Improving operations by introducing clinical indicators in Japanese public hospitals: An analysis based on a nationwide questionnaire survey concerning use of clinical indicators and medical information management

Yasutoshi Moteki (✉ moteki@hiroshima-u.ac.jp)

Hiroshima University <https://orcid.org/0000-0001-7763-670X>

Research Article

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

Posted Date: March 3rd, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1368070/v2>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

As the coronavirus pandemic continues to rage across the world, there is a greater need to improve the role and operation of public hospitals, which play an important role in the fight against the virus. A mail-in questionnaire survey of Japanese public hospitals was conducted to analyze the personal data protection challenges faced by medical institutions managed by local municipalities. Questionnaires were sent to 887 hospitals—with 20 or more beds—that are members of the Japan Municipal Hospital Association. This study summarizes and analyzes the unpublished portion of the 2016 survey conducted by Hashimoto and Moteki (2018), focusing on the characteristics of the municipal hospitals surveyed by their size and use of clinical indicators. Differences between large and small/medium hospitals regarding use of clinical indicators were found. Several small and medium-sized hospitals use a common consent form for the use of personal information, whereas larger hospitals use individual consent forms for different departments. 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).” There is a clear distinction in the clinical indicators measured in this study.

Introduction

The healthcare sector, along with the nursing care sector, has become one of the most important industries in the economy today. In many western liberal and capitalist countries, health care services are provided by a combination of private hospitals run by private medical corporations and public hospitals that focus on medical fields (advanced medicine, remote areas, psychiatry, infectious diseases) heavily funded by public money and services private hospitals cannot provide. With rapid population aging, the need for healthcare is increasing and diversifying. Unprecedented attention is now being paid to the role and function of public hospitals in Japan, as these hospitals run by local governments have been exclusively responsible for responding to the coronavirus disease (COVID-19) that has had a major impact on Japan since 2020, especially the provision of dedicated beds for the disease. While local governments in Japan are involved in the provision of medical and nursing care services in the form of public medical insurance programs called national health insurance and public long-term care insurance, they also provide medical services directly to the community 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 system of local independent administrative agencies, municipal hospitals provide core medical services that are indispensable to the community by adopting private-sector personnel management and management methods.

To provide efficient and effective healthcare services worldwide and to understand the current status of healthcare delivery, especially regarding the COVID-19 pandemic, the collection and utilization of clinical indicators has become crucial. Improving and optimizing hospital operations will lead to improved quality and quantity of medical services provided by the hospitals. In this context, there is a growing body of research on 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, is effective in measuring the prognosis of patients with COVID-19 pneumonia. Lai et al. (2022) conducted a systematic review of articles published in SCOPUS and Google Scholar to examine the literature on performance measures in hospital facility management. They found that physical and financial key performance indicators are considered important by hospital facility practitioners. 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 the use of clinical indicators to improve public hospital operations, the subject of this study, has been progressing worldwide. Lim et al. (2011) discussed the potential of using Casemix data for public hospitals in Singapore, focusing on hospital readmission rates, based on data from 2006 to 2010. Focusing on patient preference information, Pereira et al. (2021) used a computational model called 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 (2013) conducted a survey of Brazilian public hospitals using a questionnaire based on the Family Satisfaction in the ICU (FS-ICU 24) survey.

With the enactment of the Law for the Promotion of Integrated Medical and Health Care Services in 2014, from April 2015, each prefecture is required to formulate a *Chiiki Iryo Koso* (a regional medical care plan). Regional medical care plans are defined as “estimates of the demand for medical care and the amount of hospital beds needed to promote functional differentiation and coordination of hospital beds towards 2025” (Ministry of Health, Labour and Welfare, 2020). To realize this regional medical care plan, prefectures are required to take the lead in promoting measures to secure a high-quality, appropriate, and efficient medical care system and to optimize medical costs.

