

Assessment of medical malpractice cost at a Japanese national university hospital

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ABSTRACT

Medical safety management has an economic dimension that has received little attention. Medical expenses associated with medical malpractice in Japan should be investigated in relation to patient safety measures and their consequences. We analyzed medical accidents that occurred within the past seven years at a university hospital. We determined that 197 accidents involved negligence by the hospital in the years from 2011 to 2017, for which the institution bore the costs of the resulting treatment; those expenses totaled JPY 30.547 million. Most incidents occurred in the hospital ward (82, 41.6%); those in the operating room were the most expensive (JPY 19.493 million, 63.8%). The greatest number of cases involved drug administration (63, 32.0%). Materials inadvertently left in surgical sites (“remnants”) cost the hospital the most per incident (JPY 9.767 million, 32.0%). Of these, medical treatment costs for remnants associated with vascular invasion were the highest. Although the total number of malpractice incidents increased over time, the annual cost to the hospital decreased, especially in cases in which costs exceeded JPY 100,000, and those associated with the operating room. Our results suggested that adverse events must be addressed to foster patient safety, decrease medical expenses, and improve hospital administrative capacity.

Keywords: patient safety, medical malpractice, medical expense, remnant

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INTRODUCTION

Several reports on patient safety from the Organisation for Economic Co-operation and Development (OECD)^{1,2} have underscored the need to investigate the cost effectiveness of many medical safety measures used in each member country, including Japan. According to one of these reports, in OECD countries, patient harm is estimated to be the 14th leading cause of the global disease burden, comparable to tuberculosis, malaria, and some types of cancer. On average, 1 in 10 hospitalizations result in safety failure or an adverse event. As many as four out of 10 patients experience safety issues in primary and ambulatory care settings. Up to 15% of hospital expenditure and activity in OECD countries can be attributed to addressing patient safety failures.¹ One of the factors that increase medical expenses is the upsurge in medical malpractice.³ In the

Received: October 14, 2020; accepted: November 19, 2020

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United States in 2008, malpractice cost USD 19.5 billion. In 2014, the public health sector of EU member states cost approximately EUR 21 billion in health care.^{4,5}

Of the 421 million hospitalizations in a year worldwide, approximately 42.7 million adverse events are estimated to occur, thereby calling for a global awareness of patient safety.⁶ In Japan, various efforts to improve in this area have been implemented since 1999.⁷

Studies have been conducted on increased medical costs owing to malpractice, but the applicability of solutions offered is limited to operating rooms, emergency care, and certain diseases.⁸⁻¹¹ However, no clear indicators have been used to evaluate the effect of these efforts on overall patient safety. In addition, medical safety management has an economic dimension that has received little attention. This lack of scholarly investigation also applies to the cost effectiveness of medical safety management approaches.^{6,12,13} Therefore, we investigated the cost of medical malpractice at one site in Japan as an initial review of the implementation of patient safety measures and their effects.

PURPOSE

This study sought to identify the divisions at a Japanese medical institution that generated expenses owing to medical malpractice to determine the relevant measures needed to address the problem. We thus needed to ascertain how the cost of medical expenses was related to patient safety measures. Therefore, the study examined the total medical expenses incurred in the division where the medical error occurred and the medical costs incurred in each case of medical malpractice. Further, we hypothesized that medical costs are an indicator of patient safety. Thus, our study also identified the divisions and causes that need to be prioritized and then measured the impact of medical safety measures on long-term medical costs.

METHODS

We conducted a retrospective analysis of medical accidents occurring between April 1, 2011 and March 31, 2018 at one of Japan's national university hospitals that were determined to involve negligence by the hospital and for which the resulting medical expenses were borne by the hospital. The study was approved by the ethics review board of the hospital. The hospital had an incident reporting system in place that made incident reporting mandatory. For cases where the presence of negligence was determined by an in-house lawyer at the hospital, we extracted the number of cases and associated costs from the hospital's medical accounting data. The causes of the accidents were identified from medical records and incident reports.

