

Exploring financial relationships between board-certified cardiologists and pharmaceutical industry in Japan between 2016 and 2019

Anju Murayama¹, Kenichi Higuchi¹, and Yuki Senoo¹

¹Affiliation not available

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Anju Murayama^{1,2*}; Kenichi Higuchi¹; Yuki Senoo, MD, MUDr³

Affiliations:

¹ School of Medicine, Tohoku University, Sendai City, Miyagi, Japan

² Department of Population Health Science and Policy, Icahn School of Medicine at Mount Sinai, New York City, NY, USA

³ Department of Internal Medicine, Higashitotsuka Memorial Hospital, Yokohama, Kanagawa, Japan

*Corresponding author

Correspondence

Anju Murayama

School of Medicine, Tohoku University, 2-1 Seiryomachi, Aoba ward, Sendai City, Miyagi, 980-0872, Japan

Telephone: 81-22-717-8006

Email address: anju.murayama.s8@dc.tohoku.ac.jp

Introduction

Collaborations between physicians and pharmaceutical companies play a crucial role in advancing healthcare innovation and improving patient care through joint research efforts. However, such collaborations can also lead to financial conflicts of interest (COIs) for physicians. Furthermore, physicians may engage in promotional activities or be targeted for marketing by the companies,¹⁻³ potentially biasing their decision-making, including prescribing patterns and guideline recommendations.⁴⁻⁹ These COIs could bias physicians' decision-making including prescribing patterns and guideline recommendations.

To improve transparency in these financial relationships, the Japan Pharmaceutical Manufacturers Association (JPMA), the largest pharmaceutical trade organization in Japan, implemented a policy in 2013 requiring its member companies to disclose payments to physicians on their websites. This data is then collected by an independent research organization and journalists and has been voluntarily available on a comprehensive searchable database since 2016.¹⁰ Previous research using this database has revealed prevalent financial relationships between physicians and pharmaceutical companies in Japan.¹¹⁻¹⁷

Among several specialists, cardiologists are among the most heavily targeted specialists for marketing by pharmaceutical companies. Murayama et al. previously reported that society executive board members of the Japanese Circulation Society received the second highest mean payments of \$311,653, with the fourth

highest median payments of \$207,888 in personal payments for lecturing, consulting, and writing among 15 internal medicine subspecialty societies in Japan.¹² Another study found that authors of the Japanese Society of Hypertension clinical guidelines received a mean of \$21,447 in personal payments in 2016.¹⁸ Additionally, Tringale et al. reported that cardiologists received the highest median payments of \$862 from healthcare companies of 26 specialties in the United States (US).² Similarly, Murayama et al. reported that cardiologists received \$725 in personal payments in the US in 2019.¹ Despite the likely presence of prevalent and substantial financial relationships between cardiologists and pharmaceutical companies in Japan, no studies have been conducted to evaluate the whole size and extent of financial relationships between cardiologists and pharmaceutical companies. Utilizing a publicly accessible database, this study investigated the extent and trends of personal payments from pharmaceutical companies to all cardiologists in Japan.

Methods

Utilizing the publicly available payment database,¹⁰ this analysis examined all personal payments to cardiologists from JPMA-affiliated pharmaceutical companies from 2016 to 2019. We included all cardiologists board-certified by the Japanese Circulation Society (JCS) as of September 2021. The JCS, established in 1935, is the sole professional body board-certifying cardiologists since 1989. As of the specified date, we identified 15,048 board-certified cardiologists from the JCS webpage. The JPMA only requires its member companies to disclose personal payments to individual physicians for lecturing, consulting, and writing services at individual physician level. More common payment categories such as meals, travel, accommodations, and other gifts are reported in aggregate, precluding individual-level analysis.¹⁹ Therefore, we searched for the names of cardiologists and collected from the payment database only payments to cardiologists for lectures, consulting, and writing for this study. As payments in 2019 were the latest analyzable data at the time of data collection, we collected payments from 2016 to 2019.

