.6
C60–C63	9.0	19.8	71.2	

R – relationship, * – moderate R, ** – strong R, *** – very strong and extremely dependable R, COD(S) – Coefficient of determination (strength), N/A – not available, COD(S), DW – downward, UW – upward, »–« – weak or no R, BG – Both genders, F – Females, M – Males

Fig. 6. The age distribution for malignant neoplasms of male genital organs (C60-C63) in the period 2001–2009.

TABLE 8
THE AGE DISTRIBUTION AT DEATH FOR MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60–C63) IN THE OBC, PERIOD 2001–2009

TABLE 8.1

ICD-10	Age	2001–2009 (%)	Trendline	COD(S)
C60	45–64	44.4	-	N/A
	65+	55.6	DW	**R2=0.497
C61	45–64	7.6	DW	R2=0.154
	65+	92.4	UW	*R2=0.200
C62	20–44	42.9	UW	**R2=0.649
	45–64	42.9	DW	R2=0.145
	65+	14.3	–	N/A
C60–C63	20–44	1.3	UW	***R2=0.891
	45–64	9.4	DW	R2=0.058
	65+	89.2	UW	R2=0.006

TABLE 8.2

C60	All ages	2.0	UW	*R^2=0.255
C61		94.9	DW	R^2=0.048
C62		3.1	UW	**R^2=0.722

TABLE 8.3 The age proportion of each cancer site

	0–44	45–64	65+	All ages
C60	–	0.9	1.1	2.0
C61	–	7.2	87.7	94.9
C62	1.3	1.3	0.4	3.1
C60–C63	1.3	9.4	89.2	

R – relationship, * – moderate R, ** – strong R, *** – very strong and extremely dependable R, COD(S) – Coefficient of determination (strength), N/A – not available COD(S), DW – downward, UW – upward, »–« – weak or no R, BG – Both genders, F – Females, M – Males

were strong in the age groups 45–64 and 65+ years (R^2=0.667 and R^2=0.729, respectively). During the whole 9-year period, the increase in the hospital admissions was almost fourfold in the 45–64 age group (from 12 to 54, strong upward trendline R^2=0.667) while the hospital admissions more than doubled in the 65+ age group (from 56 to 133, strong upward trendline, R^2=0.729). The average LOSH was weakly decreased in the 45–64 age group (R^2=0.146), in the 65+ age group (R^2=0.110), but moderately increased in the 20–44 age group (R^2= 0.182, Table 11).

Discussion

The rates of cancers of male genital organs (especially prostate cancer) vary widely throughout the globe. These cancers are least common in South and East Asia and more common in Europe and the United States. The incidence rates greatly differentiate worldwide mostly due to wide utilization of PSA testing[18,19]. Tendencies in the in-

TABLE 9
THE NUMBER OF CANCER HOSPITALIZATIONS AND THE AVERAGE LENGTH OF STAY IN HOSPITAL FOR MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60-C63) IN THE OBC, PERIOD 2001–2009

