

## PEER REVIEW HISTORY

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### ARTICLE DETAILS

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| <b>TITLE (PROVISIONAL)</b> | Correlation between the ratio of physician consultation fees to hourly minimum wage and consultation length : a cross-sectional study of 9 countries |
| <b>AUTHORS</b>             | Kim, Ju-Ryoung; Byun, Se-Jin; Son, Dae-Soon; Kim, Hyun Ah  |

### VERSION 1 – REVIEW

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| <b>REVIEWER</b>        | Yim, Jae-Joon<br>Seoul National University College of Medicine, Department of Internal Medicine |
| <b>REVIEW RETURNED</b> | 29-Jul-2022   |

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| <b>GENERAL COMMENTS</b> | <p>This interesting manuscript provides analyses of physician consultation fees and several other indexes in nine countries. The main result is that consultation length and the ratio of consultation fee / hourly minimum wage ratio are correlated. In addition, the authors suggest that the ratio is also correlated with with the annual number of physician visits, number of consultations per doctor, and length of hospital stay, Although the results of this study is important and the manuscript is well-written, the authors should clarify several issues before the publication.</p> <ol style="list-style-type: none"> <li>1. Which year's data were collected for the consultation fees, durations, and so on? I could not find it easily.</li> <li>2. Why HbA1c and brain CT/MRI were chosen for representative laboratory and imaging tests?</li> <li>3. The authors showed the length of consultation was correlated with the length of hospital stay and hypertension admission rate (Fig. S1). I have several inquiries on this issue. First of all, what is the exact meaning of the the length of hospital stay and hypertension admission rate? Secondly, what is the rationale for assuming correlation between the length of consultation and the the length of hospital stay or hypertension admission rate? I think it is better for the authors to omit this topic from the analyses.</li> <li>4. The authors compared the ratio of consultation fee to hourly minimum wage and HbA1c cost to consultation fee. (Fig. 2A) If the same variable (consultation fee) is included in both of two variables being compared, (i.e. the ratio of consultation fee to hourly minimum wage for X-axis and HbA1c cost to consultation fee for Y-axis), the negative correlation will be confirmed in most cases. Comparisons in figures 2B and 2C have the same issue and those in figures S3A and S3B have the similar issue.</li> </ol> |
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|  | 5. It is very interesting that 42.1% of patients in Japan indicated that doctors spend sufficient time while 80.8% of patients in Korea answered similarly. What are the explanations for this discrepancy? |
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| <b>REVIEWER</b>        | Sung, Yoon-Kyoung<br>Hanyang University Hospital for Rheumatic Diseases,<br>Rheumatology |
| <b>REVIEW RETURNED</b> | 14-Aug-2022  |

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| <b>GENERAL COMMENTS</b> | <p>The authors tried to compare the physician consultation/hourly minimum wage in 9 countries and looked for the factors correlated with this variable. Using the correlation analyses, the authors found a significant correlation (<math>r = 0.79</math>) between consultation length and the consultation fee/hourly minimum wage ratio. The ratio of consultation fee/hourly minimum wage was negatively correlated with the annual number of physician visits, number of consultations per doctor, and length of hospital stay. The authors also insisted that in the countries where the brain CT/consultation fee ratio was highest, the number of CT examinations per population was also highest. This is an interesting topic, but there are some critical issues in the study design leading to the conclusion which needs supplementation.</p> <p>Major comments</p> <ol style="list-style-type: none"> <li>1. The authors selected the fees for reference laboratory or imaging tests such as hemoglobin A1c and brain imaging (brain computed tomography [CT] and magnetic resonance [MR]) in a primary care setting. Although HbA1c is usually prescribed by primary care physicians, brain imaging tests are performed by specialists. I am not sure about the relationship between the consultation fee of a primary physician and the cost of brain imaging tests. The authors should explain why they selected those kinds of tests for comparison instead of other lab tests or simple X-rays.</li> <li>2. The authors concluded that the imbalance in compensation for cognitive services might drive increased use of imaging tests in some countries. However, an increased number of brain image tests can be influenced by the prevalence of hypertensive diseases, cerebrovascular diseases, or dementia. It is also affected by the proportion of elderly people in the general population. To make this conclusion, these factors need to be considered first.</li> <li>3. In the introduction, the authors explain conclusively that the current healthcare reimbursement system is criticized for not adequately compensating physicians' cognitive services. Is it true? It is necessary to explain how this premise has been changed after conducting this research in the discussion session.</li> </ol> |
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### VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Dr. Jae-Joon Yim, Seoul National University College of Medicine

Comments to the Author:

This interesting manuscript provides analyses of physician consultation fees and several other indexes in nine countries. The main result is that consultation length and the ratio of consultation fee / hourly minimum wage ratio are correlated. In addition, the authors suggest that the ratio is also correlated with the annual number of physician visits, number of consultations per doctor, and length of hospital stay, Although the results of this study is important and the manuscript is well-

written, the authors should clarify several issues before the publication.