Multiple visits by a clinician to the outpatient division in relation to the same medical accident were counted as a single case. Our focus was solely on medical treatment expenses to the hospital in malpractice cases and did not include litigation or compensation costs. Medical malpractice that occurred in connection with clinical studies was also excluded. The costs included additional medical costs, such as hospitalization, procedure, and material costs.

RESULTS

Adverse events owing to medical malpractice

A total of 197 adverse events occurred because of medical malpractice over seven years at the hospital. The associated medical costs to the hospital totaled JPY 30.5 million, or an annual

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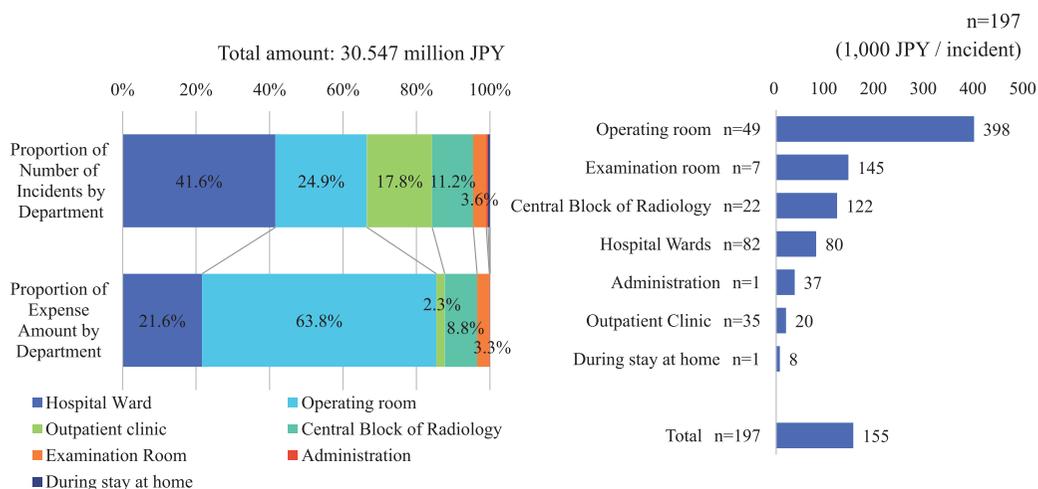


Fig. 1 Number of medical malpractices and associated expenses by division and average medical expenses incurred per event by division

average of JPY 4.4 million. The hospital has a patient safety office, where any employee can report incidents. We targeted 197 cases that amounted to JPY 30.547 million and could be judged to be medical malpractice from the incident reports out of 303 cases that cost the hospital JPY 31.310 million in medical expenses. The ratio of the number of cases was 65.0%, and the ratio of the amount of money was 97.6%.

The divisional distribution of the number of incidents and associated expenses is shown in Figure 1. The division with the greatest number of cases was the hospital ward (82 incidents, 41.6% of the total), followed in decreasing order by the operating room (49, 24.9%), outpatient clinic (35, 17.8%), and radiology division (22, 11.2%).

Incidents in the operating room accounted for the highest medical expenses borne by the hospital (JPY 19.4 million, 63.8% of total expenses), followed in decreasing order by the hospital ward (JPY 6.6 million, 21.6%) and radiology division (JPY 2.7 million, 8.8%).

Figure 1 also shows the average cost of medical expenses incurred per adverse event by division. The highest average cost was found in the operating room, at JPY 398,000 per event, followed in decreasing order by the examination room (JPY 145,000/event), Central Block of Radiology (JPY 122,000/event), and hospital ward (JPY 80,000/event). Of the 197 incidents, 24 (12.2%) accounted for 80.2% of the total costs to the hospital.

Causes identified

Table 1 shows a breakdown of the causes for medical errors, followed by the proportion of expenses associated with each cause. The principal causes, in decreasing order of reported frequency, were drug administration errors (63 cases, 32.0% of the total), intraoperative injury (21, 10.7%), mistaken acquisition of examination data (19, 9.6%), material inadvertently left at the treatment site (referred to as “remnants”; 18, 9.1%), medical errors (15, 7.6%), and falling (10, 5.1%).

