ACTA MEDICA LITUANICA. 2011. Vol. 18. No. 4. P. 156–160

Time trends in avoidable cancer mortality in Lithuania 1992–2008

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Background. This study was aimed to evaluate achievements of medical health care services in Lithuania by analysing time trends in avoidable cancer mortality of the whole Lithuanian population from 1992 through 2008.

Materials and methods. Data of the Lithuanian Cancer Registry for 1992–2008 were used to analyse avoidable cancer mortality trends. Mortality rates for all cancer and selected cancer sites were analysed. Age-standardised rates were calculated for both sexes. The age of the study subjects ranged between 5 and 75 years. The corresponding population data by age, sex and year were available from the Statistics Lithuania.

Results. Cancer mortality has been decreasing continuously over time in both sexes. The degree of reduction in all-site cancer mortality was slightly higher in women (by 1.03% per year) than in men (by 0.83% per year). Mortality avoidable by medical intervention has been continuously decreasing since 1992 in both sexes by more than 2% per year, while mortality avoidable by primary prevention decreased only in men. Cancer mortality avoidable by secondary prevention was decreasing in women and increasing in men.

Conclusions. In Lithuania, a remarkable reduction in avoidable cancer mortality over the past decade has been found. However, the rate of reduction was slower in mortality avoidable by primary or secondary prevention methods than in mortality preventable by direct medical care, indicating that there is a need to put more effort towards primary and secondary prevention.

Key words: avoidable death, cancer mortality, quality of health care

INTRODUCTION

Avoidable mortality is defined as untimely death that may have been prevented by the timely provision of appropriate medical intervention (1), and it is frequently used as a statistical indicator of the achievements of medical health care services in order to assess the improvement of health level independently of other socioeconomic factors (2).

In the middle of 1990, Lithuania declared independence. Since then, Lithuania has experienced many changes that have, directly or indirectly, affected the health care system. Earlier studies have examined the scale of avoidable mortality in Lithuania for the period 1970–1990 (3); later, changes in avoidable cancer mortality in 1991–1999 were compared with the previous period (4). Avoidable mortality in Lithuania is reported to be higher than in Western Europe (5).

Cancer in Lithuania, like in other European countries, is the second most frequent cause of death. The analysis of mortality trends is an important tool of monitoring cancer control and evaluating the outcomes of modifications in population lifestyle, environmental risks as well as the effectiveness of health care. The analysis of cancer mortality time trends and patterns in a given population can be helpful in assessing achievements, failures and future needs in cancer control programs (5).

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The concept of 'avoidable' mortality has changed over time, and some problems such as the ambiguity of the definition and some arbitrariness in disease selection still remain unresolved (6, 7). In this study, selection of the list of avoidable cancer deaths is based on the classification proposed by Simonato et al. (8).

This study aims to evaluate the achievement of medical health care services in Lithuania by analysing the time trends in avoidable cancer mortality of the whole Lithuanian population from 1992 to 2008, based on cancer mortality data collected by the Lithuanian Cancer Registry.

MATERIALS AND METHODS

A list of avoidable deaths from cancer was compiled following the categorization of the avoidable causes of death, proposed by Simonato et al., where the avoidable causes of death in the list were categorized into those amenable to primary prevention (group 1), those amenable to early detection and treatment (group 2), and those amenable to improved treatment and medical care (group 3). These groups were defined as:

1. Causes avoidable through primary prevention, i. e. by reducing the incidence of the disease. This category includes causes whose aetiology is in part attributable to lifestyle factors (such as alcohol and / or tobacco consumption) and / or to occupational risk factors. It also includes deaths from injury and poisoning, which are influenced in part by legal and societal measures such as traffic safety and crime reduction policies.

2. Causes amenable to secondary prevention through early detection and treatment. This group includes the causes of death for which screening modalities have been established, such as cancer of breast and cervix, as well as causes in which death is avoidable through early detection combined with adequate treatment, such as skin cancer.

3. Causes amenable to improved treatment and medical care. This group includes infectious diseases in which deaths are 'avoidable' largely through antibiotic treatment and immunization, as well as the causes that require medical and / or surgical intervention, such as hypertension, appendicitis, in which deaths are related to "complex interactions within the health care system, such as accurate diagnosis, transport to hospital, adequate medical and surgical care".

Data of the Lithuanian Cancer Registry for the years 1992–2008 were used to analyse avoidable cancer mortality trends. Cancer mortality statistics are based on the underlying causes of death as reported in the medical certificate of death by the certifying physician. Causes of death were coded according to the International Classification of Diseases, 9th revision, for the period 1992–1997, and according to the International Classification of Diseases, 10th revision, for the period 1997–2008. The corresponding population data by age, sex and year were available from Statistics Lithuania. The age of the study subjects was limited to a range between 5 and 75 years.

