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Pediatric Intravenous Anesthesia in Japan—Where Are Anesthesiologists?

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Most pediatric intravenous anesthesia in Japan is performed outside the operating theatre by non-anesthetists. The 2020 revision increased reimbursement for long-term intravenous anesthesia (Category 3) by anesthesiologists, but its impact on practice behavior is unknown. We analyzed the annual number of calculations for each category of intravenous anesthesia and their age distribution from the national reimbursement data for the three-year period fiscal years (FY) 2018-20 to elucidate trends in the pediatric age group. Regional disparities of calculation rate of pediatric addition per capita were examined. According to FY 2019 statistics, 5,774 outpatient intravenous anesthesia and 50,686 inpatient intravenous anesthesia procedures were performed annually in patients under 15 years of age. Of these, no case was complex anesthesia (Category 3) performed by a specialist anesthesiologist in outpatient settings and 1,162(3.9%) in inpatient settings. Category 3 occupancy was slightly higher in infants and decreased with age. ($P < 0.01$) In FY 2020 data, 41(0.7%) new Category 3 procedure were calculated in outpatient cases. The share of Category 3 in inpatient cases decreased to 2.0%. There was no decrease in the number of overall venous anesthesia due to COVID-19 pandemic. Regional disparities in calculations were up to 20 times greater. Long-term total intravenous anesthesia by anesthesiologists is rarely performed in Japan. Improvements in reimbursement are not sufficient to enable total intravenous anesthesia by a specialized anesthesiologist. A system for safe intravenous anesthesia by non-anesthesiologists is needed.

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Introduction

Total intravenous anesthesia (TIVA) in children is essential for many pediatric procedures that require deep sedation and immobility, such as magnetic resonance imaging (MRI) scans, cardiac catheterization, and gastrointestinal endoscopy outside the operating room. It is also available in surgical procedures, especially in outpatient or intensive care unit setting, where anesthesia machines cannot be installed, and has the significant advantage of minimizing the risk of malignant hyperthermia. (Lauder 2015)

As a basis for this study, medical fees are reimbursed

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under the universal health insurance system in Japan. All citizens are required to have some form of health insurance, and medical fees are refunded at a later date upon request from medical institutions.

However, reimbursement for intravenous anesthesia in Japan is considerably lower than that for inhalation anesthesia, and it has been difficult for anesthesiologists to choose TIVA even in operation room due to the medical economics. (Union of Surgical Societies Social Insurance Committee 2021) Thus, many intravenous anesthesia are actually performed outside of the operating room by non-anesthesiologists such as pediatricians. In addition, reports of serious accidents related to pediatric deep sedation and intravenous anesthesia by non-anesthesiologists have not shown a decreasing trend. (Japan council for Quality Health Care 2022) There are several surveys on specific fields such as cardiac catheterization and MRI imaging, but there are no descriptive epidemiological studies on the actual status of overall intravenous anesthesia in Japan. (Miura et al. 2014; Tsuji et al. 2022)

With the goal of promoting higher-quality intravenous anesthesia, the fiscal year (FY) 2020 reimbursement revision significantly increased reimbursement for complex anesthesia (Category 3) performed by specialized anesthesiologists. However, it is not clear to what extent this has resulted in an increase in such anesthesia in the pediatric setting.

The National Database of Health Insurance Claims and Specific Health Checkups of Japan (NDB) Open Data is a public database of medical practices of the Ministry of Health, Labour and Welfare (MHLW). It is an anonymized source of medical information from the original NDB dataset that registers > 90% of medical insurance claims in Japan. (Ishikawa 2016)

Here, we analyzed the actual number of calculated intravenous anesthesia in Japan and its chronological change based on the actual number in the NDB open data. In addition, we analyzed the actual number of intravenous anesthesia in FY2020, the first year of the Coronavirus Disease 2019 (COVID-19) pandemic, and the extent to which Category 3 increased due to increased reimbursement.

