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## Based on Outpatient Fee to Discuss the Correlation between Competition of Medical Ecology and Number of Outpatients

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### Abstract

Current Medical ecology is highly competitive that institutional managers in the Medical ecology are gradually increasing the percentage in striving for market advantages for the long-term development and sustained-yield management of the organization. In the Medical ecology, patients for medical care are always the minority of information, not being able to decide the quality, quantity, and even model of medical resources. Normally, physicians are the agents to make the medical decisions. In this case, physicians' behaviors present the most debate in Medical ecology. Medical institution statistics provided by Shanghai Municipal People's Government, as the research sample data, are proceeded secondary data analyses. The research results show that 1.competition in Medical ecology presents significantly positive effects on outpatient fee, 2.competition in Medical ecology reveals remarkably positive effects on number of outpatients, 3.aging index would affect number of outpatients, 4.education would influence number of outpatients, 5.income level would affect number of outpatients, and 6.number of hospitals would influence number of outpatients. According to the results, suggestions are proposed, expecting to assist the medical ecology in the long-term development and sustained-yield management.

**Keywords:** medical ecology, competition, outpatient fee, number of outpatients

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### INTRODUCTION

A healthcare provider's behavior presents the critical status on the healthcare system of a country and the smooth operation of the health insurance system. For this reason, physicians' behaviors show the most debates in Medical ecology. In a free-economy country, physicians might present the attributes of a general economic man. In other words, they would respond to the incentive or disincentive provided by the system to maximize the effectiveness. When a physician also emphasizes economic benefits, would the doctor-patient information asymmetry in the Medical ecology have the physician present specific behavior patterns, e.g. price discrimination and pursue target income? Since general people could not interfere in medical profession, physicians' attitudes could be "these are what you should do", rather than "this is our price, how much do you intend to spend". The situation that a physician induces demands to achieve the target incomes is often heard.

In the medical ecology, patients for medical care are always the minority of information, not being able to decide the quality, quantity, and even model of medical resource use, but relying on physicians, as the agents, making medical decisions to form the so-called appointment-agent relationship. From the position of patients, they expect physicians making the decisions mostly conforming to patients' benefits. From the position of physicians, on the other hand, they are both the business and the agent to easily appear conflict of interests. It has been wondered whether consumers are receiving proper healthcare. In this case, people's self-protection or consumer groups' supervision on physicians presents significant meanings. Current Medical ecology is highly competitive. Physicians, when encountering competition, would estimate the reducing income that it is the strongest time to induce the demand motivation. Researchers discovered that hospitals in urbanized and highly competitive areas were easily resulted in closing-down. However, closing-down was simply the final result of

competition. Apparently, competition in Medical ecology is heating up, and the carefree days of Medical ecology are passing away. Institutional managers in the medical ecology therefore are increasing the weight to strive for market advantages for the long-term development and sustained-yield management of the organization. In the apparently competitive medical ecology, there has not been the research on the effect of competition among medical institutions on medical expenses and times domestically. For this reason, the empirical research on the effect of competition in medical ecology on outpatient fee and times is proceeded in this study.

## LITERATURE REVIEW

### Medical Ecology Market

The condition of the establishment of “market” in economics is not the real transaction sites, but the abilities to “decide prices” and “classify products with prices” (Moscelli et al. 2016). Aiming at the research on price function, market structure was classified into “perfect competition”, “monopolistic competition”, “oligopoly”, and “monopoly”; Medical ecology market appeared no exception. The difference was that medical service provided by physicians showed the characteristics of heterogeneity and non-retradability (Reeves et al. 2015) to affect the market structure in the medical ecology market. It was not simply the service provided by physicians presenting heterogeneity (different surgery methods, different service attitudes, and even different graduation schools), but medical service was reputation effects (Bloom et al. 2015) and customer preference also revealed heterogeneity (in favor of specific physicians). Under such combination, physicians presented certain degree of market monopoly, i.e. the market power to decide prices. Besides, there were numerous physicians in a city that economists generally regarded the medical ecology market as a monopolistic competition market (McIntyre et al. 2017).