	Number of hospital admissions					Overall length of stay in hospital				
	Age groups									
ICD-10	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
C60	–	2	18	21	41	–	8.5	11.2	11.3	11.1
C61	–	–	225	951	1176	–	–	11.2	10.6	10.7
C62	7	165	31	1	204	21.1	12.4	10.6	4.0	12.4
C63	–	1	3	2	6	–	15.0	12.7	22.5	16.3
C60-C63						21.1	12.4	11.1	10.6	11.0
C60										
Overall	–	0.2	2.0	2.3	4.6	–	8.5	11.2	11.3	11.1
COD(S) R^2 =	N/A	N/A	0.727	0.301	0.000	N/A	N/A	0.076	0.113	0.122
Trendline	N/A	N/A	UW	DW	UW	N/A	N/A	DW	UW	UW
Strength	N/A	N/A	Strong	Moderate	Barely	N/A	N/A	Weak	Weak	Weak
C61										
Overall	–	–	25.0	105.7	130.7	–	–	11.2	10.6	10.7
COD(S) R^2 =	N/A	N/A	0.631	0.759	0.817	N/A	N/A	0.199	0.080	0.212
Trendline	N/A	N/A	UW	UW	UW	N/A	N/A	DW	DW	DW
Strength	N/A	N/A	Strong	Strong	Very Strong	N/A	N/A	Moderate	Weak	Moderate
C62										
Overall	0.8	18.3	3.4	0.1	22.7	21.1	12.4	10.6	4.0	12.4
COD(S) R^2 =	0.107	0.131	0.398	N/A	0.351	0.035	0.202	0.000	N/A	0.155
Trendline	UW	UW	DW	N/A	UW	UW	UW	DW	N/A	UW
Strength	Weak	Weak	Moderate	N/A	Moderate	Weak	Moderate	Barely	N/A	Weak
C63										
Overall	–	0.1	0.3	0.2	0.7	–	15.0	12.7	22.5	16.3
COD(S) R^2 =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trendline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Strength	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C60-C63										
Overall	0.8	18.7	30.8	108.3	158.6	21.1	12.4	11.1	10.6	11.0
COD(S) R^2 =	0.107	0.106	0.667	0.729	0.800	0.035	0.182	0.146	0.110	0.040
Trendline	UW	UW	UW	UW	UW	UW	UW	DW	DW	DW
Strength	Weak	Weak	Strong	Strong	Strong	Weak	Moderate	Weak	Weak	Weak

COD(S) – Coefficient of determination (strength), R – Relationship, DW – downward, UW – upward, »–« or N/A – no cases or too small number of cases, not available, Overall – overall in period 2001–2009

cidence and mortality rate from prostate cancer in Croatia (unlike the trends in Europe) have disclosed an increase since 1997[20,21]. During the 9-year study period (2001–2009), the incidence (strongly) and mortality rate (moderately) increased in the OBC. Despite the fact that the health care in the OBC has been familiar and provided with all the procedures and knowledge needed for early detection of these cancers, particularly prostate cancer (digital rectal examination, PSA and transrectal ultrasound of the prostate and other methods), it is not clear why the mortality rate is still growing. A lack of necessary information and a late visit to the doctor for preventive examination in males aged 65+ with disturbed prostate functions (e.g. erectile and urinary dysfunction) might be identified as reasons for the rising mortality in the OBC.

The age-standardized incidence rate of C60-C63 cancers in the OBC was lower than those in the EU and Croatia but is still increasing. It may reflect no recent stabilization of prostate-specific antigen test utilities, re-