Research on information management in the medical field is to be expanded to other related fields, including medicine and management sciences, but at present, physicians play a central role in both medical practice and medical research. With an aging population, there is a need for cooperation between medical and nursing care services, and with the global pandemic, there is a need for cooperation between medicine, epidemiology, and pharmacology to develop vaccines and special medicines. Therefore, multidisciplinary cooperation, including in the field of

medical policy, is extremely important from a practical as well as a theoretical point of view. Given the multidisciplinary approach that is required, the protection of personal information and procedures such as informed consent are becoming a prime focus of study.

This study conducted a survey of 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 or more beds. This study was part of a larger research project that provided access to information on medical institutions with patient consent, important for medical management, including clinical indicators. A relatively large amount of data was collected during a survey in 2016. While key parts of the dataset, especially concerning consent of personal information use, have been analyzed in a prior study (Hashimoto and Moteki, 2018), a significant portion is yet to be examined. This study analyzes this unpublished portion of the survey and re-analyzes the published questions using a different methodology. It aims to provide a comprehensive picture of the results of the survey conducted in 2016, focusing on the actual use of clinical indicators and procedures for protecting personal information in public hospitals. This study also aims to obtain the academic knowledge and specific methods necessary to operationalize the medical care delivery system after the regional medical care plan is established in each prefecture. The protection of personal information and privacy in the use of medical information systems are issues that need to be addressed to promote multi-sector collaboration for the realization of the regional medical care plan.

The survey in this study investigated two issues. 1) How hospitals are taking 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 (1), and 2) How medical information officers and personal information protection officers are handling personal information. In addition to these, 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.

1.1 Related studies

Hashimoto and Moteki (2018) reviewed relevant literature on personal information protection in hospitals in Japan. Osaka (2004) surveyed the information management staff of the National Hospital Organization and found that ethical and legal issues such as obtaining informed consent and information protection need to be resolved. It is important that they be resolved by the National Hospital Organization as a whole, rather than by individual institutions. Endo et al. (2009) studied the status of the organizational efforts of 244 hospitals regarding medical ethics, focusing on hospital attributes. Implementation of ethical considerations, specifically hospitals with an ethics committee, ethics guidelines, and a manual for ethics issues, was compared by different categories using the number of beds in the hospitals. The findings of Hashimoto and Moteki (2018) show that although small, medium, and large hospitals do not differ significantly in the number of employees in charge of protecting patients’ personal information, there are significant differences in the use of personal information through computer network systems depending on the size of the municipal hospitals, which relate to whether they use 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 a topic relevant to medical information management. Concerning privacy, tighter regulations such as the General Data Protection Regulation (GDPR) by the European Union (EU) have had a significant effect on European hospitals. Beyleveld et al. (2005) discussed the overall effects of the Data Protection Directive on medical research in Europe (Chen and Jeng [2020] also deal with the same theme). Fuster (2014) examined personal data protection legislation under the EU laws after 2000, including the international treaty, the 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 influences of the GDPR on medical practice in Ireland. The example of Nigeria, a member of the Commonwealth, is detailed in Idowu et al.’s (2003) study. For detailed discussions in specific medical fields, the European Society of Radiology (2017) is a practical commentary on the effect of the GDPR on the field of radiology (2).

For evaluation in health care, including clinical indicators, Donabedian’s work (1980) is well known. It identifies three perspectives for measuring the quality of health care: structure, process, and outcomes. As for clinical indicators, research has been conducted on the application of the indicators in each field of medicine. Haller et al. (2009) examined quality and safety indicators in the field of anesthesia using a systematic review approach. Hamilton-Davies et al. (1997) compared clinical indicators for hypovolemia.

Methods Of The Nationwide Survey Of Municipal Hospitals In Japan

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 because more public hospitals have implemented the regional medical care plan than private hospitals. Questionnaires were sent to all municipal hospitals (887 hospitals—with 20 or more beds—that are members of the Japan Municipal Hospital Association [JMHA]). A relatively large amount of data was collected during the survey in 2016, and whereas key parts of the dataset, especially those related to consent for personal information use, were analyzed in Hashimoto and Moteki

(2018), a significant amount of data is yet to be analyzed. Target hospitals that met the condition of having 20 or more beds were extracted from the database of member facilities of the JMHA as of April 6, 2016.

