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Comprehensive Quality Report of National Health Insurance **2010**

Health Insurance
Review & Assessment Service

The Health Insurance Review & Assessment Service (HIRA) is dedicated to enhancing the public's health and the quality of the nation's medical services, while reviewing the propriety of medical costs. All HIRA members are doing their utmost to ensure that the public receive the highest possible quality of medical service.

HIRA has been conducting the work of the quality assessment since July 2000. During the early stages, the assessment was focused on the level of use of medical services. It then began improving its quality by expanding its boundaries to the assessment of clinical quality. In addition, for the purpose of encouraging the use of assessment results, HIRA relays the results to medical service providers and the public, and expands the linkage with a value incentive project and the quality improvement program.

"Comprehensive Quality Report of National Health Insurance 2010" is the second report, following the initial one in 2009. The report will be consecutively published each year addressing the changes and accomplishments of the quality assessment. It is with our sincere appreciation and gratitude that we thank all who have made such tremendous efforts in data collection and quality improvement activities.

We also hope that this report will serve as useful material for understanding the quality assessment activities and the level of our medical practices, and for upgrading the quality of healthcare services.

July 2011
Kang Yoon Koo
President of HIRA

Kang Yoon Koo

Comprehensive Quality Report of National Health Insurance 2009

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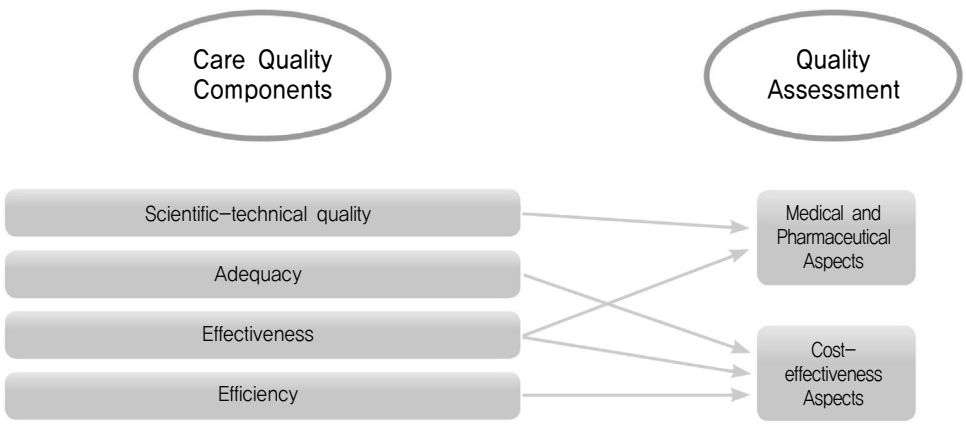
Summary

1. Overview of Quality Assessment

1.1 Concept of quality assessment

- Pursuant to the National Health Insurance Act ("the Act"), as amended in July 2000, the function was introduced to assess the appropriateness of care; thus, the Act defines the HIRA's work as the work of assessing their appropriateness.
- The Enforcement Regulation of the Act stipulates that the assessment of the appropriateness of care, etc. is intended to assess whether the care are properly implemented from the aspects of medical and pharmaceutical service and cost-effectiveness.
- WHO proposed the components of "quality of care" as effectiveness, efficiency, adequacy, and scientific-technical quality.
- Thus, the assessment of the appropriateness of care assessing medical and pharmaceutical services and cost-effectiveness aspects can be regarded as one of quality of care.



Summary Figure 1. Relationship between care quality and quality assessment

1.2 Objectives

- In a bid to improve care quality, the assessment scheme aims to assess the appropriateness of care, to continue improving medical services based on the results of assessment, and to allow healthcare providers to provide the appropriate care.

1.3 Methods

A. Data sources

- The data used in the assessment includes the Health Insurance Review & Assessment Service (“HIRA”) claims, the medical care institutions’ current operational data and medical records, and the Ministry of Public Administration and Security (MOPAS)'s computerized resident registration data.

B. Method of data collection

- The methods of collecting data include the use of administrative data (claims, medical care institutions' current operational data, MOPAS' data), and the use of both administrative data and survey questionnaires.)

1.4 Analysis of quality assessment results

- Based on the assessment results, we calculate assessment indicators for each medical care institution. Then, for items involving several assessment indicators, a total score per item is calculated, and the target institutions are then classified on the basis of the composite quality score obtained.
  - In the case of the assessment indicators (e.g., fatality, and other outcome indicators) related to patients' severity levels, the patients' severity levels should be adjusted before comparing the assessment results of different medical care institutions.

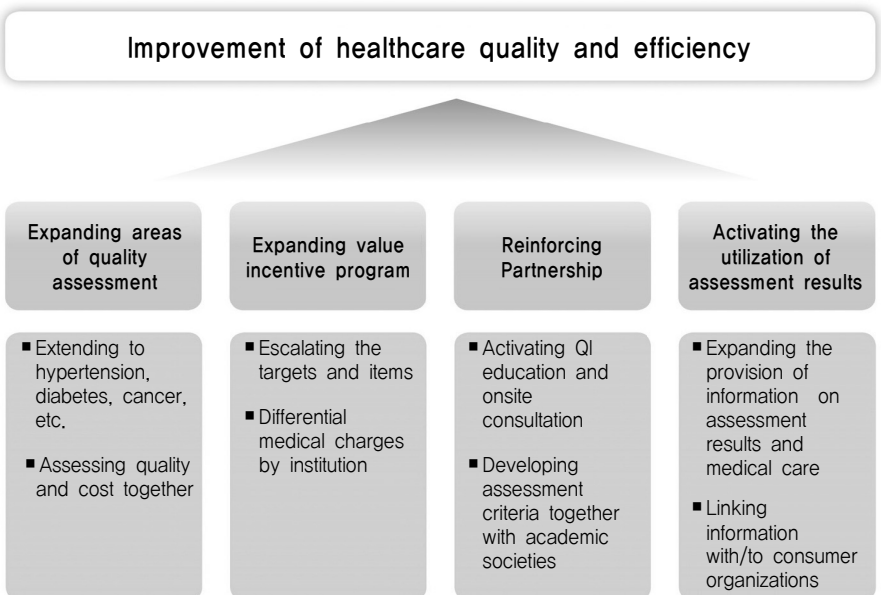
1.5 Utilization of quality assessment results

- To allow the public to use the assessment results as information when choosing a medical service, the results of the assessment of individual medical care institutions are disclosed on the HIRA website.
- To provide medical care institutions with the assessment results to assist medical care institutions in improving the quality of their services. Based on the assessment results and our consultations with medical care institutions, problems are pinpointed and improvement measures are formulated to help improve their service quality.
- To report the overall assessment results to the Ministry of Health and Welfare for reflection in the improvement of the relevant systems.
- To notify the assessment results of the target items for the value incentive program, such as acute myocardial infarction and Caesarian delivery, to the insurer, which allows it to add or reduce the medical benefits payment according to the result.

2. 2010 Quality Assessment

2.1 Quality assessment direction

- Expansion of the scope of assessment from acute care to chronic diseases, primary care, and long-term care. (high blood pressure, diabetes).
  - New assessments (3 items): high blood pressure, hemodialysis (continued from 2009), for mental hospital within medical aid (continued from 2009)
  - Continued assessments (13 items): Existing items including heart, brain diseases, prophylactic antibiotics for surgery, etc.
  - Preliminary Assessments (2 items): Diabetes, colon cancer
- Expansion of value incentive program based on the assessment results
  - Successfully operating the 3rd year demonstration project of the medical care expenses Value Incentive Program
  - Expanding the application of the value incentive program for general hospitals (from the care of 2010)
  - Analyzing the effect of the 1st year value incentive project and developing the expansion model
- Support quality improvement activities for securing medical consumers' rights to know and inducing behavioral changes of providers
  - Promoting the quality improvement (QI) support program with education and consultation for the healthcare institutions



Summary Figure 2. 2010 Quality assessment direction

2.2 Areas of quality assessment

▪ In 2010, the areas of assessment were expanded from acute diseases to chronic diseases, such as high blood pressure and diabetes.

- The scope of assessment was expanded from 32% of total medical fees in 2009 to 34% in 2010.
- The assessment for inpatient care was conducted for the following 6 items: acute myocardial infarction, acute stroke, prophylactic antibiotics for surgery, Caesarian section, surgical volume and coronary artery bypass graft (CABG).
  - ▶ The assessment of the prophylactic antibiotics for surgery was done for stomach, colon, laparoscopic gallbladder, hip replacement, knee arthroplasty, hysterectomy, Caesarian section, and heart surgeries.
  - ▶ The surgical volume was assessed for stomach cancer, colon cancer and liver cancer surgeries, hip replacement, and percutaneous coronary intervention.
  - ▶ Long-term care assessment included long-term care hospitals and mental hospital within medical aid.
- For the outpatient care, the assessment covered the 8 areas including prescription, hypertension, etc.
  - ▶ Long-term care assessment included hemodialysis.

※ Items of quality assessment 2010

- New assessment (3 items): hypertension, hemodialysis (continued from 2009), mental hospital within medical aid (continued from 2009).
- Continuing assessment (13 items): acute myocardial infarction, acute stroke, Caesarian delivery prophylactic antibiotics for surgery, long-term care hospitals, surgical volume indicator, coronary artery bypass graft (CABG), antibiotics/ injection prescription rate, etc.
- Preliminary assessment (2 items): diabetes, colon cancer

▪ The assessments for tertiary hospitals and general hospitals included 15 items with the exclusion of long-term care hospitals; for hospitals, 12 items including prophylactic antibiotics for surgery and Caesarian delivery were assessed, while clinics were assessed for 11 items such as Caesarian section, surgical volume indicator, prescription, hypertension, and mental hospital within medical aid.

▪ The assessments were conducted in consideration of the characteristics of the items; while some were assessed altogether in the aspect of structure, process, and outcome, others were done in part.

Summary Table 1. 2010 Assessment areas and target institutions.

Areas of assessment		Assessment institutions					Domain of assessment		
		Tertiary hospitals	General hospitals	Hospitals	Clinics	Long-term care hospitals	Structure	Process	Outcome
Inpatient care	Acute myocardial infarction,	O	O				O	O	O
	Acute stroke	O	O				O	O	
	Use of prophylactic antibiotics for surgery	O	O	O				O	
	Caesarian section	O	O	O	O				O
	Surgical Volume Indicator	O	O	O	O		O		O
	Coronary artery bypass graft (CABG).	O	O				O	O	O
Outpatient care	Prescription	O	O	O	O	O		O	
	Hypertension*	O	O	O	O	O		O	
Long-term care	Long-term care hospitals					O	O	O	O
	Mental hospital within medical aid*	O	O	O	O		O	O	O
	Hemodialysis*	O	O	O	O	O	O	O	O

* Newly assessed item in 2010

2.3 Quality assessment periods and data collection

▪ The target assessment periods were set according to the characteristics of the assessment items. For data collection, either a complete or a sample survey was conducted.

Summary Table 2. 2010 Data sources, target period and data collection by assessment items

Assessment item		Data sources		Target period	Target data gathering
		Administrative data	Survey sheet		
Acute myocardial infarction,		O	O	Yearly	Complete survey
Acute stroke		O	O	3 months	Sample
Use of prophylactic antibiotics for surgery		O	O	3months	Sample
Caesarian section delivery		O		Yearly	Complete
Surgical Volume Indicator	Surgeries of stomach & colon cancer, hip replacement, percutaneous coronary intervention,	O		One year of diagnosis performance	Complete
	Liver cancer surgery	O		2 years of diagnosis performance	Complete
CABG		O	O	2 years	Complete
Prescription		O		Yearly	Complete
Long-term care hospital		O	O (Institutional)	3months	Complete
Mental hospital within medical aid,		O	O (Institutional)	3months	Complete
Hemodialysis		O	O	3months	Sample
Hypertension		O		Yearly	Complete

2.4 Key quality assessment results

1) Quality is improving for all assessment items

▪ Quality improvements are being achieved in the assessment of acute myocardial infarction, acute stroke, prophylactic antibiotics for surgery, Caesarean section, surgical volume indicator and prescription; these items were assessed three times by 2010.

※ Outcomes of quality assessment

❍ Improvements have been made in medical care behaviors in acute myocardial infarction, acute stroke, prophylactic antibiotics for surgery
- Acute myocardial infarction assessment
  - Percutaneous coronary intervention execution within 120 min. of arrival at hospital; 85.9% in 2009 → 91.7% in 2010: 5.8%p ↑
  - Thrombolytic agent injection within 60 min. of arrival at hospital; 79.7% in 2009 → 81.9% in 2010: 2.2%p ↑
  - In-hospital mortality; 7.5% in 2009 → 7.0% in 2010: 0.5%p ↓
  - Death rate within 30 days of hospitalization; 8.6% in 2009 → 7.7% in 2010: 0.9%p ↓
- Acute stroke assessment
  - Improvements in initial treatment
    ☞Antithrombotic injection rate; 93.8% in 2009 → 95.9% in 2010: 2.1%p ↑
  - Improvements in secondary prevention
    ☞Anticoagulant prescription on discharge; 95.8% in 2009 → 99.1% in 2010: 3.3%p ↑
- Improvement in the use of antibiotics for preventing surgical site infection.
  - Improvements in the timing of antibiotics injection
    ☞Injection within 1 hour before skin incision; 69.8% in 2009 → 75.6% in 2010: 5.8%p ↑
  - Improvements in using unrecommended antibiotics for prophylactic purposes
    ☞Aminoglycosides injection rate; 32.3% in 2009 → 26.5% in 2010: 5.8%p ↓
    ☞3rd or later generation cephalosporin antibiotics administration rate; 10.1% in 2009 → 7.0% in 201: 3.1%p ↓

❍ Improvements have been made in prescribing rates of antibiotics and injections (2nd half)
- Antibiotics prescription rate for colds; 73.6% in 2002 → 51.6% in 2010: 22.0%p ↓
- Injection prescription rate; 37.7% in 2002 → 20.9% in 2010: 16.8%p ↓

❍ Caesarian section delivery rates have been decreased by 0.3%p in spite of the trend of mother's aging
- 40.5% in 2001 → 36.0% in 2010: 4.5%p ↓
- The number of mothers aged 35 and older has been doubled since 2001; 8.4% in 2001 → 17.9% in 2010.

2) Quality variations still exist in each assessment area regarding the type of institutions, medical care institutions, medical departments, and regions, requiring the effort to reduce them.

□ Variations by type of institutions and medical care institution

▪ Variations in each assessment area were significant, and the differences in the level of variation were found by type and medical institution.

- Clinics presented the largest variations in most indicators, while the tertiary hospitals presented the lowest.
- Overall quality improvements were found in acute stroke treatments compared to 2008, and the variations in each indicator also decreased; whereas the early rehabilitation consideration rate and t-PA intravenous administration rate, added in 2010, presented comparatively lower scores than the other indicators accompanied with considerable variations by institutions.
- In the use of prophylactic antibiotics for surgery, all the indicators except the 3rd or later generation cephalosporin antibiotics administration rate were ranked in the order of tertiary hospital, general hospital, and hospital, but a significant gap between the tertiary hospital and hospital was found and large variations in each hospital indicator still appeared.

□ Variations by medical department

▪ The assessment results regarding the prophylactic antibiotics were similar to those of 2009. The total scores of heart and stomach surgeries were over 88%, but Caesarian section and hysterectomy scored under 70%, indicating a lower quality compared to the other surgeries.

□ Variations by region

▪ The regional variations in Caesarian section and prescription were found to be similar to the previous year.

- Regional differences in Caesarian section rates were still significant as in the previous year; the rate of Jeju, the highest of last year, was reduced by 2.2% (41.5%→39.3%), only to follow Ulsan (39.5%) as the second. The region rated the lowest in Caesarian section was Gwang-Ju, the same as the last year, which was 1.5 times lower than Ulsan.
- Differences of prescription rates in injections and antibiotics still remained; Seoul presented the lowest rate in prescribing injections (18.2%), whereas Gyeong-Nam was the highest at 33.1%. Antibiotics were prescribed the lowest in Jeonbuk (43.5%) and the highest in Gwang-Ju (54.3%). In the assessment of prescription, the regional variations in the injection and antibiotics prescription rates were found to be consistent; the lowest injection prescription rate was found in Seoul (18.2%), and the highest was in Gyeong-Nam (33.1%). For the antibiotics prescription rate, Jeonbuk (43.5%) was discovered as the lowest, and Gwangju (54.3%) was the highest.

Summary Table 3. 2010 Quality assessment results by item

(Unit: %, %p, Day, Bed, No, Item, Won)

Assessment item	Indicators		Results			
			2009	2010	Up & down	Improve-ment
Acute myocardial infarction	Thrombolytics administration rate within 60 minutes of hospital arrival		79.7	81.9	2.2 ↑	O
	Primary PCI rate within 120 minutes of hospital arrival		85.9	91.7	5.8 ↑	O
	Aspirin administration rate of hospital arrival		98.1	98.6	0.5 ↑	O
	Aspirin prescription rate at discharge		99.4	99.3	0.1 ↓	
	Beta-blocker prescription rate at discharge		96.0	95.7	0.3 ↓	
	In-hospital case fatality rate		7.5	7.0	0.5 ↓	O
	30-day case fatality rate after admission		8.6	7.7	0.9 ↓	O
Acute stroke	Ischemic and hemorrhagic stroke	Documentation rate of smoking history	94.2	96.8	2.6 ↑	O
		Neurological examination rate	94.0	96.0	2.0 ↑	O
		Dysphagia examination rate within 2 days	88.0	93.2	5.2 ↑	O
		Brain imaging rate within 24 hours	98.7	99.2	0.5 ↑	O
		Brain imaging rate within 1 hour	-	92.5	-	
		Consideration rate of early rehabilitation (within 3 days)	-	89.4	-	
	Ischemic stroke	Lipid profile test rate	94.5	96.0	1.5 ↑	O
		Consideration rate of IV t-PA initiation	92.2	93.5	1.3 ↑	O
		IV t-PA administration rate	-	74.0	-	
		Antithrombotics administration rate (within 48 hours)	93.8	95.9	2.1 ↑	O
		Antithrombotics prescription rate at discharge	97.8	98.5	0.7 ↑	O
		Anticoagulants prescription rate (atrial fibrillation patient)	95.8	99.1	3.3 ↑	O
Use of prophylactic antibiotics for surgery	Initial prophylactic antibiotic prescription rate within 1 hour before skin incision		69.8	75.6	5.8 ↑	O
	Aminoglycosides administration rate		32.3	26.5	5.8 ↓	O
	3rd or later generation cephalosporin antibiotics administration rate		10.1	7.0	3.1 ↓	O
	Prophylactic antibiotics combination rate		46.6	37.3	9.3 ↓	O
	Antibiotics prescription rate at discharge		45.8	35.9	9.9 ↓	O
	Total mean of the days of prophylactic antibiotics administration		6.7	5.7	1.0 ↓	O
Caesarean section	Caesarean delivery rate		36.3	36.0	0.3 ↓	O

Assessment item	Indicators			Results			
				2009	2010	Up & down	Improve-ment
Surgical volume indicator	Share of institutions that exceeded the standard volume of stomach cancer surgery			27.6	28.5	0.9 ↑	○
	Share of institutions that exceeded the standard volume of colon cancer surgery			27.9	27.6	0.3 ↓	
	Share of institutions that exceeded the standard volume of liver cancer surgery			41.8*	43.5**	1.7 ↑	○
	Share of institutions that exceeded the standard volume of hip replacement			20.5	21.6	1.1 ↑	○
	Share of institutions that exceeded the standard volume of percutaneous coronary intervention			62.1	60.6	1.5 ↓	
Long-term care hospital	Structure	Basic facilities	Average space per ward bed	6.3	6.5	0.2 ↑	○
			Percentage of multi-patient wards (over seven people)	49.6	48.7	0.9 ↓	○
			Rate of wards with toilet	–	48.4	–	
			Availability of adequate bathroom	–	76.5	–	
			Rate of patient amenities furnished(lounge, restaurants)	–	19.8	–	
		Safety facilities	Rate of thresholds or bumps removed (wards, bathrooms, and toilets)	–	50.1	–	
			Rate of non-slip floors installed (bathrooms, toilets, stairs)	–	50.7	–	
			Rate of emergency call system installed (wards, bathrooms, and toilets)	7.0	13.1	6.1 ↑	○
			Rate of safety grip installed (bathrooms, toilets, hallways)	–	35.1	–	
		Medical human resources	No. of beds per doctor	37.3	35.7	1.6 ↓	○
			No. of beds per nurse	14.9	13.2	1.7 ↓	○
			No. of beds per nursing personnel (nurse or nurse aide)	6.8	6.0	0.8 ↓	○
			Turnover rates of nursing personnel	–	35.7	–	
			On-call doctor availability in nights/ holidays	–	30.2	–	
		Other human resources	No. of beds per physical therapist	84.3	68.1	16.2 ↓	○
			Availability of pharmacy (including pharmacist)	–	32.3	–	
			Availability of radiation cabin (including radiologist)	–	61.0	–	
			Availability of clinical laboratory (including medical lab technologist)	–	39.8	–	
			Availability of social worker	55.0	47.5	7.5 ↓	

Assessment item	Indicators			Results			
				2009	2010	Up & down	Improve-ment
		Medical equipment	No. of EKG monitor per 100 beds	2.6	2.7	0.1 ↑	O
			No. of pulse oxymeter per 100 beds	3.5	3.7	0.2 ↑	O
			No. of oxygen supply equipment per 100 beds	–	22.2	–	
			No. of aspirator per 100 beds	–	21.2	–	
	Treatment	Process	Proportion of patients with an indwelling urinary catheter (high-risk group)	24.1	24.1	–	
			Proportion of patients with an indwelling urinary catheter (low-risk group)	4.0	3.6	0.4 ↓	O
			MMSE test rate for patients aged 65 years or older when hospitalized	–	58.6	–	
			HbA1c test rate for diabetic patients	–	45.6	–	
Long-term care hospital	Treatment	Outcome	Proportion of patients with declined ability to perform daily activities - dementia	–	11.7	–	
			Proportion of patients with declined ability to perform daily activities _ non-dementia	–	9.8	–	
			Proportion of patients with improved ability to perform daily activities_ dementia	–	14.6	–	
			Proportion of patients with improved ability to perform daily activities_ non-dementia	–	14.8	–	
			Proportion of patients with newly appeared bedsores _ high-risk group	–	2.7	–	
			Proportion of patients with newly appeared bedsores _ low-risk group	–	0.2	–	
			Proportion of patients with worsened bedsores _ high-risk group	–	1.3	–	
			Proportion of incontinent patients _ low risk	–	25.3	–	
Mental hospital within medical aid	Structure	Facilities	Floor size of a ward per bed	–	5.0	–	
			Rate of wards with less than 10 beds	–	99.5	–	
			Capacity per ward	–	6.2	–	

Assessment item	Indicators			Results			
				2009	2010	Up & down	Improve-ment
		Medical human resources	No. of daily inpatients per psychiatrist	–	47.2	–	
			No. of daily inpatients per psychiatric nurse	–	21.2	–	
			No. of daily inpatients per psychiatric nursing staff	–	10.1	–	
			No. of daily inpatients per mental health professional	–	74.7	–	
	Process	Medication	Atypical medication prescription rate (schizophrenia)	–	65.5	–	
		Psychotherapy	Fulfillment rate of psychotherapy standard	–	87.8	–	
			Fulfillment rate of individual psychotherapy standard	–	85.4	–	
	Outcome	Days of hospitalization	Days of hospitalization_ median (schizophrenia)	–	379.4	–	
			Days of hospitalization_median (alcoholism)	–	130.0	–	
		Readmission rate	Readmission rate within 30 days of discharge (schizophrenia)	–	36.4	–	
Hemodialysis	Structure	Medical human resources	Rate of doctors who specialize in hemodialysis	–	76.1	–	
			Mean number of daily hemodialysis per doctor	–	22.1	–	
			Rate of nurses who have 2 years or longer experience in hemodialysis	–	74.0	–	
			Mean of daily hemodialysis per nurse	–	4.4	–	
		Equipment	Fulfillment of minimum number of isolated rate of hemodializer for hepatitis B patients	–	99.5	–	
			Availability of emergency equipment in hemodialysis ward	–	63.4	–	
		Facilities	Fulfillment rate of water examination cycle	–	85.8	–	
	Process	Hemodialysis adequacy level	Fulfillment rate of hemodialysis adequacy test cycle	–	94.5	–	
		Blood vessel management	Fulfillment rate of arteriovenous fistula monitoring	–	81.1	–	
		Periodic test	Fulfillment rate of periodic test cycle	–	94.4	–	
		Anemia management	Iron injection rate †	–	23.0	–	

Assessment item	Indicators			Results			
				2009	2010	Up & down	Improve-ment
	Outcome	Hemodialysis adequacy level	Hemodialysis adequacy level fulfillment rate	–	85.2	–	
		Anemia management	Rate of patients with Hb 10g/dℓ or under	–	28.4	–	
			Iron storing fulfillment rate	–	52.0	–	
		Blood pressure management	Systolic blood pressure satisfactory rate	–	45.1	–	
			Diastolic blood pressure satisfactory rate	–	86.4	–	
		Minerals &nutrition management	Calcium × phosphorus fulfillment rate	–	73.9	–	
			Albumin concentration	–	3.97	–	
Prescription	Injection		Injection prescription rate	22.2	21.2	1.0 ↓	O
	Antibiotics		Prescription rate of antibiotics (all diseases)	26.9	26.1	0.8 ↓	O
			Antibiotics prescription rate for acute upper respiratory infection	53.4	52.1	1.3 ↓	O
	Number of drugs per prescription		No. of drugs per prescription (all diseases)	3.94	3.91	0.03 ↓	O
			No. of drugs per prescription (respiratory diseases)	4.64	4.64	–	
			No. of drugs per prescription (musculoskeletal diseases)	3.70	3.66	0.04 ↓	O
			Proportion of prescription with more than 6 items	15.8	15.4	0.4 ↓	O
			Proportion of prescription rate for digestive system	53.9	52.5	1.4 ↓	O
	Number of medicines per prescription		Medication cost per day of administration	1,925	1,936	11 ↑	
	High-priced medicine (the highest price per ingredient) presription1)		Proportion of prescribing high-priced medicine	24.6	22.8	–	
			Proportion of expenses for high-priced medicine	39.3	37.8	–	
	NSAIDs/corticosteroids for osteoarthritis		Duplicate prescription rate for NSAIDs	1.2	1.0	0.2 ↓	O
			Prescription rate of corticosteroids	2.9	3.0	0.1 ↑	

* Results of analysis for 2 years' treatment, 2006 –2007 ** Results of analysis for 2 years' treatment, 2008 – 2009.
Note 1) The differences for the rate of prescribing high-priced medicine and the proportion of expenses for medicine can not be determined because the list of target medicines is changed on a quarterly basis.