We conducted descriptive analyses including mean and median payments per cardiologist and the proportion of cardiologists receiving payments. The concentration of payments among cardiologists was assessed using the Gini index, as in previous studies.^{20–22} Furthermore, we examined trends in the number of cardiologists receiving payments and the payment amounts from 2016 to 2019 using generalized estimating equation (GEE) models. To adjust for highly skewed distribution of payments, we used a log-linked GEE model with a Poisson distribution for the number of cardiologists receiving payments and a negative binomial GEE model for payments per cardiologist, as conducted in previous studies.^{11,13,16,19,23} For trend analysis, we adjusted for inflation, converting all payment values to 2019 Japanese yen value. Given that all data used in this study were publicly available and met the definition of non-human subjects research, institutional review board approval was not required in Japan.

Results

Of the 15,048 eligible cardiologists board-certified by the JCS, 9,858 (65.5%) received at least one personal payment from pharmaceutical companies between 2016 and 2019 (Table 1). The total amount of these payments was \$112,934,503, entailing 164,978 payment transactions. For cardiologists who received at least one payment, the median amount per cardiologist was \$2,947 (interquartile range [IQR]: \$1,022–\$8,787), with a mean of \$11,456 (standard deviation [SD]: \$35,876) over the four-year period. The Gini index was 0.840 for personal payments per cardiologist, indicating that only a small proportion of cardiologists received the vast majority of these payments. Specifically, the top 1% (150 cardiologists), 5% (752 cardiologists), and 10% (1505 cardiologists) received 31.6%, 59.4%, and 73.5% of all personal payments, respectively. Only 0.5% (67 cardiologists) received more than \$200,000 payments and one cardiologist received 565 payments totaling \$782,015 over the four years.

Lecturing payments accounted for 88.6% of the total payments (\$100,067,695) in monetary value and 89.7% in the number of payments over the four years, with 64.5% (9,710) of cardiologists receiving at least one lecturing payment. Consulting and writing payments accounted for 8.0% (\$9.1 million) and 3.3% (\$3.8 million) in monetary value. The mean values per payment were \$1,243 for lecturing, \$1,236 for consulting,

and \$915 for drafting services.

Of 83 pharmaceutical companies making payments to the cardiologists, Daichi Sankyo made the largest amounts of personal payments totaling \$26.4 million (23.4% of all payments), followed by Bayer (\$11.8 million; 10.4% of all payments), Boehringer Ingelheim Japan (\$8.8 million; 7.8% of all payments), Otsuka Pharmaceutical (\$8.3 million; 7.5% of all payments), Bristol Myers Squibb (\$5.7 million; 5.0% of all payments), and Takeda Pharmaceutical (\$5.2 million; 4.6% of all payments). The top 5 and 10 companies with the largest payment amounts were responsible for 54.2% (\$61.2 million) and 71.3% (\$80.5 million) of all payments over the four years.

The total annual payments to cardiologists were from \$27.4 million in 2016 to \$28.8 million in 2017 (Table 2). Of all cardiologists, 46.4% to 47.4% of cardiologists received at least one personal payment each year. Median annual payments slightly increased from \$1,226 (IQR: \$511–\$3,247) in 2016 to \$1,354 (IQR: \$613–\$3,335) in 2019. The GEE models showed that there were no significant trends in the number of cardiologists receiving personal payments (relative annual average percentage change [RAAPC]: 0.3% [95% confidence interval: -0.2% to 0.8%], $p=0.23$) and payments per cardiologist (RAAPC: 0.6% [95% confidence interval: -0.7% to 1.8%], $p=0.39$) between 2016 and 2019.

