Telemedicine: The Determination of Fatal Cardiovascular Risk in Internet Users Population

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Abstract

Objective: assessment of fatal cardiovascular risk over a 10-year period and thereby popularising the European Guidelines on Cardiovascular Disease.

Method: The "Ryzyko" program is based on the algorithm publicated in the EurHJ (2003) 24, 987–1003. The program is available on www.ryzyko.amg.gda.pl.

After entering personal data, each user is given an outcome and automatically generated recommendations, which involve changes in lifestyle and modification of risk factors or to contact a doctor. All the data and the results obtained are being collected on a server.

Results: Number of visits to the website – 17,301. Percentage of visits with complete data – 62%. Internet users who were advised to contact their doctor – 80.7%.

Conclusion: The program presented here functions well as an educational and screening system for cardiovascular disease.

1.   Introduction

Cardiovascular disease is the most frequent cause of death in our country, which constitutes about 48% of all death in Poland being registered within 2001 by CSO, when total 173,800 death cases were noted [1]. Even though in the last decade a slight decline has been observed, cardiovascular mortality in our country is amongst the highest in Europe [2].

Data published by the European Regional Bureau of the World Health Organization in 2001 indicate that premature cardiovascular mortality in Poland was about two and a half times higher than in the European Union countries as a whole. Among individuals aged 25-64 years 31% (31,200) of deaths were registered as caused by cardiovascular disease, 32% (23,200) among men and 27.5% (8,000) among women [3].

These data clearly point to the need to undertake effective preventive action. Experience from the USA and European countries has shown that comprehensive programmes to promote modern prevention, diagnostics and therapy can reduce considerable the cardiovascular disease epidemic [4],[5],[6].

In recent years, the main factors exacerbating global risk of death and cardiovascular events have been well described. The results of a multi-centre study, INTERHEART, covering 52 countries from all continents, published this year, showed that 6 independent risk factors and 3 cardioprotective factors are together responsible of the risk of myocardial infarction in 90% of the men and in 94% of the women affected. The main risk factors included hypertension, diabetes, lipid disorders, abdominal obesity, smoking and psychosocial factors. The cardioprotective factors included inclusion of fruit and vegetables in the diet, moderate alcohol consumption and physical activity. A similar relationship has been observed between the listed factors and the risk of myocardial infarction in men and women, in younger and older persons, and in all regions of the world [7].

In the year 2002 a precise assessment of the prevalence and control of classic cardiovascular risk factors was made in Poland on the basis of a study covering a representative group of adult Poles (the NATPOL PLUS study). The study showed that the most prevalent risk factor is lipid disorder. This was found in more than half of adult Poles [8]. A priority task should be to lower the increased cholesterol levels in whole population, but especially in people from the high risk group. This can be achieved by modifying the usual diet, increasing physical activity and by appropriate drug therapy.

One of the most effective methods of lowering total mortality and the number of cardiovascular deaths is the use of statins, both in primary prevention studies (WOSCOPS [9], AFCAPS/TexCAPS [10], HPS [11]) and in secondary prevention studies (4S[12], CARE[13], LIPID[14], HPS[11]). In May 2004 The Great Britain was the first country to put simvastatin at a dose of 10 mg on sale without prescription (as on OTC drug). The drug is sold under the supervision of pharmacists to men aged over 45 years and women aged over 55 years with additional cardiovascular risk factors (smoking, obesity and family history) and to all men aged over 55 years, irrespective of the degree of risk. Help in assessing individual cardiovascular risk is provided by the pharmacists [15].

The trend of introducing statins as an OTC medicine

will probably reach Poland soon as well, in spite of the objections of some medical groups. The education of society about cardiovascular risk factors and assessment of individual cardiovascular risk must therefore be the main goal. Different information and education techniques are being used, among them the increasingly accessible internet. In order to achieve this goal, it would appear that a widely accessible system for automatic cardiovascular risk assessment should be helpful.

In view of these considerations, our staff developed a program for individual cardiovascular risk assessment based on the internet.

2.   Methods

The "Ryzyko" program is partly based on the SCORE trial. It was constructed using the calculation algorithm published in the European Heart Journal in 2003 [16]. On the basis of the algorithm the risk of death from cardiovascular disease in a 10-year period is calculated. The algorithm for countries with a higher degree of risk was used. The following parameters were included in the algorithm: age, sex, systolic blood pressure, total blood cholesterol level and smoking. In addition, the presence of diabetes and coronary heart disease was considered in the automatic generation of recommendations for the internet user. The target values were systolic blood pressure <140 mmHg and total cholesterol <5 mmol/l. In persons with diabetes and/or coronary heart disease the target systolic blood pressure was <130 mmHg. The program users are automatically divided into 7 risk classes, commencing with very low (<1%) and ending with exceptionally high (≥15%). A risk of ≥5% was assumed to be high.

All the data and the results obtained are being collected in the form of a MySQL base on a server of the Medical University of Gdańsk. When the age entered was below 40 or above 65 years, it was approximated for risk assessment purposes to 65 years of life.

Individual results are presented in numerical and graphical form. The system automatically generates recommendations for the internet user, which involve changes in lifestyle and modification of risk factors. If any of the parameters entered is above a normal value or the calculated risk is high, advice to contact a doctor is displayed.

The number of visits to the website and the amount of data collected was unlimited for an individual user, which makes it possible to observe the potential influence of risk factor modification on the results obtained.

The Ryzyko program is available free of charge on the following website: www.ryzyko.amg.gda.pl.