Methods

Scope of data

Inpatient and outpatient anesthesia summaries in the three years of NDB Open Data released by the MHLW from April 2018 to March 2021 were used to tabulate the numbers of anesthesia. (Ministry of Health, Labour and Welfare (2018))

Calculation of the total number of anesthesia

The number of claims for intravenous anesthesia for children (Category 1: medical practice code 150232210, Category 2: 150332410, Category 3: 150370710) in the age group of 0-14 years, in which pediatric departments mainly provide initial care in Japan, was enrolled into the study. The 15-18 age group was excluded from this study because the corresponding age group in the original table was 15-19 and adult cases were mixed in. By merging the sexes and age groups in the applicable summary tables, we calculated the number of pediatric anesthesia claims by category for inpatient and outpatient pediatric anesthesia.

Anesthesia categories and chronological changes

For convenience, the three categories of intravenous anesthesia in Japanese reimbursement are summarized in Table 1. The annual number of calculations by category was calculated from the FY 2019 table (NDB open data 6) just before the COVID-19 pandemic, and the distribution of the three categories by age was analyzed. The number of calculations of the addition for prolonged anesthesia (practice code: 150370970), which can only be calculated for intravenous anesthesia (Category 3) by anesthesiologists, was analyzed too.

Occupancy rate of procedures by anesthesiologists

The share of Category 3 (long-term anesthesia that can only be calculated by a specialized anesthesiologist) as a percentage of total long-term anesthesia (Category 2 and 3) was calculated and its annual trend was examined.

Regional disparities in intravenous anesthesia

Information on regional disparities in the number of claims for intravenous anesthesia itself is only available in

Table 1. Reimbursement for intravenous anesthesia in Japan.

L001-2 Intravenous anesthesia		Reimbursement(points)	
		FY 2018	FY 2020
Intravenous anesthesia 1	Less than 10 min.	120	120
Intravenous anesthesia 2	Long term (simple)	600	600
Intravenous anesthesia 3	Long term (complicated)	800	1,100

One point of medical fee in Japan is equivalent to 10 yen for outpatients. In the case of hospitalization, it is corrected by a coefficient. Category 3 intravenous anesthesia can be calculated only by anesthesiologists. Pediatric addition: 10% of reimbursement can be added for intravenous anesthesia performed on 3-6 years old. Additional 100 points can be added if the duration of intravenous anesthesia Category 3 exceeds 2 hours.

a summary table that is merged with the adult data. For this reason, we analyzed regional disparities in the number of claims of additional fee for intravenous anesthesia for infants (medical practice code: 150370870). The table of pediatric population by prefecture provided by the Statistics Bureau of the Ministry of Internal Affairs and Communications was used as the population. (Statistics Bureau Ministry of Internal Affairs and Communications 2022) The number of hospitalized cases was used to examine regional disparities because the effect of masking is relatively small.

Processing of minority values

Columns containing minority cases are masked and hyphenated in the NDB Open Data database to protect people's personal information; however, these were read as 0 and counted.

Statistical analysis

The chi-square test was used to compare the application of calculations between the different age groups, and the Cochran-Armitage test was used to analyze the difference in time trends. P-values of < 0.05 were considered significant. We used GraphPad Prism version 5 (GraphPad Software, San Diego, CA, USA) for our statistical analyses.

Ethical considerations

This study is a secondary bibliometric analysis of public statistical information that has been anonymized and made available on the Internet. Therefore, ethical approval was waived by the Juntendo University School of Medicine Ethics Review Committee.

Note

The Social Insurance Committee members of Japan Pediatric Society (E.I., A.E., Y.N., and S.O. [observer]) , including the chair (A.E.), former chair (Y.N.), vice chair (E.I.), director in charge of the Social Insurance Committee of the Japanese Society of Pediatric Nutrition, Gastroenterology and Hepatology (I.I.), the Social Insurance Committee member of the Japanese Society of Pediatric Anesthesiology (Y.S.), and the chair of the Pediatric Committee of the Social Insurance Union of Societies Related to Internal Medicine (S.O.) were the authors of this article. However, the views expressed in this paper are those of the authors as individuals and do not reflect the views of the four abovementioned organizations.

Results

Number of intravenous anesthesia and age groups

Fig. 1 shows the number of outpatient and inpatient intravenous anesthesia by age group in FY 2019 (just before the COVID-19 pandemic in Japan).

