Introduction of Clinical Indicators to Improve Operations in Japanese Public Hospitals

Yasutoshi Moteki

1　Introduction

The healthcare sector, along with the nursing care sector, has become one of the most important industries in today's economy. In many Western liberal and capitalist countries, healthcare services are provided by a combination of (1) private hospitals run by private medical corporations and (2) public hospitals heavily funded by public money, focusing on specific medical fields (namely, advanced medicine, remote areas, psychiatry, and infectious diseases) and services private hospitals cannot provide. The need for healthcare is increasing and diversifying with rapid population aging. Unprecedented attention is being paid to the role and function of Japanese public hospitals managed by local governments since they exclusively responded to the coronavirus disease (COVID–19) by providing dedicated beds. COVID–19 has severely impacted Japan since 2020. Japanese local governments provide medical and nursing care services through public medical insurance programs: national health insurance and public long-term care insurance. Furthermore, they deliver medical services directly to communities by operating municipal hospitals. These public hospitals originally provided medical services to patients with communicable diseases and mental illnesses that were difficult for private hospitals to manage. Today, under the local independent administrative agencies' system, municipal hospitals provide core medical services that are indispensable to the community by adopting private-sector personnel management and management methods.

Collecting and utilizing clinical indicators are crucial to providing efficient and effective healthcare services worldwide and understanding the current status of healthcare delivery, especially during the COVID–19 pandemic. Improving and optimizing hospital operations will improve medical services' quality and quantity. A growing body of research examined the measurement and use of clinical indicators in hospitals. For example, Zhang et al. [2021] indicated that the radiomics nomogram, a combination of clinical indicators and radiomic signatures, effectively measures the prognosis of patients with COVID–19. Lai et al. [2022] systematically reviewed articles in SCOPUS and Google Scholar to examine the literature on performance measures in hospital facility management. They found that hospital facility practitioners consider physical and financial key performance indicators important. Similarly, Haller et al. [2019] conducted a systematic review to explore valid clinical outcome indicators for perioperative clinical trials. They identified 167 clinical outcome indicators and found eight to be the most effective, including surgical site infection at 30 days of surgery and stroke

within 30 days of surgery.

Research on clinical indicators' use to improve public hospital operations is progressing worldwide. Lim et al. [2011] discussed the potential of using Casemix data for Singapore's public hospitals, focusing on hospital readmission rates based on data from 2006–2010. Pereira et al. [2021] focused on patient preference information and used a computational model and data envelopment analysis to create composite indicators that aggregate key performance indicators for Portuguese public hospitals. De Oliveira Melo et al. [2017] evaluated the quality of applied care after intensive care unit (ICU) discharge in three public hospitals in Brazil by comparing the ICU readmission rates and in-hospital mortality after discharge from the ICU. Meliala [2014] examined the distribution of specialists and demographic characteristics of public hospitals in Indonesia in a primary study of three hospitals and a secondary study based on data provided by government agencies. Othero et al. [2013] surveyed Brazilian public hospitals using a questionnaire based on Family Satisfaction in the ICU survey.

This study surveyed public hospitals across Japan to analyze the issues and challenges concerning personal data protection and clinical indicators. Questionnaires were sent to all 887 municipal hospitals with 20+beds. This study was part of a larger research project that provided access to information on medical institutions with patient consent, which is important for medical management, including clinical indicators. A relatively large amount of data were collected during a 2016 survey. Although key parts of the dataset, especially concerning consent for personal information use, were analyzed in a prior study [Hashimoto and Moteki 2018], a significant portion, mainly concerning clinical indicators used in Japanese municipal hospitals, is yet to be examined. This study analyzes this unpublished portion of the survey to provide a comprehensive picture of the use of clinical indicators in public hospitals.

The survey investigated two issues: (1) how hospitals take protective measures beyond those directed in the "Guidelines for Appropriate Handling of Personal Information in Medical and Nursing Care Providers" (December 2014) by the Ministry of Health, Labour and Welfare, and (2) how medical information and personal information protection officers handle personal information. Moreover, questions regarding clinical indicators used as performance indicators of hospital activities and open-ended questions about practical difficulties and issues in handling personal information were included.

2 Related Studies

Hashimoto and Moteki [2018] reviewed relevant literature on personal information protection in Japan's hospitals. Osaka [2004] surveyed the information management staff of the National Hospital Organization. They found that ethical and legal issues such as obtaining informed consent and information protection must be resolved by the National Hospital Organization as a whole rather than by individual institutions. Endo et al. [2009] studied the organizational efforts status of 244 hospitals regarding medical ethics and focused on hospital attributes. Implementation of ethical considerations, specifically in hospitals with ethics committees, ethics guidelines, and manuals for ethics issues, was

compared under different categories using the number of hospital beds. Hashimoto and Moteki [2018] showed that although small, medium, and large hospitals did not differ significantly in the number of employees in charge of protecting patients' personal information, significant differences existed in the use of personal information through computer network systems depending on the municipal hospitals' size; this is related to whether they used computer network systems to report patients' medical information to other institutions or research groups.

