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Pilot Study on Developing Symptom-Response Ratio*

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I. INTRODUCTION

Health which has multi-dimensional or qualitative characteristics is difficult to define in operational terms and can only be inferred. To assist, however, in the formulation of health care plans and in the monitoring of the subsequent development it is important to be able to provide health administration with information on trends in the levels of mortality and morbidity which have been the most useful indices of health.

While the shortcomings of mortality indices are apparent, use of these rates has at least two virtues: one, mortality statistics are relatively widely available, largely because they are by-products of death registration; and two, high mortality—that is, a large number of premature deaths—has been widely recognized as a major problem of public health importance in the past.

During the twentieth century, as mortality was at first gradually and later rapidly reduced to lower levels, the morbidity and impairment aspects of ill health loomed ever larger. However, it is desirable for planning purposes that this information should be capable of being translated either into needs for specific action or into the successfulness of past actions. To meet these purposes health care indices have recently been introduced although some people assume that the indices will not measure the results for improving health status. The health care indices

* This research was part of the project entitled "Basic Health Survey Urban Low Income Area" (BHSULIA), with was supported in part by the World Health Organization under the Health Services Research Programme.

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are, in other words, related to evaluating the status of the health care delivery and should consist of the following three components, indicating:

- a. level of community need,
- b. level of resource availability, and
- c. level of health care utilization.

Data regarding the first and second components are usually collected through health interview surveys in many countries.

To evaluate levels of health care utilization, the data will be collected from hospital and clinic records or survey data. However, the simple enumeration of the total number of encounters is of very little value for analytical purposes. It is the utilization rate that is significant, especially when it is compared with similar figures in the previous time periods or with *other*. Even the utilization rate is not sufficient to provide information on equity of access to health care which is best considered in the context of whether people actually in need of health care receive it or not. For the purpose, more complex measure of access which indicate use of services relative to the need for care are the use-disability ratio and the symptom-response ratio.

The use-disability ratio is the ratio of mean frequency of use of physicians versus mean days of disability during a given period. The higher the ratio is, the higher is the satisfaction about need of health care.

Within a group whose mean days of disability as well as their mean frequency of use of physicians are both small the ratio may become relatively high. While the use-disability ratio has the advantage of showing use of services with some adjustment for need, there are some limitations of the measures because interviewed data on the disability day which is calculated with respondents' answers influenced by the inhabitants' perception on health, habit or background, etc., can be biased. Since felt need is limited by the knowledge and expectations of the respondent which may be unrealistically optimistic or pessimistic, the possible health care overuse or underuse cannot be checked exactly by the use-disability ratio.

The symptom-response ratio is intended to overcome such kind of problem. This ratio reflects whether people who need health care utilize the health care facilities or not. There are several research papers on methodology and utility of the symptom-response ratio. However, this study is the first trial in Korea which aims at measuring the possibility of utilizing the ratio as indices of health care through modification (simplification) of the original method by utilizing community survey data.

II. MATERIALS AND METHODS

1. Data

The basic data for this study are results of 1) the health interview survey in Seoul during June 8-28, covering 1,461 patients and 2) mailing survey covering 121 doctors.

Table 1 shows the characteristics of the respondents who experienced at least more than one kind of symptoms during the last one year. Table 2 shows the characteristics of the respondent doctors.

In the table 1 we can find the distinction between the urban poor and the middle class. The urban poor means sampled persons who live in areas which comprise more than five needy households per *Ban*, while the middle class are those who live in *Dongs* whose ratio of needy families are lower than one percent.

2. Methods

The symptoms-response ratio make use of a checklist of 13 specific symptoms administered to all the samples. A list of the specific is as follows:

<u>Acute</u>	<u>Chronic</u>
a. Cold	a. Headache
b. Stomachache	b. Indigestion
c. Vomiting	c. Fatigue
d. Diarrhea	d. Arthralgia
e. Haemoptysis	e. Lumbago
f. Eye or Ear Condition	f. Loss of Weight
	g. Loss of Permanent Teeth

For each of the 13 symptoms, people were asked whether or not they experienced the symptoms during the survey year and, if the symptom was reported, whether or not a doctor was seen about it.

In addition, a panel of 121 doctors was asked to estimate, based on their training and experience, what percentage of the people should see a physician for a given symptom through a mailing survey. An age-specific symptom-response ratio which was calculated by Anderson

Table 1. General Characteristics of the Patient Respondents

	Urban Poor (N=948)	Middle Class (N=513)
Sex		
Male	48.4	45.8
Female	51.6	54.2
Age		
0 ~ 4	11.5	9.4
5 ~ 14	19.4	23.2
15 ~ 49	55.3	50.9
50+	13.8	16.6
Education		
No schooling*	14.2	12.3
Illiteracy	4.6	1.4
Literacy	2.2	0.8
Primary school	37.2	22.8
Middle school	21.5	22.8
Middle school	21.5	9.7
High school	17.6	19.9
College or more	2.5	33.1
Medical Care		
Medical insurance	23.5	67.8
Medicaid	21.4	0
None	55.1	32.2

* Pre-school children are categorized as no schooling.

was not applied in this paper.