In the outpatient setting, 3,218 Category 1 intravenous anesthesia (short anesthesia) and 2,556 Category 2 (long-term anesthesia by a non-anesthesiologist) were calculated in the 0-14 age group, while Category 3 (long-term anesthesia by an anesthesiologist) was statistically zero (Fig. 1A). 0-14 years of age were significantly less likely to calculate Category 3 than the other ages ($P < 0.01$, chi-square test).

In the same age group, 20,838 Category 1 and 28,686 Category 2 intravenous anesthesia procedures were performed in hospitalized patients, while only 1,162 Category 3 procedures were performed (Fig. 1B). Of all age groups, the highest number of Category 2s were calculated in the 0-4 age group. As in the outpatient setting, the share of Category 3 in 0-14y for total long-term anesthesia was significantly less than in the adult population. ($P < 0.01$)

Table 2 shows the annual number of inpatient intravenous anesthesia in children by age group and the occupancy rate of Category 3 during the same year. Overall, the share of anesthesia by specialized anesthesiologists in pediatric long-term intravenous anesthesia was only 3.9%. The number of additions for prolonged anesthesia (billable only in Category 3) during the same year was zero for all age groups.

Anesthesia by anesthesiologists after improvement of fees

Table 3A shows the number of outpatient intravenous anesthesia and additions in the 0-14 age group from FY 2018 to 2020. After the increase, 41 Category 3 cases (1.6% of overall long-term anesthesia) were calculated per year.

Changes in the number of inpatient calculations during the same period are shown in Table 3B. Although the number of Category 3 long-term anesthesia calculations dropped to 1,024 (3.5% of the total), a small number of Category 3 additions, which were statistically undetectable until FY 2019, became calculated.

Trends in the share of Category 3 in total long-time anesthesia are shown in Fig. 2. The time-series trend shows a significant improvement in the occupancy rate of Category 3 anesthesia in the outpatient setting ($P < 0.01$, Cochrane-Armitage test) (Fig. 2A), while the share of Category 3 anesthesia declined in the inpatient setting ($P < 0.01$), which accounts for the overwhelming majority of Category 3 cases (Fig. 2B). Analysis of total outpatient and inpatient anesthesia also showed a decrease in Category 3 rates ($P < 0.05$) (Fig. 2C). Although FY 2020 was the first year of the COVID-19 pandemic in Japan, there was no marked decrease in the number of venous anesthesia cases, both in inpatient and outpatient settings.

Regional disparities in the number of intravenous anesthesia

Fig. 3 shows the relative calculation rate of intravenous anesthesia for children aged 3-6 years, based on the population of children by prefecture. Even after excluding prefectures with zero calculation, where masking of original tables in columns containing minority (or blank) data to protect personal data, there were large regional differences in the calculation rate of intravenous anesthesia for infants, with a 20.6-fold difference between Kyoto, the highest pre-