Discussion

Our study revealed that 65.5% of all board-certified cardiologists in Japan received personal payments for activities such as lecturing, consulting, and writing from pharmaceutical companies between 2016 and 2019. The total amount of these payments exceeded \$112.9 million, equivalent to approximately 12.3 billion Japanese yen over this four-year period. Although the level of these payments remained stable throughout the study period, a disproportionately small group of cardiologists received the majority of these payments. To the best of our knowledge, this is the first study to explore the comprehensive financial interactions between pharmaceutical companies and cardiologists in a country other than the US.^{1,2,20}

Contrary to findings in the US, where approximately three-quarters of cardiologists reportedly received various personal payments, including compensation, honoraria, travel fees, royalties, and food and beverage payments from pharmaceutical and medical device corporations,^{1,2} our research in Japan indicates that a mere half of the board-certified cardiologists annually received financial recompense for lecturing and consulting from the pharmaceutical companies. Although the study findings were consistent with previous studies in Japan,^{11,13-17,19,23-25} this lower percentage of cardiologists in Japan receiving such payments than those in the US would substantially underrepresent the actual degree of their financial engagements with the healthcare companies, given that our study was limited to compensation payments to individual cardiologists and did not encompass other prevalent payment categories or payments from medical device companies, despite that cardiologists frequently utilized medical equipment and devices such as implantable cardioverter-defibrillators, cardiac catheters, and stents.

Although the majority of cardiologists received only modest amounts of payments relative to their overall income as cardiologists, the impact of these payments should not be underestimated. Previous studies in the United States have demonstrated that even small payments to cardiologists from medical device and pharmaceutical companies are significantly associated with increased usage of implantable cardioverter-defibrillators,⁸ percutaneous coronary interventions,²⁶ stent placements,⁹ and prescriptions for oral anticoagulants²⁷ and antiplatelet drugs.⁹ Nonetheless, given the absence of studies exploring the associations between payments to cardiologists and their clinical practices, future research is warranted to investigate the impact of industry payments on the clinical practices of cardiologists in Japan.

Additionally, we found that only a small number of cardiologists received the vast majority of personal payments. As we elucidated, the average payments to JCS executive board members¹² and cardiology guideline authors¹⁸ were substantially larger than those received by the board-certified cardiologists on average. These physicians, often referred to as key opinion leaders, are frequently targeted by pharmaceutical and medical device companies,²⁸⁻³⁷ due to their authoritative and influential positions.

Given their significant influence on other cardiologists, it is crucial to properly manage COIs among these influential cardiologists. However, previous studies have indicated significant undeclared and underreported COIs between these physicians and pharmaceutical companies in Japan.^{12,18,28-30,37} Additionally, the policies for managing COIs in Japan are less rigorous and transparent compared to those in other developed countries.^{28,30,36,37} The study findings further underscore the critical need for effective management of financial COIs among influential cardiologists in Japan.

This study has several limitations. Potential inaccuracies in the payment data reported by companies and in the database may exist. Moreover, the omission of certain types of payments, including meals, travel expenses, and gifts, which are not readily available in Japan, likely leads to a substantial underestimation of the magnitude and proportion of financial relationships between cardiologists and pharmaceutical companies in Japan. Furthermore, as the study encompassed only payments from JPMA-affiliated companies, it may not fully represent the entire range of financial interactions between cardiologists and pharmaceutical companies not affiliated with the JPMA and medical device companies.

Despite these limitations, our study demonstrates that more than 65% of cardiologists certified by the Japanese Circulation Society received personal payments related to lecturing, consulting, and writing from pharmaceutical companies between 2016 and 2019. These payments were concentrated among a small group of cardiologists. Future studies should explore the influence of these payments to cardiologists on their clinical practice in Japan.

Declarations

Data availability statement

All data used in this study is available from Yen For Docs database run by Medical Governance Research Institute (<https://yenfordocs.jp/>) and each pharmaceutical companies belonging to the Japan Pharmaceutical Manufacturers Association. The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of interest:

The authors have no conflicts of interest for this study.

Funding statement:

The authors declare that there were no funding sources for this study.

Ethics approval statement:

As this study was a retrospective analysis of publicly available data and met the definition of non-human subjects research, no institutional board review and approval were required. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline.