3. Quality Improvement Projects

3.1 Public reporting of the quality assessment results

A. Background and purpose

▪ The public reporting of the quality assessment results aims to provide consumers with information about the assessment results to help them choose medical care institutions which offer high-quality medical services.

B. Method of reporting

▪ The quality indicator results have been reported by medical care institution on the HIRA website.

- The total results of each indicator are presented by the number of stars(★~★★★★★), while the values of the results also are provided.

3.2 “HIRA Value incentive program” demonstration project

A. Background and purpose

▪ The Value Incentive Program pursues the enhancement of medical care quality through the implementation of incentives for institutions with superb or improved assessment results (and disincentives for the counterparts), in order for the people to enjoy more effective and safer medical services.

B. Business framework

▪ Target Items: Acute Myocardial Infarction, Caesarian Section

☞ Two items have been selected first among the assessment items, where behavioral changes are expected through the incentives, considering the scale of the problem, seriousness, feasibility, possibility of improvement, and social effect, etc.

▪ Tertiary hospitals equipped with the infrastructure of assessment have been chosen as the subjects.

▪ It has been implemented sequentially to increase the receptivity from the subject institutions.

C. Outcomes of value incentive program demonstration project 2010

▪ Provision of incenfives

- Incentives have been applied for the institutions with the 1st grade and quality improvement by reviewing the treatment records of 2009.

※ Disincentives have not been applied since the QI support program has been implemented continuously after the announcement of the disincentives threshold in 2008.

▪ Institutions which were given incentives and amount of money

- 453 million won was paid to 21 institutions in the 2nd year, and 404 million won was paid to 26 institutions the following year. In total, 857 million won has been provided as incentives during the Value Incentive Program demonstration project.

Summary Table 4. Current status of payments for the incentives and disincentives

(Unit: institution, 10,000 Won)

Classification			1st year (2nd half of 2007)	2nd year (2008)	3rd year (2009)
Application			Set disincentive threshold	Applied incentives	Applied incentives and disincentives
Subject				1st grade and quality improved institutions	
Incentive*	No. of institutions	Total	–	21***	26***
		Acute myocardial infarction	–	15	13
		Caesarian section	–	15	17
	Amount of money	Total	–	45,300	40,400
		Acute myocardial infarction	–	31,000	25,000
		Caesarian section	–	14,300	15,400
Disincentive Application**			–	–	None

Note. * 1st grade and quality improved institutions
** Institutions under the disincentive threshold
*** Number of overlapped institutions: 9 institutions in total in the 2nd year (1st grade for both items: 5, 1st grade or quality improvement: 4), 4 institutions in total for the 3rd year (1st grade for both items: 1, quality improvement for both items: 1, 1st grade or quality improvement: 2)

D. Results

1) Acute myocardial infarction

▪ Composite scores for acute myocardial infarction increased

- The mean of the composite score has increased by 5.28 points (92.10→ 93.65→ 97.38), and the standard deviation has decreased by 6.18 points (9.37→ 7.22→ 3.19). The composite score for the lowest also has increased by 28.96 points (59.08→ 64.71→ 88.04).
- According to the results of 2009, actual in-hospital mortality was 5.6%, and the death rate within 30 days of admission was 6.4%; both results indicate a decrease from those in 2008, by 1.8% for both the in-hospital mortality and death within 30 days of admission.

▪ In general, quality improvements appropriate for the Value Incentive Program demonstration model have been induced, an increase in the composite score of the lowest institutions owing to along with a decrease in variations amongst the institutions.

2) Caesarian section

▪ During the years of conducting the Value Incentive Program demonstration projects, the width of decrease in the mean and maximum value of standard scores (in the lowest) have gradually increased compared to the previous year.

- The decrease in the mean of the standard score has increased from 0.559 to 1.077 over the previous year.
- The decline in the maximum value (in the lowest) has grown from 2.118 to 2.423 since the previous year.

▪ In 2009, the interquartile range (Q3-Q1) has reduced by 0.513, which represents a decrease of the deviations among the institutions.

▪ In 2009, the mean and maximum value of standard scores have decreased in every grade compared to the second quarter of 2007; especially, the decrease has been greater in the lower grades (4th-5th grades), satisfying the purpose of the Value Incentive Program demonstration project.

E. Value incentive expansion project

▪ This project intends to annually expand the range of target institutions from tertiary hospitals to general hospitals, and the assessment items including acute stroke, use of prophylactic antibiotics for surgery, etc.

3.3 Quality improvement (QI) support program

▪ HIRA developed a quality improvement support program since 2007 to enable individual medical care institutions to make the most of the quality assessment results.

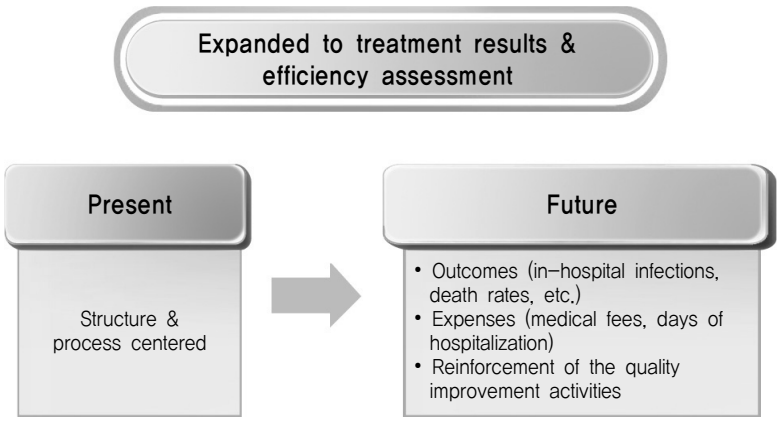
▪ Main activities include publishing QI Newsletter, operating QI Community, holding the contest for the excellent cases of QI activities, presenting and awarding the best practices and QI training sessions.

▪ According to the survey results conducted after the QI training session in 2010, 95 % of the responses indicated that it was helpful for improving knowledge and practicing activities, presenting the high level of satisfaction.

▪ Support for the quality improvement activities regarding the institutions with low grades in the assessment and ones that requested support has been reinforced with assistance such as quality improvement consulting.

4. Future of Quality Assessment Direction

- While the overall quality of care has been improving with the quality assessment, variations within the indicators including institutions, type of healthcare institutions, medical departments and regions still exist. Thus, continuous quality improvement is needed through the quality assessment.
- The healthcare quality assessment, which has focused on acute inpatient services, needs to be expanded to areas where the assessment has not been conducted.
  - The scope of assessment should be expanded to hypertension, diabetes, cancer, and other chronic diseases, considering the aging population and the change of medical environment.
- Expand the range of indicators for enabling an integrated evaluation by assessment area.
  - Enlarge the scope of assessment from the volume of utilization and structure and process to the outcomes of treatments.
  - The assessment ot the use of prophylactic antibiotics for surgery needs to be extended to that of surgical site infection.
- Expand the Value Incentive Program based on the quality of medical service and the efficiency of use of resources.
  - Increase the number of assessment items for the Value Incentive Program; expand the scope of assessment from an individual disease to a comprehensive evaluation; pursue the method for expansion with a pay for performance system.
- Laterally support the quality improvement projects for healthcare institutions and medical community.
  - Counseling and training for the QI related personnel of medical care institutions; sharing the excellent cases to benchmark the events
  - Support the medical research to improve the objectivity and receptivity of assessment criteria.
- Expand the provision of information about using medical services from the consumers' perspective.
  - Provide and promote diverse information that are necessary for people selecting healthcare services.
  - Provide comprehensive information about each area of treatment including cardio-cerebrovascular diseases and high-risk surgeries.



Summary Figure 3. Direction of expanding assessment areas

Part. 01

Quality Assessment System

1. Background to Quality Assessment
2. Concepts and Objectives of Assessment
3. Quality Assessment Procedure and Methods

1. Background to Quality Assessment

1.1 Background to introduction

A. Quantitative expansion of medical services in Korea

- The quantitative level of medical services increased by a considerable extent as the medical care workforce and facilities expanded with the introduction of national health insurance in 1989.
- Public demand for the enhancement of adequacy and quality of medical services has increased since the 1990s.

B. Emerging interest of the healthcare field in assessment and management of quality of medical service

- The healthcare field started its own quality control activities after recognizing the importance of ensuring the quality of care.
  - In 1981, the Korean Hospital Association began the hospital standardization review.
  - In the early 1990s, individual medical care institutions embarked upon their own quality improvement activities.
  - In 1995, the Korean government initiated an assessment system of healthcare services in order to improve quality of medical care.
- Though interest in quality of care increased, the diverse activities conducted in that direction were insufficient in themselves to establish a national concept of quality medical services or to improve quality of care.

C. Increased demand for quality assessment of health insurance coverage

- Assessment of coverage adequacy was somewhat insufficient as the existing review of National Health Insurance medical benefit costs focused on suppressing excessive services.
- Necessity for the Quality Assessment
  - It is possible to provide unnecessary, excessive services that can results in the waste of care resources under the fee-for-service system.
  - It is possible to provide excessively limited services in the case of services that are not beneficial to the healthcare providers.
  - Differences in quality exist depending on the medical care institution or practitioner.

D. National Health Insurance Act

- In July 2000, the National Health Insurance Act was amended to introduce functions for quality assessment of national health insurance benefit/coverage.
- The Act defines the adequacy assessment service as the duty of the Health Insurance Review and Assessment Service (HIRA).

1.2 Quality assessment implementation history

A. Introduction period (2000~03)

- After the first year's assessment in 2001 following the introduction of the quality assessment function under the National Health Insurance Act in July 2000, the Service performed an assessment of medication benefits, social welfare corporate medical care institutions, and institutions for stem cell transplantation.

B. Development period (2004~06)

- Starting with the assessment of ischemic heart diseases in August 2004, the focus of the assessment was switched from service frequency to clinical quality assessment.
  - Areas of assessment were extended to cover acute stroke and the use of prophylactic antibiotics for surgery. Outcome indicators complemented with patient severity was adjusted.
- In May 2005, the assessment results were published, starting with the disclosure of the list of institutions that had recorded superior injection prescription rate. In February 2006, the assessment results were further extended to publish the findings on all the institutions subject to assessment.
- In February 2006, the assessment data collected as hard copy were computerized. A Web-based system was introduced to collect assessment data on the Web.
- In December 2006, a prospective method of assessment was introduced, starting with the assessment of the use of prophylactic antibiotics for surgery.

C. Expansion period (2007~)

- In 2007, quality improvement (QI) supporting program for medical care institutions was started.
- In June 2007, "HIRA Value Incentive Program" demonstration project was launched by enacting the pilot project criteria for the pay for performance.
- In 2007, a periodic assessment system was introduced for the assessment of acute myocardial infarction, acute stroke, and the use of prophylactic antibiotics for surgery.

- The assessment, whose scope was previously limited to acute in-patient care, was extended to long-term care services (long-term care hospital) and chronic diseases care (hypertension).
- Starting with the assessment results for 2009, the graded assessment results by item was compiled, disclosed and published.
- In 2010, the quality assessment and Value Incentive Program of South Korea were presented at the OECD Conference of Health Ministers.
- Completed the Value Incentive Program demonstration project (Jun. 2007～ Dec. 2010, 3 ½ years), and expanded the Value Incentive Program.

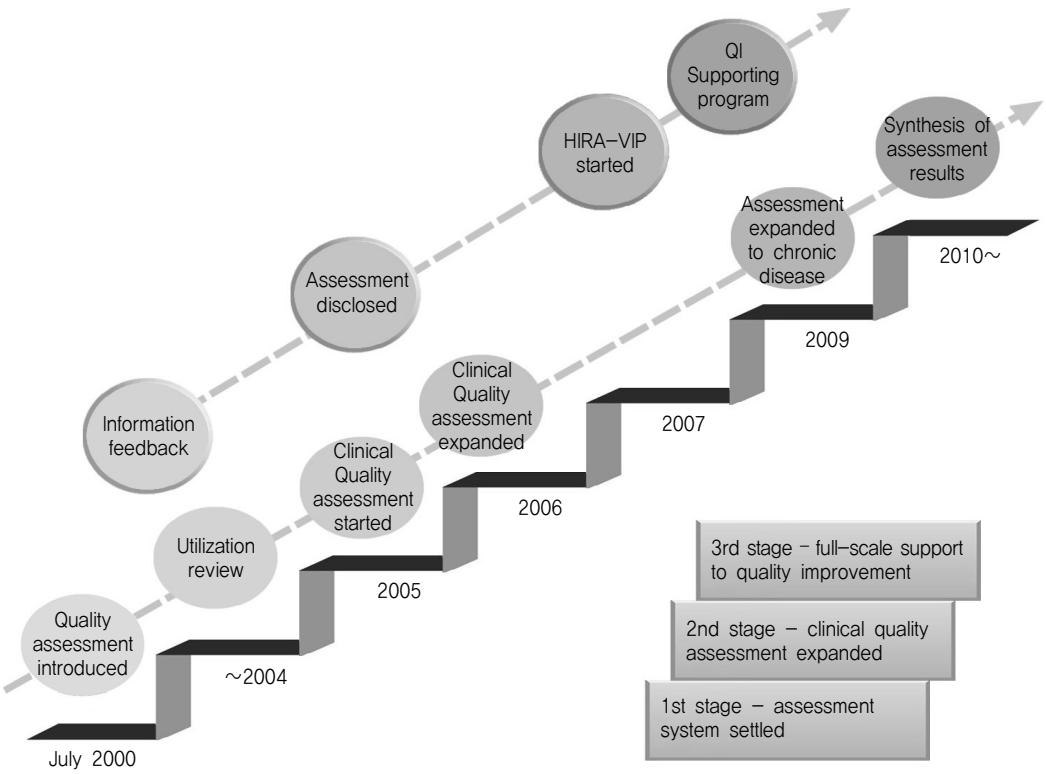


Figure 1.1 Changes in quality assessment

Implementation History

- ▪2000 Quality Assessment functions were introduced under the National Health Insurance Act.
- ▪2001 The medical service quality assessment and the criteria for the pay for performance of medical benefit costs were enacted (Public Notice Sep. 2001.)
  Assessment of social welfare corporate medical care institutions, stem cell transplantation, and Caesarean section
  Prescription, antibiotic and injection prescription rates, daily medication cost per day of administration (total quantity assessment)
- ▪2002 Computed tomography, hemodialysis assessment
  Prescription (number of drugs per prescription was added), assessment based on disease)
- ▪2003 Assessment of blood transfusion, total knee arthroplasty, intensive care units, and mental hospitals within medical aid
  The weight of high priced prescription was added to the prescription assessment.
- ▪2004 Assessment of ischemic heart disease
  Preparations containing adrenal cortical hormones for respiratory diseases (J00-J47) were added to the prescription assessment.
- ▪2005 Disclosure of the listings of high-performing institutions with injection prescription rate was begun.
  Disclosure of the listings of institutions with a lower rate of risk-adjusted Caesarean section was started.
  Prescription of NSAIDs and steroids for osteoarthritis were added to the prescription assessment.
- ▪2006 Disclosure of the listings of all institutions subject to an assessment of their injection prescription ratio was begun.
  The Web-based assessment data collection system was introduced.
  Acute stroke was assessed.
  A progressive method of assessment was introduced.
- ▪2007 Enactment of demonstration project criteria for the flexible payment of medical care benefit costs (Notice June 2007).
  The demonstration project for the flexible payment of medical care benefit costs was started (acute myocardial infarction, Caesarean section).
  The Statistics Korea approved the assessment result of Caesarean section
  Quality assessments of surgical volume indicator, use of prophylactic antibiotics for surgery, and acute myocardial infarction were conducted.
  Research for the local development of treatment guidance concerning prophylactic antibiotics for surgery was requested.
  (The Korean Surgical Society, The Korean Orthopedic Association, Korean Society of Obstetrics and Gynecology, and The Korean Society for Thoracic and Cardiovascular Surgery)
- ▪2008 The demonstration project criteria on the reduced payment of medical costs were published
  Quality assessment of long-term care hospitals
  The Statistics Korea approved the assessment result regarding the use of prophylactic antibiotics for surgery.
- ▪2009 Itemized assessment outcome compiled and graded
  The composite assessment result by institution was published (starring ★★★★★).
  The scope of assessment was extended to include chronic diseases (hypertension assessed).
  Hemodialysis and medical hospitals within medical aid were assessed.
  The Statistics Korea approved the assessment result of acute myocardial infarction and acute stroke.
  Additional payments were granted to 1st grade and quality-improved institutions under the HIRA VIP demonstration project.
- ▪2010 Expansion of public reporting on the assessment results (opened information about 52 indicators in 11 assessment areas)
  Public reporting of surgical costs and number of days in hospitals by institution (38 kinds of surgeries)
  Quality assessment for hypertension
  Approval from the National Statistics Office regarding the assessment results including long-term care hospitals and hemodialysis.
  Preliminary assessment for diabetes and colon cancer
  Presentation about the Quality Assessment and HIRA Value Incentive Program of South Korea at the OECD Conference of Health Ministers
  Amendment to the criteria for the Quality Assessment and the Value Incentive provision (Notice. April 2010.)

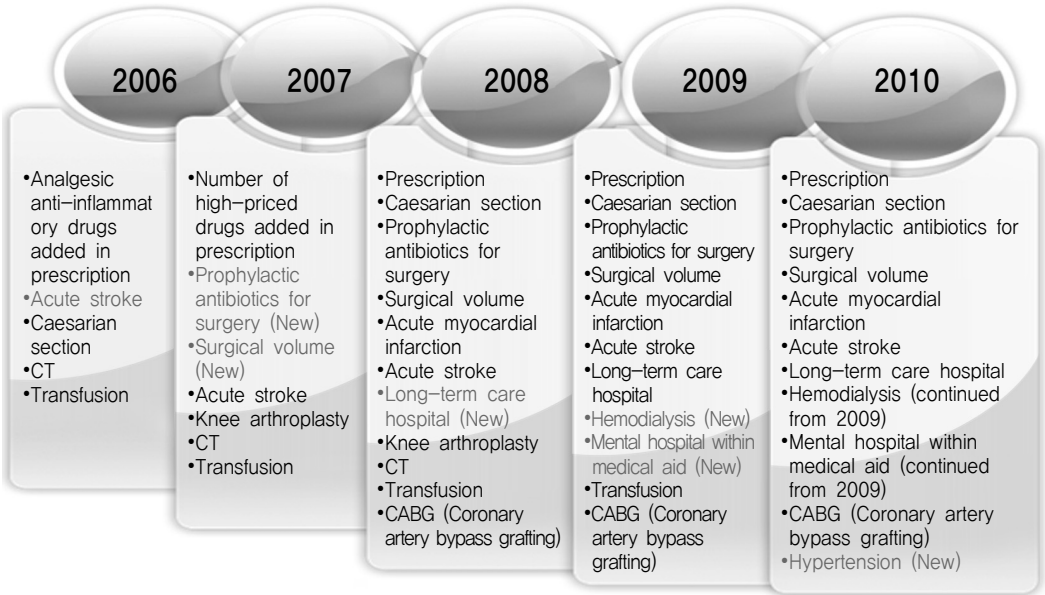


Figure 1.2 Annual status of quality assessment (2006-2010)

2. Concepts and Objectives of Assessment

2.1 Legal grounds of review

▪ The quality assessment is performed pursuant to the National Health Insurance Act and the Medical Care Assistance Act.

Statutory Grounds

□ National Health Insurance Act
- Article 56 (Duties of Review and Assessment Service) ① 2. "Evaluation of the reasonableness of medical care benefits"
  - ※ Article 39 (Medical Care Benefits): Diagnosis, medical examination, supply of medicine, materials for medical treatment, emergency aid, operation or other types of medical treatments, prevention, rehabilitation, hospitalization, nursing, transfers
  - ※ Article 40 (Medical Care Institutions): Medical care institutions, pharmacies, Korea Orphan Drug Center, public health clinics, etc.
- Article 43 (Claims for and Payment of Medical Care Benefit Costs) ⑤ "Flexible payment of medical care benefit costs"

□ Enforcement rules of the National Health Insurance Act
- Article 11 (Criteria for the Flexible Payment of Care Benefit Costs)
  - – Additional or reduced payment of medical care benefit costs is determined and published by the Minister of Health & Welfare and Family within 10% of the amount borne by the Corporation in the preceding year based on the review and decisions of those medical care institutions subject to assessment.
- Article 21 (Quality Assessment of Care Benefit)
  - – The quality assessment of medical care benefit and other related matters shall assess whether medical care benefits are being adequately provided in terms of medical and cost efficiency. The assessment outcome shall be published.

□ Notice of the minister of health, welfare and family
- Demonstration Project Criteria for the Flexible Payment of Medical Care Benefits (Notice No. 2007-56, 29 June 2007))
- Quality Assessment of Medical Care Benefits and Criteria for the Flexible Payment of Medical Care Costs (Notice No. 2010-13, 14 Apr. 2010)

□ Medical care assistance act
- Article 11 (Claims for and Payment of Care Costs) The care costs shall be paid by the mayor, county or district office head with an addition or reduction based on the results of evaluation for payment when the agency responsible for reviewing the care costs notifies them of the results of the quality assessment of the care costs.)

□ Enforcement decree of the medical care assistance act
- Article 20 (Entrustment of Duties) The quality assessment of care costs under Article 11 paragraph 4 shall be entrusted to the Health Insurance Review & Assessment Service.

□ Enforcement rules of the medical care assistance act
- Article 23 (Criteria for the Flexible Payment of Medical Care Costs) The additional or reduced payable amount of care costs based on the adequacy assessment of medical care services under Article 11 paragraph 4 of the Act shall be published by the Minister of Health, Welfare and Family within 10% of the amount borne by the medical care fund in the preceding year for the subject medical nursing institution based on the review and decisions.

2.2 Concept of quality assessment

- According to the National Health Insurance Act and the Medical Care Assistance Act, the quality assessment of medical care benefits shall assess whether medical care benefits have been provided adequately in terms of "medical and cost efficiency"
- The WHO has defined quality of care as consisting of effectiveness, efficiency, adequacy, and scientific-technical quality.
- The medical and pharmaceutical aspect of the quality assessment covers scientific-technical quality (among the quality elements presented by the WHO), while the cost efficiency aspect covers effectiveness and efficiency.
- In conclusion, it can be said that the medical/pharmaceutical and cost efficiency aspects of the quality assessment of cares cover the WHO's 'quality of medical service' elements, which consist of effectiveness, efficiency, adequacy, and scientific-technical quality.

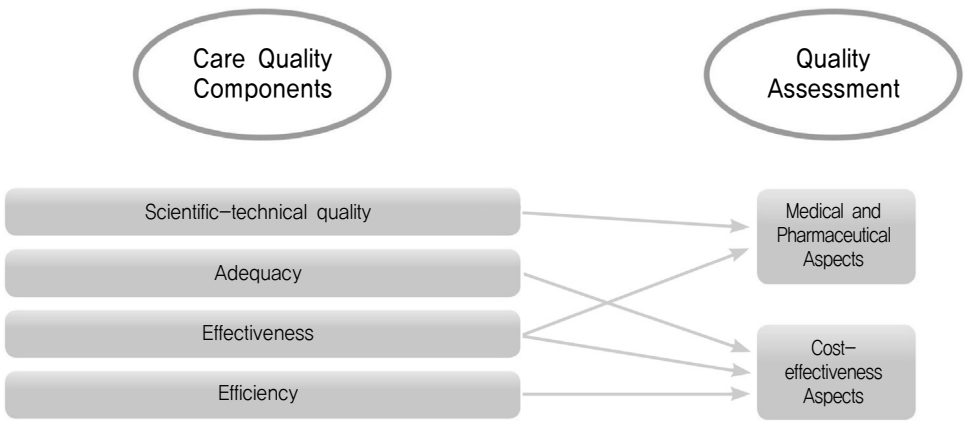


Figure 1.3 The relationship between care quality and quality assessment

Quality of care elements (WHO)

- **Scientific-technical quality**: Refers to the degree of actual application of currently available medical knowledge and techniques.
- **Adequacy**: Refers to the degree of compliance on the part of available services with the requirements of a population group.
- **Effectiveness**: Refers to the enhancement of the health level that can be achieved in daily conditions where the care is provided.
- **Efficiency**: Refers to the relationship between an effect and the resource (cost) used to obtain that effect. A given care that costs less is more efficient when it achieves an identical efficacy and effect.

2.3 Scope of quality assessment

A. Scope of Medical Care Services

- "The National Health Insurance Act provides the medical care benefit" refers to diagnosis, medical examinations, supply of medicine, materials for medical treatment, emergency aid, operation or other medical treatments, prevention, rehabilitation, hospitalization, nursing, transfers of the patient, injury, or childbirth of an insurance subscriber or dependents. Therefore, "medical care benefit" refers to the entire range of cares provided, in fact.
- The quality assessment evaluates the entire range of medical services related to public health as it assesses 'care services' rather than 'medical costs'.

※ Scope of medical care benefits under the National Health Insurance Act

- The National Health Insurance Act Article 39 (Medical Care Benefits) ① provides medical care benefits for diagnosis, medical examinations, supply of medicine, materials for medical treatment, emergency aid, operation or other medical treatments, prevention, rehabilitation, hospitalization, nursing, transfers of the patient, injury, or childbirth of an insurance subscriber or dependents
- Paragraph ③ In determining the criteria for medical care benefits, the Minister of Health, Welfare and Family shall exclude diseases that do not impede work or daily life or others that are provided under the Ordinance of the Ministry of Health, Welfare and Family Affairs from the scope of "medical care benefits".

B. Service institutions subject to adequacy assessment

- All medical care institutions are subject to assessment as the National Health Insurance Act provides that cares, except for nursing and transport, shall be performed by "such medical care institutions as medical institutions, pharmacies, Korea Orphan Drug Centers, Public Health Centers, Health Clinics or their branches".
- All care billings to all Korean citizens are subject to the quality assessment under the National Health Insurance Act, as the entire population is covered by the National Health Insurance, given that it is intended as a unified medical insurance for the entire population.
  - Approximately 3% of the citizens are beneficiaries of free medical care, and the quality assessment of their medical services should be performed by the Health Insurance Review & Assessment Service pursuant to the Medical Care Assistance Act. Accordingly, the quality assessment shall be applied to the entirety of medical service security, including medical services under the National Health Insurance and the medical care costs.

- In view of the above, the quality assessment shall be performed on all medical services provided by all medical care institutions to the entire population.

2.4 Objectives

- The improvement of care quality is pursued by inducing service providers to provide adequate medical service by assessing the adequacy of their medical service and by steadily improving any cares found to be inadequate based on the assessment outcome.
- The assessment also pursues the enhancement of public health, the rationalization of insurance payments, and the prevention of socio-economic losses by guaranteeing the quality of care at an adequate cost.

