



Current Trends in Medical Economics in the Circulatory Field

— Socioeconomics Background and Research Issue —

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Background: Circulatory diseases now comprise a larger share of medical expenses, accounting for 19.7% (2016) of total national health expenditure. Medical economics is an area of study encompassing medical science and economics that deals with a wide variety of topics and issues related to the medical and health-care field.

Methods and Results: In order to discuss the relationship between medical costs and research activities, this article conducted a correlation analysis of the ratio of national health expenditures to gross domestic product (GDP) and the number of medical economics articles in the circulatory field. A comparison of the ratios of national health expenditure and of the number of medical economics articles indicates that the number of articles increased as the ratio of the expenditure increased and vice versa with a slight time lag ($r^2=0.964$, $P<0.01$). Medical economics will explore deeply the subjects related to the clinical and economy in the circulatory field in the future, with due consideration of these diverse backgrounds.

Conclusions: Lively and in-depth future-oriented discussions of medical economics topics will facilitate the construction of valuable evidence that will help many personnel engaged in medical sites to gain new insights into clinical services, in addition to promoting the development of the healthcare system.

Key Words: Circulatory disease; Correlation analysis; Innovative medical technology; Medical economics; National health expenditure

In Japan, with the aging of society in recent years, disease proportions have changed. Cardiovascular diseases have increased in proportion as the cause of death, accounting for 26.8% of total deaths, with 15.5% being due to heart disease and 9.0%, to cerebrovascular disease. Especially notable is the increase in chronic heart failure and stroke wherein patients have multiple disorders and their disease courses are also complicated by diverse care factors.

Increasing Importance of Medical Economics

Medical economics is an area of study encompassing medical science and economics that deals with a wide variety of topics and issues related to the medical and health-care field. The primary objective of medical economics is to analyze diverse phenomena (e.g., technology, management, policy) occurring in relation to medical systems and clinical practice using methodologies of economics, including econometrics, value evaluation, decision making, and behavioral science, as well as medical statistics, to contribute to the advancement of both medical systems and public health and welfare. As part of the efforts to achieve these

objectives, medical economics research, from the standpoint of a group of personnel involved in the medical field, particularly focuses on discussing approaches to optimizing cost-effectiveness and maximizing the happiness (i.e., quality of life) of patients, their families, and the general public as a whole. Separately, from the standpoint of ensuring social equity, medical economics research is expected to present academic concepts and supporting rationales based on discussions of the rational allocation of medical resources (e.g., public expenditure on universal health care).¹