In the letter to each hospital, we requested that the respondent be the department in charge of personal information protection in the hospital. The questionnaires were addressed to the departments in charge of personal information protection at the hospitals, asking them to fill out the questionnaire. We explained that the data from the survey were to be tabulated and analyzed and the results of the analysis would be published. It was also made clear that the individual responses from each hospital would not be released in their presented form. The contact information of the researchers was provided for queries. Reminders were sent to municipal hospitals that had not responded by the initial deadline. The response rate was 26.6% (236 hospitals).

Results

We first examined the data to identify 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 to 199 beds. Very few municipal hospitals have more than 800 beds.

[Insert Table 1 near here]

Another indicator of hospital size was the number of full-time physicians. Less than 25 physicians was the most common category, 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 or more beds are defined as “large hospitals.”

Table 2 shows the aggregate results for the use of consent forms for the use of personal information in Question 7, which were not analyzed in Hashimoto and Moteki (2018). Many small and medium-sized hospitals use a common form of consent for the use of personal information, whereas large hospitals tend to have individual consent forms for different departments (26.4%). Interestingly, the percentage of hospitals that did not have a prescribed consent form was higher in the large hospitals than in the small and medium hospitals. A χ^2 test was performed on this table and the χ^2 value was 8.337, which was significant at the 5% level. That is, there was a statistically significant association between the variables of hospital size and consent form preparation.

[Insert Table 2 near here]

An important consideration is how to erase personal information that is no longer needed when considering the protection of a patient’s personal information. Table 3 indicates that the primary method for disposing of or deleting personal information varied by the size of hospitals. The most chosen item among small and medium-sized hospitals was the incineration or dissolution method (62.5%). By contrast, in large hospitals, the order of each method was the same, but the percentage of outsourcing to contractors was relatively high (39.5%). A χ^2 test on this table showed a chi-square value of 6.0, indicating a statistically significant association between the two variables at the 5% level.

[Insert Table 3 near here]

3.1 Use of clinical indicators

Table 4 compares the proportion of each hospital measuring clinical indicators by hospital size. More than 60% of large hospitals measured indicators, whereas only 20% of small and medium-sized hospitals did so. Table 5 summarizes the hospitals that measure clinical indicators and whether they publish the results on their websites. More than 60% of large hospitals published their clinical indicators on their websites, whereas less than 16% of small and medium-sized hospitals did so. This may be related to the fact that some small and medium-sized hospitals do not have websites in the first place.

[Insert Table 4 near here]

[Insert Table 5 near here]

Table 6 summarizes the rate of each of the typical examples of clinical indicators that are measured. The most measured indicators were average length of hospitalization and rate of hospital bed utilization (80.4%). Both 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.

Discussion

This study summarizes and analyzes the unpublished portion of the 2016 questionnaire survey conducted by Hashimoto and Moteki (2018). The analysis of the results focuses on the characteristics of the municipal hospitals surveyed and the measurement of clinical indicators. Many small

and medium-sized hospitals use a common form of consent for the use of personal information, while many large hospitals have individual consent forms for different departments (26.4%). There was a statistically significant association between the two variables of hospital size and consent form preparation based on the chi-square test. Large hospitals prepare consent forms for each department according to the characteristics of the department. There were also differences in the methods for disposing of personal information that is no longer needed, depending on the size of the hospital. Although incineration and melting were the most common disposal methods for both sizes, the percentage of outsourced disposal was relatively high in large hospitals (39.5%). The size of the hospitals affects their operations and preparation of consent forms regarding medical information management. It is clear that small and medium-sized hospitals need to promote in-hospital systems for medical information management according to their situation or limitations, such as low personnel power and staff expertise.