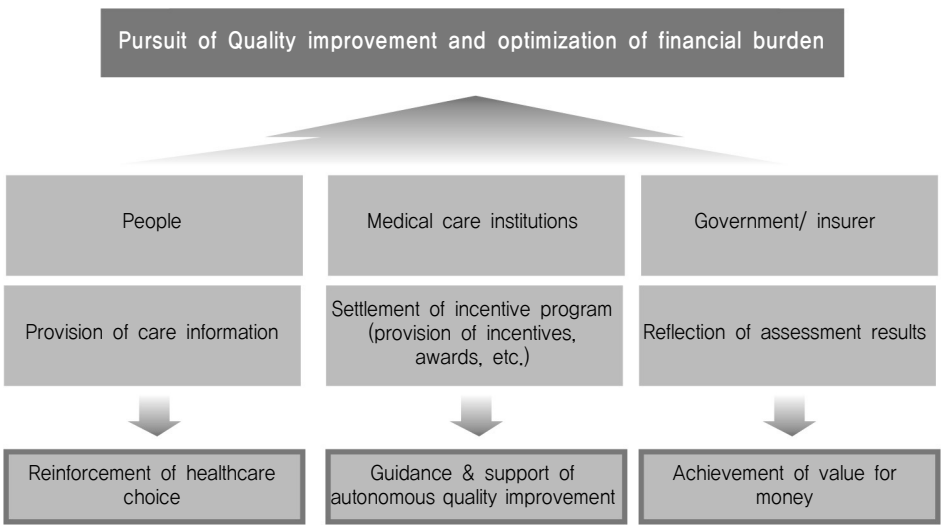


Figure 1.4 Purpose of quality assessment

3. Quality Assessment Procedure and Methods

3.1 Quality assessment procedure

▪ Development of annual assessment plan

- At the end of each year, an annual assessment plan is prepared for the following year. The annual assessment is implemented according to the plan, which is approved by the Ministry of Health and Welfare (MHW) after review by the Central Assessment Committee.
- The plan includes assessment items and period, medical care institutions subject to assessment, assessment criteria and utilization of the assessment results.
- The approved annual assessment plan is published on the Website of the Health Insurance Review & Assessment Service (HIRA) and in the form of a press release.

▪ Development of specific quality assessment plans

- Specific implementation plans may be prepared by further specifying the assessment criteria by item, data survey, and assessment methods on the annual plan.

- Specific matters such as assessment criteria and data collection are informed through the presentations for the health care institutions

※ Export consultative body

- When medical or pharmaceutical advice is required for the assessment processes, including the development of assessment criteria, expert opinions are collected through an advisory consultative body that consists of experts from the medical societies or academic circles in question.
- An expert consultative body is operated for each assessment item.

▪ Disclosure of specific quality assessment plans

- The established specific assessment plan is announced and published two months before its implementation through the HIRA website, official publications, and press releases.
- Related institutions such as medical pharmaceutical associations affiliated with the health care institutions are informed through documents.

▪ Performance of quality assessment

- The assessment results are derived after analysis of the collected data.
- Critical matters such as the assessment results, scope of disclosure, and methods are examined by the central assessment committee.

▪ Utilization of the quality assessment results

- The assessment results is notified to the relevant medical care institutions and published through the website of the HIRA. Items subject to pay for performance is notified to the National Health Insurance Corporation (NHIC).

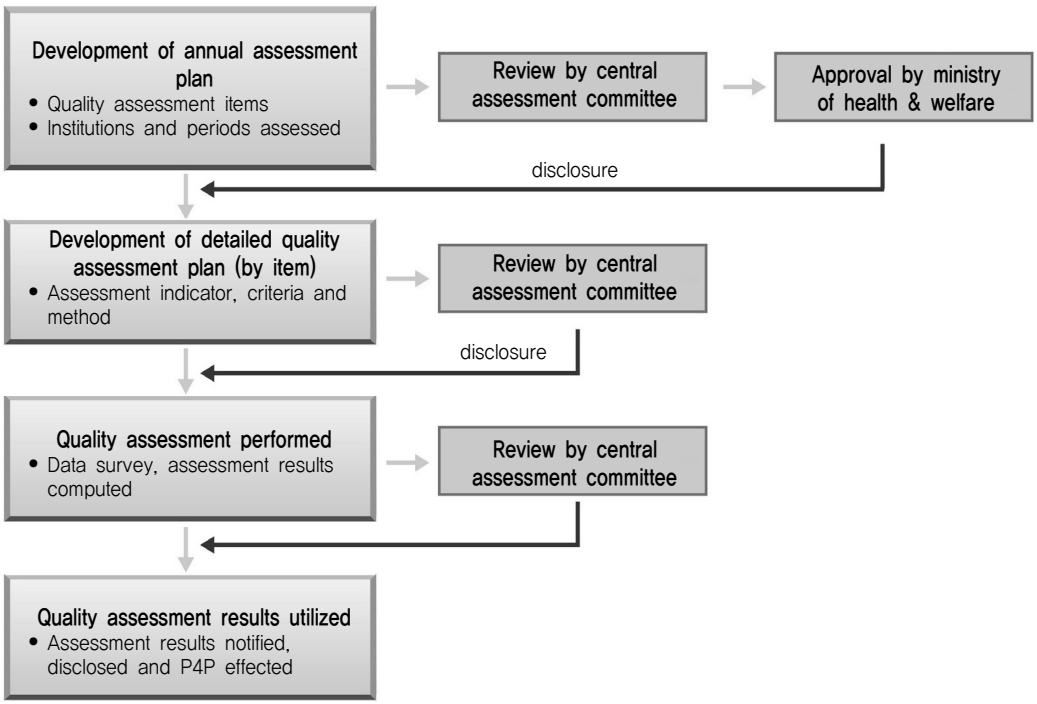


Figure 1.5 Assessment implementation procedures

※ Central assessment committee

▪ The Central Assessment Committee was established within the Medical Service Review and the Assessment Commission to perform the assessment service efficiently pursuant to Article 59 of the National Health Insurance Act.

▪ The Central Assessment Committee is composed of one chair and twenty or fewer members who are recommended by medical and pharmaceutical trade organizations, consumer organizations, the National Health Insurance Corporation, and the board of directors of the Health Insurance Review and Assessment Service. The committee reviews critical matters related to the assessment, including the development of assessment plans.

3.2 Methods

A. Data sources

▪ The data used in the assessment include the claim data submitted to the HIRA; the current status data of medical care institutions; the mandatory medical service data of medical care institutions; and computerized data concerning resident registration as maintained by the Ministry of Public administration and Security (MOPAS).

B. Data collection methods

▪ The methods of data collection include the exploitation of administrative data - such as claims data, current status data of medical care institutions, and data provided by the MOPAS.

1) Administration data utilization method

▪ When assessment data are collected using the administrative data of the government, the HIRA compiles the various types of data after extracting data from the following databases:

- Patients subject to assessment are extracted based on the medical service statement for the claims submitted by the relevant medical care institution.
- Additional items required for assessment, such as past disease history or medication histories, are extracted from inpatient or outpatient databases which have been previously reviewed.
- Data concerning the facilities and workforce of medical care institutions subject to assessment are extracted from the relevant files on institutions' current status maintained by the HIRA.
- Data concerning deceased patients are extracted using the computerized resident registration data maintained by the MOPAS with its Minister's approval after review by MHW based on Article 30 of the Resident Registration Act and other statutes on the use of data concerning computerized resident registration data.

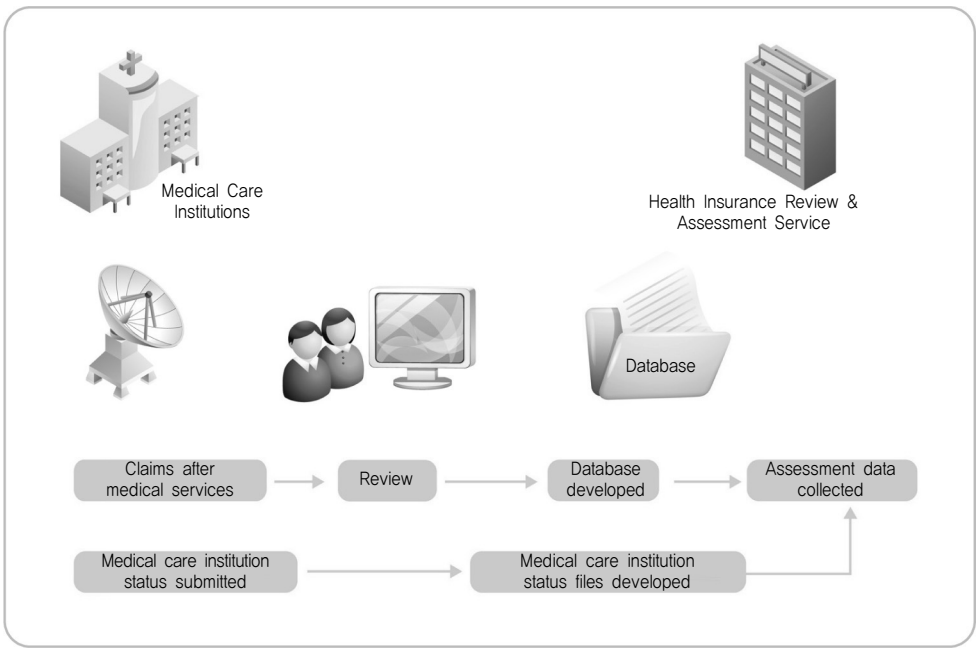


Figure 1.6 Data collection method using administrative data

2) Methods of using administrative data and survey sheets

- Data concerning care institutions are coll ected using survey sheets when the data required for assessment cannot be obtained only from administrative data (claims data, current status data of medical care institutions, and data from the MOPAS).
- When the survey sheet is used in parallel, patient details are indicated on a survey sheet already generated by the medical care institutions based on their own medical records.
- The HIRA develops and provides to medical care institutions a Web-based quality assessment data collection system so that data can be collected efficiently.
- Reliability Check
  - The reliability of data is checked in order to verify their validity and accuracy.
  - Medical records are requested from the medical care institutions by extracting some sample cases from the assessment data submitted or checked via personal visits to the care institutions.

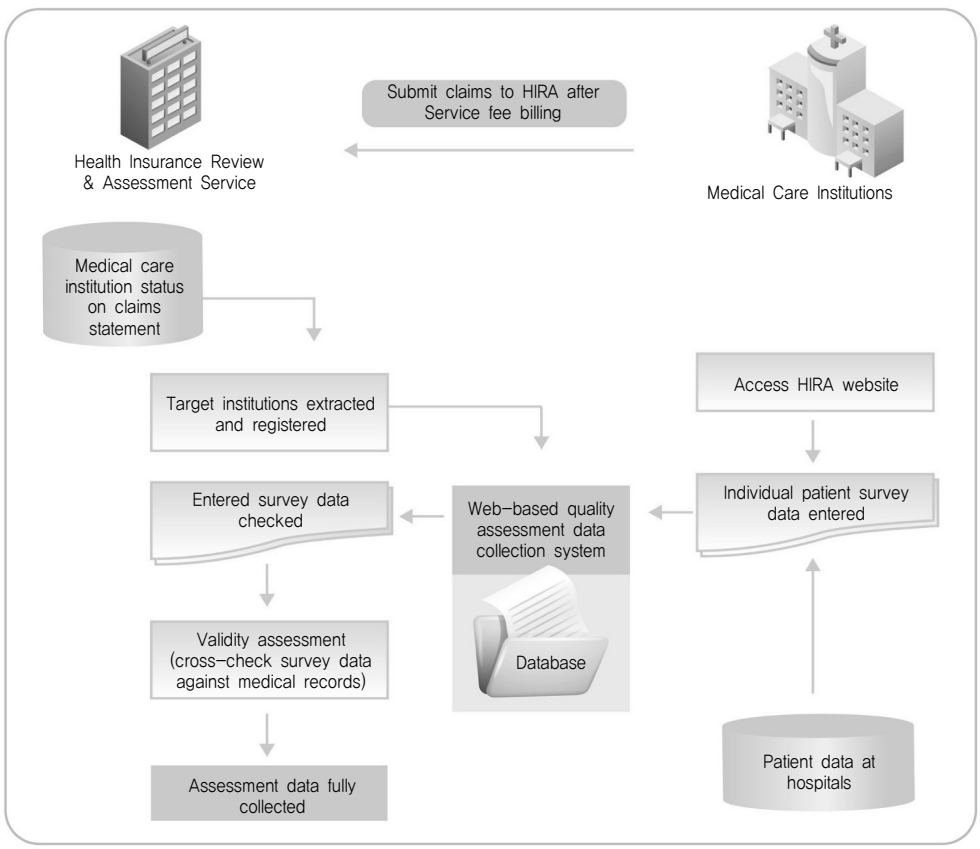


Figure 1.7 Data collection method using administrative data and survey sheet

3.3 Analysis of the assessment results

▪ Assessment of Individual Care Institutions

- The values of each assessment indicator are computed for each individual care institution in order to identify variations among the care institutions.
- Assessment method: When there is a specific target value, the absolute assessment method is employed. Otherwise, the indicators are relatively assessed within an identical group.

▪ Adjustment of patient severity

- The assessment indicator, whose resulting value is affected by patient severity (e.g. outcome indicator such as fatality), is compared between medical care institutions after adjusting patient severity.
- Patient information required for adjusting severity is surveyed upon collection of the assessment data.

- Composite quality score calculating and grading
  - The composite quality score (CQS) is calculated per item when the assessment indicator covers multiple items.
  - The weight per indicator in calculating CQS varies depending on the assessment items.
  - The institutions assessed are graded based on their CQS.

3.4 Raising objections

- The NHIC, medical care institutions and others who have an objection to the dispositions of the HIRA, including its quality assessment, may file an objection with the Service in order to have their rights upheld.
- The objection should be filed in writing within 90 days of the day on which the disposition is made known. The objection may be filed within 180 days of the day of the disposition when the filing of an objection within the above period is impossible because of a justifiable cause.
- Determination is made against the objection within 60 days of the day on which the relevant documents are received. The period may be extended up to 30 days in cases where inevitable causes for so doing arise.

3.5 Utilization of quality assessment results

- Public relations
  - The assessment outcomes of individual institutions are published on the Website of the HIRA so that general public can consult them when choosing a healthcare provider.
- Support for quality improvement by medical care institutions
  - The assessment outcome is provided to medical care institutions together with the benchmarking data so that they may refer to the information when attempting to improve their quality.
  - Assessment results and overall matters that require improvement are delivered to medical care institutions through briefing sessions.
  - Problem areas are diagnosed through on-site counseling at the care institution and solutions are presented based on the assessment data of the medical care institution.
  - As part of the programs aimed at improving medical service quality, examples of QI (quality improvement) activities are collected through competition among medical care institutions, prizes and citations are awarded to outstanding cases of such QI activities, and opportunities are provided for publication of their details.
- Utilization for policy making
  - The overall assessment results are reported to the MHW so that the same information may be used to improve the systems.

- Details of medical care benefit costs subject to P4P based on the assessment results are notified to the NIHC to add or reduce the costs.
- Any matters requiring interaction, including the review of medical benefit costs, are shared with the relevant departments of the HIRA.

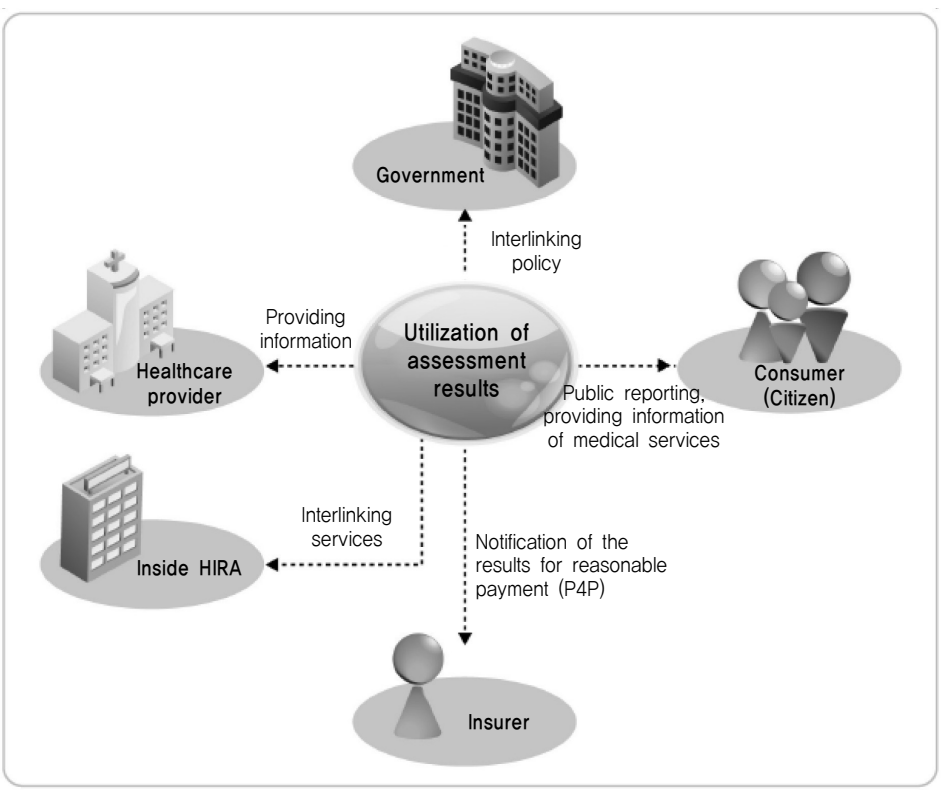


Figure 1.8 Utilization of quality assessment results

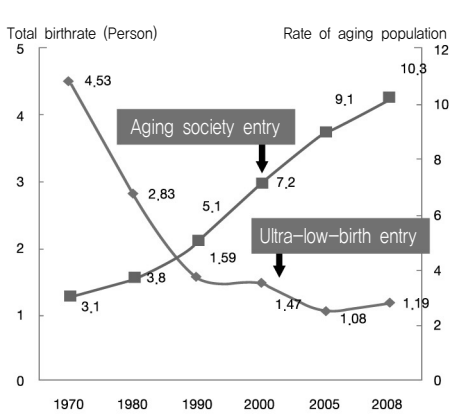
Part. 02

Quality Assessment in 2010

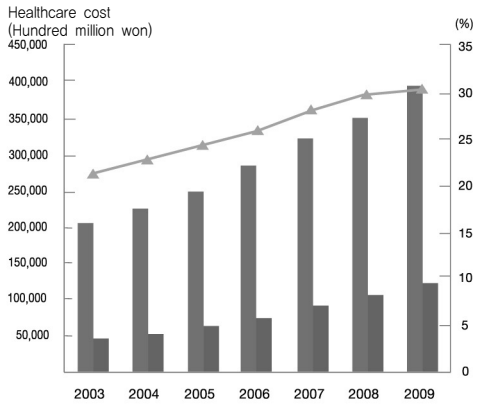
1. Summary of 2010 Assessment

1.1 Internal and external policy environment

- Consumer interest in high quality medical services has increased.
- Chronic disease management is required due to the rapid growth of the elderly population and the steady growth of medical expenses.



※ Source : Statistics Korea, Birth Statistics of 2009, Funeral population projections, 2006



※ Source : HIRA, Annual statistics of national health insurance assessment 2003~2009

Figure 2.1 Changes of aging population and medical benefit costs paid for elderly citizens

- (The competitiveness of the medical service needs be strengthened by improving quality in order to introduce an advanced medical service system.
- Medical costs should be paid based on the quality rather than on the quality of medical services.
  - The Pay for Performance (P4P) system is being introduced by more countries, including the USA, the UK, Australia, Canada and various other countries around the world.
    - ✓ The US public sector has implemented the Premier Hospital Quality Incentive Demonstration (HQID) Projectof the CMS (Center for Medicare and Medicaid Services), the Physician Group Practice Demonstration (PGPD), and Value-Based Purchasing (VBP).
    - ✓ The US private sector has implemented the Bridges to Excellence and Integrated Healthcare Association California P4P Programs since 2003.
    - ✓ In the UK, the National Health Service (NHS) started the Quality and Outcomes Framework (QOF) as a system for controlling performance and payment to primary service doctors in 2004. The Care Quality Commission (CQC) has also implemented the same system for inpatient and psychiatric health services since April 2009.
    - ✓ Australia has implemented the Practice Incentives Program (PIP) to improve the quality of its outpatient services.)

1.2 Promotion direction of assessment

- Expansion of the scope of assessment from acute care to chronic diseases, primary care, and long-term care. (high blood pressure, diabetes).
  - New assessments (3 items): high blood pressure, hemodialysis (continued from 2009), for mental hospital within medical aid (continued from 2009)
  - Continued assessments (13 items): Existing items including heart, brain diseases, prophylactic antibiotics for surgery, etc.
  - Preliminary Assessments (2 items): Diabetes, colon cancer
- Expansion of value incentive program based on the assessment results
  - Successfully operating the 3rd year demonstration project of the medical care expenses Value Incentive Program
  - Expanding the application of the value incentive program for general hospitals (from the care of 2010)
  - Analyzing the effect of the 1st year value incentive project and developing the expansion model
- Support quality improvement activities for securing medical consumers' rights to know and inducing behavioral changes of providers
  - Promoting the quality improvement (QI) support program with education and consultation for the healthcare institutions

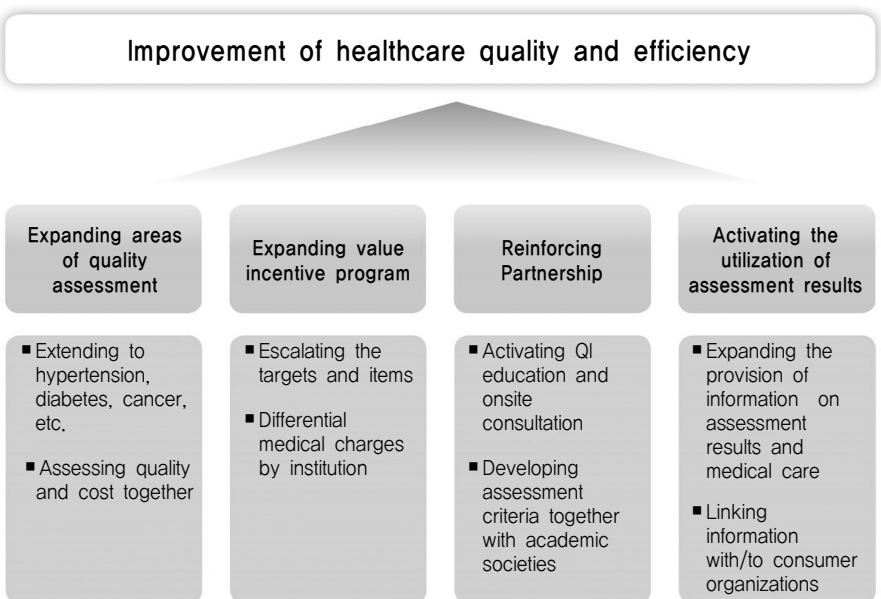


Figure 2.2 The direction of healthcare quality assessment 2010

1.3 Assesment scope and results

A. Areas of quality assessment

- In the first year of assessment, the following were assessed: prescription, computed tomography, Caesarean section, and medical care institutions annexed to social welfare corporations and intensive care units that have attracted social attention.
- In 2004, the scope of assessment was expanded to include clinical service quality in such areas as acute myocardial infarction and acute stroke, and the use of prophylactic antibiotics for surgery.

Quality assessment history by year

Classification	Total	New & preliminary assessments	Continuous assessment (Management)
2001	5 Items (5)	5 Items	–
		•3 items in prescription (antibiotics, injection, medication cost per day of administration) •Social welfare corporate medical care institutions •Stem cell transplant	–
2002	7 Items (9)	3 Items	4 Items
		•Hemodialysis ('02.)•Caesarian section •CT(Computed tomography)	•4 items in prescription(number of drugs per prescription)
2003	11 Items (14)	4 Items	7 Items
		•Blood transfusion •Intensive care unit •Knee arthroplasty •Mental hospital within medical aid ('03.)	•5 items in prescription (prescription rate of high-priced drugs added) •Caesarian section •CT
2004	11 Items (18)	3 Items	8 Items
		•AMI (Acute myocardial infarction) •PCI(Percutaneous coronary Intervention) •CABG(Coronary artery bypass grafting)	•6 Items (adrenal cortical hormones added) •Caesarian section •CT
2005	13 Items (19)	3 Items	10 Items
		•AMI •PCI •CABG	•7 items in prescription (NSAID added) •Caesarian section •CT • blood transfusion
2006	11 Items (20)	1 Item	10 Items
		•Acute stroke (New)	•Prescription (7 items) •Caesarian section •blood transfusion •knee arthroplasty

Classification	Total	New & preliminary assessments	Continuous assessment (Management)
2007	15 Items (22)	3 Items	12 items
		•Use of prophylactic antibiotics for surgery (New) •Surgical volume indicator (7 kinds of surgeries) •Stroke(cont. from 2006)	•Prescription (7 Items) •CT •Blood transfusion •AMI •Caesarian section •Knee arthroplasty
2008	17 Items (23)	2 Items	15 Items
		•Long-term care hospital costs (New) •Use of prophylactic antibiotics for surgery (cont. from 2007)	•7 items in prescription (injection, antibiotics, NSAID, no. of drugs, high-priced drugs, medication costs, adrenal cortical hormones) •Blood transfusion •CT •AMI •CABG •Caesarian section •Knee arthroplasty •Acute Stroke •Surgical volume
2009	16 Items (25)	2 Items	14 Items
		•Hemodialysis •Mental hospital within medical aid	•6 items in prescription (injection, antibiotics, NSAID, no. of drugs, high-priced drugs, medication costs) •Surgical volume •Blood transfusion •Long-term care hospital •Ischemic heart disease (AMI) •Stroke •CABG •Caesarian section •Prophylactic antibiotics for surgery
2010	16 Items (26)	3 Items	13 Items
		•Hypertension •Hemodialysis (cont. from 2009) •Mental hospital within medical aid (cont. from 2009)	•6 items in prescription (injection, antibiotics, NSAID, no. of drugs, high-priced drugs, medication costs) •Surgical volume •Long-term care hospital •Ischemic heart disease (AMI) •Acute stroke •CABG •Caesarian section •Prophylactic antibiotics for surgery

▪ In 2010, the areas of assessment were expanded from acute diseases to chronic diseases, such as high blood pressure and diabetes.