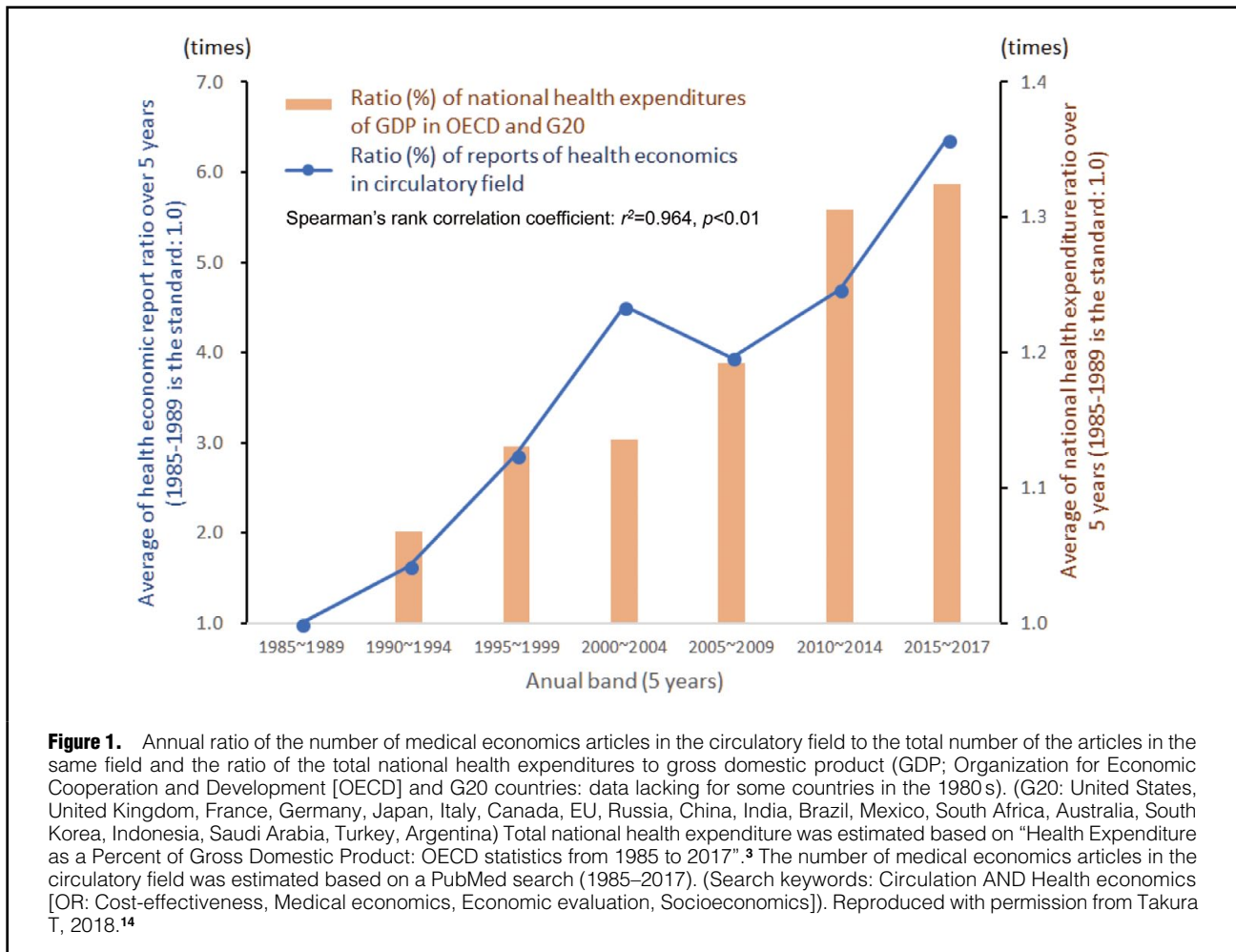
Medical economics is generating interest among both the general citizenry and medical personnel engaged in clinical practice, and an increasing number of reports, including clinical studies, are emerging from this area of study. In the background of such a move lies the fact that medical costs are growing at substantially high rates globally, because of sharply increasing rates of morbidity, multiple stratification of diseases, and advancements in medical technology. Innovation in medical technology is costly, and effective implementation of innovations depends on larger budgets and infrastructure of research and development (R&D) systems amid the complicating and diversifying effects of discovery (or component) technologies.

Received July 1, 2019; accepted July 2, 2019; J-STAGE Advance Publication released online August 1, 2019

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T.T. is a member of *Circulation Reports*' Editorial Team.

This article is reprinted from Takura T. Background and current trends in medical economics research in the circulatory field. *Circ Rep* 2018; 0: 11–14 (http://www.j-circ.or.jp/english/eng_CRipi.pdf).

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This in turn indicates the increasing emphasis placed on economic themes among the main issues in the medical and health-care field. And circulatory diseases now account for a larger share of medical expenses, accounting for 19.7% (2016) of national health expenditure.

Correlation Between Medical Expenses and Research Reports

One example of the increasing importance of medical economics is the year-by-year increase in the number of articles on medical economics in the circulatory field on PubMed, which is operated by the National Center for Biotechnology Information: compared with only 3 reports published in 1985, this number had grown to 90 by 2016. When the number of medical economics articles in the circulatory field is expressed as a ratio of the total number of articles in the same field, the annual increase in publication in the 2010–2014 and 2015–2017 periods was 4.7- and 6.4-fold the number in the 1985–1989 period, respectively (Figure 1).²