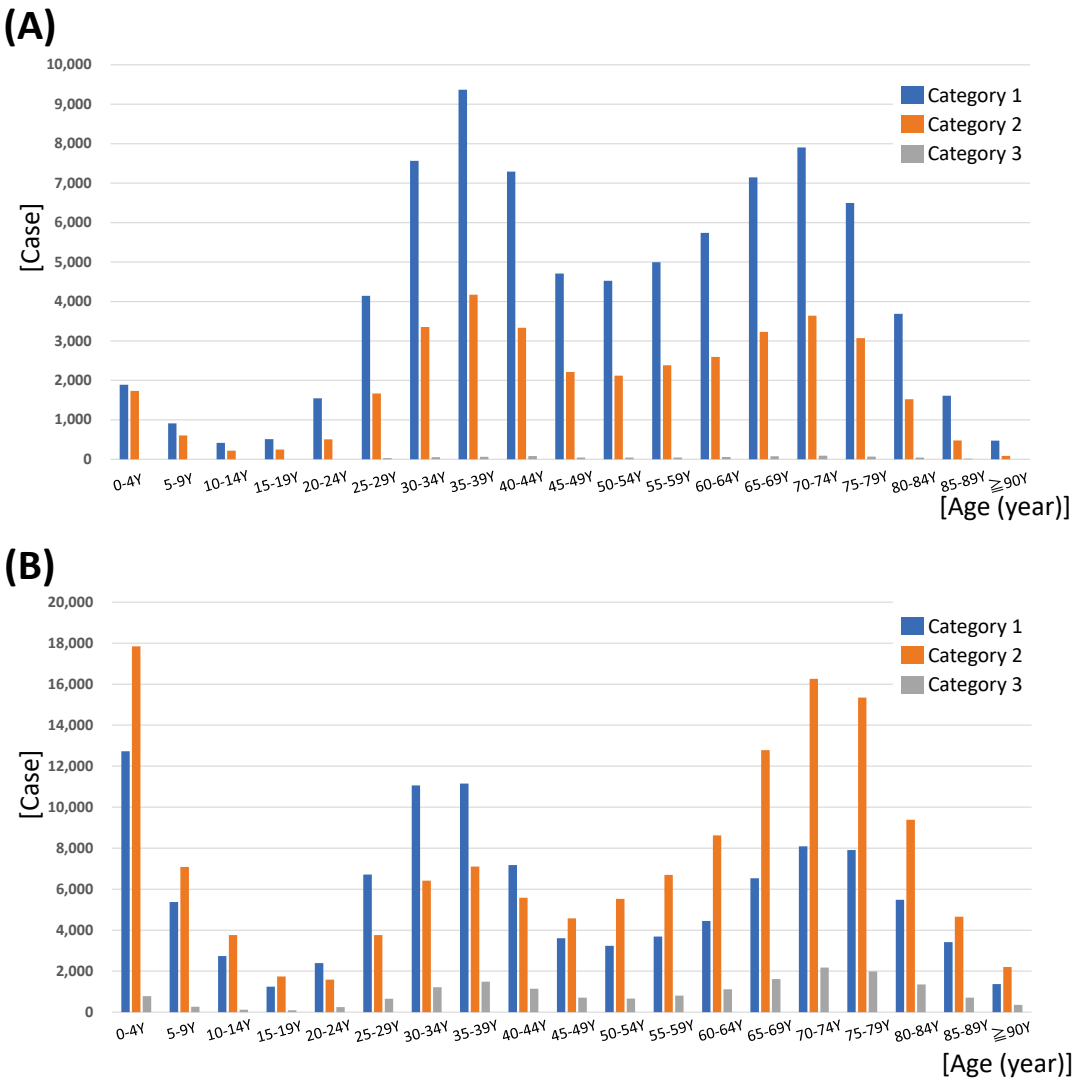

Fig. 1. Number of outpatient and inpatient intravenous anesthesia procedures by age group in FY 2019 (just before the COVID-19 pandemic in Japan).
A. Number of outpatient cases. B. Number of inpatient cases. FY, fiscal year.

fecture, and Yamanashi, the lowest prefecture.

Discussion

Intravenous anesthesia in children carries the risk of significant respiratory and circulatory variability. Thus, the Japan Pediatric Society and two other academic societies have established practice guidelines for sedation related to MRI imaging, which constitutes a large part of this risk (Japanese Society of Pediatrics et al. 2020). Despite these safety considerations, many serious pediatric sedation-related accidents are still scattered on registered accident database in Japan (Japan council for Quality Health Care 2022).

This study is the first report to analyze the status of all intravenous anesthesia procedures, their actual conditions, and changes after the increase in reimbursement on Category 3 in the real world in Japan. Although a large disparity in reimbursement is established between Categories 2 and 3 in terms of whether they are performed by a specialized anesthesiologist or not, the requirements for their calculation remain almost the same except for the presence of specialized anesthesiologists. Thus, it is unlikely that anesthesiologists will bill Category 2. Therefore, it was quantitatively demonstrated that the majority of long-term TIVA procedures in children are performed by non-anesthesiologists. It is easy to assume that the majority of the less expensive Category 1 procedures are also performed by non-anesthesiologists. Claim registration rate of the original database is estimated to be over 90%. Therefore, it is considered to be virtually national data and is highly reliable, suitable to real world data analysis (Jingushi and Fukuda 2021; Okui and Park 2022) .