Table 1 also indicates that the most expensive causes, in decreasing order of expenses incurred, were remnants (JPY 9.8 million, 32.0% of the total) and intraoperative injury (JPY 6.0 million). Altogether, these accounted for over half of the total expenses, followed by additional

surgery owing to other negligence (JPY 4.3 million, 14.2%) and drug administration errors (JPY 4.0 million, 12.8%). Additional surgery owing to other negligence consisted of three cases of persistent lesions (JPY 2.3 million), two cases in which unsterilized instruments were used (JPY 1.5 million), and one case of fixture failure on a repair device (JPY 537,000).

Table 2 gives a breakdown of the 18 remnants and medical expenses accrued for their respective removal. Medical expenses for remnants associated with vascular invasion, such as by Radifocus Guide Wire, stent grafts, or vascular stents, proved to be especially costly.

Table 1 Breakdown of incidents and medical cost to hospital by cause

| Incidents by cause | Cost (¥1,000) | % | Number | % |
|---|------------------|-------------|------------|-------------|
| Remnants | 9,767 | 32.0% | 18 | 9.1% |
| Intraoperative injury | 5,978 | 19.6% | 21 | 10.7% |
| Other additional surgery | 4,328 | 14.2% | 6 | 3.0% |
| Drug administration error | 3,919 | 12.8% | 63 | 32.0% |
| Falling | 1,180 | 3.9% | 10 | 5.1% |
| Errors During Medical Treatment | 1,094 | 3.6% | 15 | 7.6% |
| Misdiagnosis | 1,063 | 3.5% | 2 | 1.0% |
| mistaken acquisition of examination data | 957 | 3.1% | 19 | 9.6% |
| Category for events costing less than one million yen | 3,217 | 10.5% | 62 | 21.8% |
| TOTAL | 30,547 | 100% | 197 | 100% |

Table 2 Breakdown of remnants and medical expenses incurred by their removal (in ¥1,000)

| Remnant Type | Medical expenses incurred by removal (¥1,000) |
|--------------------------------|--|
| Radifocus guidewire | 3,513 |
| Catheters (4 incidents) | 2,316 |
| Vascular stent | 1,037 |
| Pancreatic duct stent | 636 |
| Drill | 625 |
| Pinch | 525 |
| Hemostatic device | 424 |
| Silicone cap | 238 |
| Gauze | 185 |
| Hem-o-lok | 96 |
| Dental bridge bracket | 82 |
| Outer tube of a Foley catheter | 61 |
| Skin stapler | 15 |
| Mark pin | 13 |
| Surgical tape | 2 |
| Total Cost | 9,767 |

Analysis of changes over time

From 2011 to 2017, the hospital tended to have an overall increase in the incidence of adverse events but tended to have a decrease in the annual medical costs borne by the hospital (Fig. 2). Therefore, the number of cases where the cost burden was less than JPY 100,000 tended to increase with time, whereas the number of cases where the cost burden exceeded JPY 100,000 decreased (Fig. 3).