Wang et al. (2016) mentioned that medical ecology was generally a monopolistic competition market, but would be completely different with divisions. As the example of number of suppliers in a market, there were more clinics providing basic medical service for the public in urban areas that approached perfect competition market. Nevertheless, there might be only one medical center in a remote area (Brunner-La Rocca et al. 2016) to become the typical monopoly market; special treatment units with expensive equipment (e.g. burn center) or professional groups with difficulty in

talent cultivation (such as organ transplantation team) were included. Under different market structures, the competition would be distinct. Schmid and Varkevisser (2016) indicated that the conclusion of viewing Medical ecology from resource dependence theory in “open system theory” in organizational behaviors would be different from it from ethnic ecology theory. Mutually competitive medical institutions would actively change the structure and pattern to adapt to the Medical ecology for the survival. However, with the restriction to organizational inertia, medical institutions with worse adaptability would be easily eliminated. In this case, it could be regarded as the market structure of perfect competition among medical institutions (Kim et al. 2017). Consequently, the medical ecology market is in the “competitive” environment, either from the viewpoint of economics or organizational behaviors, but merely shows the difference in levels.

### Competition

Langford et al. (2016) stated that the market structure in most industries appeared in between perfect competition and monopoly market, called imperfect competition market, in which “monopoly power” was often used for testing the monopoly of individual businesses. Monopoly power referred to a business not reducing customers when enhancing prices. Among various methods to test monopoly power, market concentration was a method which could more easily acquire data and the calculation was simplified. Regarding the service areas of hospitals, Bakunina et al. (2015) defined the market location with common medical markets of geopolitical boundary approach, radius circle around approach, variable radius measure approach, patient origin data approach, market share approach, market boundary estimates method, and cross elasticity of demand approach (Mesquita et al. 2017).

Driscoll et al. (2016) regarded Herfindahl index as the common index to calculate the competition of individual industry in preset market areas. Herfindahl index was the sum of individual market share of all businesses in the market. Tseng et al. (2015) pointed out two common market share processing methods in the calculation process; one was to calculate with percentage, and the other was to multiply the value by 100 and to calculate with the percentage. The values calculated by such two methods appeared 10,000 times difference; however, it did not affect the meaning when the methods were consistent. The number of businesses in the perfect competition market was extremely large that the market share of each business was extremely

small; the Herfindahl index square was about 0. On the contrary, when there was merely one in the market, which was the typical monopoly market, the market share was 100% and the Herfindahl index was 1 (or 10,000). Accordingly, Herfindahl index and market competition showed opposite relationship that the higher Herfindahl index, the smaller market competition to tend to monopoly market, while the lower Herfindahl index, the larger market competition to tend to perfect competition market (Neutens 2015). Unlike hospital size or illness severity, the operation of Herfindahl index would not appear endogenous problem (Loozen 2015) that it was generally agreed by researchers. For this reason, the market share is directly used for analyzing the competition in various Medical ecology areas in this study.

### Research Hypothesis

Research on hospital competition is rare. Schmid and Varkevisser (2016), as the pioneer, first discovered that hospital competition could not reduce the price required for patients for medical care. Research on the effect of competition on medical service market contained three directions (McIntyre et al. 2017). First, the effect of competition on overall medical utilization was measured, e.g. single medical service (outpatient or hospitalization) expense, one-day hospitalization expense, or hospitalization days (Grant 2016). The empirical results proved the existence of “medical arms race” in the medical service market, i.e. the more potential competitors in the market, the higher medical service price. Second, the correlation between competition and the popularity of specific medical items was tested (Mesquita et al. 2017). The higher market competition would have hospitals tend to high-tech medical service, e.g. P. Pulmonary Stenosis, computed tomography, and radiotherapy. Finally, competition and social welfare were evaluated. Taking fatality rate as the measurement indicator, the significant relationship between the two was not discovered in early research results (Mansur et al. 2015). Nevertheless, recent research revealed that competition could enhance social welfare (Neutens 2015). The following hypothesis is therefore established in this study.