- The scope of assessment was expanded from 32% of total medical fees in 2009 to 34% in 2010.
- The assessment for inpatient care was conducted for the following 6 items: acute myocardial infarction, acute stroke, prophylactic antibiotics for surgery, Caesarian section, surgical volume and coronary artery bypass graft (CABG).
  - ▶ The assessment of the prophylactic antibiotics for surgery was done for stomach, colon, laparoscopic gallbladder, hip replacement, knee arthroplasty, hysterectomy, Caesarian section, and heart surgeries.
  - ▶ The surgical volume was assessed for stomach cancer, colon cancer and liver cancer surgeries, hip replacement, and percutaneous coronary intervention.
  - ▶ Long-term care assessment included long-term care hospitals and mental hospital within medical aid.
- For the outpatient care, the assessment covered the 8 areas including prescription, hypertension, etc.
  - ▶ Long-term care assessment included hemodialysis.

※ Items of quality assessment 2010

- New assessment (3 items): hypertension, hemodialysis (continued from 2009), mental hospital within medical aid (continued from 2009).
- Continuing assessment (13 items): acute myocardial infarction, acute stroke, Caesarian delivery prophylactic antibiotics for surgery, long-term care hospitals, surgical volume indicator, coronary artery bypass graft (CABG), antibiotics/ injection prescription rate, etc.
- Preliminary assessment (2 items): diabetes, colon cancer

▪ The assessments for tertiary hospitals and general hospitals included 15 items with the exclusion of long-term care hospitals; for hospitals, 12 items including prophylactic antibiotics for surgery and Caesarian delivery were assessed, while clinics were assessed for 11 items such as Caesarian section, surgical volume indicator, prescription, hypertension, and mental hospital within medical aid.

▪ The assessments were conducted in consideration of the characteristics of the items; while some were assessed altogether in the aspect of structure, process, and outcome, others were done in part.

Table 2.1 2010 Assessment areas and assessment institutions

Areas of assessment		Assessment institutions					Domain of assessment		
		Tertiary hospital	General hospital	Hospital	Clinics	Long-term care hospital	Structure	Process	Outcome
Inpatient care	Acute myocardial infarction	O	O				O	O	O
	Acute stroke	O	O				O	O	
	Use of prophylactic antibiotics for surgery	O	O	O				O	
	Caesarian section	O	O	O	O				O
	Surgical volume indicator	O	O	O	O		O		O
	CABG	O	O				O	O	O
Outpatient care	Prescription	O	O	O	O	O		O	
	Hypertension*	O	O	O	O	O		O	
Long-term care	Long-term care hospital					O	O	O	O
	Mental hospital within medical aid*	O	O	O	O		O	O	O
	Hemodialysis*	O	O	O	O	O	O	O	O

* 2010 new quality assessment items

B. Quality assessment periods and data collection

▪ Assessment periods were decided based on the characteristics of the assessed items. Data were collected by reviewing entire lots or by sampling.

Table 2.2 2010 Data sources, target period and data collection by assessment items

Assessment items		Data sources		Target period	Target data gathering
		Administrative data	Survey sheet		
Acute myocardial infarction		O	O	Yearly	Complete
Acute stroke		O	O	3 months	Sample
Use of prophylactic antibiotics for surgery		O	O	3 months	Sample
Caesarian section delivery		O		Yearly	Complete
Surgical Volume	Surgeries for stomach & colon cancers, hip replacement, percutaneous coronary intervention	O		One year of diagnosis performance	Complete
	Liver cancer surgery	O		Two years of diagnosis performance	Complete
CABG		O	O	2 years	Complete
Prescription		O		Yearly	Complete
Long-term care hospital		O	O (Institutional)	3 months	Complete
Mental hospital within medical aid		O	O (Institutional)	3 months	Complete
Hemodialysis		O	O	3 months	Sample

C. Key quality assessment results

1) Quality is improving for all assessment items

▪ Quality assessments are being performed in the assessment of acute myocardial infarction, acute stroke, use of prophylactic antibiotics for surgery, Caesarian section, and prescription, which had been assessed more than 3 times by 2010.

※ Outcomes of quality assessment

❍ Improvements have been made in medical care behaviors in acute myocardial infarction, acute stroke, prophylactic antibiotics for surgery
- Acute myocardial infarction assessment
  - Percutaneous coronary intervention execution within 120 min. of arrival at hospital; 85.9% in 2009 → 91.7% in 2010: 5.8%p ↑
  - Thrombolytic agent injection within 60 min. of arrival at hospital; 79.7% in 2009 → 81.9% in 2010: 2.2%p ↑
  - In-hospital mortality; 7.5% in 2009 → 7.0% in 2010: 0.5%p ↓
  - Death rate within 30 days of hospitalization; 8.6% in 2009 → 7.7% in 2010: 0.9%p ↓
- Acute stroke assessment
  - Improvements in initial treatment
    ☞Antithrombotic injection rate; 93.8% in 2009 → 95.9% in 2010: 2.1%p ↑
  - Improvements in secondary prevention
    ☞Anticoagulant prescription on discharge; 95.8% in 2009 → 99.1% in 2010: 3.3%p ↑
- Improvement in the use of antibiotics for preventing surgical site infection.
  - Improvements in the timing of antibiotics injection
    ☞Injection within 1 hour before skin incision; 69.8% in 2009 → 75.6% in 2010: 5.8%p ↑
  - Improvements in using unrecommended antibiotics for prophylactic purposes
    ☞Aminoglycosides injection rate; 32.3% in 2009 → 26.5% in 2010: 5.8%p ↓
    ☞3rd or later generation cephalosporin antibiotics administration rate; 10.1% in 2009 → 7.0% in 201: 3.1%p ↓

❍ Improvements have been made in prescribing rates of antibiotics and injections (2nd half)
- Antibiotics prescription rate for colds; 73.6% in 2002 → 51.6% in 2010: 22.0%p ↓
- Injection prescription rate; 37.7% in 2002 → 20.9% in 2010: 16.8%p ↓

❍ Caesarian section delivery rates have been decreased by 0.3%p in spite of the trend of mother's aging
- 40.5% in 2001 → 36.0% in 2010: 4.5%p ↓
- The number of mothers aged 35 and older has been doubled since 2001; 8.4% in 2001 → 17.9% in 2010.

2) Quality variations still exist in each assessment area regarding the type of institutions, medical care institutions, medical departments, and regions requiring the effort to reduce them.

□ Variations by type of institutions and medical care institution

▪ Variations in each assessment area were significant, and the differences in the level of variation were found by type and medical institution

- Clinics presented the largest variations in most indicators, while the tertiary hospitals presented the lowest.
- Overall quality improvements were found in acute stroke treatments compared to 2008, and the variations in each indicator also decreased; whereas the early rehabilitation consideration rate and t-PA intravenous administration rate, added in 2010, presented a comparatively lower scores than the other indicators accompanied with considerable variations by institutions.
- In the use of prophylactic antibiotics for surgery, all the indicators except the 3rd or later generation cephalosporin antibiotics administration rate were ranked in the order of tertiary hospital, general hospital, and hospital, but a significant gap between the tertiary hospital and hospital was found and large variations in each hospital indicator of still appeared.

□ Variations by medical department

▪ The assessment results regarding the prophylactic antibiotics were similar to those of 2009. The total scores of heart and stomach surgeries were over 88%, but Caesarian section and hysterectomy scored under 70%, indicating a lower quality compared to the other surgeries.

□ Variations by region

▪ The regional variations in Caesarian section and prescription were found to be similar to the previous year.

- Regional differences in Caesarian section rates were still significant as in the previous year; the rate of Jeju, the highest in the last year, was reduced by 2.2% (41.5%→39.3%), only to follow Ulsan (39.5%) as the second. The region rated the lowest in Caesarian section was Gwang-Ju, the same as the last year, which was 1.5 times lower than Ulsan.
- Differences of prescription rates in injections and antibiotics still remained; Seoul presented the lowest rate in prescribing injections (18.2%), whereas Gyeong-Nam was the highest as of 33.1%. Antibiotics were prescribed the lowest in Jeonbuk (43.5%) and the highest in Gwang-Ju (54.3%). In the assessment of prescriptions, the regional variations in the injection and antibiotics prescription rate were found to be consistent; the lowest injection prescription rate was found in Seoul (18.2%), and the highest was in Gyeong-Nam (33.1%). For the antibiotics prescription rate, Jeonbuk (43.5%) was discovered as the lowest, and Gwangju (54.3%) was the highest.

Table 2.3 2010 Quality assessment results by item

(Unit: %, %p, Day, Bed, No., Item, Won)

Assessment Item	Indicators		Results			
			2009	2010	Up & down	Improvement
Acute myocardial infarction,	Thrombolytics administration rate within 60 minutes of hospital arrival		79.7	81.9	2.2 ↑	O
	Primary PCI rate within 120 minutes of hospital arrival		86.9	91.7	4.8 ↑	O
	Aspirin administration rate of hospital arrival		98.1	98.6	0.5 ↑	O
	Aspirin prescription rate at discharge		99.4	99.3	0.1 ↓	
	Beta-blocker prescription rate at discharge		96.0	95.7	0.3 ↓	
	In-hospital case fatality rate		7.5	7.0	0.5 ↓	O
	30-day case fatality rate after admission		8.6	7.7	0.9 ↓	O
Acute stroke	Ischemic and hemorrhagic stroke	Documentation rate of smoking history	94.2	96.8	2.6 ↑	O
		Neurological examination rate	94.0	96.0	2.0 ↑	O
		Dysphagia examination rate within 2 days	88.0	93.2	5.2 ↑	O
		Brain imaging rate within 24 hours	98.7	99.2	0.5 ↑	O
		Brain imaging rate within 1 hour	-	92.5	-	
		Consideration rate of early rehabilitation (within 3 days)	-	89.4	-	
	Ischemic stroke	Lipid profile test rate	94.5	96.0	1.5 ↑	O
		Consideration rate of IV t-PA initiation	92.2	93.5	1.3 ↑	O
		IV t-PA administration rate	-	74.0	-	
		Antithrombotics administration rate (within 48 hours)	93.8	95.9	2.1 ↑	O
		Antithrombotics prescription rate at discharge	97.8	98.5	0.7 ↑	O
		Anticoagulants prescription rate at discharge (atrial fibrillation patient)	95.8	99.1	3.3 ↑	O
Use of prophylactic antibiotics for surgery	Initial prophylactic antibiotic prescription rate within 1 hour before skin incision		69.8	75.6	5.8 ↑	O
	Aminoglycosides administration rate		32.3	26.5	5.8 ↓	O
	3rd or later generation cephalosporin antibiotics administration rate		10.1	7.0	3.1 ↓	O
	Prophylactic antibiotics combination rate		46.6	37.3	9.3 ↓	O
	Antibiotics prescription rate at discharge		45.8	35.9	9.9 ↓	O
	Total mean of the days of prophylactic antibiotics administration		6.7	5.7	1.0 ↓	O
Caesarean section	Caesarean delivery rate		36.3	36.0	0.3 ↓	O

Assessment Item	Indicators			Results			
				2009	2010	Up & down	Improvement
Surgical volume indicator	Share of institutions that exceeded the standard volume of stomach cancer surgery			27.6	28.5	0.9 ↑	O
	Share of institutions that exceeded the standard volume of colon cancer surgery			27.9	27.6	0.3 ↓	
	Share of institutions that exceeded the standard volume of liver cancer surgery			41.8*	43.5**	1.7 ↑	O
	Share of institutions that exceeded the standard volume of hip replacement			20.5	21.6	1.1 ↑	O
	Share of institutions that exceeded the standard volume of percutaneous coronary intervention			62.1	60.6	1.5 ↓	
Long-term care hospital	Structure	Basic facilities	Average space per ward bed	6.3	6.5	0.2 ↑	O
			Percentage of multi-patient wards (over seven people)	49.6	48.7	0.9 ↓	O
			Rate of wards with toilet	–	48.4	–	
			Availability of adequate bathroom	–	76.5	–	
			Rate of patient amenities furnished(lounge, restaurants)	–	19.8	–	
		Safety facilities	Rate of thresholds or bumps removed (wards, bathrooms, and toilets)	–	50.1	–	
			Rate of non-slip floors installed (bathrooms, toilets, stairs)	–	50.7	–	
			Rate of emergency call system installed (wards, bathrooms, and toilets)	7.0	13.1	6.1 ↑	O
			Rate of safety grip installed (bathrooms, toilets, hallways)	–	35.1	–	
		Medical human resources	No. of beds per doctor	37.3	35.7	1.6 ↓	O
			No. of beds per nurse	14.9	13.2	1.7 ↓	O
			No. of beds per nursing personnel	6.8	6.0	0.8 ↓	O
			Turnover rates of nursing personnel	–	35.7	–	
			On-call doctor availability in nights/ holidays	–	30.2	–	
		Other human resources	No. of beds per physical therapist	84.3	68.1	16.2 ↓	O
			Availability of pharmacy (including pharmacist)	–	32.3	–	
			Availability of radiation cabin (including radiologist)	–	61.0	–	
			Availability of clinical laboratory (including medical lab technologist)	–	39.8	–	
			Availability of social worker	55.0	47.5	7.5 ↓	
		Medical	No. of EKG monitor per 100 beds	2.6	2.7	0.1 ↑	O

Assessment Item	Indicators			Results			
				2009	2010	Up & down	Improvement
		equipment	No. of pulse oxymeter per 100 beds	3.5	3.7	0.2 ↑	○
			No. of oxygen supply equipment per 100 beds	–	22.2	–	
			No. of aspirator per 100 beds	–	21.2	–	
	Treatment	Process	Proportion of patients with an indwelling urinary catheter (high-risk group)	24.1	24.1	–	
			Proportion of patients with an indwelling urinary catheter (low-risk group)	4.0	3.6	0.4 ↓	○
			MMSE test rate for patients aged 65 years or older when hospitalized	–	58.6	–	
			HbA1c test rate for diabetic patients	–	45.6	–	
Long-term care hospital	Treatment	Outcome	Proportion of patients with declined ability to perform daily activities - dementia	–	11.7	–	
			Proportion of patients with declined ability to perform daily activities _ non-dementia	–	9.8	–	
			Proportion of patients with improved ability to perform daily activities_ dementia	–	14.6	–	
			Proportion of patients with improved ability to perform daily activities_ non-dementia	–	14.8	–	
			Proportion of patients with newly appeared bedsores _ high-risk group	–	2.7	–	
			Proportion of patients with newly appeared bedsores _ low-risk group	–	0.2	–	
			Proportion of patients with worsened bedsores _ high-risk group	–	1.3	–	
			Proportion of incontinent patients _ low-risk	–	25.3	–	
Mental hospital within medical aid.	structure	facilities	Floor size of a ward per bed	–	5.0	–	
			Rate of wards with less than 10 beds	–	99.5	–	
			Capacity per ward	–	6.2	–	
		personnel	No. of daily in-patient per psychiatrist	–	47.2	–	
			No. of daily in-patient per psychiatric nurse	–	21.2	–	

Assessment Item	Indicators			Results			
				2009	2010	Up & down	Improvement
			No. of daily in-patient per psychiatric nursing staff	-	10.1	-	
			No. of daily in-patient per psychiatric & mental health specialist	-	74.7	-	
	Process	Medication	Atypical medication prescription rate (schizophrenia)	-	65.5	-	
		Psychotherapy	Fulfillment rate of psychotherapy standard	-	87.8	-	
			Fulfillment rate of individual psychotherapy standard	-	85.4	-	
	Outcomes	Days of hospitalization	Days of hospitalization_ median (schizophrenia)	-	379.4	-	
			Days of hospitalization_median (alcoholism)	-	130.0	-	
		Readmission rate	Readmission rate within 30 days of discharge (schizophrenia)	-	36.4	-	
Hemodialysis	Structure	Human resources	Rate of doctors who specializes in hemodialysis	-	76.1	-	
			Mean number of daily hemodialysis per doctor	-	22.1	-	
			Rate of nurses who have 2years or longer experience in hemodialysis	-	74.0	-	
			Mean of daily hemodialysis per nurse	-	4.4	-	
		Equipments	Fulfillment rate of minimum number of isolated hemodializer for hepatitis B patients	-	99.5	-	
			Availability of emergency equipment in hemodialysis ward	-	63.4	-	
		Facilities	Fulfillment rate of water examination cycle	-	85.8	-	
	Process	Hemodialysis adequacy level	Fulfillment rate of hemodialysis adequacy test cycle	-	94.5	-	
		Blood vessel management	Fulfillment rate of arteriovenous fistula monitoring	-	81.1	-	
		Periodic Test	Fulfillment rate of periodic test cycle	-	94.4	-	
		Anemia management	Iron injection rate †	-	23.0	-	
	Outcome	Hemodialysis adequacy level	Hemodialysis adequacy level fulfillment rate	-	85.2	-	

Assessment Item	Indicators			Results			
				2009	2010	Up & down	Improvement
		Anemia management	Rate of patients with Hb 10g/dℓ or under	–	28.4	–	
			Iron storing fulfillment rate	–	52.0	–	
		Blood pressure management	Systolic blood pressure satisfactory rate	–	45.1	–	
			Diastolic blood pressure satisfactory rate	–	86.4	–	
		Minerals & nutrition management	Calcium × phosphorus fulfillment rate	–	73.9	–	
			Albumin concentration	–	3.97	–	
Prescription	Injection		Injection prescription rate	22.2	21.2	1.0 ↓	○
	antibiotics		Prescription rate of antibiotics (all diseases)	26.9	26.1	0.8 ↓	○
			Antibiotics prescription rate for acute upper respiratory infection	53.4	52.1	1.3 ↓	○
	Number of drugs per prescription		No. of drugs per prescription (all diseases)	3.94	3.91	0.03 ↓	○
			No. of drugs per prescription (respiratory diseases)	4.64	4.64	–	
			No. of drugs per prescription (musculoskeletal diseases)	3.70	3.66	0.04 ↓	○
			Prescription rate with more than 6 items	15.8	15.4	0.4 ↓	○
			Prescription rate for digestive system.	53.9	52.5	1.4 ↓	○
	High-priced medicine (the highest price per ingredient) presription1)		Proportion of prescribing high-priced medicine	24.6	22.8	–	
			Proportion of cost for high-priced medicine	39.3	37.8	–	
	NSAIDs/corticosteroids for osteoarthritis		Duplicate prescription rate for NSAIDs	1.2	1.0	0.2 ↓	○
			Prescription rate of corticosteroids	2.9	3.0	0.1 ↑	

* Results of analysis for 2 years' treatment, 2006 –2007 ** Results of analysis for 2 years' treatment, 2008 – 2009.
Note 1) The rate of prescribing high-priced medicine and the proportion of expenses for medicine can not be told the differences for the list of target medicines is changed quarterly.

▪ While the overall quality of care has been improving with the quality assessment, variations within the indictors including medical institution, type, medical department, and region are still being found. Thus, continuous quality improvement is required through the quality assessment.

- The quality assessment, having been focused on acute inpatient services, needs to be expanded to include the areas where the assessment has not been conducted.
  - The scope of assessment should be expanded to hypertension, diabetes, cancer, and other chronic diseases, considering the aging population and the change of medical environment.
- Integrated evaluation for each assessment area by expanding the range of indicators.
  - The assessment needs to be upgraded from that of the volume of utilization, structure, and process to the outcomes of treatments.
  - The assessment for the use of prophylactic antibiotics needs to be extended to that of surgical infection.
- Expansion of the Value Incentive Program based on the quality of medical service and the efficiency of using resources.
  - Increase the number of assessment items for the Value Incentive Program; expand the scope of assessment from an individual disease to a comprehensive evaluation; pursue the method for expansion with a pay for performance (P4P) system.
- Lateral support for the quality improvement projects of healthcare institutions and medical community.
  - Counseling and training for the QI related personnel of medical care institutions; sharing the excellent cases to benchmark through the events
  - Supporting the medical research to improve the objectivity and receptivity of assessment criteria.
- Expand the provision with information about using the medical services from the consumers' perspective.
  - Provide and promote diverse information that is necessary for selecting healthcare services.
  - Provide comprehensive information about each area of treatment including cardio-cerebrovascular diseases and high-risk operations.

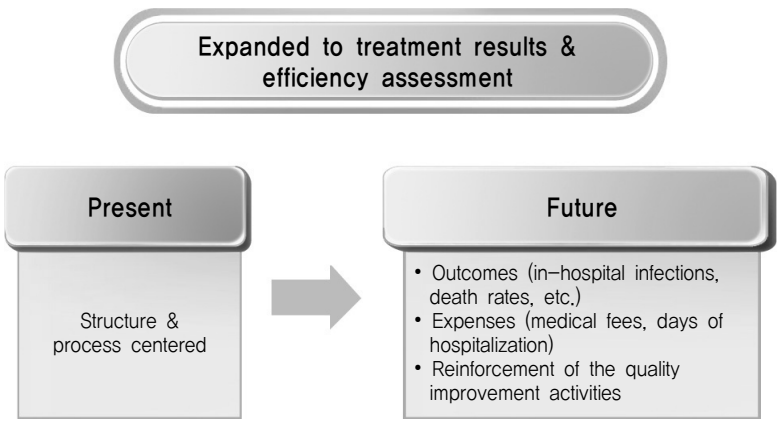


Figure 2.3. Direction of expanding the assessment areas

2. Quality Assessment Results by Area

2.1 Inpatient care area

2.1.1 Acute myocardial infarction

1. Assessment background and objective

- Myocardial infarction and ischemic heart diseases took the third place of death cause next to cancers and cerebrovascular diseases.
  - The number of deaths per 100,000 persons increased from 13.1 in 1995 to 26.0 in 2009.
- The number of in or outpatients of ischemic heart diseases has been consistently growing since 2003.

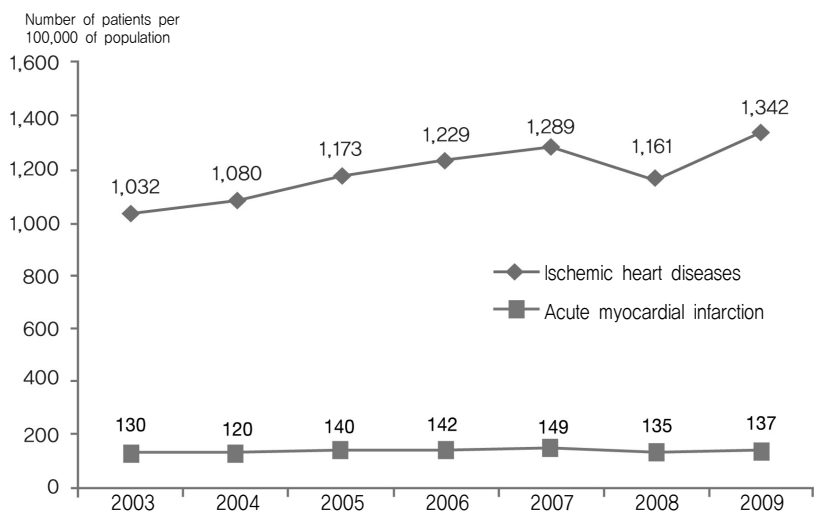


Figure 2.4 The Occurrence of ischemic heart diseases per 100,000 of population

- The case fatality rate for AMI in South Korea is one of the worst among the OECD member states.
  - According to "Health at a glance" published in 2007, the case fatality rate was the highest after Mexico.
- The 2005 assessment results revealed that treatment time is delayed from arrival to revascularization for ischemic hear diseases, which are very risky and incur high medical costs, showing significant variations among the assessed medical care institutions.

▪ Clinical feasibility is relatively well established against the assessment indicator. These are representative items for quality assessment in the USA or other advanced countries. These indicators have a quality improvement effect.)

2. subject to assessment

1) Subject diseases

▪ Patients admitted to hospitals through emergency room for AMI (I21.0~I21.9) based on claims data.

▪ Exclusion criteria

- Cases where final diagnosis was not AMI
- Cases of continued inpatient status when the survey sheet was filled in
- Cases where AMI was discovered during hospitalization for other injuries/diseases
- Cases where the patient died at the time of arrival in hospital
- When the indicator was calculated.
  - Patients who were younger than 18 years
  - Resident registration number errors
  - Pregnancy, childbirth, puerperium (MDC 14)
  - Acquired immunodeficiency syndrome (V103)
  - Metastatic cancer (C77, C78, C79)
  - Heart or lung transplantation (V087, V088)

2) Assessment period

▪ Inpatient treatments performed from January to December 2009.

3) Assessed medical care institutions

▪ 211 general or tertiary hospitals (44 tertiary hospitals, 167 general hospitals))

3. Assessment method

1) Assessment indicator

▪ Acute myocardial infarction (AMI) is a disease for which an early response and prompt cares critical as many patients die before they arrive at a hospital. The fatality rate could be lowered by timely treatment or medication when the patients are hospitalized via an emergency room. Cases of relapse can be reduced by steady medication after release from hospitals. The service related to this disease is assessed by selecting the following related indicators.

Domain	Indicator code	Indicators
Structure	AMI_01	No. of AMI inpatient cases
Process	AMI_02	Thrombolytics administration rate within 60 minutes of hospital arrival
	AMI_03	Primary PCI rate within 120 minutes of hospital arrival
	AMI_04	Aspirin administration rate of hospital arrival
	AMI_05	Aspirin prescription rate of hospital release from hospital
	AMI_06	Beta-blocker prescription rate at discharge
Outcome	AMI_07	Fatality rate (in-hospital and 30 day case fatality after admission)

2) Method of data collection

- Use of medical care benefit claims data and survey sheets

3) Grading method

- Medical care institutions were divided into five grades after calculating the composite quality scores (CQS) using six indicators, except for the number of inpatient cases.

<table>
<tr><th>Stage</th><th>Computing methods</th></tr>
<tr><td>1st</td><td>
■ Grade calculating criteria
– Institutions are excluded when their total number of cases comes to less than 30, or when each indicator comprises fewer than ten cases.
■ Grouping by indicator
– Institutions were divided into three groups considering indicator characteristics (2 x care processes, 1 x care outcome)
① Revascularization: thrombolytic drug administration rate within 60 minutes of hospital arrival; primary PCI rate within 120 minutes of hospital arrival
② Oral medication and prescription rate: Aspirin administered at hospital arrival; aspirin prescription rate at discharge; beta blocker prescription rate at discharge
③ Fatality rate: The fatality rate is converted into a survival index after adjusting with patient
The prediction model is developed by adjusting severity via a univariate analysis with risk factors and logistic regression analysis using a 30-day case fatality as the dependent variable.
Severity
※Prediction model after adjusting with patient severity
The prediction model is developed by adjusting severity via a univariate analysis with risk factors and logistic regression analysis using a 30-day case fatality as the dependent variable.
<table>
<tr><th>Classification</th><th>Risk factors for adjustment</th></tr>
<tr><td>Basic variables</td><td>Age, gender, Killip class</td></tr>
<tr><td>Selected variables</td><td>Time required to reach an emergency room after symptoms were first detected, use of an ambulance, body mass index, serum creatinine, initial blood pressure & pulse, heart test results (ejection fraction, LV wall motion, left main disease, number of blood vessels invaded), EKG diagnosis, CPR, cardiogenic shock, cardiac arrest upon arrival, past history of stroke</td></tr>
</table>
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<table>
<tr><th>Stage</th><th>Computing methods</th></tr>
<tr><td>2nd</td><td>
■ Assigning weight by group
– Different weight values are assigned to the three groups using the Delphi technique
– Weight values: Revascularization (4.5); oral medication or prescription (2.5); fatality rate (3.0)
■ Calculation of Composite Quality Scores (CQS)
<table>
<tr><th>Indicator groups</th><th>Denominator</th><th>Numerator</th><th>Weight values</th></tr>
<tr><td>Revascularization</td><td>A1</td><td>A2</td><td>4.5</td></tr>
<tr><td>Oral medication or prescription</td><td>B1</td><td>B2</td><td>2.5</td></tr>
<tr><td>Case fatality rate</td><td>C1</td><td>C2</td><td>3.0</td></tr>
</table>
$$\text{CQS formula} = \frac{\{(A2/A1)\times 4.5+(B2/B1)\times 2.5+(C2/C1)\times 3.0)}{10} \times 100$$
</td></tr>
<tr><td>3rd</td><td>■ Grading of medical care institutions using CQS
– Equally divided into five grades by type of institution</td></tr>
</table>

4. Assessment results

1) Total results

▪ Indicators of aspirin administration at hospital arrival, aspirin prescription at discharge and beta blocker prescription at discharge have presented high value results of 95% or higher.