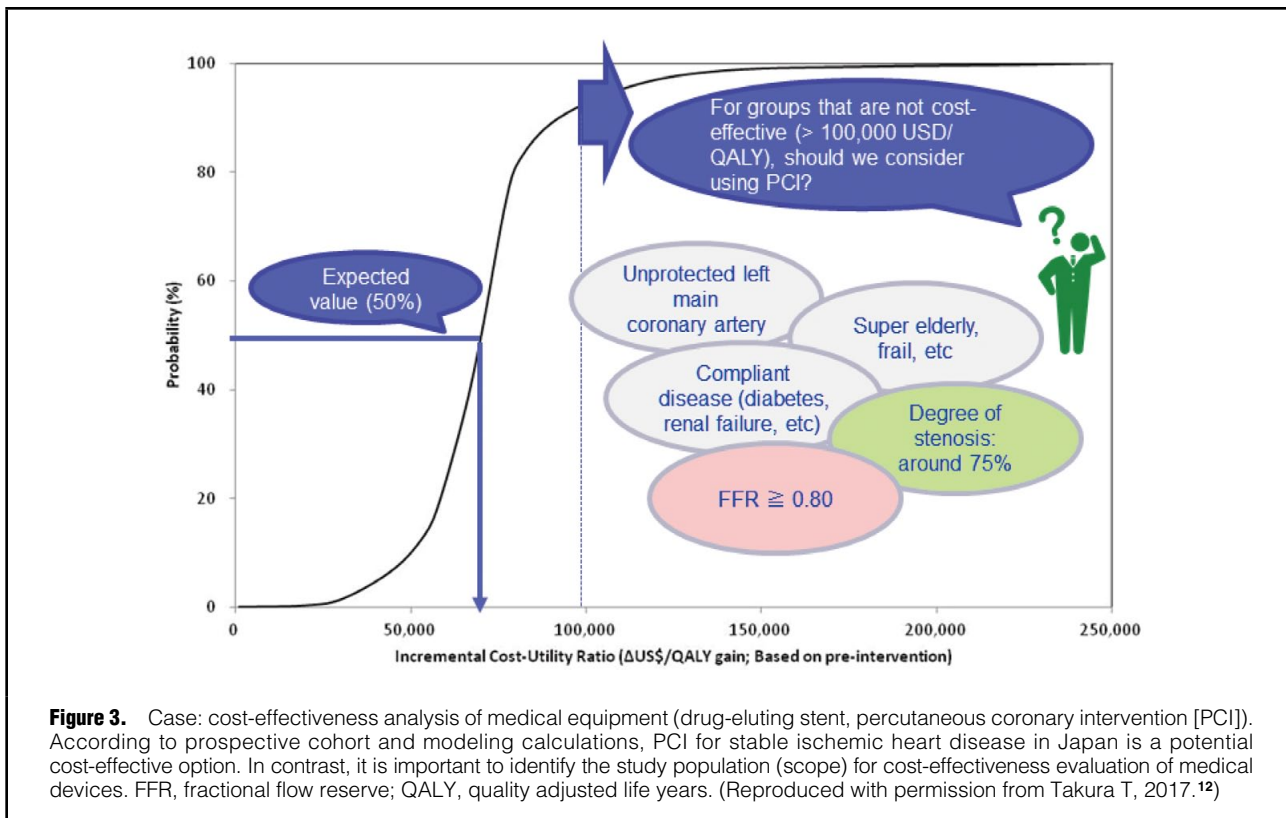
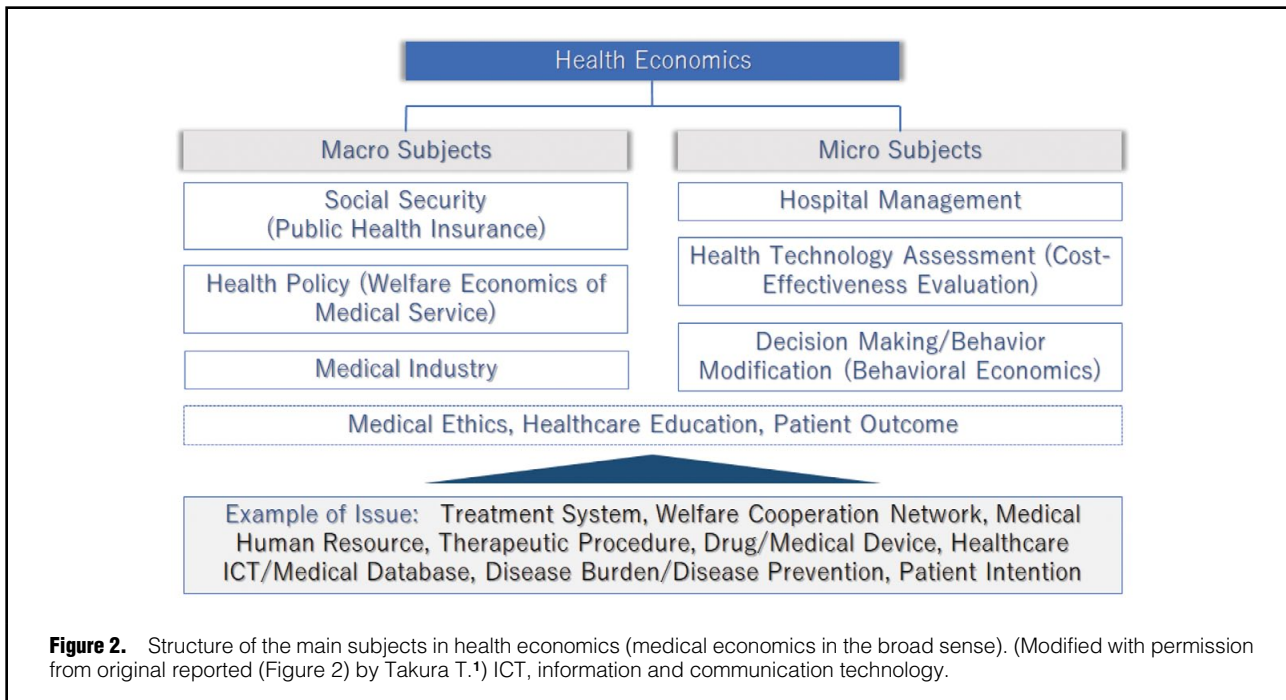
There are diverse backgrounds to the increase in medical economics articles. Regarding financial burden, annual national health expenditure showed a 1.3-fold increase in the ratio to gross domestic product (GDP) over the 3-year period from 2015 to 2017 compared with the ratio over the