This study also found differences between large and small/medium hospitals concerning the proportion of measured clinical indicators (Table 4). Only approximately 20% of small and medium-sized hospitals measured clinical indicators. The survey also asked about the adoption of typical clinical indicators (Table 6). The most measured indicators were the average length of hospitalization and the rate of hospital bed utilization (80.4%). "Clinical path coverage rate" and "Number of ambulances received and refused (rate)" were more than 40%. There is a clear distinction in the clinical indicators that are measured.

As shown in Section 1, research on the status of the introduction of clinical indicators in public hospitals has been 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 has not been examined in English language papers until now. 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 in 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 take these factors, which have not yet been dealt with, into account.

Notes

1. The guideline was modified in 2017 to *Iryo kaigo kankei jigyo-sha ni okeru kojn joho no tekisetsuna toriatsukai no tame no gaidansu* [Guidance for the proper handling of personal information by medical / nursing-related businesses].
2. For relevant literature on health care law and medical ethics in other fields, including privacy protection, please see, Bellazzi (2014); Creighton et al. (2002); Richter et al. (2019); and Wyatt (1995).

Declarations

Yasutoshi Moteki (PhD) is an associate professor of public administration at Hiroshima University's Faculty of Law and the School of Humanities and Social Sciences. His current research interest lies in public management, budgetary process, and policy evaluations. He has also been conducting empirical research on customer or citizen satisfaction in the field of public administration. He received his Bachelor of Law, Master of Laws, and PhD degree from Kyushu University. His work has appeared in prominent scholarly journals both in Japan and abroad. He served on the Board of Directors of the Nippon Urban Management and Local Government Research Association from 2015 to 2018.

Acknowledgments

This work was funded by the Regional Economic Research Cooperation Council.

Disclosure statement

The author reports there are no competing interests to declare.

Data availability statement

The datasets generated and/or analyzed during the current study are not publicly available due to the data anonymity guarantee given to the hospitals. The aggregated statistics of each question items are available from the corresponding author on reasonable request.