Patient consent statement

Not applicable

Permission to reproduce material from other sources

Not applicable

Clinical trial registration

Not applicable

Declaration of generative AI in scientific writing

During the preparation of this work, the authors used ChatGPT version 4.0 to check and correct grammatical and spelling errors. After using this tool, the authors carefully reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Author contribution:

A.M.: conceptualization; methodology; resource; software; formal analysis; investigation; writing - original draft; writing - review & editing; visualization; study administration

K.H.: conceptualization; methodology; resource; software; formal analysis; investigation; writing - review & editing

Y.S.: conceptualization; methodology; resource; formal analysis; investigation; writing - original draft; writing - review & editing

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Table 1. Summary of personal payments to board-certified cardiologists

Variables	Value
Total amounts of payments	
Payment values, \$	112,934,503
Number of payments, No.	164,978
Payments per cardiologist	
Mean (standard deviation) ^a	
Payment values, \$	12,649 (35,012)
Number of payments, No.	16.7 (33.9)
Median (interquartile range) ^a	
Payment values, \$	2,947 (1,022 – 8,787)
Number of payments, No.	7.0 (2.0 – 17.0)
Maximum ^a	
Payment values, \$	782,015
Number of payments, No.	575.0
Gini index	0.840
Cardiologists with specific amounts of payments (N=15,048), n (%)	
No payment	5,190 (34.5)
Any payments	9,858 (65.5)

Variables	Value
\$1-\$1,000	2,318 (15.4)
\$1,001-\$10,000	5,314 (35.3)
\$10,001-\$50,000	1,825 (12.1)
\$50,001-\$100,000	225 (1.5)
\$100,001-\$200,000	109 (0.7)
\$200,001 or more	67 (0.5)
Payment categories	
Lecturing payments	
Monetary value (%), \$	100,067,695 (88.6)
Number of payments (%), No.	148,012 (8.0)
Number of cardiologists receiving payments (%), n	9,710 (64.5)
Consulting payments	
Monetary value (%), \$	9,084,765 (89.7)
Number of payments (%), No.	11,814 (8.0)
Number of cardiologists receiving payments (%), n	3,561 (23.7)
Writing payments	
Monetary value (%), \$	3,782,044 (3.3)
Number of payments (%), No.	5,152 (3.1)
Number of cardiologists receiving payments (%), n	2,300 (15.3)

Legends: ^a Payments per cardiologist were calculated among cardiologists who received one or more payments, as 34.5% of cardiologists did not receive any payments over the five years.

Table 2. Trend in personal payments from pharmaceutical companies to board-certified cardiologists between 2016 and 2019.

Variables	2016	2017	2018	2019	Average relative yearly change between 2016 and 2019 (95% CI), %
Total payments					
Monetary value, \$	27,358,539	28,757,456	28,090,504	28,728,005	—
Number of payments, No.	40,527	41,822	40,572	42,057	—
Payments per cardiologist					
Monetary value, \$					
Mean (standard deviation)	3,917 (10,883)	4,068 (11,314)	3,938 (10,416)	4,082 (10,764)	0.6 (-0.7 to 1.8)
Median (interquartile range)	1,226 (511–3,247)	1,328 (511–3,372)	1,320 (511–3,270)	1,354 (613–3,335)	
Maximum	248,198	221,104	173,339	211,955	
Gini index	0.865	0.862	0.858	0.858	

Variables	2016	2017	2018	2019	Average relative yearly change between 2016 and 2019 (95% CI), %
Number of payments, No.					
Mean (standard deviation)	5.8 (10.1)	5.9 (10.4)	5.7 (9.7)	6.0 (10.0)	0.8 (-0.1 to 1.7)
Median (interquartile range)	3.0 (1.0–6.0)	3.0 (1.0–6.0)	3.0 (1.0–6.0)	3.0 (1.0–6.0)	
Maximum	189.0	160.0	155.0	162.0	
Gini index	0.810	0.808	0.802	0.805	
Physicians with payments (%) (N=15,048), n	6,984 (46.4)	7,070 (47.0)	7,133 (47.4)	7,038 (46.8)	0.3 (-0.2 to 0.8)

Abbreviation: 95% confidence interval (95% CI). *p<0.01. **p<0.001.