The symptom-response ratio is based on the difference between actual number of symptoms for which a visit to the physician was made and the doctor estimates of the number of people with the symptom who should have seen the doctor for that symptom. The computational formula is:

Table 2. General Characteristics of Doctors

		Age			Total	
		below 44	44 ~ 54	55 more	N	Percent
Total	(N)	62	32	27	121	—
	(%)	51.2	26.5	22.3	—	100.0
Sex						
	Male	54	21	26	101	84.2
	Female	7	11	1	19	15.8
	Total	61	32	27	120	100.0
Occupied						
	Public	24	0	0	24	20.0
	Private	28	17	18	63	52.5
	Health center	7	4	2	13	10.8
	Others	3	11	6	20	16.7
	Total	62	32	26	120	100.0
Status						
	Specialist	30	8	6	44	37.0
	General	7	20	18	45	37.8
	Residents	19	3	2	24	20.2
	Intern	6	0	0	6	5.0
	Total	62	31	26	119	100.0
Management						
	Self	6	25	23	54	47.4
	Non self	52	7	1	60	52.6
	Total	58	32	24	114	100.0
Year Licensed						
	Before 54	0	2	22	24	20.2
	55 ~ 65	1	23	2	26	21.8
	After 65	60	7	2	69	58.0
	Total	61	32	26	119	100.0

$$\text{Symptom-response ratio(s)} = \frac{O-E}{E} \times 100$$

where O = observed number of symptoms; E = expected number of visits there “should be” for symptoms. Using this formula both general symptom-response ratio and symptom specific symptom—response ratio can be calculated. If the ratio indicates zero, it means that the medical needs are fulfilled properly. The plus ratio indicates the over-utilization, while the minus ratio means the under-utilization. The statistical significance of S will be tested through the X² of $\frac{O-E}{E}$, while the significance of difference between two S will be tested by F-test.

III. RESULTS

Based on the information collected through the interview survey and mailing the symptom-response ratio was calculated. The general symptom response ratio is -61.1, indicating the under-utilization by the standard of doctors' suggestion. Among all symptoms except cold, particularly chronic fatigue and loss of weight show minus ratios.

1. Symptom Response Ratio by Sex

The general symptom response ratio is -62.5 and -59.9 for male and female respectively, which shows no statistically significant difference. On the whole the ratios of chronic symptoms and acute symptoms such as stomachache and vomiting are lower among the males than the females, those of the others show the opposite tendency. Such a higher level of symptom response ratios of stomachache and vomiting among the females may be explained by the physiological characteristics of women.

2. Symptom Response Ratio by Age

The general tendency is that the lower the age is, the higher the utilization level is. Among the children under 5, there is no significant under-utilization. (See table 4) But the age group over 15 shows remarkable under-utilization which is greater than that of the age group under 14. The younger age group under 14 has too few cases with chronic symptoms.

The response ratios of symptoms among the age group 15-49 are much lower than those among the age group over 60. These age specific response ratios are in general similar to the

Table 3. Symptom-Response Ratio by Sex

	Male			Female			Total
	Patient's visits	Recom-mended	Indices	Patient's visits	Recom-mended	Indices	Indices
Cold							
One day	9	6	50	8	7	14.3	90.8
Two or more	174	417	-58.3	177	470	-62.3	-60.4
Stomachache							
One day	12	46	-73.9	18	47	-61.7	-67.7
Two or more	40	159	-74.8	50	150	-66.7	-70.9
Vomiting							
One day	12	39	-69.2	13	30	-56.7	-60.9
Two or more	21	61	-65.6	19	55	-65.5	-65.5
Diarrhea							
One day	18	28	-35.7	21	23	-8.7	-20.4
Two or more	51	149	-65.8	33	116	-71.6	-68.3
Chronic							
Headache	15	39	-61.5	38	71	-46.5	-51.8
Indigestion	25	53	-52.8	46	69	-33.3	-41.8
Fatigue	18	83	-78.3	22	79	-72.2	-75.3
Arthralgia	21	54	-61.1	35	86	-59.3	-60.0
Lumbago	7	23	-69.5	29	62	-53.2	-57.6
Weight loss	2	23	-91.3	3	28	-89.3	-90.2
Loss of Teeth	30	33	-9.1	21	35	-40.0	-25.0
Total	446	1,122	-62.5	544	1,424	-59.9	-61.1

results of the research by Aday, et al.

3. Ratio by Income Level Table

The difference of utilization rates according to the income level was already found by Anderson, in 1963, in U.S.A.

