COMPARATIVE ASSESSMENT OF DISEASE BURDEN IN ROMANIA BETWEEN 1990 AND 2010 AS ESTIMATION BASED ON THE CONCEPTUAL DISEASE MODEL

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INTRODUCTION

For studies that aim to estimate the burden of disease and for cost-effectiveness studies, availability of data related to the incidence, prevalence and mortality by age and sex, is essential and usually, incidence and prevalence data are less available than mortality data.

When there is only partial data and missing data collection is not an option, a way to estimate the less available necessary data is to exploit causal relationships in the natural history of disease, namely the incidence precedes prevalence (the disease case was at an earlier time new case of illness) and deaths due to illness or cure / improvement of disease occur in people with the disease. These relationships can be expressed as a logical mathematical model that allows the calculation of a complete set of internally consistent data using partial data.

Global Burden of Disease 1990 and subsequent studies have used a mathematical model of disease, specifically developed to complement the observed data given the prior checking of internal consistency [2]. Based on a set of differential equations that describes the age-specific incidence, remission, fatality and mortality rates from other causes, based on the conceptual model shown in Figure 1, was developed DisMod software package which can estimate missing data in the epidemiology of disease.

Figure 1. Conceptual model of Disease [1]

DisMod estimates disease parameters for each age from a cohort of 1,000 newborns to extinction. Within an age range, the transition risks are assumed to be constant and to minimize the impact of the presumption, considered age intervals are 1 year.

For Global Burden of Disease Study 2010 was used DisMod-MR (Disease Modeling Meta-Regression), an enhanced version of the software used in previous GBD studies, which can estimate incidence, prevalence, mortality and remission even when the data are heterogeneous, and may generate uncertainty analysis.

age groups and 187 countries in contrast with GBD 1990 [3] that generated estimates for 107 diseases, 483 sequelae, grouped into 8 regions and five age groups.

**AIM OF THE STUDY**

The purpose of this study is to evaluate by comparison between 1990 and 2010, the burden of disease in Romania, expressed in DALY estimated based on the conceptual model of the disease and on the incidence and mortality data available.

**STUDY METHODOLOGY**

The study is descriptive and to estimate the burden of disease were used data published by the Institute for Health Metrics and Evaluation in 2012 [4]. The data used to estimate the burden of disease were: the number of deaths by cause and age, the number of new cases by cause and age, prevalence, data on disease remission and duration. Unlike the GBD 1990, disability weighting factors for GBD 2010 were reviewed based on the perceptions of individuals in a very large study that included people from many parts of the world.

In the present study were compared the top 10 causes of illness and death generating burden in Romania, between 1990 and 2010, and for 2010 were compared causes of illness and death between Romania and Central Europe. Two causes of illness (lung cancer and chronic obstructive pulmonary disease), which showed large variations between periods mentioned, were compared by age distribution.

**RESULTS**

The first two generating burden causes in Romania, both in 1990 and 2010, are ischemic heart disease and stroke (Fig.no.2), although they represent globally in 1990, the 4th respectively 5th issue of burden of disease (primary causes are represented by lower respiratory infections, diarrheal diseases and complications of preterm birth). Romanian model for 2010 is similar to that of Central Europe, the area for which the first four causes of burden does not changed between 1990 and 2010.

A significant increase in disease burden between 1990 and 2010 had lung cancer (from the 11th to the 5th issue of burden of disease). Distribution by age groups shows an increase of DALY in older age groups (from 55 years) (Fig. no. 4). DALY absolute increase is 10% between 1990 and 2010.

Another important change between 1990 and 2010 is the decrease, by almost 40% of the burden of chronic obstructive pulmonary disease data (COPD), from 318.700 in 1990 to about 183.500 DALY.

COPD has gone from 5th issue of burden to the 11th issue in 2010. As can be seen in Fig.no.5, the largest decrease occurred in older age groups (from 50 years).

By comparison with the model of Central Europe, in Romania it remains as important burden of disease causes: cirrhosis, lower respiratory infections, hypertensive cardiomyopathy (Fig.no.3).

**CONCLUSIONS**

Ability to assess the burden of disease by cause, age group and compared over long periods of time,
even with some degree of data uncertainty is crucial for assessing the adequacy of the health system to the population's needs. In the past 20 years, Romania was close to the model of Central Europe morbidity and mortality, although there are still differences in the burden of cirrhosis, lower respiratory infections, hypertensive cardiomopathy. Detailed comparisons with neighboring countries and other European countries as cost-effectiveness studies would be useful in the development of health interventions tailored to the needs and the possibility, based on the presented estimation methods, to obtain burden of disease data is essential for such studies.

References