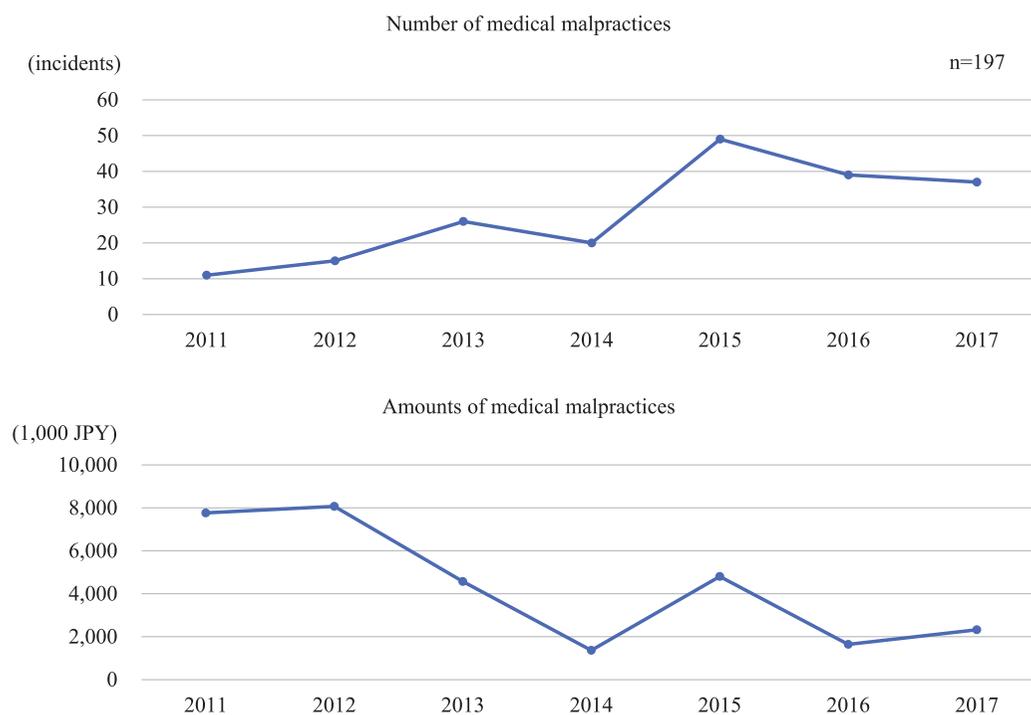


Fig. 2 Changes in the number and amounts of medical malpractices

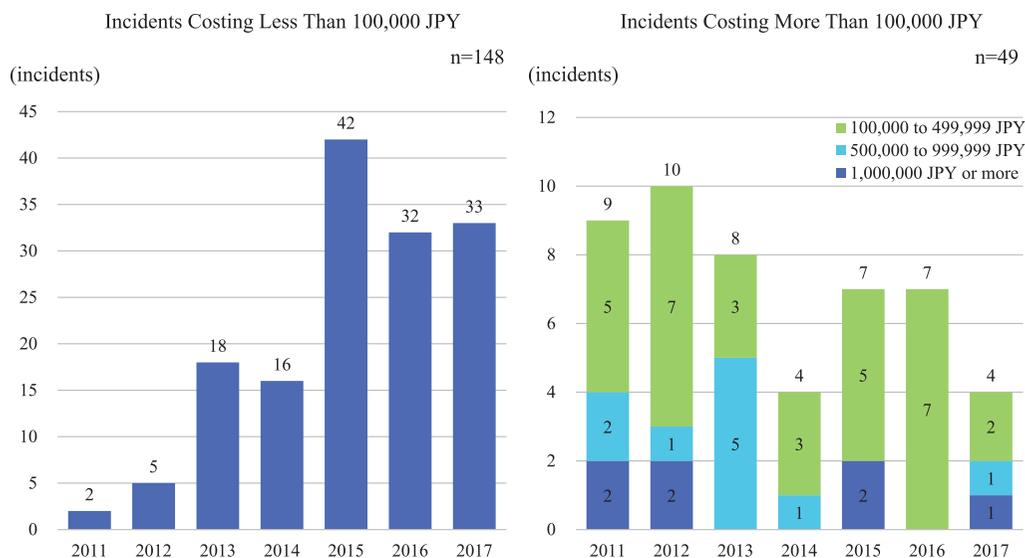


Fig. 3 Number of medical malpractices by amount category

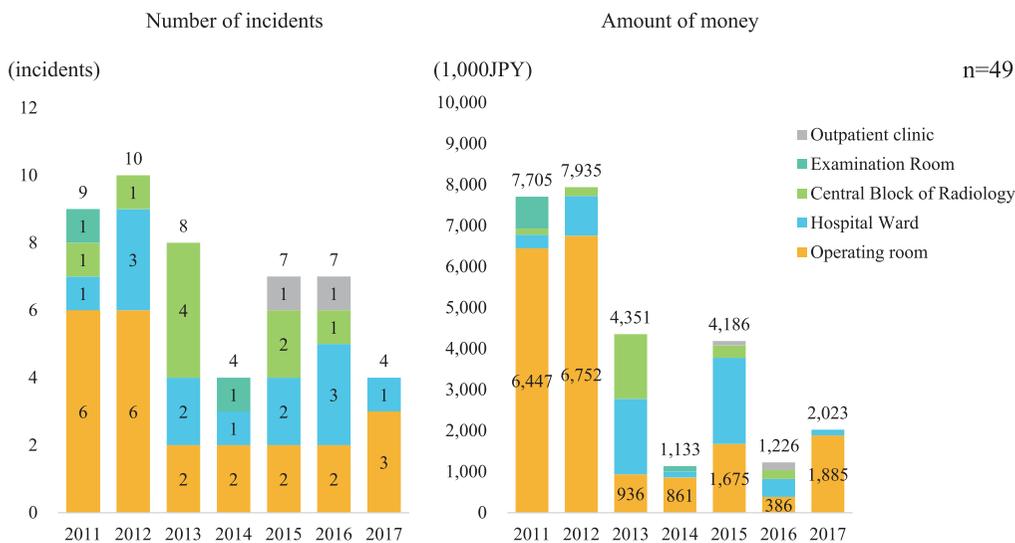


Fig. 4 Number of medical malpractices by division (100,000 yen or more)

Meanwhile, we observed a downward trend in the number of adverse events occurring in each division. This was particularly obvious for operating room accidents and related costs (Fig. 4).

Estimates of medical expenses for medical malpractice across Japan

Using the data from “Report on the results of the Discharged Patient Survey, a survey on the impact assessment of 2018 DPC introduction Ministry of Health, Labour and Welfare,” we looked at the number of hospital beds, patients hospitalized, surgeries, and cases involving general anesthesia performed in Japan, and then we conducted a proportional calculation using data from the hospital to estimate the cost of malpractice in medical expenses at the national level (Table 3).¹⁴ To compare the status before and after the implementation of medical safety efforts, we used the data of this hospital from 2011 and 2017. Using the 2011 data, medical expenses were estimated to be between JPY 3.4 and 4.9 billion. Using the 2017 data, these were estimated to be between JPY 1.0 and 1.5 billion.

Table 3 Estimated medical expenses of medical malpractice across Japan

| | Number of beds | Number of hospitalized patients | Number of surgeries | Number of general anesthesia cases |
|------------------------------------|----------------|---------------------------------|---------------------|------------------------------------|