**H1:** Competition in medical ecology presents remarkably positive effects on outpatient fee.

Wang et al. (2016) found out the correlation between the percentage of cross-region hospitalization person-time and “number of hospitals above regional level” in secondary medical areas in 1985-1995, i.e. the effect of number of hospitals above regional level on the

public use of medical resources. Gorodeski et al. (2018) mentioned that, in the behavior pattern of medical service use, a community could have the meanings of factors matching the accessibility of medical equipment or manpower in the community being able to predict or explain the medical service use behavior. Langford et al. (2016) indicated that the number of patients’ use of healthcare would increase with increasing basic-level physicians in the medical ecology. Driscoll et al. (2016) revealed that Medical ecology being able to enhance health or the accessibility for medical care could induce the public needs for medical care as well as benefit the entire society. Consequently, the following hypothesis is established in this study.

**H2:** Competition in medical ecology shows notably positive effects on number of outpatients.

Tseng et al. (2015) pointed out the effects of “age”, “education”, and “income” on the use of medical service in the health demand model. Moscelli et al. (2016) indicated that “age” could be the depreciation rate of health capital that medical demands would increase with increasing age. McIntyre et al. (2017) proposed that ones with higher age showed higher use of medical service. Other researchers revealed the similar findings (Loozen 2015). Aging index was the index to measure the population aging in an area (Bloom et al. 2015) that medical demands would increase with increase aging index. Kasteenpohja et al. (2015) presented the consistent findings that ones with lower education showed higher use of medical service; high utilization rate mostly appeared on illiterate ones, while ones with college education presented low utilization rate. Neutens (2015) indicated that medical demands would increase after the income was enhanced. Without the interference of medical insurance, Kim et al. (2017) discovered that the consumers’ medical demand curve was negative, i.e. consumers’ medical demands reducing after the enhancing of medical service. Mesquita et al. (2017) pointed out the correlation with “number of hospitals above regional level” in secondary medical areas. In other words, the number of hospitals above regional level would affect the public use of medical resources. In the behavior pattern of medical service use, a community could have the meanings of factors matching the accessibility of medical equipment or manpower in the community being able to predict or explain the medical service use behavior. The following hypotheses are therefore established in this study.

**H3:** Aging index would affect number of outpatients.

**H4:** Education would influence number of outpatients.

**H5:** Income level would affect number of outpatients.

**H6:** Number of hospitals would influence number of outpatients.

**DEFINITION OF RESEARCH DIMENSION AND DESIGN OF RESEARCH METHOD**

**Definition of Research Dimension**

*Competition in medical ecology*

Herfindahl index is used for the operation of competition in this study. Unlike hospital size or illness severity with endogenous problems, it is generally agreed by researchers. For this reason, the market share is directly used for analyzing the competition in Medical ecology areas.

*Outpatient fee*

Taking the average annual medical expenses of a person as the geometric data, the amount of general outpatient cases of all basic-level medical institutions in secondary medical areas reported to the central is summed and divided by the total population by the end of the year in the secondary medical areas.

*Number of outpatients*

Regarding the average annual number of outpatients of a person as the geometric data, the number of general outpatient cases of all basic-level medical institutions in secondary medical areas reported to the central is summed and divided by the total population by the end of the year in the secondary medical areas.

**Research Object**

The medical institution statistics provided by Shanghai Municipal People’s Government is used as the sample data for the secondary data analysis.

**Analysis Method**

Regression analysis is applied to understand the effect of competition in Medical ecology on outpatient fee and number of outpatients.