▪ The rate of thrombolytics administration within 60 minutes of hospital arrival has increased from 79.7% in 2009 to 81.9% in 2010. The primary PCI rate within 120 minutes of hospital arrival also has increased from 86.9% in 2009 to 91.7% in 2010, a differential increase of 4.8%.

- In the case of the thrombolytics administration rate within 60 minutes of hospital arrival, tertiary hospitals have shown an increase of 4.8%p (86.4%→91.2%) from the previous year, while the general hospitals presented 2.5%p (69.0%→71.5%) of increase.
- Also, the rate of primary PCI within 120 minutes of hospital arrival has been found to have increased by 7.1%p (88.9%→96.0%) in tertiary hospitals, whereas general hospitals have shown an increase of 3.0%p (83.0%→86.0%). While all types of institutions have achieved an increase in both indicators, differences also have been found between the tertiary (91.2%, 96.0%) and general hospitals (71.5%, 86.0%).

Table 2.4 Assessment results of acute myocardial infarction by indicator

(Unit: Institution, Cases, %)

Classification			2009[1]			2010[1]			Ups & downs from 2009
			No. of Institution	No. of cases	Total outcome[2]	No. of institution	No. of cases	Total outcome[2]	
No. of AMI inpatient cases		Total	195	11,656	11,656	211	15,776	15,776	4,120 ↑
		Tertiary hospitals	43	8,465	8,465	44	9,166	9,166	701 ↑
		General hospitals	152	3,191	3,191	167	6,610	6,610	3,419 ↑
Thrombolytics administration rate within 60 min. of hospital arrival		Total	74	370	79.7	91	519	81.9	2.2 ↑
		Tertiary hospital	33	228	86.4	34	273	91.2	4.8 ↑
		General hospital	41	142	69.0	57	246	71.5	2.5 ↑
Primary PCI rate within 120 min. of hospital arrival		Total	116	3,095	86.9	131	5,980	91.7	4.8 ↑
		Tertiary hospital	42	2,037	88.9	44	3,364	96.0	7.1 ↑
		General hospital	74	1,058	83.0	87	2,616	86.0	3.0 ↑
Aspirin administration rate of hospital arrival		Total	165	7,019	98.1	190	11,944	98.6	0.5 ↑
		Tertiary hospital	43	4,801	98.8	44	6,842	99.7	0.9 ↑
		General hospital	59	2,218	96.6	146	5,102	97.2	0.6 ↑
Aspirin prescription rate at discharge		Total	146	9,730	99.4	168	13,371	99.3	0.1 ↓
		Tertiary hospital	43	7,098	99.6	44	7,964	99.6	0.0 ↑
		General hospital	64	2,632	98.9	124	5,407	98.9	0.0 ↑
Beta-blocker prescription rate at discharge		Total	145	8,019	96.0	165	11,235	95.7	0.3 ↓
		Tertiary hospital	43	5,967	97.7	44	6,823	98.7	1.0 ↑
		General hospital	58	2,052	91.1	121	4,412	91.3	0.2 ↑
Fatality rate[3]	In-hospital case fatality rate	Total	103	7,763	7.5	189	13,359	7.0	0.5 ↓
		Tertiary hospital	43	5,300	7.4	44	7,747	5.6	1.8 ↓
		General hospital	60	2,463	7.8	145	5,612	8.9	1.1 ↑
	30-day case fatality rate	Total	103	7,763	8.6	189	13,359	7.7	0.9 ↓
		Tertiary hospital	43	5,300	8.2	44	7,747	6.4	1.8 ↓
		General hospital	60	2,463	9.4	145	5,612	9.6	0.2 ↑

Note. 1) The whole year's treatment records of 2008 and 2009 were counted for tertiary hospitals, while the records for the second half of 2008 and the year of 2009 were assessed for general hospital.
2) The values were calculated for institutions with one or more denominator cases by indicator.
3) Results of fatality rate after adjusting with patient severity

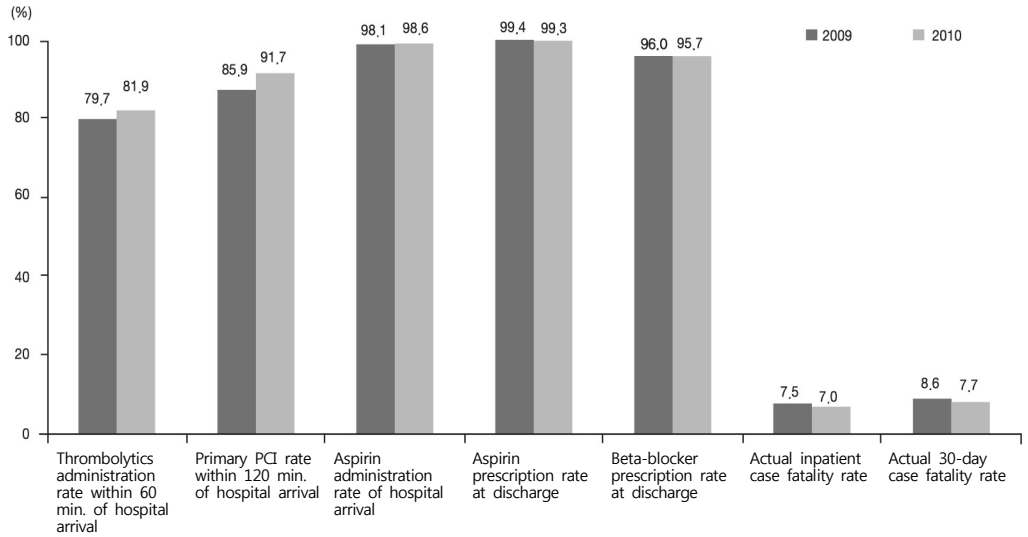


Figure 2.5 Assessment results of AMI by indicator

2) Results by institution

- The deviations between the institutions have been reduced in all indicators except for the beta-blocker prescription rate at discharge in 2010, compared to the previous year.
  - Especially, the indicators of thrombolytics administration rate within 60 min. of hospital arrival and P.PCI rate within 120 min. of hospital arrival have presented greater decreases in deviation existed between the two types of institutions.
- All indicators including thrombolytics administration rate within 60 minutes of hospital arrival have presented higher results values in tertiary hospitals than in general hospitals.

Table 2.5 Assessment results of AMI by institution

(Unit: case, %)

Classification		Type of institution	Mean[1)]	Standard deviation	Median	Minimum	Maximum	Q1	Q3
Number of AMI in-patient cases		Total	75	106	31	1	698	3	116
		Tertiary hospitals	208	136	164	37	698	122	283
		General hospitals	40	59	7	1	337	2	57
Thrombolytics administration rate within 60 min. of hospital Arrival		Total	78.7	24.4	87.5	20.0	100.0	72.3	100.0
		Tertiary hospitals	87.2	21.5	96.2	20.0	100.0	83.3	100.0
		General hospitals	69.2	24.5	75.0	20.0	100.0	48.9	87.5
Primary PCI rate within 120 min. of hospital arrival		Total	86.3	15.8	91.0	20.0	100.0	81.8	97.2
		Tertiary hospitals	94.6	6.8	97.2	74.2	100.0	94.2	99.1
		General hospitals	81.0	17.5	85.7	20	100.0	76	92
Aspirin administration rate of hospital arrival		Total	98.1	4.8	100.0	64.3	100.0	98.7	100.0
		Tertiary hospitals	99.5	0.8	100.0	96.7	100.0	99.2	100.0
		General hospitals	97.4	5.9	100.0	64.3	100.0	96.9	100.0
Aspirin prescription rate at discharge		Total	98.9	3.0	100.0	74.1	100.0	99	100.0
		Tertiary hospitals	99.6	0.8	100.0	95.8	100.0	99.5	100.0
		General hospitals	98.6	3.7	100.0	74.1	100.0	98.9	100.0
Beta-blocker prescription rate at discharge		Total	91.0	17.0	97.1	0.0	100.0	90.9	100.0
		Tertiary hospitals	97.7	3.6	99.2	81.8	100.0	96.9	100.0
		General hospitals	87.2	20.2	94.4	0.0	100.0	86.7	100.0
Fatality rate[2)]	In-hospital	Total	7.5	4.4	6.9	0.0	23.1	4.7	9.3
		Tertiary hospitals	6.3	2.5	6.2	0.0	11.5	4.9	8.0
		General hospitals	8.2	5.0	7.6	0.0	23.1	4.5	10.7
	30-day case fatality rate	Total	8.1	4.4	7.8	0.0	24.7	5.7	9.8
		Tertiary hospitals	7.2	3.1	7.5	0.0	16.1	5.7	8.5
		General hospitals	8.5	4.9	8.0	0.0	24.7	5.7	10.8

Note. 1) The values were calculated with ten or more denominator cases by indicator excluding the number of inpatients. However, five or more cases were calculated for the rate of thrombolytics administration within 60 minutes of hospital arrival and primary PCI within 120 minutes of hospital arrival.
2) The fatality rate was adjusted by the patients' severity.

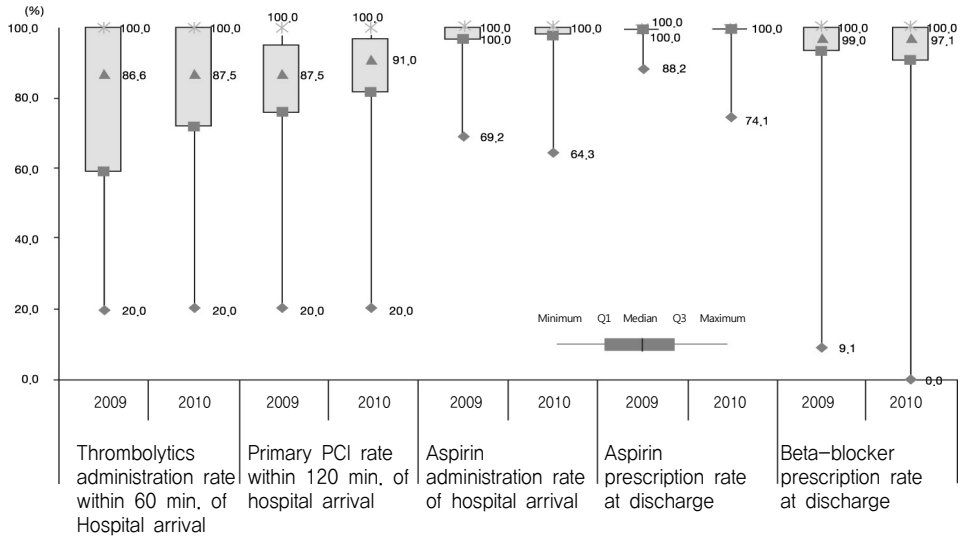


Figure 2.6 Assessment results of AMI by type of institution

3) Composite results

- The distribution of composite scores from each type of institution indicates a mean point of 93.41, with a minimum of 57.13 and a maximum of 101.78, which represents the variations between the institutions.
  - The tertiary hospitals presented higher mean points (97.38±3.19) with lower variations than the general hospitals (90.49±7.90).

Table 2.6 Composite scores of AMI assessment

(Unit: Institution, Case, Point)

Classification	Subject institution	Subject case	Distribution by institution						
			Mean	S.D.	Minimum	Q1	Median	Q3	Maximum
Total	104	15,035	93.41	7.19	57.13	91.05	95.54	98.55	101.78
Tertiary	44	9,166	97.38	3.19	88.04	96.81	98.53	99.29	101.78
General	60	5,869	90.49	7.90	57.13	87.00	92.68	95.88	100.59

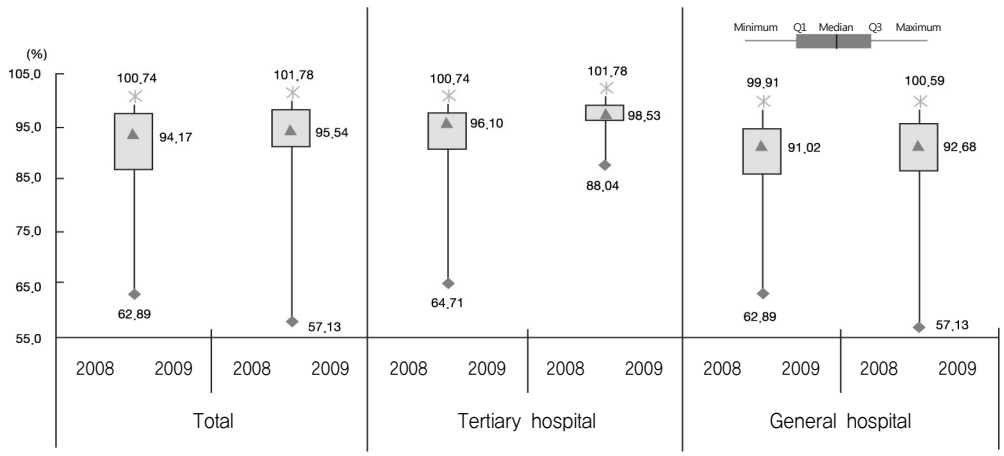


Figure 2.7 Overall results of AMI assessment

▪ Composite score is equally divided into five grades by categorizing types.

Table 2.7 Overall assessment results of AMI by type of institution

(Unit: Institution, %)

Classification	Tertiary hospital		General hospital	
Total	44	(100.0)	167	(100.0)
★★★★★ (1st grade)	9	(20.5)	12	(7.2)
★★★★☆ (2nd grade)	9	(20.5)	12	(7.2)
★★★☆☆ (3rd grade)	8	(18.2)	12	(7.2)
★★☆☆☆ (4th grade)	9	(20.5)	12	(7.2)
★☆☆☆☆ (5th grade)	9	(20.5)	12	(7.2)
Excluded from grading[1)]	0	(0.0)	107	(64.0)

Note. 1) Institutions are excluded when their total number of cases comes to fewer than 30 or when each individual indictor has less than ten cases.

5. Other key factors

- A total of 120.9 billion won was claimed for 15,776 cases of AMI. The average length of stay in the hospital was 8.7 days, with an average medical cost of 7.57 million won per case.

Table 2.8 Claiming status of AMI cases assessed

Classification	Total	Tertiary hospital	General hospital
Total medical cost claimed (100 million won)	1,209	739	470
No. of cases	15,776	9,166	6,610
No. of days in hospital (days)	8.7	8.7	8.7
Medical cost per case (10,000 won)	757	796	704

- The use of an ambulance was rated at 51.3%, which increased by 4.7% from the previous year, but the time taken to arrive at hospital after heart pain started was found to be 164 minutes, with an eight minute delay compared to the results of 2009.
  - The average time taken for those who used an ambulance was 149 minutes, while 182 minutes were taken for non-users of an ambulance.
- The thrombolytics administration rate for AMI patients was 7.3% and the time taken from arrival at the hospital to the administration of thrombolytics was 40 minutes (Median).
- The rate of primary PCI for AMI patients was 85.4%, which had increased by 3.9% over the last year, and the time taken from arrival at the hospital to balloon inflation was shortened by 9 minutes, from 85 to 76 minutes (Median).

Table 2.9 Other key factors related to AMI assessment

Classification	Total	Tertiary hospital	General hospital
Rate of ambulance use (%)	51.3	52.4	50.0
Time taken to arrive at hospital after heart pain started (min.)	164	176	145
Thrombolytics administration rate for AMI patients (%)	7.3	6.9	7.9
P.PCI rate for AMI patients (%)	85.4	86.9	83.5
Median of time taken from arrival at hospital to administer thrombolytics (min.)	40	33	48
Median of time taken from arrival at hospital to P. PCI Balloon inflation (min.)	76	72	81

2.1.2 Acute stroke

1. Assessment background and objective

- Medical costs keep growing because of the high frequency of disabilities and other complications that occur after suffering stroke.
- Continuous increase in the number of stroke patients and medical care cost according to the aging of the population
  - In 2009, a total of 524,689 patients (both inpatients and outpatients) were treated for stroke (I60~I63) at general or tertiary hospitals (18.5% increase over 2 005) and their claims amounted to 870.3 billion won (54.7% increase over 2005).

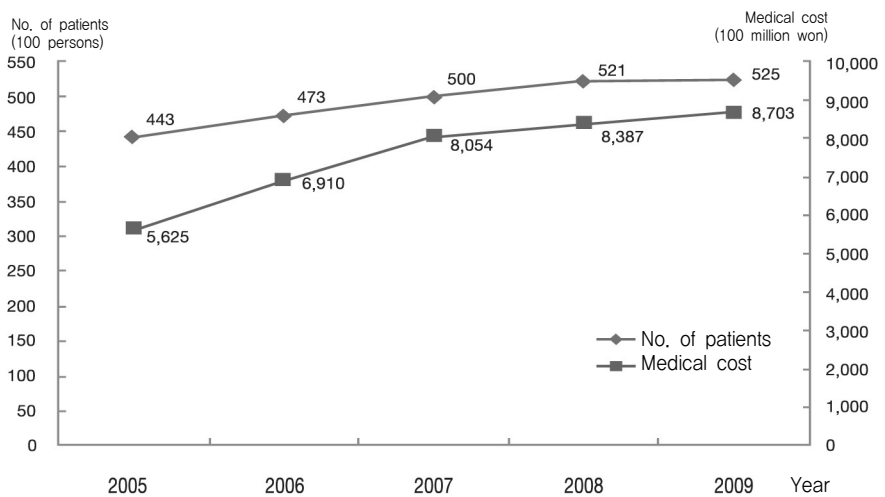


Figure 2.8 The number of acute stroke patients and status of medical cost

- Cerebrovascular disease takes first place among the causes of death as a single disease in South Korea
  - The status of death rates caused by cardiovascular and cerebrovascular diseases in 2009 (deaths per 100,000 of population) were reported as 52.0 persons from cerebrovascular diseases > 26.0 persons from ischemic heart disease > 9.6 persons from hypertension diseases.
  - The analysis of the crude fatality rate for stroke inpatients of tertiary and general hospitals in 2009 (I60~I63) revealed that the in-hospital case fatality rate was 8.3% (0.9% decrease from 2005) and the case fatality rate within 30 days after discharge was 12.0% (2.0% decrease from 2005).
- As the first year assessment indicated, the second year assessment also found considerable variations among the medical institutions. The variations were more significant in secondary prevention and the management of patients' status than initial responses and more in general hospitals than in tertiary hospitals.

- Consistent assessments are required to improve the quality of AMI care service and to reduce the variations among the institutions.

2. Subject to assessment

1) Subject diseases

▪ Cases of inpatients admitted through the emergency room for stroke (I60~I63) as the main disease within one week after symptoms developed, according to the claims data.

▪ Exclusion criteria

- Patients who were younger than 18 years
- Patients who had a traumatic injury as well
- Patients who belonged to medical departments other than internal medicine, neurology, neurosurgery, emergency medicine and rehabilitation medicine
- Resident registration number errors
- Patients hospitalized on 1 Jan. 2010 or earlier, or discharged from hospital on 31 Mar. 2010 or later
- Patients hospitalized for one day or less (after bundled by episode)
- Patients hospitalized in seven days or later from symptoms developed
- The cases that the actual diseases in the medical records are not included in I 60~I63
- Patient who developed stroke while hospitalized for another disease or as a results of a traumatic injury
- Patients hospitalized for complications related to past stroke.
- Patients who were not admitted via emergency room

2) Assessment period

▪ Inpatient treatment performed from January to March 2010.

3) Assessed medical care institutions

The subjects for the assessment consisted of 201 institutions of general or tertiary hospitals that claimed 10 or more admissions for acute stroke during the assessment period (44 tertiary hospitals, 157 general hospitals).

※ For institutions with less than 100 cases of acute stroke inpatients, complete surveys were conducted, while institutions with 100 or more cases were assessed by a random sampling method with a sample size of 100.

3. Assessment method

1) Assessment indicator

▪ As initial timely treatment based on an accurate diagnosis influences the degree of handicap or even the life or death of acute stroke patients, the selected assessment indicators included the status of an institution's expert personnel, which in turn gives an indication of the institution's capacity for treatment, initial diagnosis, initial treatment, and whether secondary preventive treatment is duly performed.

Domain	Items	Indicator code	Indicators
Structure	Treatment ability	STR_01	Organization of specialist personnel (Specialists of neurology, neurosurgery, and rehabilitation medicine)
Process: Acute stroke (I60–I63)	Patient Status assessment & management	STR_11	Documentation rate of smoking history (doctor's record)
		STR_12	Neurological examination rate (Category–consciousness, motor and sensory functions, cranial nerve exam, reflex function)
		STR_13	Dysphagia examination rate (within 2 days)
	Initial diagnosis	STR_21	Brain imaging rate (within 24 hours)
		STR_22	Brain imaging rate (within 1 hour) †
	Initial treatment	STR_31	Consideration rate of early rehabilitation (within 3 days) †
Process: ischemic stroke (I63)	Initial diagnosis	STR_23	Lipid profile test rate (including the test within 30 days before admission)
	Initial treatment	STR_32	Consideration rate of IV t–PA initiation
		STR_33	IV t–PA administration rate †
		STR_34	Antithrombotics administration rate (within 48 hours)
	Secondary prevention	STR_41	Antithrombotics prescription rate of at discharge
		STR_42	Anticoagulants prescription rate at discharge (atrial fibrillation)

† Indicators that were added to assessment of ischemic stroke in 2010

2) Data collection method

▪ Use of medical care benefit claims data and survey sheet

3) Grading method

▪ The structure and process indicator values are combined and categorized into five grades.

Stage	Calculation methods
1st	■ Result calculation by indicator – Calculating the results of structure indicators – Values of process indicators are calculated when there are 5 or more denominator cases.
2nd	※ Calculation of composite quality score (CQS) – Composite scores are calculated for institutions with 4 or more process indicators for assessment ■ Assigning standardized scores by assessment areas (1–4 points) – Assigning standardized scores according to the results from the indicators of structure and process, and the number of process indicators for assessment (1~4 points) ■ Weighting each assessment area – Structure indicator (3.0), Process indicator (4.5), Number of process indicators for assessment (2.5) ■ The composite scores are calculated by multiplying the scores of each area by the weighted values. (Σ Standardized scores by area X weight)
3rd	■ The institutional composite scores are rescored into a 100 point scale. ■ Grading based on the composite scores

Grade	Composite Scores
★★★★★ (1st grade)	90 and higher
★★★★☆ (2nd grade)	70 and higher ~ less than 90
★★★☆☆ (3rd grade)	50 and higher ~ less than 70
★★☆☆☆ (4th grade)	30 and higher ~ less than 50
★☆☆☆☆ (5th grade)	Less than 30

† [Excluded from Grading] is for institutions with less than 3 process indicators for assessment.

4. Assessment results

1) Organization area

▪ The number of institutions having permanent specialist doctors for 3 medical departments was 128 (63.7%), which had increased by 6.0%p from 112 institutions (57.7%) in 2008.

Table 2.10 The Status of specialized personnel employed by the institutions assessed for acute stroke.

(Unit: Institution, %, %p)

Classification †		No. of institutions		A		B		C		D	
Total	2010	201	(100.0)	128	(63.7)	48	(23.9)	25	(12.4)		–
	Variation from 2008			(6.0↑)		(1.7↑)		(7.2↓)		(0.5↓)	
Tertiary hospital	2010	44	(100.0)	43	(97.7)	1	(2.3)	–		–	
	Variation from 2008			(7.0↑)		(7.0↓)		–		–	
General hospital	2010	157	(100.0)	85	(54.1)	47	(29.9)	25	(15.9)	–	
	Variation from 2008			(5.8↑)		(4.1↑)		(9.3↓)		(0.7↓)	

† Grades are calculated based on the availability of permanent specialist doctors of neurology, neurosurgery, and rehabilitation medicine into 4 levels from A to D.

2) Process areas

▪ Total results

- Overall improvements were found in the averages of 9 process indicators with newly added indicators excluded, and the dysphagia examination rate (within 2 days) and anticoagulants prescription rate at discharge indicated comparatively high increases of 5.2%p and 3.3%p over 2008.
- The indicators such as consideration rate of early rehabilitation within 3 days and IV t-PA administration rate that were newly added in 2010, presented at 89.4% and 74.0% respectively, indicating relatively lower rates than the other indicators.