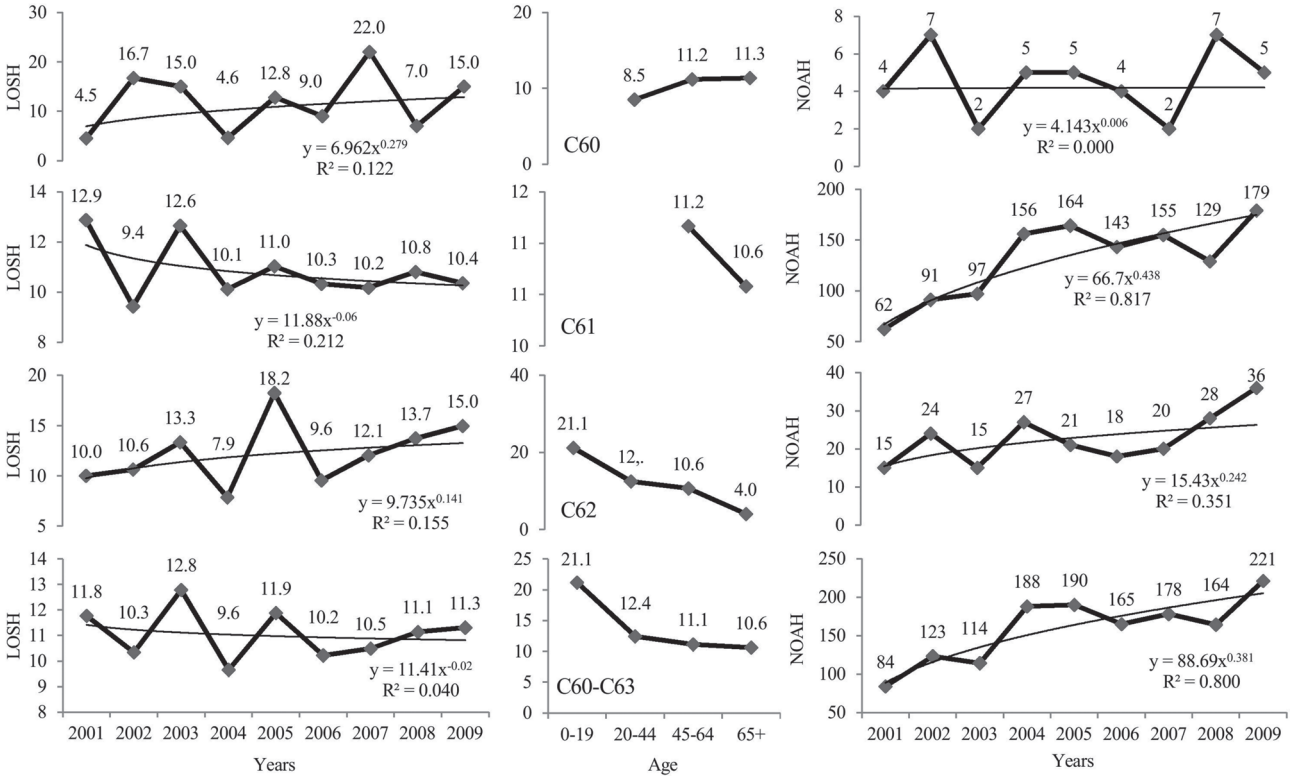

Fig. 7. Length of stay in hospital (LOSH) (in days) and number of hospital admissions (NOAH) of cancer group C60-C63 in the OBC in the 2001–2009 period. Very strong and strong relationships exist between NOAH and years for C61 and C60-C63 (R^2= 0.817 and R^2=0.800, respectively).

TABLE 10
THE YEARS OF DIAGNOSIS AND TRENDLINES OF THE AVERAGE ADMISSION IN HOSPITAL, THE AVERAGE LENGTH OF STAY IN HOSPITAL AND THE NUMBER OF ADMISSION IN HOSPITAL PER PATIENT FOR SELECTED MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60-C63) IN THE OBC, PERIOD 2001–2009

Year	C61				C62				C60-C63			
	NOAH	N	AAH	LOSH	NOAH	N	AAH	LOSH	NOAH	N	AAH	LOSH
2001	62	48	1.3	12.9	15	5	3.0	10.0	84	57	1.5	11.8
2002	91	77	1.2	9.4	24	8	3.0	10.6	123	87	1.4	10.3
2003	97	70	1.4	12.6	15	8	1.9	13.3	114	80	1.4	12.8
2004	156	114	1.4	10.1	27	11	2.5	7.9	188	128	1.5	9.6
2005	164	109	1.5	11.0	21	16	1.3	18.2	190	126	1.5	11.9
2006	143	79	1.8	10.3	18	7	2.6	9.6	165	88	1.9	10.2
2007	155	82	1.9	10.2	20	8	2.5	12.1	178	93	1.9	10.5
2008	129	89	1.4	10.8	28	14	2.0	13.7	164	107	1.5	11.1
2009	179	106	1.7	10.4	36	15	2.4	15.0	221	125	1.8	11.3
2001–2009	1176	774	1.5	10.7	204	92	2.2	12.4	1427	891	1.6	11.0
COD(S) – R^2 =	0.817	0.543	0.558	0.212	0.351	0.491	0.153	0.155	0.800	0.559	0.404	0.040
Trendline	UW	UW	UW	DW	UW	UW	UW	UW	UW	UW	UW	DW