**ANALYSIS AND DISCUSSION**

**Effects of Competition in Medical Ecology on Outpatient Fee and Number of Outpatients**

With regression analysis to test the hypothesis and theoretical structure, the first regression, **Table 1**, shows the regression equation achieving the significance (F=36.443, p<0.001) that competition in Medical ecology presents remarkably effects on

**Table 1.** Regression analysis of competition in Medical ecology to outpatient fee and number of outpatients

Independent variable	Outpatient fee		Number of outpatients	
	Beta	ρ	Beta	ρ
competition in Medical ecology	0.255**	0.000	0.263**	0.000
F	36.443		43.851	
P	0.000***		0.000***	
R2	0.327		0.388	
Adjusted R2	0.312		0.367	

Note: \* stands for p<0.05 and \*\* for p<0.01

**Table 2.** Variance analysis of other factors on number of outpatients

variable	F	P	Scheffe post test	
other factors	aging index	8.662	0.000**	high>low
	education	16.731	0.000**	high>medium >low
	income level	22.453	0.000**	high>meidum >low
	number of hospitals	31.625	0.000**	more>less

Note: \* stands for p<0.05 and \*\* for p<0.01

outpatient fee (Beta=0.255, p<0.01). H1 is therefore supported.

The second regression, **Table 1**, reveals the regression equation reaching the significance (F=43.851, p<0.001) that competition in Medical ecology appears notably effects on number of outpatients (Beta=0.263, p<0.01). H2 is therefore supported.

**Variance Analysis of Other Factors on Number of Outpatients**

Analysis of variance is applied to discuss the difference of other factors in number of outpatients, i.e. analyses and explanations of aging index, education, income level, and number of hospitals. From **Table 2**, higher aging index presents higher number of outpatients, and high education shows higher number of outpatients than medium education and low education. Nonetheless, high income level reveals higher number of outpatients than medium and low income level. Finally, an area with more number of hospitals appears higher number of outpatients than those with less number of hospitals.

**CONCLUSION**

Medical ecology presents critical status on the healthcare system of a country and the smooth operation of health insurance system. The research results reveal that, under fee-for-service payment, basic-level medical institutions appear higher medical

expenses in higher competition, as physicians in the areas with high competition would anticipate reducing income. The increase of outpatient fee or times therefore is regarded as the compensation. Besides, increasing number of returns would enhance patients' financial payment (registration fee, copayment ...), transportation cost, and time cost that physicians would respond with increasing expenses when selecting to increase outpatient fee or times. As a result, it is realized that there is bad integration between management economy and social responsibility in current Medical ecology. On one hand, a doctor's introspection and social expectation show large space to improve physicians' humanities and ethics. On the other hand, some doctors regard humanities and ethics as dreams when they could not survive. Hospitals constantly propose core value and mission to convince the public, but also achieve the management index with economic tactics and rules. In this case, the reform of medical ecology should not be preceded without alternatives. Any current systems or improvement programs should be considered with the balance of social responsibility and management economy so as to satisfy social expectation as well as take care of medical practice and respect experts' suggestions.

#### SUGGESTION

According to the research findings, the following suggestions are proposed in this study.

1. Physicians are the main role in the entire Medical ecology. A physician should contribute to medical industry with conscience, honor, dignity, and altruism. From the enrollment of a medical student to the end of lifelong education, a physician has to constantly promote himself/herself from cognition to action, from knowledge to literacy, from value to morality, and from professional behaviors to life details.
2. The management and operation of a hospital is entrusted and assessed by the health insurance system with clear core aims, goals, and core value. However, the reward and punishment for modifying medical behaviors, when making strategies and the details, should be considered from diverse angles, rather than expecting doctors to enhance the core value and professional literacy with bad financial incentives and unbalanced honor and punishment.
3. Some policies considering finance but calling for quality should be strictly examined. The government should fully analyze and control the messy Medical ecology and propose specific Medical ecology improvements, as the government presents the administrative power to show moral courage and successful strategies for medical reform.

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