1985–1989 period in both the Organization for Economic Cooperation and Development and G20 countries (Group of Twenty: United States, United Kingdom, France, Germany, Japan, Italy, Canada, EU, Russia, China, India, Brazil, Mexico, South Africa, Australia, South Korea, Indonesia, Saudi Arabia, Turkey, Argentina) (Figure 1).³ A comparison of the ratio of national health expenditure with the number of medical economics articles indicates that the number of articles increased as the ratio of the expenditure increased and vice versa with a slight time lag (Spearman’s rank correlation coefficient: $r^2=0.964$, $P<0.01$). This trend shows that an increase in financial burden makes medical economics issues apparent, leading to increases in awareness of and research into medical economics-related subjects.

Concept of Medical Economics and Recent Subjects of Economic Research

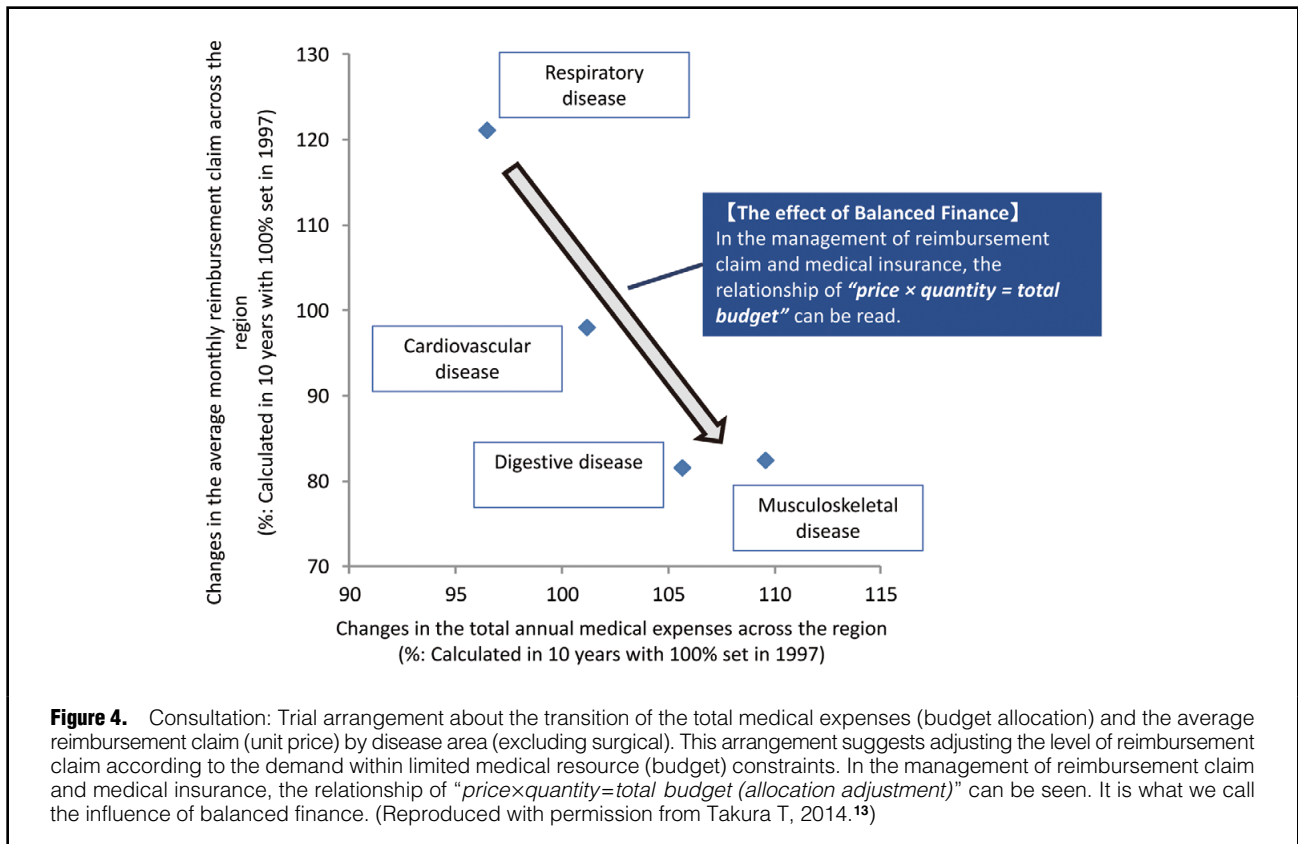
The following is an additional discussion of the concept of medical economics as briefly described in the previous section. Medical economics articles in the circulatory field may be approximately classified into macro and micro subjects (Figure 2).