Mortality rates for all cancer and selected cancer sites were analysed. Age-standardised rates were calculated for both sexes. Standardization was performed using the direct method (European standard population). The estimated annual percentage change (EAPC) was computed for trends by means of generalized linear models. Joinpoint software version 3.4.3 was used for the analysis (National Cancer Institute: Joinpoint Regression Program Version 2.6. Available from: URL:http://srab.cancer.gov/joinpoint/download.html).

RESULTS

The mortality rate has been decreasing continuously over time in both sexes. The degree of reduction in total cancer mortality was slightly higher in females than in males.

Table 1. **Categorisation of causes of avoidable cancer mortality (adopted from Simonato et al.)**

Causes of death	ICD-9	ICD–10
Group 1. Causes avoidable through primary prevention		
Malignant neoplasms of upper airways and digestive tract	140–150, 161	C00-C15, C32
Malignant neoplasms of the liver	1550	C22
Malignant neoplasms of the trachea, bronchus, and lung	162	C33, C34
Malignant neoplasms of the bladder	188	C67
Group 2. Causes avoidable through early detection and treatment		
Malignant skin neoplasms (melanoma and non-melanoma)	172, 173	C43, C44
Malignant female breast neoplasms	174	C50
Malignant cervix uteri neoplasms	180	C53
Malignant neoplasms of the uterus	179, 182	C54, C55
Group 3. Causes avoidable through improved treatment and medical care		
Malignant neoplasms of the testis	186	C62
Hodgkin's disease	201	C81
Leukaemia	204–208	C91-C95

Table 2. **Time trend of avoidable mortality rates by each category of intervention effectiveness for preventing death, 1992–2008**

Site (ICD-10)	Sex	Rate per 100000		EAPC	95% confidence interval	
		1992	2008			
All sites C00-C96	M	222.9	189.7	–0.83*	–1.14	–0.52
	F	105.7	98.1	–1.03*	–1.40	–0.66
Causes avoidable through primary prevention C00-C15, C32-C34, C67	M	105.4	86.6	–1.38*	–1.77	–0.99
	F	8.7	7.7	–0.68	–1.46	0.11
Causes avoidable through early detection and treatment C43-C44, C50, C53-C55	M	2.2	2.4	2.44*	1.10	3.79
	F	34.6	34.0	–0.77*	–1.29	–0.25
Causes avoidable through improved treatment and medical care C62, C81, C91-C95	M	9.9	6.4	–2.70*	-3.54	–1.86
	F	5.5	4.2	–2.10*	–3.17	–1.02

* $p < 0.05$.

There were no joinpoints found in male or female data; standardised rates steadily go down on average by 0.83% (95% CI from –1.14 to –0.52) per year for males and 1.03% (95% CI from –1.40 to –0.66) for females.

Table 3 shows the time trend of avoidable cancer mortality rates according to each category of medical intervention effectiveness for preventing death from cancer. Mortality avoidable by medical intervention has been continuously decreasing since 1992 in both sexes by more than 2% per year, while mortality avoidable by primary prevention decreased only in males. Cancer mortality avoidable by secondary prevention was decreasing in females and increasing in males.

Results of the joinpoint analysis by sex and cancer site are reported in Table 3. There are differences in avoidable mortality cancer groups by individual cancer sites. In cancer mortality avoidable by primary prevention, mortality from cancer of the upper airways and digestive tract was stable in both sexes, and lung cancer mortality was stable only in females. Mortality from trachea, bronchus and lung cancer was decreasing on average by 1.98% in males. Mortality from bladder cancer also shows diminution with EAPC of –2.62 (males) and –3.02 (females).

Mortality from melanoma and other skin cancers shows an uprising trend in males (EAPC 2.85%) and a stable trend in females. Mortality from breast cancer, the major cause of death for the female population, shows a decreasing trend by 1.13% per year over the study period. Female mortality rates from cervical cancer were stable. Mortality rates from the cancer of uterus are not in line with cervix cancer and are steadily decreasing over the whole period. The average change in mortality from uterus cancer is –2.26%.

Being overall low, mortality rates of cancer avoidable through improved treatment and medical care are decreasing in Lithuania in all cancer sites studied. Mortality rates from testicular cancer are decreasing, and for the study period the EAPC is –2.53 with 95% CI from –4.56 to –0.47.