Table 2.11 Assessment results 1 of acute stroke by type of institution

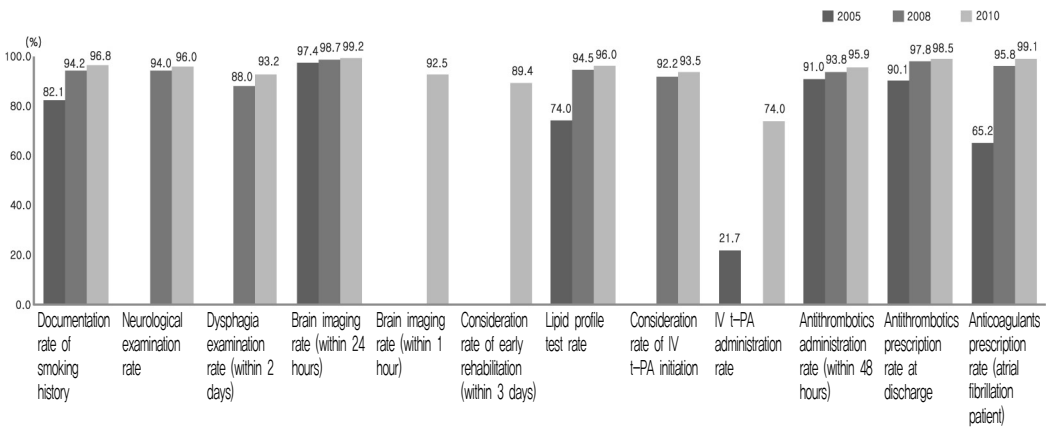
(Unit: Institution, cases, %, %p)

Classification	No. of institution	No. of cases	No. of cases	Total results	Variation from 2008
Documentation rate of smoking history	Total	191	7,836	96.8	2.6 ↑
	Tertiary hospital	44	3,453	99.9	0.2 ↑
	General hospital	147	4,383	94.3	4.1 ↑
Neurological examination rate	Total	191	7,836	96.0	2.0 ↑
	Tertiary hospital	44	3,453	99.9	0.7 ↑
	General hospital	147	4,383	92.8	2.5 ↑
Dysphagia examination rate (within 2 days)	Total	189	7,554	93.2	5.2 ↑
	Tertiary hospital	44	3,409	99.3	4.0 ↑
	General hospital	145	4,145	88.1	5.6 ↑
Brain imaging rate (within 24 hours)	Total	188	6,779	99.2	0.5 ↑
	Tertiary hospital	44	3,066	99.3	0.1 ↑
	General hospital	144	3,713	99.0	0.7 ↑
Brain imaging rate † (within 1 hour)	Total	133	1,673	92.5	–
	Tertiary hospital	44	716	90.9	–
	General hospital	89	957	93.6	–
Consideration rate of early rehabilitation † (within 3 days)	Total	187	7,250	89.4	–
	Tertiary hospital	44	3,311	98.2	–
	General hospital	143	3,939	82.1	–
Lipid profile test rate	Total	172	4,718	96.0	1.5 ↑
	Tertiary hospital	44	2,182	99.2	1.1 ↑
	General hospital	128	2,536	93.2	1.7 ↑
Consideration rate of IV t-PA initiation	Total	96	818	93.5	1.3 ↑
	Tertiary hospital	40	370	98.9	2.6 ↑
	General hospital	56	448	89.1	0.1 ↓
IV t-PA Administration rate †	Total	25	150	74.0	–
	Tertiary hospital	12	72	95.8	–
	General hospital	13	78	53.8	–

Classification	No. of institution	No. of cases	No. of cases	Total results	Variation from 2008
Antithrombotics administration rate (within 48 hours)	Total	172	4,628	95.9	2.1 ↑
	Tertiary hospital	44	2,161	99.6	3.4 ↑
	General hospital	128	2,467	92.7	0.8 ↑
Antithrombotics prescription rate at discharge	Total	153	3,762	98.5	0.7 ↑
	Tertiary hospital	44	1,831	99.9	–
	General hospital	109	1,931	97.3	1.4 ↑
Anticoagulants prescription rate (atrial fibrillation patient)	Total	42	319	99.1	3.3 ↑
	Tertiary hospital	29	229	99.6	1.3 ↑
	General hospital	13	90	97.8	6.0 ↑

Note. 1) † Indicates that were newly added to assessment of acute stroke in 2010.
2) The calculation was made for the institutions with 5 or more denominator cases in each indicator.

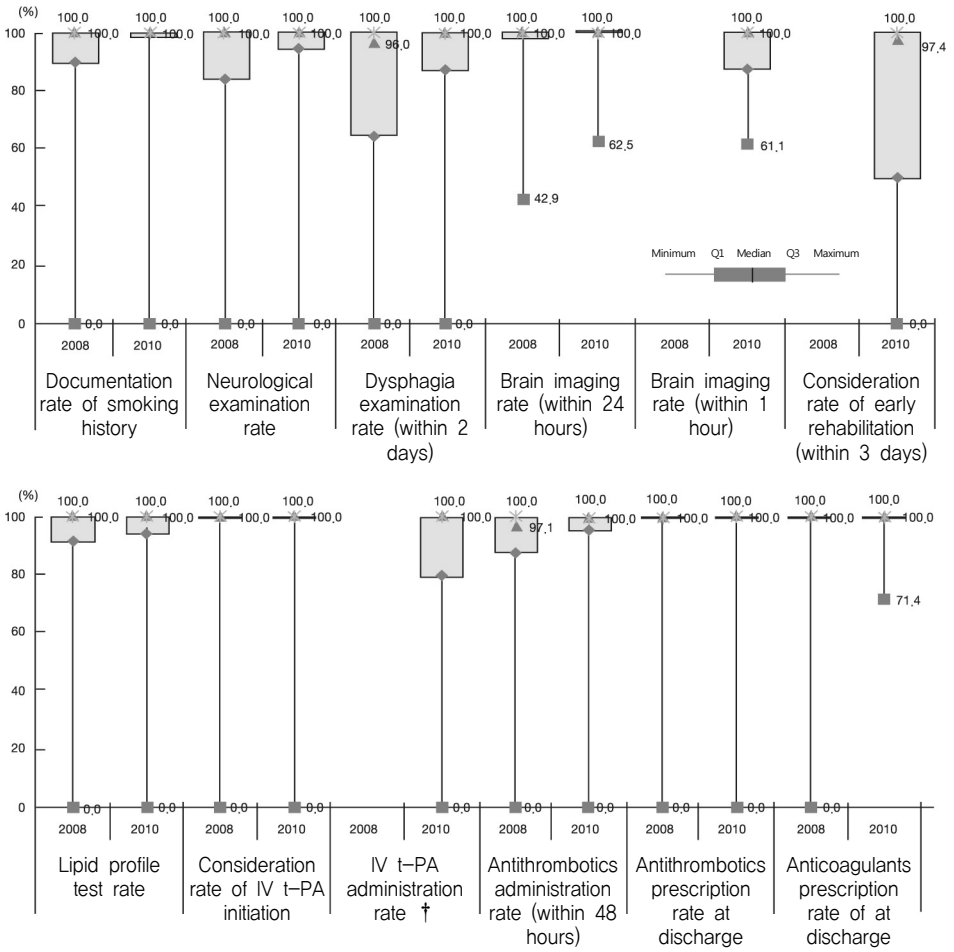
- All indicators except for the seven newly added indicators were found to have continuously increased from the first assessment in 2005, and especially, the indicators such as IV t-PA administration rate (52.3%p), anticoagulants prescription rate at discharge (atrial fibrillation patient) (33.9%p), and lipid profile test rate (22.0%p) have shown an outstanding increase.



† Calculated with the institution having 5 or more denominator cases

Figure 2.9 Annual assessment results of acute stroke by process indicator

- Overall improvements in all areas of treatment have been found compared to 2008, and the variations in each indicator have also been reduced.



† Calculated with the institutions having 5 or more denominator cases

Figure 2.10 Annual assessment results of acute stroke by process indicator

▪ Results by Institution

- The variations among the institutions in all indicators, except for brain imaging rate (within 24 hours and within 1 hour) and anticoagulants prescription rate at discharge (atrial fibrillation patient), were still revealed to be significant, mainly due to the general hospitals.
- The consideration rate of early rehabilitation (within 3 days) and IV t-PA administration rate that were newly added in 2010, were found to have greater variations among institutions than the other indicators.

Table 2.12 Assessment results 2 of acute stroke by type of institution

(Unit: Institution, cases, %,)

Classification	Type of institution	Mean †	Standard deviation	Median	Minimum	Maximum	Q^1	Q^3
Documentation rate of smoking history	Total	90.1	25.4	100.0	0.0	100.0	98.8	100.0
	Tertiary hospital	99.9	0.2	100.0	98.8	100.0	100.0	100.0
	General hospital	87.1	28.3	100.0	0.0	100.0	91.4	100.0
Neurological examination rate	Total	89.5	25.2	100.0	0.0	100.0	94.3	100.0
	Tertiary hospital	99.9	0.4	100.0	97.6	100.0	100.0	100.0
	General hospital	86.3	28	100.0	0.0	100.0	89.8	100.0
Dysphagia examination rate (within 2 days)	Total	81.6	33.9	100.0	0.0	100.0	87.5	100.0
	Tertiary hospital	99.2	1.9	100.0	91.3	100.0	98.9	100.0
	General hospital	76.3	37.1	97.1	0.0	100.0	76.2	100.0
Brain imaging rate (within 24 hours)	Total	98.5	4.3	100.0	62.5	100.0	100.0	100.0
	Tertiary hospital	99.2	1.8	100.0	89.8	100.0	98.7	100.0
	General hospital	98.2	4.8	100.0	62.5	100.0	100.0	100.0
Brain imaging rate † (within 1 hour)	Total	92.7	9.4	100.0	61.1	100.0	87.5	100.0
	Tertiary hospital	91.5	10.5	94.6	61.1	100.0	86.4	100.0
	General hospital	93.2	8.8	100	66.7	100.0	88.9	100.0
Consideration rate of early rehabilitation † (within 3 days)	Total	74.2	36.7	97.4	0.0	100.0	50.0	100.0
	Tertiary hospital	98.1	5.0	100.0	71.4	100.0	98.8	100.0
	General hospital	66.9	39.1	90.0	0.0	100.0	36.8	100.0
Lipid profile test rate	Total	91.4	20.9	100.0	0.0	100.0	94.4	100.0
	Tertiary hospital	99	2.1	100.0	91.7	100.0	99.7	100.0
	General hospital	88.8	23.6	100.0	0.0	100.0	90.0	100.0
Consideration rate of IV t-PA initiation	Total	92.2	22.3	100.0	0.0	100.0	100.0	100.0
	Tertiary hospital	98.9	3.9	100.0	83.3	100.0	100.0	100.0
	General hospital	87.5	28.2	100.0	0.0	100.0	98.4	100.0
IV t-PA administration rate †	Total	76.9	36.5	100.0	0.0	100.0	80.0	100.0
	Tertiary hospital	95	12.4	100.0	60.0	100.0	100.0	100.0
	General hospital	60.3	43.5	80.0	0.0	100.0	14.3	100.0
Antithrombotics administration rate (within 48 hours)	Total	90.9	21.5	100.0	0.0	100.0	95.6	100.0
	Tertiary hospital	99.6	1.3	100.0	93.9	100.0	100.0	100.0
	General hospital	87.9	24.3	100.0	0.0	100.0	90.0	100.0
Antithrombotics prescription rate at discharge	Total	97.4	11.1	100.0	0.0	100.0	100.0	100.0
	Tertiary hospital	99.8	0.9	100.0	95.0	100.0	100.0	100.0
	General hospital	96.4	13	100.0	0.0	100.0	100.0	100.0
Anticoagulants prescription rate (atrial fibrillation patient)	Total	99.1	4.6	100.0	71.4	100.0	100.0	100.0
	Tertiary hospital	99.7	1.7	100.0	90.9	100.0	100.0	100.0
	General hospital	97.8	7.9	100.0	71.4	100.0	100.0	100.0

† Calculated with the institutions having 5 or more denominator cases

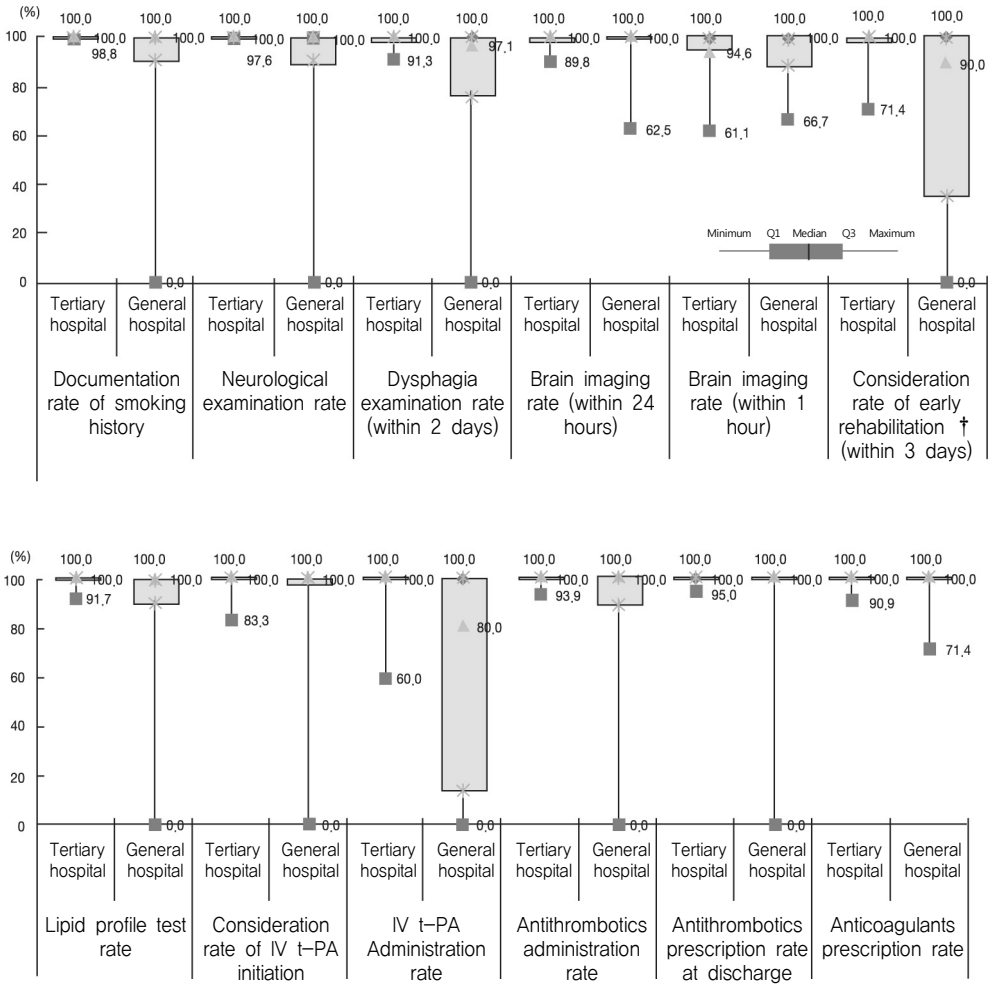


Figure 2.11 Assessment results of acute stroke process indicator by type of institution

3) Overall results

- The overall results was calculated for 189 institutions (94.0%) out of the 201 total assessment subjects.
  - Twelve institutions with three or less process indicators for assessment were excluded from grading.
- 96 institutions were included in the 1st grade (47.8%); 43 institutions out of 44 tertiary hospitals (97.7%) and 53 out of 157 general hospitals (33.8%).
- Eight institutions were included in the 5th grade, which are all general hospitals.

Table 2.13 Institutional status by grade based on the CQS of acute stroke

(Unit: Institution, %)

Classification	Total	Tertiary hospital	General hospital
Total	201 (100.0)	44 (100.0)	157 (100.0)
★★★★★ (1st grade)	96 (47.8)	43 (97.7)	53 (33.8)
★★★★☆ (2nd grade)	39 (19.4)	1 (2.3)	38 (24.2)
★★★☆☆ (3rd grade)	29 (14.4)	–	29 (18.5)
★★☆☆☆ (4th grade)	17 (8.5)	–	17 (10.8)
★☆☆☆☆ (5th grade)	8 (4.0)	–	8 (5.1)
Excluded from grading †	12 (6.0)	–	12 (7.6)

† Note. 1) Institutions that had only three or less process indicators were excluded from computation of the CQS

5. Other key factors

- The time taken to arrive at the emergency room after showing symptoms of stroke was
  - noted as 824±1,437 minutes on average (mean), and the median was 243 minutes (54 minute increase from 2008).
  - 43.3% of patients arrived at the emergency room within three hours of the symptoms being noticed (5.7%p decrease from 2008).
- The rate of using an ambulance was 56.1%, which increased by 7.6%p over 2008 (48.5%).
  - The mean time taken to get to the emergency room was 603.2 minutes for the users of an ambulance (349.1 minutes in 2008), and 1,124.6 minutes for non-users of an ambulance (958.8 minutes in 2008), which indicated that the users of ambulances arrived two times faster than non-users of ambulances.
  - The rate of patients who arrived within 3 hours of the symptoms first being noticed was 53.6% for the users of an ambulance, and 29.7 % for non-users of an ambulance, which consisted of a 23.9% gap.

2.1.3 Use of prophylactic antibiotics for surgery

A. Assessment background and objective

- Surgical site infections accounted for approximately 15.5% of the total number of infections mortality at hospitals and 14% of the complications experienced by hospitalized patients. (Korea Society for Nosocomial Infection Control, 1996).
- The number of claims made through the online media regarding the subject surgeries for assessment was 322,045 cases in 2009, and the total amount of the medical cost was 1.0462 trillion won.

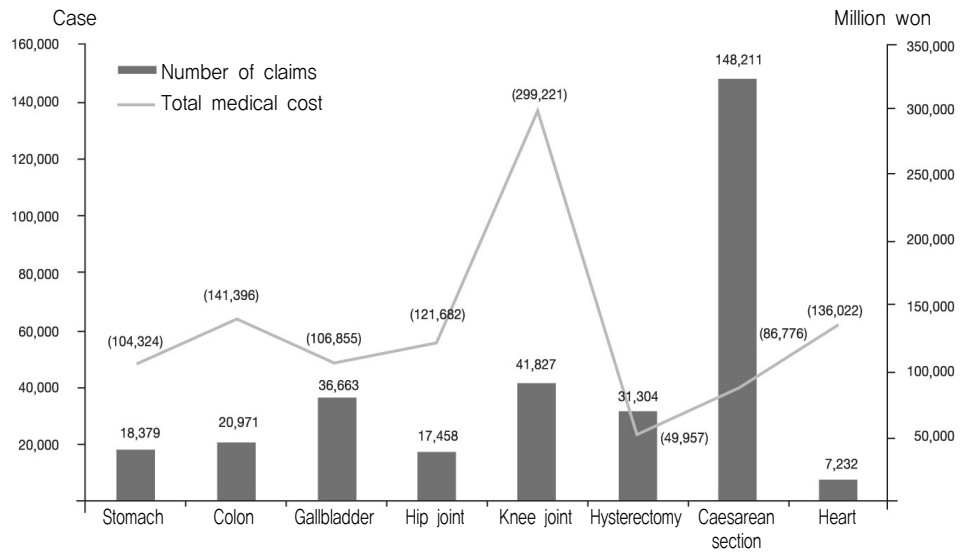


Figure 2.12 Status of the number of claims and medical cost on the subject surgeries of assessment

- It is important to select and use antibiotics that meet the criteria using an accurate dosage and method for an adequate period so as to prevent surgical site infection.
- A preliminary assessment results (HIRA ,2006) for the use of prophylactic antibiotics for surgery revealed that the rate of compliance with the guidelines on the use of the prophylactic antibiotics for surgery was low and that variations were significant among the assessed medical care institutions.
- The assessment was performed to induce the voluntary improvement of quality by care institutions and to provide the general public with essential information for using medical services.

2. Subject to assessment

1) Subject Surgeries

▪ Surgeries

- Surgery of the stomach, colon, and gall bladder; total hip replacement arthroplasty; total knee arthroplasty; hysterectomy; Caesarean section; and cardiac surgery.

▪ Exclusion criteria

- Patients who are younger than 18 years
- Patients who are transferred from another hospital
- Patients who had 38℃ or higher fever within the 24 hours preceding surgery
- Patients who were diagnosed with an infection when hospitalized
- Patients who had a knee replacement because of rheumatoid arthritis
- Patients who had colon surgery because of Crohn's disease or u lcerative colitis
- Patients who had an ASA score[1] of class 4 or higher
- Emergency surgery
- Premature rupture of membrane during Caesarean section operation
- Total hip replacement for traumatic injury
- When another surgery is performed at the same time with the surgery subject to assessment (Surgeries that were performed through skin incision and under the identical view to assessed surgery was performed or those that were performed in a serial process are included in those subject to assessment)
- When two or more surgeries were performed within the identical hospitalization period (total knee replacement arthroplasty is included in those subject to assessment)
- Patients who had open-heart surgery in the past (cardiac surgery)
- Errors of resident registration numbers

2) Assessment period

▪ Inpatient treatment performed from Aug. to Oct. 2009

3) Assessed medical care institutions

▪ 346 care institutions of hospital or greater sized that claimed ten or more cases of surgery during the above period. (44 tertiary hospital, 131 general hospitals, and 171 hospitals)

※ All cases were surveyed for hospitals with 60 cases of surgery or less; however, 60 cases were randomly extracted for hospitals with more than 60 cases.

1) ASA (American Society of Anesthesiologists) score: given by an anesthesiologist before surgery by assessing the patient".s condition.

3. Assessment method

1) Assessment indicator

▪ As the use of adequate antibiotics according to the established principles is important for reducing the rate of surgery site infections, 'adequate time and period of administration' and 'selection of antibiotics' were selected as assessment indicators.

Items	Indicator code	Indicators
Time first administered	SIP_***_01	Initial prophylactic antibiotics within one hour before skin incision †
	SIP_kne_02	Prophylactic antibiotics administration rate before proximal tourniquet inflation
Selection of antibiotics	SIP_***_03	Administration rate of aminoglycosides †
	SIP_***_04	Administration rate of 3rd or later generation cephalosporin antibiotics †
	SIP_***_05	Prophylactic antibiotics combination rate †
Period administered	SIP_***_06	Antibiotics prescription rate at discharge †
	SIP_***_07	Total average prophylactic antibiotics administration days † (Administered at hospital + prescription at discharge)
Records	SIP_***_10	Documentation rate of history of antibiotics allergy
	SIP_***_11	Documentation rate of ASA class

*** : Marking of surgery types – gas: gastrectomy, col: colorectal, LLC: Laparoscopic gallbladder surgery, hip: total hip replacement arthroplasty, kne: knee arthroplasty, hys: hysterectomy, cse : Caesarean section, hea: cardiac surgery
† : Composite Quality Score calculating indicators

2) Data collection method

▪ Use of medical care benefit claims data and survey sheet

3) Grading method

▪ Composite results are equally divided into five grades by categorizing types.

Stage	Calculation method
1st	■ Six indicators selected out of nine indicators Initial prophylactic antibiotics within one hour before skin incision, Administration rate of aminoglycosides, Administration rate of 3rd or later generation cephalosporin antibiotics, Prophylactic antibiotics combination rate, Antibiotics prescription rate at discharge, Total average prophylactic antibiotics administration days (Administered at hospital + prescription at discharge) ■ Cases are excluded from assessment when the denominator has fewer than five cases per indicator. ■ The higher the values the five indicators have, the more they can be matched in a desirable direction. ■ The numerator value (B2~E2) of four indicators, except for the rate of initial prophylactic administration of antibiotics within one hour before skin incision, is substituted with (denominator value – numerator value) (B′ 2~E′ 2). ※Four indicators: Administration rate of aminoglycosides, Administration rate of 3rd of later generation cephalosporin antibiotics, Prophylactic antibiotics combination rate, and Antibiotics prescription rate at discharge

1st

Indicator	Denominator	Numerator	Numerator substituted
Initial prophylactic antibiotics within one hour before skin incision	A1	A2	
Administration rate of 3rd or later generation cephalosporin antibiotics	B1	B2	B'2: B1−B2
Antibiotics prescription rate at discharge	C1	C2	C'2: C1−C2
Administration rate of aminoglycosides	D1	D2	D'2: D1−D2
Prophylactic antibiotics combination rate	E1	E2	E'2: E1−E2
Total average days of administration	F1	F2	

2nd

○ Composite scores are calculated by weighting

Indicators	Denominator	Numerator	Numerator substituted	Weight
Initial prophylactic antibiotics within one hour before skin incision	A1	A2		1
Administration rate of aminoglycosides	B1		B'2	0.5
Administration rate of 3rd or later generation cephalosporin antibiotics	C1		C'2	1
Prophylactic antibiotics combination rate	D1		D'2	0.5
Antibiotics prescription rate at discharge	E1		E'2	0.5
Total average days of administration	F1	F2		0.5

Composite Quality Score (CQS)

$$\text{Formula} = \frac{\Sigma\ \{(\text{sum of all indicator numerators / sum of all indicator denominators}) \times \text{weights by indicator}\}}{\text{Total sum of weights}} \times 100$$

3rd

○ Grade classification
Divided into five grades based on the CQSs

Grade	Marking	Total Score (~or more-less than~)
1st grade	★★★★★	90%or more
2nd grade	★★★★☆	70−90%
3rd grade	★★★☆☆	40−70%
4th grade	★★☆☆☆	20−40%
5th grade	★☆☆☆☆	Less than 20%

4. Assessment results

1) Total results

- Quality improvements were made in all assessment indicators. In particular, the antibiotics prescription rate at discharge increased the most (9.9%p of decrease from the previous year).

Table 2.14 Total assessment results by indicator of prophylactic for surgery

(Unit: institution, case, %, %p, work)

Indicator	Type of institution	2009			2010			Variation from 2009
		No. of institution	No. of cases	Total results[1)]	No. of institution	No. of cases	Total results[1)]	
Initial prophylactic antibiotics within one hour before skin incision[2)]	Total	310	20,474	69.8	346	22,749	75.6	5.8 ↑
	Tertiary	43	7,253	94.3	44	8,239	96.5	2.2 ↑
	General	125	6,934	82.2	131	7,133	89.1	6.9 ↑
	Hospital	142	6,287	27.8	171	7,377	39.2	11.4 ↑
Administration rate of aminoglycosides	Total	306	18,498	32.3	343	20,291	26.5	5.8 ↓
	Tertiary	43	6,436	7.5	44	7,257	1.1	6.4 ↓
	General	125	6,310	21.0	131	6,357	16.2	4.8 ↓
	Hospital	138	5,752	72.3	168	6,677	64.0	8.3 ↓
Administration rate of 3rd or later generation cephalosporin antibiotics	Total	306	18,498	10.1	343	20,291	7.0	3.1 ↓
	Tertiary	43	6,436	11.2	44	7,257	5.4	5.8 ↓
	General	125	6,310	14.2	131	6,357	11.9	2.3 ↓
	Hospital	138	5,752	4.3	168	6,677	4.0	0.3 ↓
Prophylactic antibiotics combination rate	Total	306	18,498	46.6	343	20,291	37.3	9.3 ↓
	Tertiary	43	6,436	23.8	44	7,257	9.5	14.3 ↓
	General	125	6,310	39.0	131	6,357	31.9	7.1 ↓
	Hospital	138	5,752	80.6	168	6,677	72.7	7.9 ↓
Antibiotics prescription rate at discharge	Total	306	18,494	45.8	343	20,250	35.9	9.9 ↓
	Tertiary	43	6,443	21.1	44	7,264	7.8	13.3 ↓
	General	125	6,310	43.3	131	6,342	29.4	13.9 ↓
	Hospital	138	5,741	76.2	168	6,644	72.7	3.5 ↓
Total average prophylactic antibiotics administration days	Total	299	17,903	6.7	342	20,168	5.7	1.0 ↓
	Tertiary	43	6,412	5.0	44	7,251	3.2	1.8 ↓
	General	125	6,262	6.9	131	6,335	5.8	1.1 ↓
	Hospital	131	5,229	9.1	167	6,582	8.4	0.7 ↓

Note. 1) The values were calculated for institutions with one or more denominator cases by indicator.
2) The better the indicator, the higher the initial preventive administration of antibiotics within one hour before skin incision.