References

- Barbarito, F., Pincioli, F., Barone, A., Pizzo, F., Ranza, R., Mason, J., Mazzola, L., Bonacina, S. and Marceglia, S. "Implementing the lifelong personal health record in a regionalised health information system: The case of Lombardy, Italy" *Computers in Biology and Medicine*, 59, 2015, 164–174. <https://doi.org/j.compbimed.2013.10.021>
- Bellazzi, R. "Big data and biomedical informatics: A challenging opportunity" *Yearbook of Medical Informatics*, 9(1), 2014, 8. <https://doi.org/10.15265/IY-2014-0024>
- Beylerveld, D., Townend, D., Rouillé-Mirza, S. and Wright, J. (Eds.). *Implementation of the Data Protection Directive in relation to medical research in Europe*. Ashgate Pub, 2005.
- Chen, Y. J. and Jeng, W. "Does GDPR influence the hospital-patient relationship? Trust and commitment between health data stakeholders" *Proceedings of the Association for Information Science and Technology*, 57(1), 2020, e409. <https://doi.org/10.1002/pra2.409>
- Creighton, S., Alderson, J., Brown, S. and Minto, C. L. "Medical photography: Ethics, consent and the intersex patient" *BJU international*, 89(1), 2002, 67–72. <https://doi.org/10.1046/j.1464-4096.2001.01809.x>
- de Oliveira Melo, U., da Silveira, R. R., da Costa Silva, H. L., Queiroz, V. D. A. R., Gress, C. H. T., Oliveira, J. H. D. G. E., da Silva Tristão, S. H. and Junior, H. V. "Quality indicators after discharge from the intensive care unit in 3 public hospitals" *Journal of Critical Care*, 42, 2017, 402. <https://doi.org/10.1016/j.jcrc.2017.09.101>
- Donabedian, A. *Definition of quality and approaches to its assessment, Explorations in Quality Assessment and Monitoring (Vol. 1)*. Health Administration Press, 1980.
- Endo, E., Doi, M., Shinoda, K. and Yamahata, A. "Kansen ryoiki ni okeru byoin deno rinri-teki torikumi no genjo [Report on ethical issues in infection areas of hospitals]" *Nihon kansensho gakkai-shi [Japanese Journal of Infection Prevention and Control]*, 24(4), 2009, 255–259. <https://doi.org/10.4058/jsei.24.255>
- European Society of Radiology. "The new EU General Data Protection Regulation: What the radiologist should know" *Insights into Imaging*, 8(3), 2017, 295–299. <https://doi.org/10.1007/s13244-017-0552-7>
- Fuster, G. G. *The emergence of personal data protection as a fundamental right of the EU*. Springer, 2014.
- Haller, G., Bampoe, S., Cook, T., Fleisher, L. A., Grocott, M. P., Neuman, M., Story, D., Myles, P. S. and Johnson, M. "Systematic review and consensus definitions for the Standardised Endpoints in Perioperative Medicine initiative: Clinical indicators" *British Journal of Anaesthesia*, 123(2), 2019, 228–237. <https://doi.org/10.1016/j.bja.2019.04.041>
- Haller, G., Stoelwinder, J., Myles, P. S. and McNeil, J. "Quality and safety indicators in anesthesia: a systematic review" *Anesthesiology*, 110(5), 2009, 1158–1175. <https://doi.org/10.1097/ALN.0b013e3181a1093b>
- Hamilton-Davies, C., Mythen, M. G., Salmon, J. B., Jacobson, D., Shukla, A. and Webb, A. R. "Comparison of commonly used clinical indicators of hypovolaemia with gastrointestinal tonometry" *Intensive Care Medicine*, 23(3), 1997, 276–281. <https://doi.org/10.1007/s001340050328>
- Hashimoto, K. and Moteki, Y. "Koritsu byoin ni okeru kojiri joho no rikatsuyo oyobi hogo ni kansuru taisei seibi no genjo to kadai: Zenkoku no jichitai byoin wo taisho to shita shitsumonshichosa wo moto ni shite [Current state of system development for use and protection of personal information in public hospitals in Japan: Based on a questionnaire survey of municipal hospitals]" *Nihon iryo byoin kanri gakkai-shi [Journal of the Japan Society for Healthcare Administration]*, 55(2), 2018, 79–87. <https://doi.org/10.11303/jsha.55.79>
- Hauka, J. "Finnish health and social welfare registers in epidemiological research" *Norsk Epidemiologi*, 14(1), 2004, 113–120. <https://doi.org/10.5324/nje.v14i1.284>
- Idowu, B., Ogunbodede, E. and Idowu, B. "Information and communication technology in Nigeria the health sector experience" *Journal of Information Technology Impact*, 3(2), 2003, 69–76. https://www.academia.edu/download/55860998/Information_and_Communication_Technology_in_Nigeria_The_Health_Sector_Experience_.pdf
- Lai, J. H., Hou, H. C., Chiu, B. W., Edwards, D., Yuen, P. L., Sing, M. and Wong, P. "Importance of hospital facilities management performance indicators: Building practitioners' perspectives" *Journal of Building Engineering*, 45, 2022, 103428. <https://doi.org/10.1016/j.jobe.2021.103428>
- Laurie, G. T., Harmon, S. and Porter, G. *Mason and McCall Smith's Law and Medical Ethics*. Oxford University Press, 2016.
- Lim, E., Matthew, N., Mok, W., Chowdhury, S. and Lee, D. "Using hospital readmission rates to track the quality of care in public hospitals in Singapore" *BMC Health Services Research*, 11, 2011, A16. <https://doi.org/10.1186/1472-6963-11-S1-A16>

Meliala, A. "Distribution and engagement of specialist doctors in public hospitals in Indonesia" *BMC Public Health*, 14, 2014, 015. <https://doi.org/10.1186/1471-2458-14-S1-O15>

Ministry of Health, Labour and Welfare. *Chiiki Iryo Koso [About the Regional Medical Care Plan]*. Ministry of Health, Labour and Welfare, 2020. <https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000080850.html>