1. Which year's data were collected for the consultation fees, durations, and so on? I could not find it easily.

->> Table 1 legend, supplementary appendix and methods provide the data. Please refer to the following :

Consultation fee and other fee schedules were based on year 2021, while consultation duration was based on the paper by Irving et al (2017), adapted from Irving G, Neves AL, Dambha-Miller H, et al. International variations in primary care physician consultation time: a systematic review of 67

countries. BMJ Open 2017;7 e017902 except for Korea and Taiwan. For Korea, [의과 의원의 외래 진료 질 담보 및 비용 관리를 위한 진찰료 수가모형](#) at

<https://repository.hira.or.kr/handle/2019.oak/2429> (last access, 31st March, 2021). For Taiwan, [健保給付中逐年下降的醫師費，會帶來什麼影響？](#) at <https://www.twreporter.org/a/health-insurance-system-diagnostic-fee> (last access, 31st March, 2021). For information regarding the healthcare index and minimum wage, the OECD report was used: <https://stats.oecd.org/> (last access, 10 July 2021).

2. Why HbA1c and brain CT/MRI were chosen for representative laboratory and imaging tests?

->> HgBA1C was chosen because of its relative simplicity in fee schedule compared to other lab tests, and its importance. Compared to blood battery or liver function test, HgBA1C has a single fee schedule in most countries. Likewise, compared to thoracic, or abdominal imaging, brain imaging has simpler fee schedule in most countries studied. In addition, brain CT/MRI are typical high cost tests that are often the culprit of abuse.

3. The authors showed the length of consultation was correlated with the length of hospital stay and hypertension admission rate (Fig. S1). I have several inquiries on this issue. First of all, what is the exact meaning of the the length of hospital stay and hypertension admission rate? Secondly, what is the rationale for assuming correlation between the length of consultation and the the length of hospital stay or hypertension admission rate? I think it is better for the authors to omit this topic from the analyses.

->> The length of hospital stay is an important indicator to assess the efficiency of patient quality of care, which is associated with increased risks of opportunistic infections, side effects of medication, treatment outcome and mortality rates (Baek H, Cho M, Kim S, Hwang H, Song M, Yoo S. Analysis of length of hospital stay using electronic health records: A statistical and data mining approach. PLoS One. 2018 Apr 13;13(4):e0195901.) Hypertension is an exemplar of ambulatory sensitive care condition(ASCC), for which hospitalization may indicate poor care quality. The hypothesis behind this analysis was that short consultation time would lead to lower quality of care overall and leads to longer hospitalization duration and higher admission rate for ambulatory sensitive care condition.

4. The authors compared the ratio of consultation fee to hourly minimum wage and HbA1c cost to consultation fee. (Fig. 2A) If the same variable (consultation fee) is included in both of two variables being compared, (i.e. the ratio of consultation fee to hourly minimum wage for X-axis and HbA1c cost to consultation fee for Y-axis), the negative correlation will be confirmed in most cases. Comparisons in figures 2B and 2C have the same issue and those in figures S3A and S3B have the similar issue.

->> This is a very valid criticism. The purpose here was to show whether there is a tendency of higher compensation for labs and imaging in countries with lower compensation for cognitive service. We had to standardize fee levels of each country, but we could not think of the way that we could avoid such statistical problem. (Adjustment of fees would lead to same variables appearing in each side of adjustment). We omitted the statistical analysis in these cases and presented the data in a descriptive way. (Page 16, highlighted, Figure 2, Figure S3 revised)

5. It is very interesting that 42.1% of patients in Japan indicated that doctors spend sufficient time while 80.8% of patients in Korea answered similarly. What are the explanations for this discrepancy? ->>Considering the similar culture between Japan and Korea, this is an unexpected finding. I believe that the response of south Korean patients is exceptional in that despite short consultation length, high percentage of patients are satisfied. Probably, expectation of patients for their physicians is correlated with the economic development status of that country. Compared to other reference countries, South Korea was still in the process of economic growth in year 2010s, and patients may still have been used to the short consultation and low quality care of previous decades.