Laurie et al. [2016] offered a general bibliography on medical law in English comprising a series of editions that have gained a large readership. Their chapter on medical confidentiality deals with patients' access to medical records, which is relevant to medical information management. Concerning privacy, tighter regulations such as the General Data Protection Regulation (GDPR) by the European Union (EU) have significantly affected European hospitals. Beyleveld et al. [2005] discussed the Data Protection Directive's overall effects on medical research in Europe (Chen and Jeng [2020] deal with the same theme). Fuster [2014] examined personal data protection legislation under EU laws after 2000, including the international treaty, Lisbon Treaty of the EU (enacted in 2009; pp. 213–248). Barbarito et al. [2015] surveyed practices in Italy, whereas Haukka [2004] presented the Finnish case. Philip [2019] discussed the GDPR's influences on medical practice in Ireland. Further, Idowu et al. [2003] detailed the example of Nigeria, a member of the Commonwealth. The European Society of Radiology [2017] offered detailed discussions in specific medical fields, with practical commentary on GDPR's effects on radiology.

Donabedian [1980] is well-known for evaluating healthcare, including clinical indicators. They identified three perspectives for measuring healthcare quality: structure, process, and outcomes. Clinical indicators' application in each field of medicine has also been researched. Haller et al. [2009] examined quality and safety indicators in anesthesia using a systematic review approach. Hamilton-Davies et al. [1997] compared clinical indicators for hypovolemia.

3 Methods

A mail survey of public hospitals across Japan was conducted to analyze the issues and challenges concerning personal data protection faced by medical institutions managed by local municipalities in Japan. Public hospitals were surveyed since more of these had implemented the regional medical care plan than private hospitals. Questionnaires were sent to all (887) municipal hospitals with 20 + beds that are members of the Japan Municipal Hospital Association (JMHA). A relatively large amount of data was collected during the 2016 survey. Although Hashimoto and Moteki [2018] analyzed key parts of the dataset, especially related to consent for personal information use, a significant amount of data remains to be analyzed. Target hospitals that met the condition of having 20 + beds were extracted from the database of JMHA member facilities as of April 6, 2016.

In the letter to each hospital, we requested that the respondent be the hospital department in charge of personal information protection. The questionnaires were also addressed to these departments, asking them to fill them out. We explained that data from the survey were to be

tabulated and analyzed, and the results would be published. We clarified that individual responses from each hospital would not be released in their presented form. The researchers' contact information was provided for inquiries. Reminders were sent to municipal hospitals that had not responded by the initial deadline. The response rate was 26.6% (236 hospitals), which is relatively low, making the results' generalizability somewhat weak. However, it is a valuable study conducted in a Japanese public hospital before the COVID−19 pandemic.

4 Results

Regarding the characteristics of the municipal hospitals that had responded, Table 1 shows the number of beds in each hospital as of April 1, 2016. The most selected category was less than 100 beds, followed by 100−199 beds. Very few municipal hospitals have 800 + beds.

Another indicator of hospital size was the number of full-time physicians. The most common category was less than 25 physicians, with 136 hospitals. The median was 14.5, the mean was 36.4, and the standard deviation was 42.8. In the following analysis, hospitals with less than 200 beds are defined as "small and medium hospitals," whereas those with 200 + beds are defined as "large hospitals."

Table 1 Number of beds (Q1)

Number of beds	Count	Ratio
900 to 999	2	0.8%
800 to 899	1	0.4%
700 to 799	5	2.1%
600 to 699	7	3.0%
500 to 599	11	4.7%
400 to 499	28	11.9%
300 to 399	29	12.3%
200 to 299	29	12.3%
100 to 199	61	25.8%
Less than 100	63	26.7%
Total	236	100.0%

Note: This table was prepared by the author.

Regarding clinical indicators, Table 2 compares the proportion of each hospital measuring clinical indicators by hospital size. Over 60% of large hospitals measured indicators, whereas only 20% of small and medium-sized hospitals did. Table 3 summarizes the hospitals that measure clinical indicators and whether they publish the results on their websites. More than 60% of large hospitals published clinical indicators on their websites, whereas less than 16% of small and medium-sized hospitals did so. This may be related to the websites in some small and medium-sized hospitals.

Table 2 Use of clinical indicators compared by hospital size (Q32)

Hospital size	Implementing	Not Implementing	Total
Small and medium	27	92	119
	(22.7%)	(77.3%)	(100.0%)
Large	70	40	110
	(63.6%)	(36.4%)	(100.0%)
Total	97	132	229

Note: This table was prepared by the author.

Table 3 Hospitals that published data on clinical indicators online vs. those that did not (Q32 sub 1)

Hospital size	Publishing on the hospital website	Not publishing on the hospital website	Total
Small and medium	7	37	44
	(15.9%)	(84.1%)	(100.0%)
Large	53	31	84
	(63.1%)	(36.9%)	(100.0%)
Total	60	68	128

Note: This table was prepared by the author.