In Japan, only 37% of all sedation for high-risk cardiac catheterization examinations are performed by anesthesiol-

Table 2. Breakdown of inpatient pediatric venous anesthesia cases and Category 3 occupancy in FY 2019.

	0-4Y	5-9Y	10-14Y	Overall
Category 1	12,725	5,372	2,741	20,838
Category 2	17,843	7,083	3,760	28,686
Category 3	779	261	122	1,162
Occupancy Rate [%]	4.2	3.6	3.1	3.9

Occupancy rate [%]: Category 3 / (Category 2 + Category 3) *100
Occupancy of Category 3 in prolonged anesthesia is greatest in the younger age group of 0-4Y and declines slightly thereafter. ($P < 0.01$, chi-square test)

Table 3. Annual changes in pediatric intravenous anesthesia (0-14Y) and long-time additions in FY2018-20.

A. Outpatient calculation

	FY2018	FY2019	FY2020
Category 1	3,254	3,218	**3,096**
Category 2	2,557	2,556	**2,573**
Category 3	0	0	**41**
Long term addition for Category 3	0	0	**0**

B. Inpatient calculation

	FY2018	FY2019	FY2020
Category 1	20,522	**20,838**	**20,138**
Category 2	27,919	**28,686**	**29,622**
Category 3	1,123	**1,162**	**1,024**
Long term addition for Category 3	0	0	**32**

A. Number of outpatient calculations. A small number of Category 3s, which had not been billed before, were now billed. ($P < 0.01$, for Category 2). B. Number of inpatient calculations.

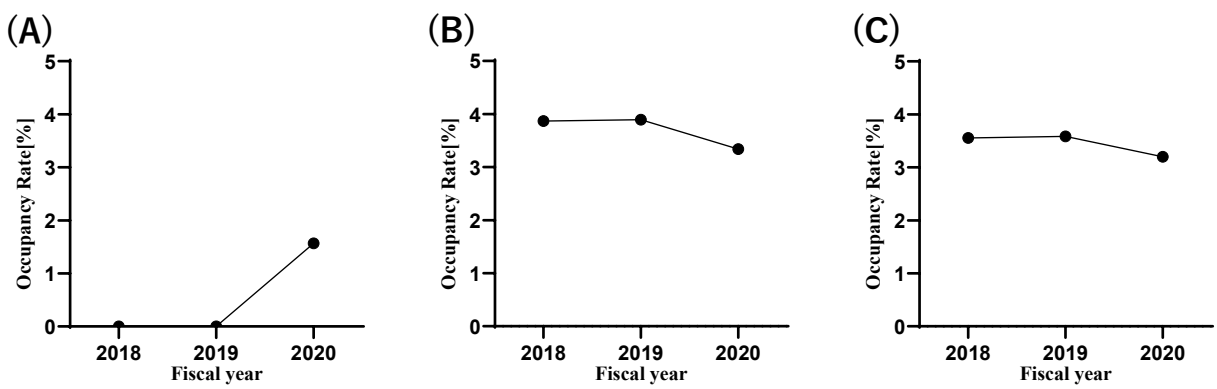

Fig. 2. Trends in the share of Category 3 (by specialized anesthesiologists) in total long-duration intravenous anesthesia. A. outpatient; B. inpatient; C. Total of outpatient and inpatient. A small number of new Category 3s were calculated in outpatient cases ($P < 0.01$, Cochran-Armitage test), whereas the number calculated in inpatient setting decreased ($P < 0.01$). The total of outpatient and inpatient anesthesia also decrease in Category 3 rates ($P < 0.05$)

ogists. (Miura et al. 2014) In contrast, specialized anesthesiologists and intensivists are the primary anesthesiologists, and pediatricians provide anesthesia for only 2-7% of the examinations. (Cravero et al. 2006; Cravero et al. 2009) The shortage of anesthesiologists in Japan and the lack of a system that allows anesthesiologists to be dispatched for intravenous anesthesia outside the operating room may be the cause of this difference.