Reviewer: 2

Dr. Yoon-Kyoung Sung, Hanyang University Hospital for Rheumatic Diseases

Comments to the Author:

The authors tried to compare the physician consultation/hourly minimum wage in 9 countries and looked for the factors correlated with this variable. Using the correlation analyses, the authors found a significant correlation ( $r = 0.79$ ) between consultation length and the consultation fee/hourly minimum wage ratio. The ratio of consultation fee/hourly minimum wage was negatively correlated with the annual number of physician visits, number of consultations per doctor, and length of hospital stay. The authors also insisted that in the countries where the brain CT/consultation fee ratio was highest, the number of CT examinations per population was also highest. This is an interesting topic, but there are some critical issues in the study design leading to the conclusion which needs supplementation.

Major comments

1. The authors selected the fees for reference laboratory or imaging tests such as hemoglobin A1c and brain imaging (brain computed tomography [CT] and magnetic resonance [MR]) in a primary care setting. Although HbA1c is usually prescribed by primary care physicians, brain imaging tests are performed by specialists. I am not sure about the relationship between the consultation fee of a primary physician and the cost of brain imaging tests. The authors should explain why they selected those kinds of tests for comparison instead of other lab tests or simple X-rays.

->>The purpose of the study was to compare the compensation for physician cognitive service and laboratory/imaging, and because consultation fees varies greatly according to health care settings in each country, a representative consultation fee was chosen. Consultation length data are not available in many countries, except for the primary care(Irving et al.), or in cases that physicians are compensated by the time they spent. Although these data are in large part derived from primary care for the sake of availability, they represent overall physician fee for cognitive service or consultation length in that country (South Korea or Taiwan have the same problem of short consultation length regardless of practice setting.) HgBA1C and brain imaging was chosen because of their relative simplicity in fee schedule, frequency and importance. Compared to blood battery or liver function test, HgBA1C has a single item fee in most countries. Likewise, compared to thoracic, or abdominal imaging, brain imaging has simpler fee schedule in most countries studied. In addition, brain CT/MRI are typical high-cost tests that is often the culprit of abuse. The reason for using brain CT/MRI instead of X-ray was thus, to show the imbalance between cognitive service and high tech test, which is applicable in overall health care compensation.

2. The authors concluded that the imbalance in compensation for cognitive services might drive increased use of imaging tests in some countries. However, an increased number of brain image tests can be influenced by the prevalence of hypertensive diseases, cerebrovascular diseases, or dementia. It is also affected by the proportion of elderly people in the general population. To make this conclusion, these factors need to be considered first.

->>That is another limitation of this study, which uses national data that does not reflect such

variables. This point was added in the discussion as follows (Page 19, highlighted).  
 Although we suggested that an increased number of brain imaging tests is correlated with low compensation for physician cognitive service, it is also influenced by a number of variables such as the prevalence of hypertensive diseases, cerebrovascular diseases, or the proportion of elderly people. Because national data that does not reflect such variables were used, this is another limitation of this study.

3. In the introduction, the authors explain conclusively that the current healthcare reimbursement system is criticized for not adequately compensating physicians' cognitive services. Is it true? It is necessary to explain how this premise has been changed after conducting this research in the discussion session.

->> Such criticisms were raised by other researchers as well (Bodenheimer T, Berenson RA, Rudolf P. The primary care-specialty income gap: why it matters. *Ann Intern Med.* 2007;146(4):301-306, Sinsky CA, Dugdale DC. Medicare payment for cognitive vs procedural care: minding the gap. *JAMA Intern Med* 2013;173:1733–7). However, the compensation issue may be perceived differently depending on the health care system and social value of each countries.

The reviewer's point was added in the discussion as follows (page 18, highlighted).  
 Because consultation fee was negatively correlated with HbA1c or brain imaging fees, systematic overcompensation for lab tests and imaging tests compared to consultation may be present in countries with low compensation for consultation.

#### VERSION 2 – REVIEW

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| <b>REVIEWER</b>         | Yim, Jae-Joon<br>Seoul National University College of Medicine, Department of Internal Medicine |
| <b>REVIEW RETURNED</b>  | 23-Sep-2022   |
| <b>GENERAL COMMENTS</b> | The authors improved the manuscript according to the suggestions.                               |