| The university hospital (1) | 982 | 20,970 | 10,671 | 5,210 |
| Nationwide (2) | 616,367 | 11,620,820 | 5,141,407 | 2,308,452 |
| annual burden in 2011 (¥1,000) (3) | 7,764 | | | |
| annual burden in 2017 (¥1,000) (4) | 2,324 | | | |

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|---|--------------|--------------|--------------|--------------|
| Coefficient (2)÷(1)) (5) | 628 | 554 | 482 | 443 |
| Estimated burden nationwide based on 2011 (¥1,000,000) (3) × (5) | 4,876 | 4,301 | 3,742 | 3,440 |
| Estimated burden nationwide based on 2017 (¥1,000,000) (4) × (5) | 1,459 | 1,287 | 1,120 | 1,029 |

DISCUSSION

Our results provided insight into the number and type of medical malpractice incidents that occurred over several years at a Japanese national university hospital, as well as the medical costs, divisions involved, causes, changes in the number of incidents, and total medical expenses over time.

To the best of our knowledge, no other study has estimated the medical expenses incurred owing to medical malpractice throughout Japan. In determining the cost, our study clarified that medical malpractice was an issue from the viewpoint of controlling medical expenses in Japan. To this end, we identified the divisions and cases where measures should be taken and the cause addressed. The total estimated costs in this study may seem small compared with the medical expenses incurred in other countries reported by the OECD.² However, the smaller figures may be because the current estimate was limited to only medical expenses incurred owing to medical malpractice.