The fact that the long-time addition, which can only be calculated for Category 3, is rarely calculated indicates

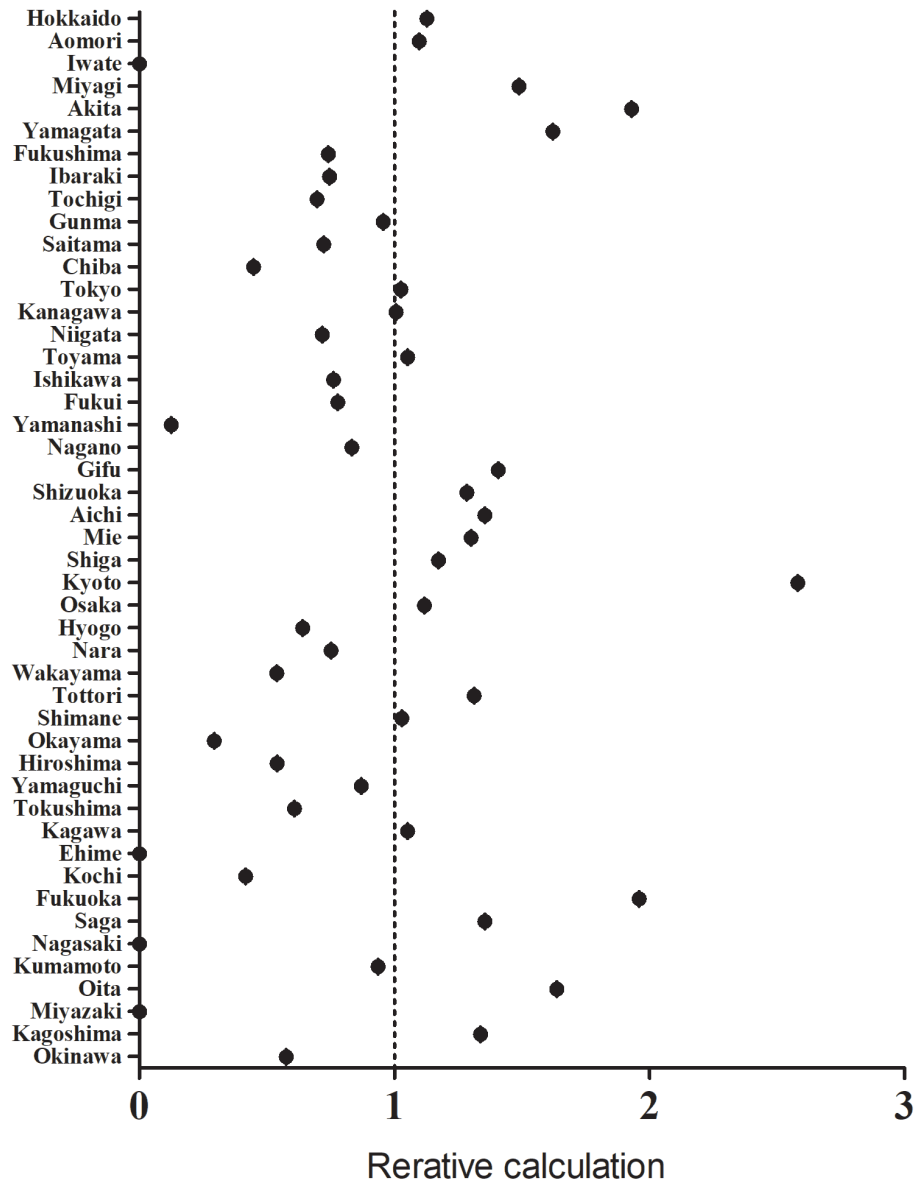

Fig. 3. Relative calculation rate of the additional fee for intravenous anesthesia for children aged 3-6 years (practice code: 150370870), based on the population of children by prefecture in Japan.
The counties with 0 value may be affected by statistical masking. Even if such prefectures were excluded from the study, there was a maximum 20.6-fold disparity in the relative calculation rate.

that most of Category 3 anesthesia that overcame these difficulties is also used for deep sedation for short-term surgeries and examinations lasting less than two hours, and that intravenous anesthesia is rarely used for long, full-scale surgeries. One of the reasons for this may be that the hourly reimbursement for inhalation anesthesia is considerably higher than that for TIVA, and it is difficult to find an economic incentive to choose TIVA over balanced anesthesia with mask anesthesia using nitric oxide (Igaku Tsushinsha 2022).