NOAH – number of hospital admissions, N – number of cases, AAH – average admission in hospital per patient, LOSH – length of stay in hospital, COD(S) – Coefficient of determination (strength), UW – upward, DW – downward

sulting in decreased detection or a reduced number of timely diagnosed cases. The mortality rate was two times higher than that in the EU and did not exceed the Croatian average by much[6–10]. Prostate cancer alone accounted for 12.5% of new cancer cases among males in the OBC, which is still only a half way to the appertain-

TABLE 11
THE YEARS OF DIAGNOSIS AND THE AVERAGE LENGTH OF STAY IN HOSPITAL (LOSH) AND NUMBER OF HOSPITAL ADMISSIONS (NOHA) FOR MALIGNANT NEOPLASMS OF MALE GENITAL ORGANS (C60-C63) IN THE OBC, PERIOD 2001–2009

Year	NOAH					Average LOSH				
	0–19	20–44	45–64	65+	All ages	0–19	20–44	45–64	65+	All ages
2001	–	16	12	56	84	–	10.3	12.2	12.1	11.8
2002	–	15	27	81	123	–	9.2	13.1	9.6	10.3
2003	1	14	19	80	114	10.0	13.6	10.5	13.2	12.8
2004	–	25	33	130	188	–	8.3	10.6	9.7	9.6
2005	1	15	39	135	190	52.0	18.1	11.9	10.9	11.9
2006	–	11	30	124	165	–	11.8	10.0	10.1	10.2
2007	4	13	24	137	178	17.5	10.2	13.8	9.7	10.5
2008	–	26	39	99	164	–	13.0	10.7	10.8	11.1
2009	1	33	54	133	221	16.0	15.5	9.6	10.9	11.3
Trendline	UW	UW	UW	UW	UW	21.1	UW	DW	DW	DW
COD (S) – R^2 =	0.107	0.106	0.667	0.729	0.800	0.035	0.182	0.146	0.110	0.040
2001–2009	0.8	18.7	30.8	108.3	158.6	21.1	12.4	11.1	10.6	11.0
Strength	Weak	Weak	Strong	Strong	Strong	Weak	Moderate	Weak	Weak	Weak

COD (S) – R^2 – Coefficient of determination (strength), R – relationship, »–« – downward trendline, »+« – upward trendline, NOAH – number of hospital admissions, LOSH – length of stay in hospital, »–« – no cases

ing USA percentage (28%). However, the 5-year relative survival rate approaches 100% in the latter country nowadays[22]. The mean European 5-year relative survival was 76.5%. In Nordic countries, the survival rate was generally above the European mean while in Eastern countries, it was systemically lower, which supports the thesis about great differences in C60-C63 cancer survival rates across Europe[23]. Unfortunately, the OBC 5-year relative survival rate of 53.4% from the C60-C63 cancer group and 48.5% from prostate cancer (C61) were both much below the European average. At this point, these discouraging data are difficult to explain. On the one hand, it is well known the way in which diagnosis and treatment is carried out. These activities are known to medical professionals and the manner in which they are implemented. On the other hand, it is declared that these activities are implemented. What is then the reason for these data?

The risk of getting C60-C63 cancers and prostate cancer alone rose rapidly with the age in the OBC. All patients who died of prostate cancer were at least 45 years old at the moment of death.

The length of stay in hospital is as an important factor influencing both hospital charges and patient costs. This report reveals a weak decline in the length of stay in hospital per patient in period 2001–2009 while at the same time, the number of admissions and average admission in hospital per patient strongly went up. Implementation of clinical pathways for patients with prostate cancer has been confirmed as a simple and effective method for reducing length of hospital stay without having effect on complications, readmission rates or patient satisfaction[24]. The question which length of hospitalization is optimal and necessary after implementation of this procedure arises controversies[25]. Unfortunately, mandatory statistical reports (ONKO forms) in the OBC (as well as on the state level) did not contain information on implemented medical treatments, so there is no possibility to compare the length of hospitalization with them. It is a pity that this problem has existed in Croatia for years.