Macro subjects include social security-related issues that are concerned with financial resources for medical insurance



systems; health policy-related issues covering medical services;⁴⁻⁶ and, although less frequently studied, medical industry-related issues, including systems for new drug development, systems for medical device supply, and model development of genetic diagnosis.^{7,8} Micro subjects include

human resources management, which is essential for administration of medical institutions; safety management; and medical economics research, including economic evaluation of team-based care and inter-institutional collaboration.⁹ The number of articles is also increasing in



the areas of economic evaluation (including cost-effectiveness assessment) of medicines, medical devices, and medical-care information systems.¹⁰ In addition, there are sporadic instances of research in which behavior modifications in patients, their families, and medical personnel are examined from a medical economics viewpoint by taking into account desired forms of decision making and support measures.¹¹

In recent years, it has become fairly common for macro subjects to be cross-sectionally discussed with micro subjects, as seen in the education of medical personnel and the health literacy of patients. There are also cases in which the economic value of aspects of the health-care system, such as the public positions of treatment modalities, is analyzed from a new methodological point of view by applying the parameters of not only patient outcomes but also the socioeconomic values to the public. In the not-too-distant future, it will become more common to see, even in the circulatory field, the more active pursuit of socioeconomic research using, for example, practice models of therapy based on new strategies made feasible by progress in medical information and communication technologies, and improvement in other infrastructure environments (Figure 2).

Future Medical Economics Issues Expected in the Circulatory Field

As future research areas, not only adverse economic effects and determinants of morbidity of circulatory diseases but also the social significance of economic investment in health behaviors of therapeutic and preventive interventions are expected to be extensively discussed topics. It is also

critical to analyze regional medical systems and welfare systems, which relate to the aforementioned economic effects and significance of economic investment, from the perspective of medical economics. Furthermore, it is highly likely that particular attention will be paid to research on the management of medical institutions that support the health-care system and to research on behavior modifications (not only of patients but also health-care providers).

Other highly interesting topics include economic evaluation of innovative medical technologies in the circulatory field through clinical trials and distribution of medical resources based on other cost-effectiveness assessments with modeling estimates (Figure 3).¹² In relation to these topics, it is also important to determine the effectiveness (or restrictions) of medical treatment, including the measurement of therapeutic and preventive efficacy, from broader and deeper perspectives than before. These topics require the development of a range of methodologies for the calculation of utility value of patients and patient-reported outcomes (including patient quality of life, functional status, and satisfaction with provided medical treatment), which are closely related to the evaluation of medical economics.

The health-care system, per se, involves public aspects to a greater or lesser extent in any region of the world, therefore significant progress in medical treatment in the circulatory field could be achieved through theory development, empirical studies, and associated investigations of welfare economics verifying the validity of health policy. In particular, there is a need for efficacy evaluation of various health policies and medical services, as well as medical economic verification of the quality of medical

services, against the background of discussions concerning the supply and demand of medical services (Figure 4).¹³

Conclusions

Lively and in-depth future-oriented discussions of these topics will facilitate the construction of valuable evidence that will help all personnel engaged in medical clinical site in not only to gain new insight into welfare policy and but also to enhancing their explanatory power in propagating the significance of medical economics in the circulatory field.¹⁴ These approaches will reinforce the foundation of medical economics research by economically supporting the advancement of circulatory science.

Disclosures

The author declares no conflicts of interest.

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