Table 3. **Time trend of age- and sex-adjusted all-cause and avoidable mortality rates, 1992–2008**

Site (ICD-10)	Sex	Rate per 100000		EAPC	95% confidence interval	
		1992	2008			
Upper airways and digestive tract C00-C15, C32	M	24.7	26.9	0.41	–0.23	1.06
	F	1.6	1.7	0.45	–1.58	2.52
Trachea, bronchus and lung C33-C34	M	73.2	54.5	–1.98*	–2.40	–1.55
	F	6.0	5.3	–0.80	–1.94	0.35
Bladder C67	M	7.5	5.2	–2.62*	–3.71	–1.52
	F	1.2	0.6	–3.02*	–4.77	–1.24
Skin C43-C44	M	1.9	2.2	2.85*	1.22	4.52
	F	2.0	1.7	0.82	–0.95	2.61
Breast C50	M	0.3	0.2	–0.51	–5.49	4.73
	F	20.8	20.2	–1.13*	–1.81	–0.44
Cervix C53	F	6.8	8.6	0.54	–0.65	1.74
Uterus C54-C55	F	5.0	3.5	–2.26*	–3.29	–1.22
Testis C62	M	0.5	0.4	–2.53*	–4.56	–0.47
Hodgkin's disease C81	M	1.7	0.5	–6.90*	–8.82	–4.95
	F	0.6	0.4	–5.80*	–8.84	–2.66
Leukaemia C91-C95	M	7.6	5.5	–2.00*	–3.17	–0.82
	F	4.9	3.7	–1.58*	–2.87	–0.28

* $p < 0.05$.

Mortality rates from Hodgkin's disease are going down for both sexes: EAPC for males is –6.90 and for females –5.80. Leukaemia mortality rates also show a consistent downtrend which is 2.00% per year for the male and –1.58% for the female population.

DISCUSSION

In general, avoidable mortality is declining in European countries (8). In Sweden, avoidable mortality between 1974 and 1985 declined in male and female populations (9). A study in Belgium also showed a decrease in avoidable mortality between 1974 and 1994 (10). All European countries, except Hungary, showed a 2.4% annual reduction in avoidable mortality between 1980 and 1997 (11). Avoidable mortality in Lithuania in 1991–1999 increased as compared with 1970–1990 (4).

Avoidable cancer mortality is usually studied in broad categories of avoidable deaths. These broad categories obscure the potentially contradictory trend in specific groups of causes. It is thus necessary to consider in detail some components in each category. In previous studies of avoidable mortality in Lithuania, the increasing lung and cervical cancer mortality was reported for the period 1971–1990 (4); an increase of these cancer sites was also found for the period 1991–1999 (4).

During the period 1992–2008, cancer mortality in Lithuania has been decreasing. This reduction was greatly attributable to the reduction of avoidable mortality, an indicator reflecting the quality of medical health care service. There were noticeable differences between males and females in the patterns and trends of cancer mortality according to the category of medical intervention proven effective for disease prevention. These figures, while having some explanatory power, do mask considerable fluctuations of cancer mortality by site. Cancer mortality avoidable by medical intervention in Lithuania has been decreasing since 1992 in both sexes, although mortality rates in this group of avoidable cancer are low. In the category of mortality avoidable by secondary prevention, mortality rates were higher in females than in males, and a reduction in mortality over the study period was observed only in females. This finding suggests that there might be an inequality between sexes in terms of the usage of preventive medical services in Lithuania. Mortality associated with cervical cancer, which is known to be preventable by secondary prevention, was not decreasing in Lithuania. Also, the delayed introduction of secondary prevention and low participation rates in cervical cancer screening programs were likely the main reasons for the stable trend. Cancer mortality avoidable by primary prevention was decreasing in male and stable in female populations. This observation is valid for lung cancer mortality, which has been decreasing in males. Mortality rates in females were low; therefore, the decrease was not significant. This finding could have been the result of decreasing smoking rates or other changes in smoking behaviour.

To our knowledge, our study is the first to examine the contribution of medical health care services to the improvement of the population health level, using avoidable cancer mortality as an indicator of the quality of medical services in Lithuania. Any division of the indicators of avoidable mortality, used in this study, is to some extent artificial. Despite this limitation, the findings of our study are valuable because they prove that the quality medical health care service significantly contributes to the prevention of untimely and unavoidable deaths. Furthermore, findings of our study can be used to facilitate further improvements in the population health level.

CONCLUSIONS

In Lithuania, a remarkable reduction in avoidable cancer mortality over the past decade has been noted. However, the rate of reduction was slower for mortality avoidable by primary or secondary prevention methods than for that preventable by direct medical care, indicating that there is a need to put more effort towards primary and secondary prevention.