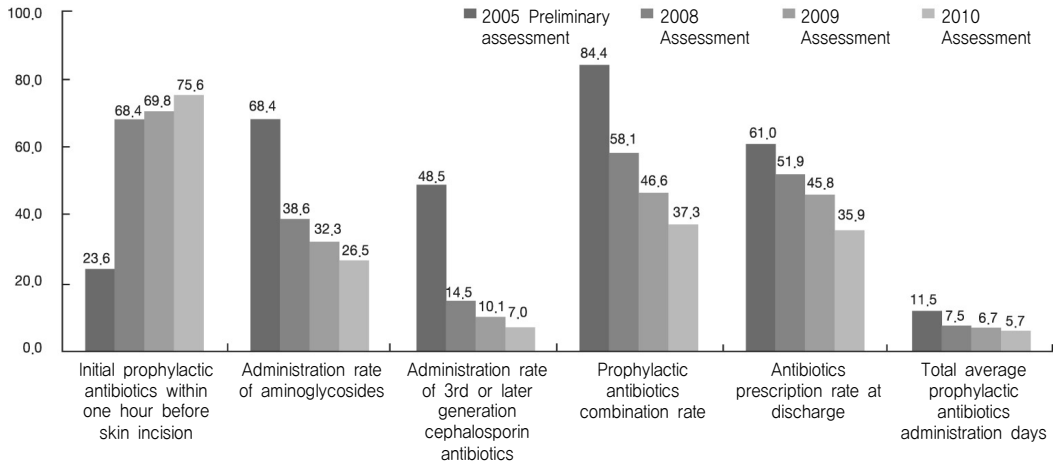


Figure 2.13 Total assessment results by indicator of prophylactic antibiotics for surgery (by year)

- The most improved among the indicators was the antibiotics prescription rate at discharge, which showed a 9.9% decrease, and hysterectomy and Caesarean section also were found to have improved, indicating a 17%p and 8.2%p decrease respectively.
- The prophylactic antibiotics combination rate decreased by 9.3%p, and particularly, the surgeries of colon (29.7%p decrease) and heart (13.9%p decrease) presented significant improvements.
- The administration rate of aminoglycosides presented a decrease of 5.8%p, and its rate for colon surgery improved the most (9.7% decrease).
- The rate of initial prophylactic antibiotics within one hour before skin incision was found to have increased by 5.7%p, showing the greatest improvement in colon surgery (7.0%p increase).
- The administration rate of 3rd or later generation cephalosporin antibiotics has decreased by 3.1%p in average, and it was found the most in the surgeries of colon (7.7%p) and gallbladder (5.9%p).
- The average number of days for prophylactic antibiotics administration after surgery was 5.7 days in total, which was found to be the shortest in stomach surgery (3.4 days) and the longest in knee replacement arthroplasty (12.2 days).
  - The total average number of days that the prophylactic antibiotics were administered has been reduced by 1.0 day, while 1.7 days were decreased in Caesarean section and 0.7 days were increased in knee replacement arthroplasty.

Table 2.15 Average rate of prophylactic antibiotics use for surgery and variation between 2007 and 2008

(Unit: %, %p, day)

Classification		Total[1)]	Stomach	Colon	Gallbladder	Hip joint	Knee joint	Hysterectomy	Caesarean section	Cardiac
Initial prophylactic antibiotics within one hour before skin incision	2010 Average	75.6	97.4	93.6	84.8	91.8	82.8	79.7	54.2	93.7
	2009 Average	69.8	97.5	86.6	84.1	90.5	77.2	74.5	47.3	97.7
	2009 vs. 2010	5.8↑	0.1↓	7.0↑	0.7↑	1.3↑	5.6↑	5.2↑	6.9↑	4.0↓
Administration rate of aminoglycosides	2010 Average	26.5	1.2	4.9	16.3	7.7	19.0	28.2	44.3	0
	2009 Average	32.3	8.9	14.6	23.2	8.7	27.4	32.5	46.6	0.0
	2009 vs. 2010	5.8↓	7.7↓	9.7↓	6.9↓	1.0↓	8.4↓	4.3↓	2.3↓	0.0↓
Administration rate of 3rd or later generation cephalosporin antibiotics	2010 Average	7.0	4.9	5.1	16.6	11.2	12.6	6.4	2.6	6.3
	2009 Average	10.1	9.8	12.8	22.5	12.5	8.5	11.3	4.9	8.2
	2009 vs. 2010	3.1↓	4.9↑	7.7↓	5.9↓	1.3↓	4.1↓	4.9↓	2.3↓	1.9↓
Prophylactic antibiotics combination rate	2010 Average	37.3	5.0	26.5	23.8	18.6	42.3	40.1	51.5	6.3
	2009 Average	46.6	14.8	56.2	32.4	24.7	45.5	48.6	57.3	20.2
	2009 vs. 2010	9.3↓	9.8↓	29.7↓	8.6↓	6.1↓	3.2↓	8.5↓	5.8↓	13.9↓
Antibiotics prescription rate at discharge	2010 Average	35.9	2.1	5.1	30.5	10.9	22.1	37.6	57.8	7.4
	2009 Average	45.8	4.7	8.7	37.5	16.0	21.9	54.6	66.0	13.7
	2009 vs. 2010	9.9↓	2.6↓	3.6↓	7.0↓	5.1↓	0.2↑	17↓	8.2↓	6.3↓
Total average prophylactic antibiotics administration days	2010 Average	5.7	3.4	4.4	3.7	7.5	12.2	5.5	5.4	5.5
	2009 Average	6.7	4.3	5.5	4.1	8.9	11.5	6.7	7.1	6.6
	2009 vs. 2010	1.0↓	0.9↓	1.1↓	0.4↓	1.4↓	0.7↑	1.2↓	1.7↓	1.1↓

Note. 1) The values were calculated for institutions with one or more denominator cases by indicator

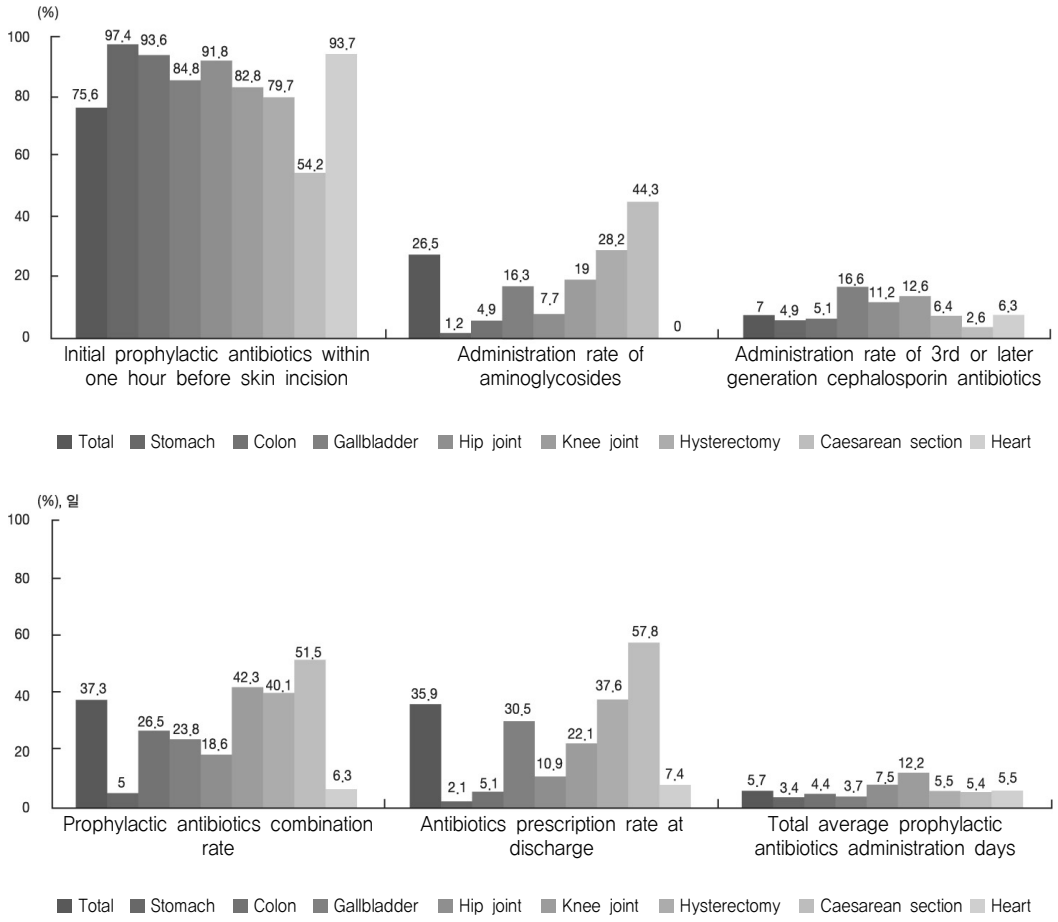


Figure 2.14 Results by indicator of prophylactic antibiotics for surgery

2) Results by institution

- All indicators, except for the administration rate of 3rd or later generation cephalosporin antibiotics, have been improved in the order of tertiary hospital, general hospital, and hospital, with a significant difference between tertiary hospital and hospital.
- The total average administration rate of 3rd or later generation cephalosporin antibiotics was 10.2%, and the results was good in the order of tertiary hospital (6.8%), hospital (9.0%), and general hospital(14.1%).

Table 2.16 Assessment results of prophylactic antibiotics for surgery by type of institution

(Unit: institution, case, %, day)

Indicator	Type of institution	Mean[1)]	Standard deviation	Median	Minimum	Maximum	Q1	Q3
Initial prophylactic antibiotics within one hour before skin incision	Total	76.7	34.1	95.2	0.0	100.0	66.7	100.0
	Tertiary	95.5	10.7	100.0	18.2	100.0	96.2	100.0
	General	86.6	22.6	96.2	0.0	100.0	84.6	100.0
	Hospital	39.5	37.9	30.0	0.0	100.0	0.0	77.8
Administration rate of aminoglycosides	Total	24.9	40.2	0.0	0.0	100.0	0.0	38.5
	Tertiary	2.0	9.6	0.0	0.0	100.0	0.0	0.0
	General	18.8	34.6	0.0	0.0	100.0	0.0	14.4
	Hospital	61.3	45.3	96.9	0.0	100.0	1.6	100.0
Administration rate of 3rd or later generation cephalosporin antibiotics	Total	10.2	24.8	0.0	0.0	100.0	0.0	4.2
	Tertiary	6.8	19.5	0.0	0.0	100.0	0.0	2.3
	General	14.1	27.5	0.0	0.0	100.0	0.0	12.5
	Hospital	9.0	25.8	0.0	0.0	100.0	0.0	0.0
Prophylactic antibiotics combination rate	Total	37.8	42.4	12.5	0.0	100.0	0.0	94.5
	Tertiary	12.4	24.6	0.0	0.0	100.0	0.0	10.0
	General	35.7	40.0	13.3	0.0	100.0	0.0	78.0
	Hospital	71.5	40.2	100.0	0.0	100.0	32.0	100.0
Antibiotics prescription rate at discharge	Total	34.2	41.2	9.1	0.0	100.0	0.0	84.6
	Tertiary	8.3	20.4	0.0	0.0	100.0	0.0	5.6
	General	32.6	38.2	12.5	0.0	100.0	0.0	68.8
	Hospital	68.0	40.7	96.4	0.0	100.0	21.0	100.0
Total average prophylactic antibiotics administration days	Total	6.4	5.4	5.3	0.0	45.0	2.9	8.5
	Tertiary	3.8	2.9	3.4	0.0	16.4	1.5	4.9
	General	6.3	4.6	5.9	0.0	45.0	3.4	8.1
	Hospital	9.9	6.7	8.5	0.1	41.8	5.9	10.8

Note. 1) The values shown are for institutions with five or more denominator cases by type of surgery.

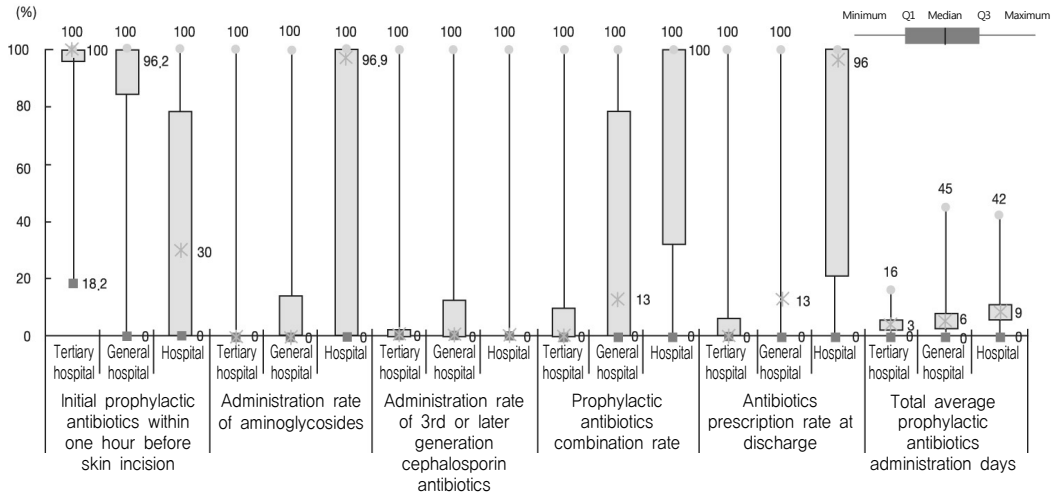


Figure 2.15 Distributions of indicators of prophylactic antibiotics for surgery (by type of institution)

3) Overall results

▪ There were 70 first grade institutions out of a total of 346 (20.2%).

- The 1st-grade institutions comprised of 31 tertiary hospitals (70.5%), 32 general hospitals (24.4%), and 7 hospitals (4.1%).

Table 2.17 Overall assessment results of prophylactic antibiotics for surgery by type of institution

(Unit: institution, %)

Classification	Total	Tertiary hospital	General hospital	Hospital
Total	346 (100.0)	44 (100.0)	131 (100.0)	171 (100.0)
★★★★★ (1st grade)	70 (20.2)	31 (70.5)	32 (24.4)	7 (4.1)
★★★★☆ (2nd grade)	71 (20.5)	11 (25.0)	35 (26.7)	25 (14.6)
★★★☆☆ (3rd grade)	109 (31.5)	2 (4.5)	43 (32.8)	64 (37.4)
★★☆☆☆ (4th grade)	74 (21.4)	–	12 (9.2)	62 (36.3)
★☆☆☆☆ (5th grade)	4 (1.2)	–		4 (2.3)
Exclusion[1)]	18 (5.2)		9 (6.9)	9 (5.3)

Note. 1) Institutions having fewer than five cases for assessment are excluded from calculating CQS.

▪ Composite Quality Scores (CQSs) by Surgery

- The total average score is 63.0%, in the order of tertiary hospitals (91.4%), general hospitals (70.6%), and hospitals (49.6%). Hospitals have scored below average in all types of surgery.
- The CQS of stomach and cardiac surgeries were high, presenting at over 88%, while hysterectomy and Caesarean section scored low, which were 69.5% and 65.3% respectively.

Table 2.18 CQS of prophylactic antibiotics for surgery (by type of surgery)

(Unit: %, %p)

Classification		Total	Stomach	Colon	Gallbladder	Hip joint	Knee joint	Hysterectomy	Caesarean section	Heart
2010 Average	Total	63.0	89.8	82.6	72.6	81.5	74.5	69.5	65.3	88.0
	Tertiary	91.4	90.9	89.5	91.7	89.7	96.2	88.8	94.3	88.4
	General	70.6	87.6	74.6	66.6	85.9	83.1	77.6	77.3	85.4
	Hospital	49.5	–	59.1	31.4	52.7	59.8	43.0	45.6	–
2009 Average	Total	69.4	91.4	79.9	69.4	84.4	76.6	63.2	57.0	91.5
	Tertiary	86.4	91.9	87.1	87.3	84.7	95.7	80.7	81.8	93.1
	General	72.3	90.8	74.5	62.1	90.5	85.9	72.4	66.5	87.5
	Hospital	43.4	–	46.6	44.5	70.3	59.9	33.1	39.4	–
Variation b/w 2009 & 2010	Total	6.4 ↓	1.6 ↓	2.7 ↑	3.2 ↑	2.9 ↓	2.1 ↓	6.3 ↑	8.3 ↑	3.5 ↓
	Tertiary	5.0 ↑	1.0 ↓	2.4 ↑	4.4 ↑	5.0 ↑	0.5 ↑	8.1 ↑	12.5 ↑	4.7 ↓
	General	1.7 ↓	3.2 ↓	0.1 ↓	4.5 ↑	4.6 ↓	2.8 ↓	5.2 ↑	10.8 ↑	2.1 ↓
	Hospital	6.1 ↑	–	12.5 ↑	13.1 ↓	17.6 ↓	0.1 ↓	9.9 ↑	6.2 ↑	–

Note. In regards to the scores, higher numbers are better.

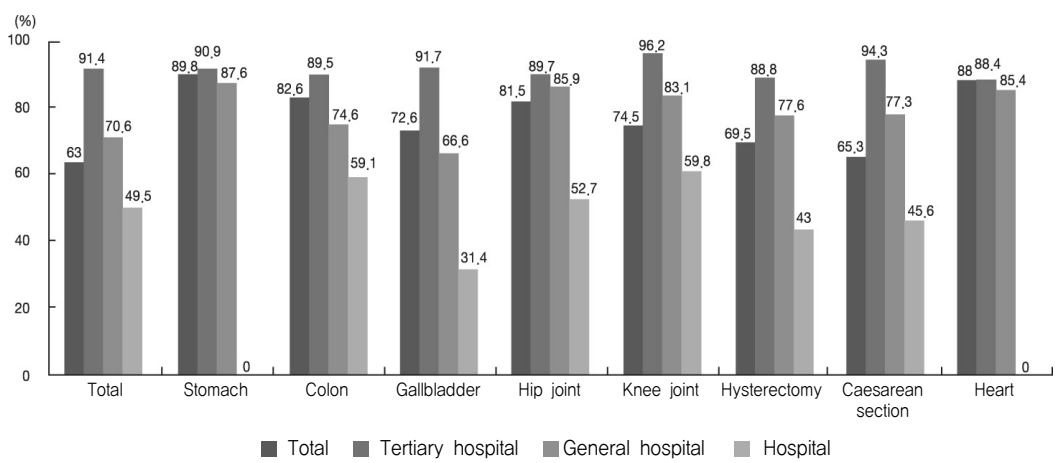


Figure 2.16 CQS of prophylactic antibiotics for surgery (by type of surgery)

5. Other key factors

1) Annual status of treatment

- The total number of treatment cases and the cost claimed for eight different types of surgeries in 2009 were 250,576 cases with 997.4 billion won.
  - The average medical cost per case amounted to 3.98 million won, and the average length of stay in a hospital per case was 10.7 days.

Table 2.19 Assessment results of prophylactic antibiotics for surgery by type of surgery

Classification	Total	Stomach	Colon	Gallbladder	Hip joint	Knee joint	Hysterecomy[1)]	Caesarean section[1)]	Heart
Total medical costs claimed (100 million won)	9,974	1,043	1,413	1,061	1,201	2,870	475	550	1,360
No. of cases	250,576	18,368	20,945	36,295	17,173	39,902	28,691	81,970	7,232
Medical costs per case (10,000 won)	398	568	675	292	700	719	166	67	1881
No. of days of hospitalization per case (days)[2)]	10.7	14.0	15.6	7.6	20.6	20.7	7.6	7.0	17.3

Note. 1) Includes the DRG service.
2) Treatment performed from Aug. – Oct. 2009, 3 months' treatment records (subject period).

2) The amount of antibiotics use in assessment period

- A total of 37,393 cases of surgery had been assessed for 2009, which had increased from 25,921 cases in 2006. The total amount of antibiotics calculated by DDD[1)] had decreased to 357,299 from 392,554 in 2006.

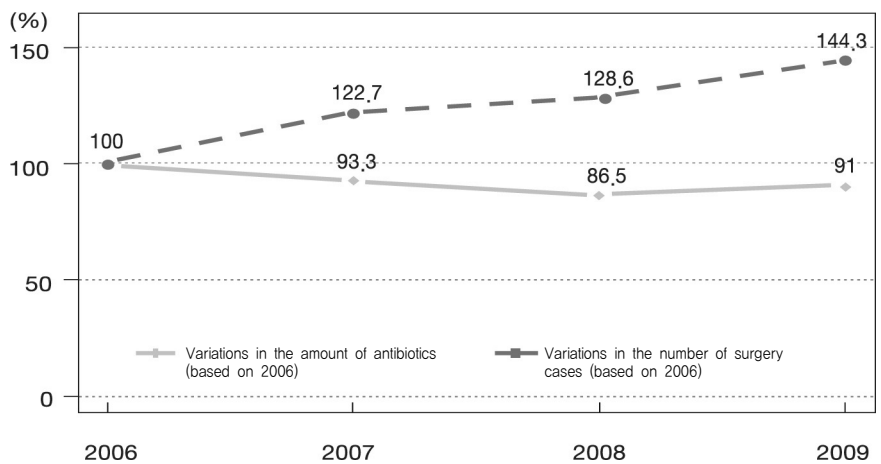


Figure 2.17 The volume of prophylactic use of antibiotics for surgery and the number of surgery cases

Note. 1) DDD (Defined Daily Dose): Means the average maintenance dose of medicine administered to an adult per day according to the active ingredients. Used to compare the dosage of other kinds of antibiotics with different unit capacities, standardized by WHO.

▪ As the results of analysis regarding the amount of antibiotics used for the eight subject surgeries of assessment and five non-subject surgeries (appendectomy, prostatectomy, hernioplasty, craniotomy and vascular surgery), conducted between August and October from 2006 to 2009, the volume of DDD started to decrease considerably since the start of the assessment in 2007, and the rate of decrease has been reduced. However, the DDD of non-subject surgeries was found to decrease slowly at first, and then begin to increase again from 2008.

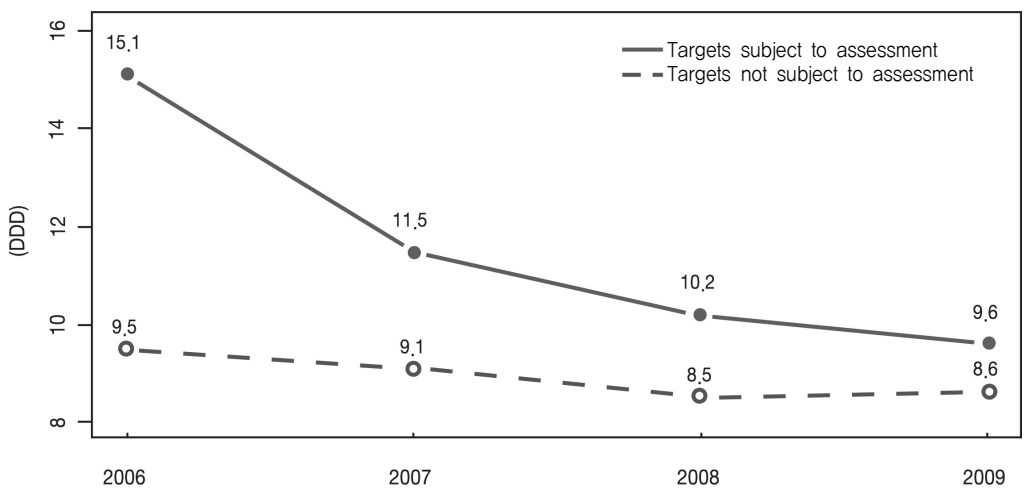


Figure 2.18 DDD Changes in prophylactic antibiotics use for surgery

2.1.4 Caesarean delivery

1. Assessment background and purpose

- The Caesarean section (C-section) delivery rate in South Korea was 40.5% in 2001, which was twice as high as the WHO recommended rate of 5-15%, and it is still higher than the level of OECD member states of 14.0 – 39.9% (2007). (Reference: the gap found among the institutions in 2009 ranged from 4.8% to 79.1%)
- It is necessary to induce the optimization of the Caesarean delivery rate and the improvement of medical service through the continuous management of C-section delivery rates.
- It aims to prevent complications for mothers and newborns related to delivery and improve the public health.

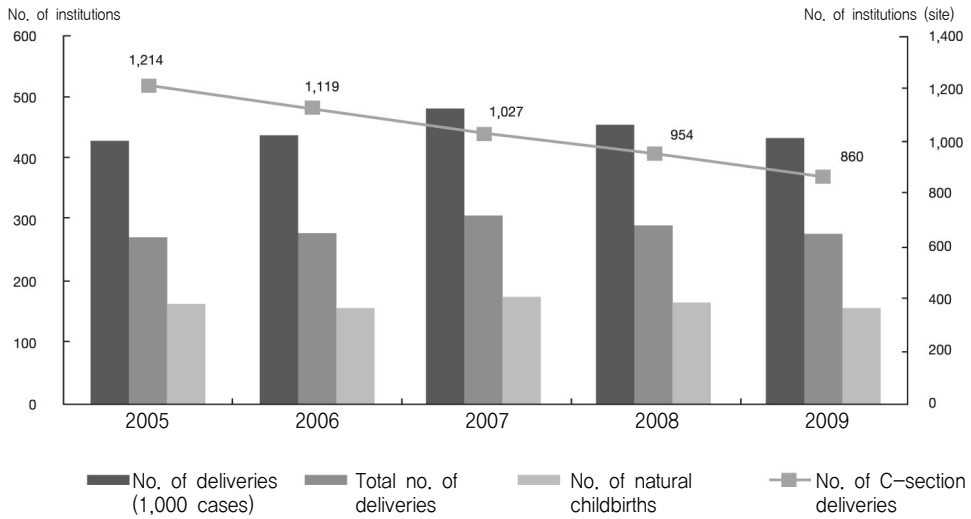


Figure 2.19 Annual changes of target delivery

2. Subject to assessment

1) Subject cases

- Delivery cases (Vaginal and Caesarean section delivery cases which were reported)

2) Assessment period

- Deliveries performed in 2009

3) Assessed medical care institutions

▪ 860 institutions

- Subject medical care institutions for assessment included those that performed 30 or more cases of delivery during the subject period.

3. Assessment method

1) Assessment indicator

Indicator Code	Indicator
CSEC_01	Caesarean delivery rate

▪ Monitoring Indicator

Indicator code	Indicator
CSEC_02	Caesarean delivery rate in primipara
CSEC_03	Vaginal birth after Caesarean delivery rate

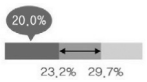
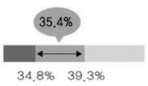
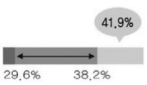
2) Data collection method

▪ Use of medical care benefit claims data

3) Grading method

▪ Institutions were divided into three grades after adjustment with clinical factors that affect the C- section rate.