Since the FY2020 reimbursement changes paralleled the early COVID-19 pandemic, caution must be exercised in their interpretation. Fortunately, the impact of COVID-19 on the total number of calculations in pediatric intravenous anesthesia was considered relatively minor in FY2020. The appearance of a small number of outpatient cases of Category 3 and the appearance of additional calculation of prolonged intravenous anesthesia in inpatient cases may indicate that the increase in points had a small but positive impact on anesthesia by anesthesiologists. The withholding of other scheduled surgeries may also have resulted in a temporary relaxation of anesthesiologists' human resources at some facilities (Noll et al. 2022; Feier et al. 2022).

The decrease in Category 3 occupancy in the inpatient

procedures despite the increase of reimbursement is a disappointing result. In children, that occupancy before the increase was also negligible, and it is probably extremely difficult to shift the majority of intravenous anesthesia to professional anesthesiologists with only a reimbursement improvement without improvements of institutional and staffing issues. However, the decrease in the number of short-term scheduled surgeries that would be good indications for TIVA might also have an impact on the data after the pandemic. In order to develop a safer pediatric intravenous anesthesia system considering the limited number of anesthesiologists, it is necessary to secure enough human and material resources on Category 1 and 2 through reimbursement. In addition to this, a system of regular surveillance of intravenous anesthesia by anesthesiologists, as well as an emergency response system, might be added to the reimbursement calculation requirements.

The large regional disparity in pediatric intravenous anesthesia, as seen in the pediatric additional fee on TIVA, is also novel finding in this study. While some Japanese prefectures have children's hospitals that are almost synonymous with terminal hospitals, there are prefectures such as Hyogo and Chiba where the relative calculation rate is never high despite having children's hospitals. Perhaps the reimbursement is too low for the required effort, resulting in insufficient equalization of technology. This implies that pediatric intravenous anesthesia requires sufficient experience and motivation to perform, and that the situation is still insufficient for national equalization of care, which is an ideal objective of national insurance system in Japan.

Limitations of this study are as follows. Self-funded care is not included. We do not have access to original NDB dataset or individual reimbursement claims data, so we do not have information on the background diseases on the procedures. Similarly, information on associated adverse events is not available. The impact of COVID-19 is a single-year analysis with the most recent statistics, and trends may change over the next few years. Some of these limitations could be mitigated by a reexamination using the original reimbursement data. Since anesthesia is not covered by DPC, the data basically includes everything inside the operating room and outside the operating room. The marked paucity of Category 3 in the data suggests that almost all of the numbers are outside the operating room, but it is difficult to classify.

In conclusion, a secondary analysis of national reimbursement database in Japan revealed that the overwhelming majority of pediatric intravenous anesthesia, including long-term ones, is performed by pediatricians and other non-anesthesiologists, and that improved reimbursement has not had a significant impact on mobilizing specialized anesthesiologists for intravenous anesthesia. Solution for safe intravenous anesthesia with limited medical resources is still needed.

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Author Contributions

S.T. and E.I. conceptualized the study design and developed the specific study design; S.T., E.I., Y.T., M.M., and S.Y. tabulated and analyzed the actual data; E.I., A.E., Y.N., I.I., Y.S., S.O., Y.B., T.K., Y.O. and T.S. interpreted the data and revised the manuscript. All participated in the revision of the final manuscript and consented to the publication of the data.

Conflict of Interest

The authors declare no conflict of interest.

References

Cravero, J.P., Beach, M.L., Blike, G.T., Gallagher, S.M. & Hertzog, J.H.; Pediatric Sedation Research Consortium (2009) The incidence and nature of adverse events during pediatric sedation/anesthesia with propofol for procedures outside the operating room: a report from the Pediatric Sedation Research Consortium. *Anesth. Analg.*, **108**, 795-804.