Osaka, Y. "Dokuritsugyoseihojin kokuritsu byoinkiko nai deno kojim joho kyoyu no tame no kankyo seibi [Environmental improvement for sharing personal information within the National Hospital Organization]" *Iryo [Medicine]*, 58(11), 2004, 621–630. <https://doi.org/10.11261/iryo1946.58.621>

Othero, J., Cavalcanti, A., Mouro, J., Normilio-da-Silva, K., Pusch, R., Moreira, F, Kodama, A. A. and Berwanger, O. "Family satisfaction with patient care in ICUs of nonacademic Brazilian public hospitals" *Critical Care*, 17, 2013, P545. <https://doi.org/10.1186/cc12483>

Pereira, M. A., Camanho, A. S., Figueira, J. R. and Marques, R. C. "Incorporating preference information in a range directional composite indicator: The case of Portuguese public hospitals" *European Journal of Operational Research*, 294(2), 2021, 633–650.

Philip, R. K. "General Data Protection Regulation (GDPR) and paediatric medical practice in Ireland: a personal reflection" *Irish Journal of Medical Science*, 188(2), 2019, 721–724. <https://doi.org/10.1007/s11845-018-1857-3>

Richter, G., Borzikowsky, C., Lieb, W., Schreiber, S., Krawczak, M. and Buyx, A. "Patient views on research use of clinical data without consent: Legal, but also acceptable?" *European Journal of Human Genetics*, 27(6), 2019, 841–847. <https://doi.org/10.1038/s41431-019-0340-6>

Wyatt, J. C. "Hospital information management: the need for clinical leadership" *BMJ*, 311(6998), 1995, 175–178. <https://doi.org/10.1136/bmj.311.6998.175>

Zhang, M., Zeng, X., Huang, C., Liu, J., Liu, X., Xie, X. and Wang, R. "An AI-based radiomics nomogram for disease prognosis in patients with COVID-19 pneumonia using initial CT images and clinical indicators" *International Journal of Medical Informatics*, 154, 2021, 104545. <https://doi.org/10.1016/j.ijmedinf.2021.104545>

Table

Table 1. Number of beds (categories)

	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%

Table 2. Preparation of consent form of personal information use compared by the size of hospitals

Count Row %	Common format within the hospital	Individual forms created in each department	No fixed format provided	Total
Small and Medium (0)	42 42.0%	14 14.0%	44 44.0%	100 100.0%
Large (1)	21 24.1%	23 26.4%	43 49.4%	87 100.0%
Total	63	37	87	187

Table 3. Methods for disposal of personal information that is no longer needed by hospital size (Q24)

Count Row %	Disposing of personal data in a form that cannot be restored, such as by incineration or dissolution	Deleting personal information in the storage device in an unrecoverable form	Outsourcing disposal of the waste with personal information	Total
Small and Medium	75 62.5%	15 12.5%	30 25.0%	120 100.0%
Large	52 47.7%	14 12.8%	43 39.5%	109 100.0%
Total	127	29	73	229

Table 4. Use of clinical indicators compared by hospital size (Q32)

Count Row %	Implementing	Not Implementing	Total
Small and Medium Hospitals (%)	27 (22.7)	92 (77.3)	119 (100.0%)
Large Hospitals (%)	70 (63.6)	40 (36.4)	110 (100.9%)
Total	97	132	229

Table 5. Hospitals that published data on clinical indicators online vs. those that did not

Count Row %	Publishing on the hospital website	Not publishing on the hospital website	Total
Small and Medium	7 15.91	37 84.09	44
Large	53 63.10	31 36.90	84
Total	60	68	128

Table 6. Clinical indicators measured (Q32 sub 2)

	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 stay for stroke patients	12	12.4%
5. Average length of hospital stay 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 stay for gastrointestinal cancer patients	9	9.3%
10. Post-operative hospital stay 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%

MSW, Medical social worker