Table 4 summarizes the rate of each typical example of the measured clinical indicators. The most measured indicators were the average length of hospitalization and rate of hospital bed utilization (80.4%). The clinical path coverage rate and the number of ambulances received and refused (rate) were used by more than 40% of public hospitals that used clinical indicators. There is a clear distinction in the clinical indicators that are measured.

Table 4 Clinical indicators measured (Q32 sub 2)

Clinical indicators	Measuring	% of total
1 . Average length of hospitalization and rate of hospital bed utilization	78	80.4%
2 . Completion rate of in-take summary	34	35.1%
3 . Coverage rate of clinical path	42	43.3%
4 . Average length of hospital stays for stroke patients	12	12.4%
5 . Average length of hospital stays for patients with acute myocardial infarction	8	8.2%
6 . Diabetes: HbA1c improvement rate and the number of referrals and reverse referrals of diabetic patients	5	5.2%
7 . Pneumonia: Average length of stay and success rate of initial treatment	4	4.1%
8 . Five-year survival rate after cancer surgery	10	10.3%
9 . Post-operative hospital stays for gastrointestinal cancer patients	9	9.3%
10. Post-operative hospital stays for lung cancer patients	8	8.2%
11. Proportion of breast-conserving surgeries in breast cancer patients	18	18.6%
12. Number of ambulances received and refused (rate)	39	40.2%
13. Transport of pregnant women: Number of admissions and refusals (rate)	4	4.1%
14. Rehabilitation: Early recommendation rate for rehabilitation within two days after hospitalization	8	8.2%
15. Medical social workers: Rates of MSW intervention for patients transferred to other hospitals and institutions	9	9.3%
16. Number of supervisors per resident doctor	8	8.2%
17. Percentage of respondents who would recommend the hospital to their friends in a patient survey	13	13.4%
18. Percentage of ambulant patients waiting for at least one hour before seeing a doctor	11	11.3%
19. Other	29	29.9%

Note: This table was prepared by the author.

5 Discussion

This study summarized and analyzed the unpublished portion of the 2016 questionnaire survey conducted by Hashimoto and Moteki [2018]. The analysis of this article focused on the measurement of clinical indicators (Q32). This study found differences between large and small/medium hospitals in the proportion of measurement of clinical indicators (Table 3). Only approximately 20% of small and medium-sized hospitals measured clinical indicators. There are significant differences in the use of clinical indicators depending on the size of the public hospitals. The survey also asked about adopting typical clinical indicators (Table 4). The most measured indicators were the average length of hospitalization and rate of hospital bed utilization (80.4%). “Clinical path coverage rate” and “Number of ambulances received and refused (rate)” were more than 40%. Less than 40% of respondents measured other indicators. The clinical indicators that are measured are distinct. This is the only

indicator commonly measured by most of the target hospitals that measure clinical indicators. This result suggests that the clinical indicators measured are diverse.

As shown in Section 1, research on introducing clinical indicators in public hospitals is progressing worldwide, with studies showing the actual average values of each specific indicator based on surveys. This study clarifies the status of the introduction of clinical indicators in Japanese public hospitals and the actual introduction rate of each indicator, which was not previously examined in English language papers. Together with the results of Hashimoto and Moteki [2018], published in Japanese, this study examined differences in approaches to personal data protection and clinical indicators by the size of municipal hospitals. Municipal hospitals differ based on the departments they open, their location, and the purpose of their establishment. When conducting research on the same topic in the future, the author would like to consider these factors, which have not yet been dealt with. In addition, the data in this paper predate the spread of novel coronavirus infections in Japan. In future studies, we wish to compare and examine how the utilization of the clinical indicators published here has changed after the pandemic.

6 Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Introduction of Clinical Indicators to Improve Operations in Japanese Public Hospitals

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Abstract

As the coronavirus pandemic continues spreading worldwide, there is a greater need to improve the role and operation of public hospitals, which are important in the fight against the virus. A mail-in questionnaire survey of Japanese public hospitals was conducted to analyze the challenges faced by medical institutions managed by local municipalities. This study summarized and analyzed the unpublished portion of a 2016 survey by Hashimoto and Moteki, focusing on using clinical indicators. Differences between large and small/medium hospitals regarding clinical indicators were found. One indicator is measured by more than 80% of the target hospitals utilizing clinical indicators. Still, the measurement of other indicators is below the majority and varies across hospitals. The most used indicator was "average length of hospitalization and rate of hospital bed utilization," followed by "clinical path coverage rate" and "number of ambulances received and refused (rate)." Now that the pandemic is ending, it is necessary to continue improving hospital management, including the use of clinical indicators, to prepare for the next phase of infectious disease spread.

Keywords: clinical indicators, municipal hospitals, survey, medical information, Japan