All the indicators of the quality of the health care provided to C60-C63 cancer patients in the OBC[26,27] suggest that further advancement in raising the level of timely diagnostics and treatment of the OBC patients should and can be expected in order to reach the corresponding European standards. An increased incidence and mortality rate from C60-C63 cancers leads to the conclusion that great efforts should be invested into raising the awareness of the male population over 45 years of age on the recognition of the first symptoms of this cancer group and on necessary regular examination as to prevent fatal consequences therefrom. Finally, the 5-year relative survival rate from this cancer is below the Croatian average, which is a worrying fact that directly addresses the health care system.

Limitations

Patients who were treated outside the two state-owned (public) hospitals in the OBC are not registered with the IPHO. Despite the efforts to obtain this information (it exists at the national level) in its original form, the authors were unable to obtain those data for unknown reasons. Therefore, these data on cancer in the OBC may differ from the official state data on cancer in the OBC.

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RAK MUŠKIH SPOLNIH ORGANA U OSJEČKO-BARANJSKOJ ŽUPANIJI, HRVATSKA

SAŽETAK

Rak muških spolnih organa (C60-C63), te posebno rak prostate kao najznačajniji rak ove skupine, je jedan od najčešćih karcinoma u muškaraca u razvijenim zemljama i s intenzivnim rastom broja oboljelih u zemljama u razvoju. Zavod za javno zdravstvo Osječko-baranjske županije u suradnji s različitim županijskim institucijama obrađuje podatke vezane za pojavu i kretanje raka na području Osječko-baranjske županije (OBC). Cilj ovoga članka je dati informaciju o kretanju raka muških spolnih organa u OBC u vremenu od 2001–2009 godine kao prvi ovakav izvještaj na razini jedne županije u Hrvatskoj. Članak sadrži podatke o incidenciji i smrtnosti, dobnoj raspodjeli, srednjoj dobi, preživljavanju i dužini hospitalizacije oboljelih od raka ove skupine. U devetogodišnjem periodu obolio je 891 pacijent od raka muških spolnih organa. Oni čine 6,2% udjela u ukupnom raku u OBC, odnosno 12.5% udjela u raku muškaraca. Dobno standardizirana stopa novooboljelih je 60,9/100.000 i raste tijekom promatranog vremena. Premda stopa smrtnosti također raste (prosječna stopa je 30,5/100.000), taj porast nije niti približno snažan kao što je porast stope novooboljelih. Za cijelu skupinu raka C60-C63 srednja dob u trenutku postavljanja dijagnoze je bila 67,1 godina, odnosno 74,6 godina za umrle. Petogodišnje relativno preživljavanje je 53,4%. Tijekom promatranog razdoblja neznatno se smanjila prosječna dužina hospitalizacije (od 11.8 na 11,3 dana), a u istom vremenu je gotovo trostruko porastao broj prijema u bolnicu (od 84 u 2001. godini na 221 prijema u 2006. godini) što je izravna posljedica povećanja broja novooboljelih. Oboljeli su prosječno 1,6 puta bili hospitalizirani zbog raka s prosječnom dužinom boravka u bolnici od 11,0 dana. Svi pokazatelji o zdravstvenoj zaštiti bolesnika oboljelih od C60-C63 ukazuju da se u zdravstvu OBC treba i može očekivati daljnji napredak u podizanju pravodobne dijagnostike i liječenja oboljelih stanovnika županije kako bi se dohvatili EU rezultati i standardi. Povećanje incidencije i smrtnosti od C60-C63 grupe raka upućuje da zajednica u OBC treba uložiti napore kako bi se u muškoj populaciji starijoj od 45 godina podigla svijest o prepoznavanju prvih simptoma raka ove skupine i ranim preventivnim pregledom djelovalo na posljedice raka. Također zabrinjava podatak o lošijem preživljavanju nakon postavljene dijagnoze raka nego što je ono u EU, a to se izravno odnosi na zdravstveni sustav.