Cravero, J.P., Blike, G.T., Beach, M., Gallagher, S.M., Hertzog, J.H., Havidich, J.E. & Gelman, B.; Pediatric Sedation Research Consoritum (2006) Incidence and nature of adverse events during pediatric sedation/anesthesia for procedures outside the operating room: report from the Pediatric Sedation Research Consortium. *Pediatrics*, **118**, 1087-1096.

Feier, C.V.I., Bardan, R., Muntean, C., Olariu, A. & Olariu, S. (2022) Impact of the COVID-19 Pandemic on the Elective Surgery for Colorectal Cancer: Lessons to Be Learned. *Medicina* (*Kaunas*), **58**, 322.

Igaku Tsu-shinsha (2022) *Quick Reference Table of Medical Fee Scores,* Igaku Tsu-shinsha, Tokyo, Japan.

Ishikawa, K.B. (2016) Medical Big Data for Research Use: Current Status and Related Issues. *Japan Med. Assoc. J.*, **59**, 110-124.

Japan council for Quality Health Care (2022) Medical Accident Collection Service [database on the Internet]. https://www.med-safe.jp/mpsearch/SearchReport.action [*Accessed*: October 8, 2022].

Japanese Society of Pediatrics; Japanese Society of Pediatric Anesthesiology; Japanese Society of Pediatric Radiology (2020) Joint recommendations on sedation during MRI examinations. *J. Jpn. Pediatr. Soc*., **124**, 771-805.

Jingushi, S. & Fukuda, H. (2021) Low-intensity pulsed ultrasound is frequently used to treat fractures after osteosynthesis in elderly patients: A study using open data from the national database of health insurance claims of Japan. *J. Orthop. Sci.*, **26**, 865-869.

Lauder, G.R. (2015) Total intravenous anesthesia will supercede inhalational anesthesia in pediatric anesthetic practice. *Paediatr. Anaesth.*, **25**, 52-64.

Ministry of Health, Labour and Welfare (2018) NDB open data. Tokyo 2018-2021. https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000177182.html [*Accessed*: October 9, 2022].

Miura, M., Kato, H., Doi, S., Park, I., Nakagawa, M., Fujiwara, M.,

Sumitomo, N., Fukazawa, R., Mizukami, A., Matsuura, H., Yasukochi, S. & Kiyosawa, N. (2014) National Survey on Deep Sedation for Diagnostic and Interventional Cardiac Catheterization Procedures Performed at Japanese Society of Pediatric Cardiology and Cardiac Surgery Institutions. *Ped. Cardiol. Card. Surg.,* **30**, 580-587.

Noll, J., Reichert, M., Dietrich, M., Riedel, J.G., Hecker, M., Padberg, W., Weigand, M.A. & Hecker, A. (2022) When to operate after SARS-CoV-2 infection? A review on the recent consensus recommendation of the DGC/BDC and the DGAI/BDA. *Langenbecks Arch. Surg.*, **407**, 1315-1332.

Okui, T. & Park, J. (2022) Analysis of regional differences in the amount of hypnotic and anxiolytic prescriptions in Japan using nationwide claims data. *BMC Psychiatry*, **22**, 44.

Statistics Bureau Ministry of Internal Affairs and Communications (2022) The Number of Children in Japan - on the Occasion of Children's Day. https://www.stat.go.jp/data/jinsui/topics/pdf/topics131.pdf [*Accessed*: October 11, 2022].

Tsuji, T., Sato, I., Kamimura, Y., Ota, H., Takeda, C., Sobue, K. & Kawakami, K. (2022) Trends and patterns in the practice of pediatric sedation for magnetic resonance imaging in Japan: A longitudinal descriptive study from 2012 to 2019. *Paediatr. Anaesth.*, **32**, 673-684.

Union of Surgical Societies Social Insurance Committee (2021) *Gaihoren Internal Draft 2022 (Gaihoren Shian 2022)*, Igaku Tsu-shinsha, Tokyo, Japan, pp. xxii, 534.