Table 4. Symptom-Response Ratio by Age

	0~5			6~14		
	Patient's visits	Recommended	Indices	Patient's visits	Recommended	Indices
Cold						
One day	2	1	100	6	3	100
Two or more	97	104	-6.7	113	188	-39.9
Stomachache						
One day	2	6	-66.7	8	26	-69.2
Two or more	22	37	-40.5	20	55	-63.6
Vomiting						
One day	9	12	-25.0	7	14	-50.0
Two or more	17	21	-19.0	8	17	-52.9
Diarrhea						
One day	18	7	157.0	7	10	-30
Two or more	47	61	-23.0	12	36	-66.7
Chronic						
Headache	—	—	—	3	10	-70
Indigestion	2	3	-33.3	5	5	0
Fatigue	0	1	-100.0	0	9	-100.0
Arthralgia	—	—	—	0	1	-100.0
Lumbago	—	—	—	0	1	-100.0
Weight loss	0	1	-100.0	0	1	-100.0
Loss of Teeth	—	—	—	11	14	-21.4
Total	216	254	-14.9	200	390	-48.7

Table 5 shows comparison of symptom response ratios between the urban poor and the middle class. The ratio is lower among the low income group than among the middle class, as was expected.

The low income group shows under-utilization for almost all symptoms except for cold, but

Table 4. Continued

	15~49			50+		
	Patient's visits	Recommended	Indices	Patient's visits	Recommended	Indices
Cold						
One day	8	7	14.3	1	2	-50.0
Two or more	111	475	-76.6	30	121	-75.2
Stomachache						
One day	17	5	14	54	-68.5	-64.3
Two or more	35	167	-79.0	13	50	-74.0
Vomiting						
One day	8	36	-77.8	1	7	-85.7
Two or more	9	61	-85.2	6	16	-62.5
Diarrhea						
One day	11	28	-60.7	3	6	-50.0
Two or more	17	134	-87.3	8	36	-77.8
Chronic						
Headache	35	75	-53.3	15	24	-37.5
Indigestion	40	82	-51.2	24	32	-25.0
Fatigue	23	115	-80.0	17	38	-55.3
Arthralgia	32	89	-64.0	24	51	-52.9
Lumbago	18	57	68.4	18	28	-35.7
Weight loss	4	35	-88.6	1	14	-92.8
Loss of Teeth	28	35	-20.0	12	19	-36.8
Total	396	1,450	-72.7	178	458	-61.1

the middle class presents nearly proper utilization for the symptoms such as cold, diarrhea, chronic indigestion, arthralgia, lumbago and loss of permanent teeth etc.

In other word, these results indicate that there are more unmet need in the low income group than in the middle class.

5. Symptom-Response Ratio by Income Level

	Middle Class			Urban Poor Class		
	Patient's visits	Recommended	Indices	Patient's visits	Recommended	Indices
Cold						
One day	7	5	40.0	10	8	25.0
Two or more	184	321	-42.7	167	566	-70.5
Stomachache						
One day	13	43	-69.8	19	55	-65.5
Two or more	30	71	-57.7	60	238	-74.8
Vomiting						
One day	12	24	-50.0	13	45	-71.1
Two or more	8	17	-52.9	32	99	-67.7
Diarrhea						
One day	23	23	0.0	16	28	-42.9
Two or more	30	65	-53.8	54	201	-73.1
Chronic						
Headache	14	25	-44.0	39	85	-54.1
Indigestion	23	29	-20.7	48	93	-20.7
Fatigue	17	42	-59.5	23	121	-81.0
Arthralgia	21	34	-38.2	35	107	-67.3
Lumbago	17	22	-22.7	19	63	-69.9
Weight loss	3	9	-66.7	2	42	-95.2
Loss of Teeth	17	17	0.0	34	51	-33.3
Total	419	747	-43.9	571	1,802	-68.3

IV. CONCLUSION AND SUGGESTIONS

This paper assesses the usability of symptom-response ratios as health indicators reflecting medical utilization levels among inhabitants. This can be summarized as:

1. Measurement for the Symptom-Response Ratio

Questionnaire for health interview survey contains 6 acute symptoms such as haemoptysis, communicable eye or ear condition, and cold, stomachache, vomiting and diarrhea, each of which is divided into two, based on morbid duration, namely within one day and more than two days. It also contains 7 chronic symptoms such as headache, indigestion, fatigue arthralgia, lumbago, loss of weight and loss of permanent teeth. The number of haemoptysis and communicable eye or ear conditions, however, is too few to be analyzed for the study.

Using the above same list of symptoms, physicians were asked to assess the recommendation regarding health care use.

2. The total respondents of interview survey were 948 in the urban poor and 513 in the middle class. The number of the physicians who responded the mailing questionnaire was 121.

3. Following is the Results of Analysis

- a. The general ratio indicates under-utilization in both sexes of male and female whose general index shows nearly the same level as -62.5 and -59.9 respectively, although only that of one day cold indicates over-utilization.
- b. The age specific symptom-response ratios indicate the proper utilization level among children under 5 and under-utilization among the age group over 15. As the age becomes older, however, the ratios decrease.
- c. The income level is also a good variable of differentiating the utilization level, although the under-utilization is general among the low income group than among the middle class.
- d. Generally the symptom-response ratio seems to be an accurate indicator reflecting equity of access to health care for the community.

4. For practical application of symptom response ratio as a health indicator in Korea, further studies are suggested as follows:

- a. To develop the age-specific expected utilization level and review the findings of response ratios based on various symptoms and their severity.
- b. To develop the methodology such as how to calculate sex and age-standardized specific ratios as well as to weight these ratios according to the composition of symptoms.

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