While the hospital ward was the site with the most frequent incidence of malpractice, the division that incurred the most significant expenses was the operating room, owing to the difference in cost per incident. The relation between patient safety and economics has been shown to be related to infection control, adverse drug events, and blood transfusion.³ Most prior studies have assessed ward-related incidents. In contrast, the current study revealed that operating room incidents had a major financial impact.

Although drug administration was the most frequent cause (32.0%) of medical errors, it accounted for no more than 12.8% of the total expenditure. In contrast, while remnants accounted for only 9.1% of incidents, they accounted for 32.0% of the total medical expenses. Among these cases, the total and average cost burden per individual case were particularly high for cases involving remnants that invaded blood vessels. The reasons for this include the relatively high costs of catheters and guide wires and the high treatment expense associated with complications, such as vascular injury during removal. Therefore, focus should be directed toward preventing such materials from remaining in the treatment site.

Since 2011, the hospital has been actively engaged in patient safety activities, including holding seminars on the quality of medical treatment and patient safety, increasing the number of full-time patient safety administrators, and hiring a full-time in-house lawyer. More than 10,000 incidents are reported each year at this hospital, and its reporting culture is regarded as one of the most advanced in Japan. This is, in part, attributable to its transparency in incident reporting.

In particular, the hospital has focused its time and attention on medical safety measures related to the operating room. Their efforts include convening regular surgical incident review meetings

by the surgical division and divisions responsible for medical quality and safety management, preparing standards for operating room incident reporting, introducing and reviewing the World Health Organization Surgical Safety Checklist, and acquiring accreditation from the Joint Commission International. Through these measures, both the number of medical malpractice cases in the operating room and associated medical expenses decreased over the study period. Increased efforts to ensure transparency and implementation of safety measures in surgical areas reduced the adverse events, which represented the highest cost burden.

Although the hospital has employed a full-time in-house lawyer to read all the incident reports and determine the hospital's level of liability, it is rare in Japan for hospitals to employ their own lawyers; therefore, the accuracy of liability determinations remains unknown. Hospitals without in-house lawyers might not be able to determine their responsibility and, therefore, inadvertently charge insurance providers inappropriately. Even if the hospital hired lawyers, the amount charged to the hospital would have to be based on professional ethics that would not allow fraud. This could also be a policy challenge from the perspective of minimizing medical expenses.

Our results suggested that hospitals should prioritize countermeasures to reduce adverse events in surgical areas, especially those involving remnants associated with vascular invasion, not only for optimal patient safety but also for operational improvement and reduction of medical expenses. At this hospital, the medical safety measures for the operating room likely contributed to the reduction of medical costs owing to malpractice.

This study had several limitations. We investigated only one hospital, which was a university hospital that provides advanced medical care that is not standard in Japan, and then estimated the Japanese total cost by multiplying the costs at this one hospital by 443 to 628 times. As such, our findings may not be sufficient for an overall evaluation of other hospitals in Japan. Although incident reporting is an in-hospital obligation, there is no guarantee of precedent reporting. We could conduct this investigation in the selected hospital because it had an in-hospital lawyer; however, the same investigation would be difficult to perform at a hospital without an in-hospital lawyer. We also presumed that the judgment of the lawyer and medical quality safety management division would provide an accurate observation regarding potential negligence.

CONCLUSIONS

This paper presented information on incident and expense priorities for implementing safety measures to reduce medical expenses from medical malpractice in one medical institution. The information was gathered by retrospectively investigating the relation between recent patient safety measures and changes over time to medical expenses borne by medical institutions. Our study suggested that conducting in-hospital investigations of malpractice incidents and associated causes and costs would be economically sound for medical institutions as doing so would foster patient safety and thus decrease medical expenses.

IMPLICATIONS

The importance of patient safety is often judged by the number of reports made regarding a case and its coverage on the news. Research using the viewpoint of medical expenses management will deepen the awareness of this issue. We also expect that measures will be prioritized based on medical expenses.

CONFLICTS OF INTERESTS

The authors have no conflicts of interest to declare.

FUNDING

This study did not receive any funding.

ACKNOWLEDGEMENTS

The authors would like to thank Editage (www.editage.jp) for the English language editing of this article.

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