ACKNOWLEDGEMENT

Financial support from the Research Council of Lithuania (grant No. SIN-14/2010) is gratefully acknowledged.

Received 2 December 2011
Accepted 20 December 2011

References

1. Rutstein DD, Berenberg W, Chalmers TC, Fishman AP, Perrin EB, Zuidema GD. Measuring the quality of medical care: second revision of tables of indexes. N Engl J Med. 1980; 302: 1146.
2. Mackenbach JP, Bouvier-Colle MH, Jougla E. "Avoidable" mortality and health services: a review of aggregate data studies. J Epidemiol Commun Health. 1990; 44: 106–11.
3. Gaizauskiene A, Gurevicius R. Avoidable mortality in Lithuania. J Epidemiol Commun Health. 1995; 49: 281–4.
4. Logminiene Z, Nolte E, McKee M, Valius L, Gaizauskiene A. Avoidable mortality in Lithuania: 1991–1999 compared with 1970–1990. Public Health. 2004 Apr; 118(3): 201–10.

5. Gaizauskiene A, Westerling R. A comparison of avoidable mortality in Lithuania and Sweden 1971–1990. Int J Epidemiol. 1995; 24: 1124–31.
6. Nolte E, McKee M. Measuring the health of nations: analysis of mortality amenable to health care. BMJ. 2003; 327: 1129.
7. Nolte E, McKee M. Population health in Europe: how much is attributable to health care? World Hosp Health Serv. 2004; 40: 12–14, 40, 42.
8. Simonato L, Ballard T, Bellini P, Winkelmann R. Avoidable mortality in Europe 1955–1994: a plea for prevention. J Epidemiol Commun Health. 1998; 52: 624–30.
9. Westerling R, Smedby B. The European Community 'avoidable death indicators' in Sweden 1974–1985. Int J Epidemiol. 1992; 21: 502–10.
10. Humblet PC, Lagasse R, Leveque A. Trends in Belgian premature avoidable deaths over a 20-year period. J Epidemiol Commun Health. 2000; 54: 687–91.
11. Treurniet HF, Boshuizen HC, Harteloh PP. Avoidable mortality in Europe (1980–1997): a comparison of trends. J Epidemiol Commun Health. 2004; 58: 290–5.

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IŠVENGIAMO MIRTINGUMO NUO VĖŽIO POKYČIAI LIETUVOJE 1992–2008 METAIS

Santrauka

Tyrimo tikslas – įvertinti sveikatos priežiūros sistemos laimėjimus Lietuvoje mažinant išvengiamą mirtingumą pagal mirtingumo nuo vėžio pokyčius 1992–2008 metais.

Medžiaga ir metodai. Išvengiamo mirtingumo nuo vėžio analizei buvo panaudoti Lietuvos Vėžio registro duomenys apie mirusiuosius nuo vėžio 1992–2008 metais. Įvertinti bendri ir kai kurių vėžio lokalizacijų mirtingumo rodikliai. Standartizuoti mirtingumo rodikliai apskaičiuoti vyrams ir moterims. Mirtingumas vertintas 5–75 metų amžiaus grupėje. Skaičiavimams naudoti kasmetiniai Lietuvos statistikos departamento duomenys apie gyventojų skaičių pagal amžių ir lytį.

Rezultatai. Abiejų lyčių mirtingumas nuo vėžio mažėjo nuosekliai. Ryškesnis mažėjimas nustatytas tarp moterų (po + 1,03 % per metus) nei tarp vyrų (po 0,83 % per metus). Mirtingumas nuo vėžio, išvengiamas dėl gerėjančio gydymo (tretinė profilaktika), nuo 1992 m. mažėjo po daugiau nei 2 % per metus tarp vyrų ir tarp moterų, o mirtingumas, išvengiamas dėl pirminės profilaktikos, mažėjo tik tarp vyrų. Mirtingumas, išvengiamas dėl antrinės profilaktikos, mažėjo tarp moterų ir didėjo tarp vyrų.

Išvados. Lietuvoje nustatytas išvengiamo mirtingumo nuo vėžio mažėjimas. Mirtingumo nuo vėžio, išvengiamo dėl pirminės ir antrinės profilaktikos, mažėjimas buvo ne toks ženklus kaip mirtingumo, išvengiamo dėl gerėjančių gydymo priemonių. Šie duomenys rodo pirminės ir antrinės profilaktikos priemonių tobulinimo poreikį.

Raktažodžiai: išvengiamas mirtingumas, mirtingumas nuo vėžio, sveikatos priežiūros kokybė