Economic burden of gastrointestinal cancer: estimation and importance

Sara Ashtari¹, Mohsen Vahedi²

¹Gastroenterology and Liver Diseases Research Center, Shahid Beheshti University of Medical Science, Tehran, Iran; ²Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

Correspondence to: Sara Ashtari. 7th Floor, Research Center of Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Taleghani Hospital, Tabnak St., Yaman Ave., Velenjak, Tehran, Iran. Email: sara_ashtari@yahoo.com.

Abstract: The economic burden of gastrointestinal (GI) cancer in the world is substantial and expected to increase significantly in the future due to expected growth the incidence rate of GI cancers especially in developing countries and the improvements in survival time and trends in treatment patterns, costs of care following cancer diagnosis and use of expensive technologies and medications. The rising cost of GI cancer treatment poses a significant challenge to health system, government and private insurers, and individual patients. In this paper, we describe how to measures the economic burden of GI cancer and also we discuss the importance of estimating the economic burden of GI cancer.

Keywords: Cost of illness; gastrointestinal (GI) cancer; health care expenditures; economic burden

Introduction

Each year globally, about 14 million people have realized that they have cancer and eight million people of them die from the cancer. According to the World Health Organization (WHO), the global number of deaths from cancer will increase by nearly 80% by 2030, with most occurring in low- and middle-income countries (1). According to the International Agency for Research on Cancer (IARC), in 2012, approximately 1.4 million individual were alive with a colorectal cancer (CRC) in the world (10% of all cancer diagnosed), and after the lung cancer (19% of all cancer deaths, 1.6 million people), gastric (9.6% of all cancer death, 0.8 million people) and liver cancers (8.6% of all cancer death, 0.7 million people) are the most common cause of cancer death in the world (2).

Gastrointestinal (GI) cancers are one of the most common cancers in some areas of the world (3) and one of the public health concerns in general (4,5). Despite a major decline in incidence and mortality, gastric cancer (GC) remains an important public health burden worldwide, especially in developing countries (6). GC is the fourth most common cancer and the second common cause of cancer death (2,7,8). The incidence of GC is particularly high in East Asia, Eastern Europe, and parts of Central and South America (9).

CRC is another important public health problem (10), with an annual one million new cases and an annual half a million death (11). CRC is the second most common cause of cancer mortality (12). CRC contains 10% of the global cancer burden and is the most frequent in North America, Australia, New Zealand and parts of Europe (7,13). According to the American Cancer Society’s reports; CRC is the third most common cancer found in men and women in the United States (14). The incidence of CRC in Iran has significantly increased over the last three decades (15,16). The incidence is still lower in older Iranians; however, it is close in young Iranians and Americans (17,18).

Esophageal cancer is the sixth most common cancer in the world, and its incidence is increasing (19). Some three to five males are affected for each female (19) and with a very low rate of survival (18). An “esophageal cancer belt”, in which the incidence of esophageal is more than a hundred times that of adjacent areas, extends from northeastern
China through central Asia to northern Iran.

Pancreatic cancer is the fourth and fifth most common cancer in man and women, respectively, and has the lowest 5-year survival rate of any GI cancers (20). Over 250,000 people die annually of pancreatic cancer in the world (21). Developed countries have the highest rate of incidence and mortality due to pancreatic cancer (7). In Iran, pancreatic cancer is not ranked in the top 10 for newly diagnosed cases (22,23). Hepatocellular carcinoma (HCC) is the sixth most common cancer in the world and the third most common cause of cancer mortality (24,25).

In this paper, we describe how to measure the economic burden of GI cancer and also we discuss the importance of estimating the economic burden of GI cancer.

**Estimates the economic burden of GI cancer**

Economic burden, or cost-of-illness, studies provide insight into the economic impact that illness has on society as well as on individuals and families (26). This approach separates economic burden into disease-attributable direct costs, the use of resources for medical care; and indirect costs, resulting from the loss of resources and opportunities (27). The direct costs are also classified into the following cost categories; direct medical costs and direct non-medical costs (28).

**Direct costs**

Direct medical costs of GI cancer, are defined as the dollar value of all medical services that patients receive, including; physician visits, diagnostic and confirmatory tests, laboratory tests, hospitalization, surgery, medication, radiation and chemotherapy or immunotherapy, and are typically measured by insurance payments and patient out-of-pocket co-payments.

Direct non-medical costs of GI cancer refer to resources supporting the medical services delivered in the health care sector. For example, travel costs to medical interventions or the valued time spent by patients and their family caregivers in relation to their illness.

Process of direct medical costs estimation is based on four steps; identification of resource consumption, measuring resource consumption, valuation of resource units, calculating total costs of intervention options (29).

In principle, all four steps could be integrated and total costs derived in a single step. However, the four-step process is recommended because executing separate steps is more likely to support comprehensive cost estimations (30).

**Indirect costs**

Indirect costs of GI cancer are typically divided between morbidity and mortality losses. Time lost from work or other usual activities are defined as morbidity costs, and lost productivity due to premature death defined as mortality costs. These costs are incurred by patients as well as their caregivers and families (27,28). Because these lost opportunities are not typically reflected in dollar value, the value of lost time must be approximated. Two main methods for valuing time are the human capital and the willingness-to-pay (WTP) method.

**Morbidity costs**

Patient and caregiver time data, including travel to and from care, waiting for and receiving care, are not routinely collected. In the few studies of time costs that have been conducted, time estimates have been based on patterns of medical care use with service specific estimates of time (31) or retrospective surveys with questions about time spent receiving care or providing assistance (32,33), and then combined with human capital or WTP estimates of the value of that time. These time costs vary by the type of cancer (31,33,34), phase of care (31,34), and by stage of disease at diagnosis (33).

**Mortality costs**

Few studies have assessed the mortality costs associated with premature death from cancer. Mortality costs are the combination of estimates of the future person years of life lost among individuals who die in a specific year with a dollar value of time, yielding an estimate that reflects lost productivity in the future (35).

It is noteworthy that, most of studies in the field of economic burden of disease; estimated direct medical costs (36-38) and only a few studies estimated patient or caregiver time costs or productivity losses (35,39-41). Because most data sources were not developed for research in or developing estimates of the economic burden, and as a result have limitations associated with their use for estimating direct non-medical or indirect costs.

**Importance the economic burden of GI cancer**

Today, rapid scientific advances in early diagnosis and access to new technologies and medications led to survival
improved for many cancers, including GI cancers (42). This increasing number of cancer survivors will receive medical care during their cancer experiences (43,44). The average cost of treating the most common cancers rise due to increased use of health care services (45,46). The economic burden of cancer are expected to be greater in the future (47,48).

GI cancers and its treatment can cause to loss of economic resources and opportunities for patients, families, employers, and society overall. These losses include financial loss, morbidity, reduced quality of life, reduced work productivity, disability and premature death (49). Estimating and projecting the economic burden of cancer, including health care expenditures, productivity loss, and morbidity for patients and their families, are increasingly important issues for health care policy makers, healthcare systems, physicians, employers, and society overall (50).

In summary, incidence of GI cancers has been increasing in most regions of the world, but there is great difference between rich and poor countries. Incidence rates remain highest in more developed regions, but mortality is much higher in developing countries due to a lack of early detection and access to treatment facilities. And given that in developed countries the number of GI cancer survivors increased due to access treatment facilities so, is expected to increase direct medical costs in this region. While in developing countries morbidity and mortality costs are high.

Acknowledgements

Disclosure: The authors declare no conflict of interest.

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