3.   Results

During the 15 months when "Ryzyko" program is in operation there were recorded 17,301 visits to the website. The number of registered observations with a calculated risk was 10,657, which constituted 62% of the visits to the page. More frequent entries from men were noted than from women, 6,006 compared with 4,651. The mean age was 45.9 ± 13.2 years. The mean systolic blood pressure was 132 ± 21 mmHg. The percentage of observations with entered systolic blood pressure above 140 mmHg was 38%. Mean total cholesterol blood level was 5.7 ± 1.8 [mmol/l]. The percentage of entries with total cholesterol above the normal values (≥5mmol/l) was 69%. The incidence of declared smoking, diabetes and coronary heart disease was 33%, 58% and 13.7% respectively. The number of registered observations in the population of 40-65-year-olds was 7,077. The percentage of individuals with a high cardiovascular risk (≥5%) in the 40-65 age group was 18.3%. The percentage of internet users who were advised to contact their doctor was 80.7%.
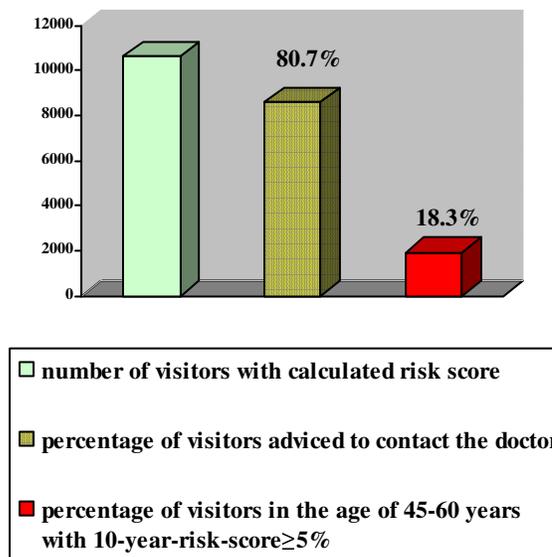

Fig. 1. Number of visitors with a calculated risk score in comparison with the percentage of visitors with calculated 10-year-risk of death ≥ 5% and visitors directed to the doctor.

4.   Discussion

The first results indicate that the program received great attention from internet users. During the 15 months in which the program has been operating there have been over 17,301 visits to the web page. Over 60% of those who entered the page performed the test assessing

individual cardiovascular risk, which is a satisfactorily high percentage of users reporting for tests, according to sociological observations.

As many as 80.7% of persons who performed the test received advice to contact a doctor and to modify cardiovascular risk factors.

Additional benefits of the program are the possibility of making multiple entries for the same person, the opportunity to monitor changes in the modified risk factors and the motivational and educational value.

No precise statistical analysis of the data obtained has yet been performed. This was the intention, as the main goal of the program was the education of society and not only data collection concerning the prevalence of cardiovascular risk factors in the population. For the internet users there was the possibility of multiple entries and observing the results, which could demonstrate the importance of particular cardiovascular risk factors. It was assumed that a graphic method of presenting the results, together with brief information about the need to reduce the particular risk factors opens up an opportunity to influence potential program users. Persons with a high cardiovascular risk (≥5%) or who had one entry outside the normal range were advised to consult their doctor. In this respect the program served as a screening test.

It is planned that a logging-in function for internet users or doctors will be added to the program. The doctors will be able to create databases of their patients, allowing them to monitor the effects of therapy. Information gathered in this way will be more reliable and will be used to draw epidemiological conclusions concerning the prevalence of cardiovascular diseases. It is also planned to extend the list of questions by socio-demographic data.

The program is fulfilling its function in practice without creating additional costs, which is significant in times when expenses have to be rationalised.

It is worth noting that use of the internet in cardiovascular risk assessment would appear to be to be an appropriate tool for the study. The advantages of the web are related to its interactivity, low costs, the possibility of gathering large amounts of varied data and transmitting it in real time. The accessibility of the internet is increasing [18]. According to a CBOS report (March 2004), over 1/5 of the adult Poles examined (21%) declared themselves to be home internet users. The use of the internet in Poland is less prevalent than in the majority of countries in the European Union. However, a gradual increase in the number of internet users is being observed. In the last 2 years this number has increased by 9 percent [17].

It is also significant that the reliability of the analysis performed using internet studies is comparable to that when the data gathered is analysed by traditional methods. The sense of anonymity and the lack of direct contact when using the internet create a sense of security which encourages greater self-disclosure and self-awareness on the part of the persons examined [18]. These characteristics of internet studies are especially important in the case of diseases in which patients use defence mechanisms. One example is cardiovascular disease and other diseases requiring a modification of lifestyle.

As with any other method, the internet also has its limitations, among which are the lack of a representative sample and the absence of non-random sample selection. However, in spite of some drawbacks, the overall characteristics of the internet favour its use as a cardiovascular risk assessment tool in a population. In primary and secondary cardiovascular disease prevention, there is a shift in the focus of diagnostics and education towards the potential patient, which is another factor in favour of choosing the internet.

Doctors and pharmacists are still the most important source of medical information for patients. However, nearly as 1 in 4 inhabitants of the European Union (23.1%) search the internet to find health information [19]. In the light of this, as well as the considerable interest noticeable in the "Ryzyko" program, it can be assumed that the role of the program in the education of the society will increase.

5. Conclusion

The program presented here functions well as an educational and screening system for cardiovascular disease.

The program does not require highly qualified personnel or additional financial expenses.

The program provides the opportunity of self-control and enables therapy to be monitored.

This approach to medicine corresponds to the trend observed in some other European countries.

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