<table>
<tr><th>Stage</th><th>Calculation method</th></tr>
<tr><td>1st</td><td>■ A C-section risk adjustment model was developed
– Logistic regression analysis applied
• Dependent variable: whether C-section delivery is performed or not
• Independent variable: 16 clinical risk factors that affect the impact of C-sections
<table>
<tr><th>Classification</th><th>Risk factors for adjustment</th></tr>
<tr><td>Mother</td><td>Hypertension disorders, diabetes, mother's age, venereal diseases, neoplasm in generative organs, placenta previa, placental abruption, difficult birth due to anatomical factors, and bleeding before and during delivery</td></tr>
<tr><td>Fetus</td><td>Excessively large fetus, multiple pregnancies, prolapsed umbilical cord, vasa praevia, fetal anomaly, and abnormal fetal position</td></tr>
<tr><td>Other</td><td>History of uterine surgery, premature birth</td></tr>
</table></td></tr>
<tr><td>2nd</td><td>■ the range of Caesarean delivery rates which are predicted by institution using the model is computed (90% confidence interval applied)
– Formula
$$\frac{\sum pi}{n} \pm 1.645 \times \frac{\sqrt{\sum pi(1-pi)}}{n}$$
Pi : Predicted value of C-section adjusted with 16 risk factors per delivery case.
1-Pi : Error of predicted value of C-section per delivery case.
n : Number of delivery cases by institution</td></tr>
</table>

<table>
<tr><th>Stage</th><th>Calculation method</th></tr>
<tr><td>3rd</td><td>
■ Divided into three grades comparing the predicted range of the Caesarean delivery rate after adjusting with the indicator results by institution (actual rate of C-section) and risk levels (90% confidence interval applied)
<table>
<tr><th>Grade</th><th>Marking Method</th><th>Definition</th><th>Example</th></tr>
<tr><td>Low
(1st grade)</td><td>★★★★★</td><td>The actual rate is lower than the predicted range</td><td> 
</td></tr>
<tr><td>Ordinary
(2nd grade)</td><td>★★★☆☆</td><td>The actual rate falls within the predicted range</td><td> 
</td></tr>
<tr><td>High
(3rd grade)</td><td>★☆☆☆☆</td><td>The actual rate is higher than the predicted range</td><td> 
</td></tr>
</table>
</td></tr>
</table>

4. Assessment results

1) Total results

▪ The rate of C-sections in 2009 was found to be 36.0%, a decrease of 0.3%p from 36.3% in 2008 and 4.5%p from 40.5% in 2001, in spite of the increased risk factors such as aging mothers.

2001		2002		2003		2004		2005		2006		2007		2008		2009
40.5% (compared to 2001)⇒	⇒	39.3% (1.2%p↓)	⇒	38.2% (2.3%p↓)	⇒	37.7% (2.8%p↓)	⇒	37.1% (3.4%p↓)	⇒	36.0% (4.5%p↓)	⇒	36.3% (4.2%p↓)	⇒	36.3% (4.2%p↓)	⇒	36.0% (4.5%p↓)

- The age adjusted C-section delivery rate was 33.6% in 2009, a decrease of 6.9%p from 40.5% in 2001.
  ☞ The value was adjusted by the aging of mothers, which was calculated based on the age distribution of 2001.

* The ratio of aging mothers (aged 35 years or older) has doubled compared to 2001.
☞ 8.4% (2001) → 9.8% (2003) → 12.5% (2005) → 15.1% (2007) → 17.9% (2009)

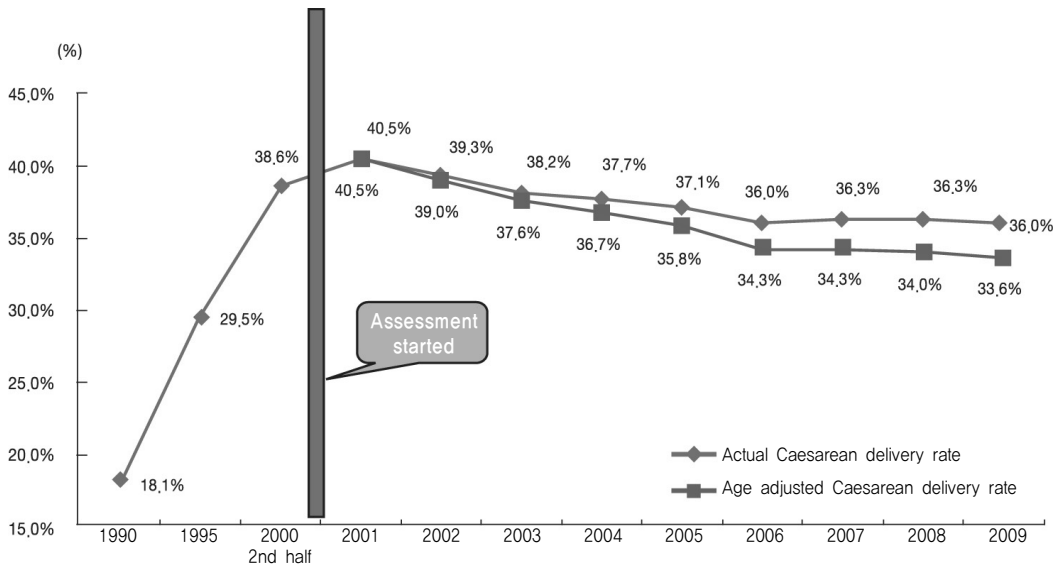


Figure 2.20 Transition of C-section delivery rate

▪ The C-section delivery rate was found in the order of tertiary hospital (49.2%), general hospital (43.2%), clinic (35.0%), and hospital(33.4%).

- The rate of tertiary hospitals has continuously increased since 2003, but has been found to decrease in 2009 over 2008 by 0.7%p.
- The number of cases with risk factors increased by 1.9%p in tertiary hospitals.
- The rate in general hospitals remained at 42～43%, which increased by 0.1%p compared to 2008.
- Hospitals were found to decrease in rates from 39.6% in 2001 to 33.4% in 2009, a 0.7%p of decrease over 2008.
- The rate of clinics was presented by 35.0% in 2009, a 3.9%p of decrease from 38.9% in 2001. However, it has increased by 0.3%p since 2008.

* The ratio of delivery cases by the type of institution (2009)

☞ Clinics (45.0%) > Hospitals (38.4%) > General hospitals (10.6%) > Tertiary hospitals (5.8%)

Table 2.20 Total results of Caesarean delivery rates

(Unit: %, %p)

Classification	2001	2002	2003	2004	2005	2006	2007	2008	2009	Variations based on 2009	
										Compared with 2001	Compared with 2008
Total	40.5	39.3	38.2	37.7	37.1	36.0	36.3	36.3	36.0	4.5 ↓	0.3 ↓
Tertiary hospital	46.8	46.0	45.9	46.5	47.0	48.0	49.6	49.9	49.2	2.4 ↑	0.7 ↓
General hospital	43.4	43.1	42.2	43.1	43.0	42.9	43.7	43.2	43.3	0.1 ↓	0.1 ↑
Hospital	39.6	37.3	36.2	35.5	34.7	33.9	33.8	34.1	33.4	6.2 ↓	0.7 ↓
Clinic	38.9	38.3	37.1	36.4	36.0	34.5	34.9	34.7	35.0	3.9 ↓	0.3 ↑

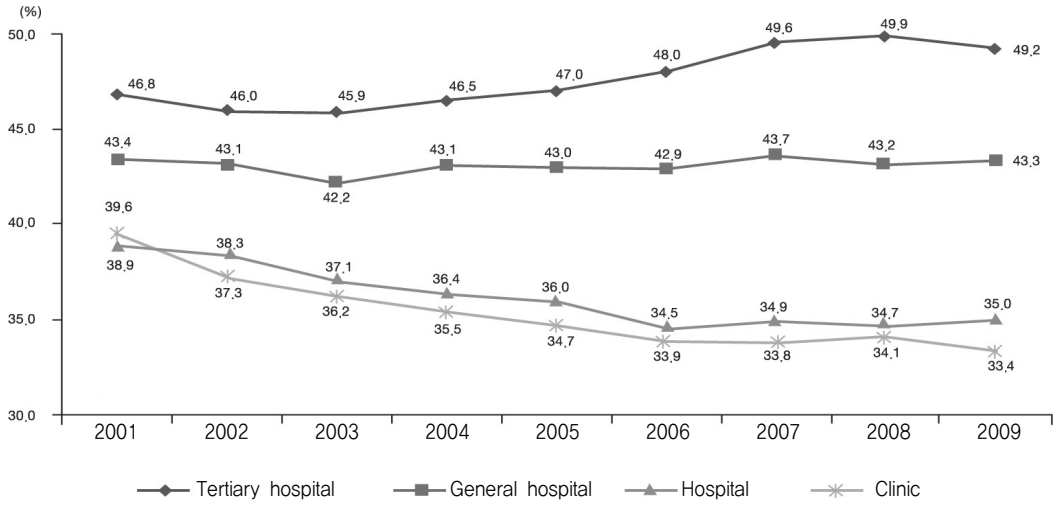


Figure 2.21 Transition of Caesarean delivery rate by type of institution

2) Results by institution

- The mean of Caesarean delivery rates in 2009 was 36.0% with a median of 37.9%, and the variations among the institutions were still significant (Minimum 4.8%, Maximum 79.1%)

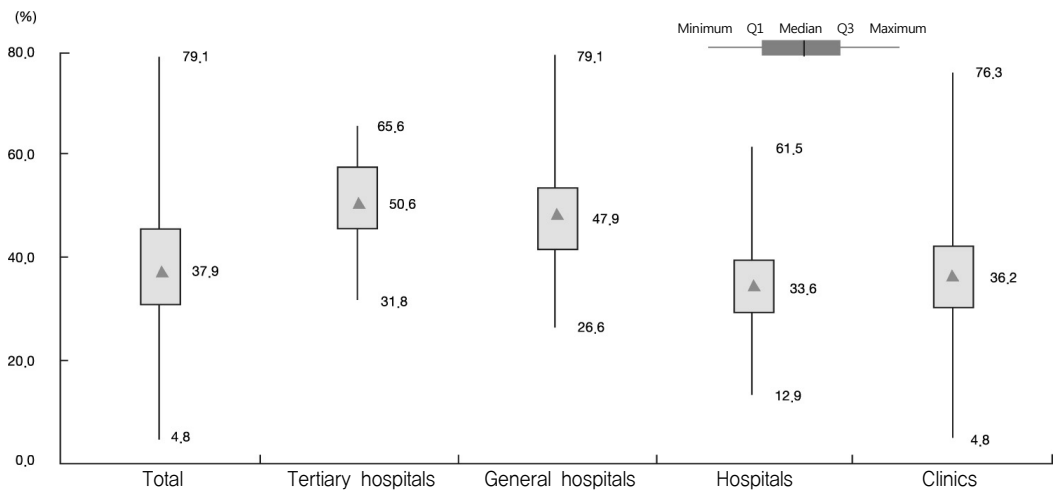


Figure 2.22 Rate of C-sections by type of institution

3) Overall results

- The 703 institutions subject to assessment were broken down into 170 1st grade institutions (24.2%), 264 2nd grade institutions (37.6%), and 269 3rd grade institutions (38.3%).
- The grading status of institutions indicated that most of the hospitals belonged to the 1st grade; many of the tertiary hospitals and clinics belonged to the 2nd grade; and most of the general hospitals belonged to the 3rd grade.

Table 2.21 Overall assessment results of Caesarean delivery rates by type of institution

(Unit: institution, %)

Classification	Total	Tertiary hospital	General hospital	Hospital	Clinic
Total	703 (100.0)	44 (6.3)	86 (12.2)	113 (16.1)	460 (65.4)
Low ★★★★★(1st grade)	170 (24.2)	16 (36.4)	10 (11.6)	43 (38.1)	101 (22.0)
Ordinary ★★★☆☆(2nd grade)	264 (37.6)	21 (47.7)	26 (30.2)	34 (30.1)	183 (39.8)
High ★☆☆☆☆(3rd grade)	269 (38.3)	7 (15.9)	50 (58.1)	36 (31.9)	176 (38.3)

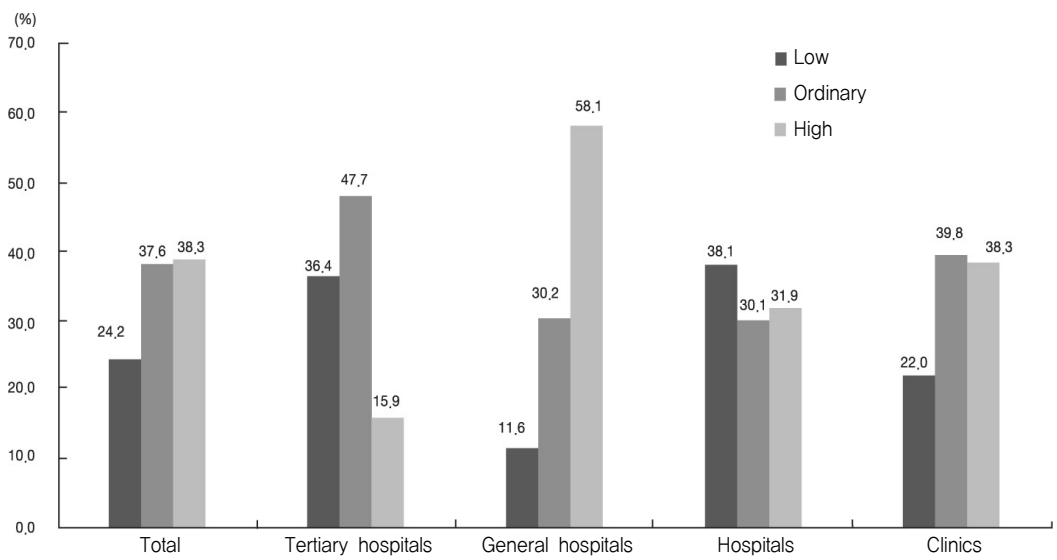


Figure 2.23 The ratio of institutions by the grades of caesarean delivery rate

5. Other key factors

- A total of 387.1 billion won was claimed for 433,716 delivery cases in 2009.
  - The number of days of hospitalization per C-section case was 6.8 days, twice as many than for vaginal delivery. The average medical cost per C-section case was 1.22 million won, which was 360,000 won higher than vaginal delivery.

Table 2.22 Assessment of C-section delivery services

Classification		Total	Tertiary hospital	General hospital	Hospital	Clinic	Public Health Center	Maternity nurses
Total service fee claimed (100 million won)		3,871	305	497	1,502	1,564	–	3
No. of Cases		433,716	25,339	45,884	166,717	195,151	1	624
No. of days in hospital (day)	Vaginal birth	3.3	3.4	3.4	3.3	3.3	3.0	2.7
	C-section	6.8	7.3	7.4	6.7	6.7	–	–
Service fee per Case (1,000won)	Vaginal birth	76	103	88	78	70	51	43
	C-section	112	138	136	115	99	–	–

Note. The total medical costs and number of cases include both cases of vaginal birth and C-section delivery.

▪ The Caesarean delivery rate in primipara in 2009 was 35.8%, which decreased by 0.3% over 2005 (36.1%), while it increased by 0.1% from the previous year. The rate has been increasing since 2006.

- The rate of order was found to be tertiary hospitals (47.5%), general hospitals (41.7%), clinics (35.3%), and hospitals (33.1%) from the highest to lowest.

Table 2.23 Caesarean delivery rate in primipara by Type of Institution

(Unit: %p)

Classification	Caesarean delivery rate in primipara							Total Caesarean delivery rate in 2009
	2005	2006	2007	2008	2009	Variations based in 2009		
						Compared with 2005	Compared with 2008	
Total	36.1	34.9	35.6	35.7	35.8	0.3 ↓	0.1 ↑	36.0
Tertiary hospital	45.5	46.8	49.1	47.9	47.5	2.0 ↑	0.4 ↓	49.2
General hospital	40.7	41.2	42.5	41.2	41.7	1.0 ↑	0.5 ↑	43.3
Hospital	33.0	32.2	32.9	33.6	33.1	0.1 ↑	0.5 ↓	33.4
Clinic	35.7	33.8	34.2	34.5	35.3	0.4 ↓	0.8 ↑	35.0

▪ The rate of vaginal delivery after a C-section (VBAC) was 3.7%, indicating a decrease of 0.5%p from the previous year, which had increased an average of 0.34%p annually until 2006 (4.6%), and has been decreasing since then.

- The rate was presented in the order of tertiary hospital (7.5%), hospital (4.2%), clinic (3.2%), and general hospital (1.7%) from the highest to the lowest.
- The rate was found to decrease in all types of institutions compared to the previous year: general hospital (0.7%p), hospital (0.7%p), tertiary hospital (0.6%p), and clinic (0.4%p).

Table 2.24 Transition of VBAC rate

(Unit: %, %p)

Classification	2001	2002	2003	2004	2005	2006	2007	2008	2009	Variations based in 2009	
										Compared with 2001	Compared with 2008
Total	2.9	2.9	3.1	3.7	4.3	4.6	4.2	4.2	3.7	0.8 ↑	0.5 ↓
Tertiary hospital	6.6	7.1	7.4	7.5	8.4	7.4	8.0	8.1	7.5	0.9 ↑	0.6 ↓
General hospital	2.9	2.4	2.4	2.9	2.9	2.6	2.4	2.4	1.7	1.2 ↓	0.7 ↓
Hospital	1.8	3.2	3.2	3.9	5.1	5.4	4.9	4.9	4.2	2.4 ↑	0.7 ↓
Clinic	2.2	2.2	2.6	3.3	3.7	4.2	3.7	3.6	3.2	1.0 ↑	0.4 ↓

Note. Total means by all types of institutions, including medical care institution, public health centers, and maternity nurses (midwives).

▪ Caesarean delivery rate by Region (2009)

- In 2008, the rate of order from the highest was Jeju (41.5%), Gangwon (39.9%), and Ulsan (39.6%); in 2009, the rate has been reduced in general, and the highest was Ulsan (39.5%), followed by Jeju (39.3%) and Gangwon (38.5%). The region that presented the lowest rate was Gwangju (28.8%), followed by Jeonnam (32.1%) and Gyeongbuk (34.4%).
- The range of regional C-section delivery rates (difference between the maximum and minimum) was 10.7%p in 2009, which has decreased by 6.9%p since 2001 (17.9%p).

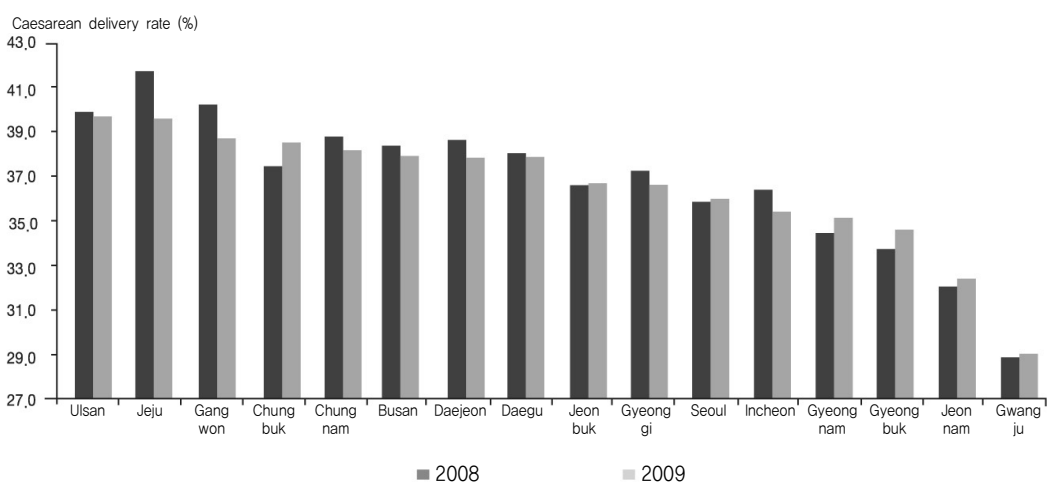


Figure 2.24 Regional Caesarean delivery rate

2.1.5 Surgical volume indicator

1. Assessment background and objective

- Many research reports show that the care outcomes of hospitals that perform a greater care number (volume) of cancer and other highly difficult surgeries are better than hospitals that perform less (volume-outcome relationship).
- In reality, a volume indicator is easier for consumers to understand than process indicators when assessing service quality. The surgical volume is a proxy indicator that measures medical quality indirectly, and which has long been disclosed to consumers in other countries.

> * USA : New York State (Center for Medical Consumers)
> PHC4 (The Pennsylvania Health Care Cost Containment Council)
> Health Grade, Hospital Profile, Leapfrog Group, etc.

- In 2006, 48.3% of all medical care institutions performed fewer than ten cases of stomach surgery in South Korea, which accounted for a greater percentage than the counterpart. The 2008 assessment of stomach and liver cancer surgeries revealed that the fatality rate for medical care institutions with fewer surgery cases than the cut-off point was 3.6 and 3.5 times greater than that of institutions with more surgery cases (surgery fatality rate: fatality rate at hospital + deaths within 30 days of surgery).
- This aims to help the public choose reliable healthcare institutions by assessing the surgeries by the correlation of volume and results of treatments, and disclosing the institutions that conduct more cases of certain surgeries.

2. Subject to assessment

1) Subject surgeries

- Medical care benefit claims data for surgeries of stomach, colon, and liver cancers, total hip replacement arthroplasty, and percutaneous coronary intervention (PCI).

☞ See Annex 1

2) Assessment period

Periods assessed	Surgeries assessed
Jan. 2008~Dec. 2009 (Inpatients)	Liver cancer surgery
Jan.~Dec. 2009 (Inpatients)	Surgeries of stomach cancer, colon cancer, hip replacement, and percutaneous coronary intervention (PCI)

3) Assessed medical care institutions

- A total of 844 institutions that reported the surgery subjects during the above periods.

※ Excluded the institutions that were newly opened or closed during the assessment periods.

3. Assessment method

1) Assessment indicator

- The institutions were assessed if they satisfied the surgical volume by cut-off point that satisfies a given quality level by item of surgery assessed.

Surgery item	Indicator code	Name of indicator
Stomach cancer surgery	Vol_gas_1	Whether the surgical volume by cut-off point is satisfied or not
Colon cancer surgery	Vol_col_1	
Live cancer surgery	Vol_liv_1	
Hip replacement	Vol_hip_1	
Percutaneous coronary intervention (PCI)	Vol_pci_1	

2) Data collection methods

- Subject data: Medical care benefit cost claims data
- Date of surgery: Survey (questionnaire) sheet
- Date of death: Ministry of Government Administration and Safety resident registration database is utilized.

3) Grading method

- Institutions were divided into two grades by computing the range of surgical volume by cut-off and predicted or estimated death rate.

<table>
<tr><th>Stage</th><th>Calculation method</th></tr>
<tr><td>1st</td><td>
■ The provisional cut-off point volume is set for each surgery
– The number of surgery cases that showed a significant difference in terms of the fatality rate was set as the provisional cut-off point volume by dividing the number of each medical care institution's surgery cases into groups of five to ten cases.
■ Analysis of the relationship between the cut-off point volume and the fatality rate adjusted with severity.
– Patient characteristics which affect the fatality rate in addition to the surgical volume were selected as risk factors.
※ Risk factors
– Patient's demographic characteristics: age, gender, type of medical insurance, etc.
– Service-related factors: hospitalization through ER, type of surgery, accompanying surgery, past history, etc.
• past history: cardiac disease, renal failure, diabetes, hypertension, liver diseases, past surgeries, etc.
– The model's adequacy is judged with C- and H-L test statistics after developing a logistic regression model.
• Outcome variable: death after surgery
• Independent variable: surgical volume (more or less than the cut-off point), patient risk factors
■ Final determination of the cut-off volume by surgery
– When the developed model turns out to be adequate, it is accepted as the final cut-off volume.
</td></tr>
<tr><td>2nd</td><td>
■ Comparison between the predicted and the actual fatality rate
– The data are analyzed to determine whether the actual fatality rate falls within the 95% confidence interval of the predicted fatality rate by computing the predicted fatality rate by type of medical care institution.
• Medical care institution whose fatality rate is ordinary or low: medical care institutions whose actual fatality rate falls within the 95% confidence interval of the predicted fatality rate or is lower than its upper limit value.
• Medical care institutions with high fatality rate: Medical care institutions whose actual fatality rate is higher than the upper limit value of the 95% confidence interval of the predicted fatality rate.
※The average value obtained by dividing the sum of each patient' s probability of death by developing a logistical regression model using the risk factor of a death prediction model adjusted with the patients' severity as the independent variable and their death as the independent variable and their death as the dependent variable. model using the risk factor of a death prediction model adjusted wi
■ Formula for computing the predicted fatality rate (95% confidence interval is applied)
$$\frac{\Sigma \text{Severity adjusted fatality rate}}{\text{No. of cases}} \pm 1.96 \times \frac{\sqrt{\Sigma \text{predicted fatality rate by patient} \times (1-\text{predicted fatality rate by patient})}}{\text{No. of cases}}$$
</td></tr>
<tr><td>3rd</td><td>
■ Outcome of Grading
<table>
<tr><th colspan="2">Grade</th><th>Grading method</th></tr>
<tr><td>1st grade</td><td>★★</td><td>Medical care institutions whose surgical volume is above the cut-off point and whose fatality rate is ordinary or low</td></tr>
<tr><td>2nd grade</td><td>★☆</td><td>Medical care institutions whose surgical volume is less than the cut-off point and whose fatality rate is high</td></tr>
</table>
</td></tr>
</table>

4. Assessment results

1) Cut-off point volume and surgical fatality rate

- The overall fatality rate following stomach cancer surgery was 0.9%. The fatality rate of institutions whose surgical volume was less than the cut-off point was 4.5%, which is higher than the fatality rate of 0.7% among institutions whose volume was equal to or more than the cut-off point. The death rate from other surgeries before the adjustment for institutions whose service volume was less than the cut-off was higher than that of institutions whose surgical volume was equal to or more than the cut-off point.

Table 2.25 Service volume, cut-off point and fatality rate by surgery

(Unit: institution, case, %)

Classification	No. of institution	Cases of surgery	Cut-off point	Fatality rate		
				Total	Cut-off point	
					Less than	Equal to or more than
Stomach cancer surgery	242	18,271	41	0.9	3.8	0.7
Colon cancer surgery	297	17,861	31	1.4	5.7	1.1
Live cancer surgery †	124	8,160	21	2.0	7.2	1.9
Hip replacement	820	19,355	31	2.5	3.5	2.0
Percutaneous coronary intervention (PCI)	137	48,844	151	2.1	2.3	2.1

† Surgery conducted in two years

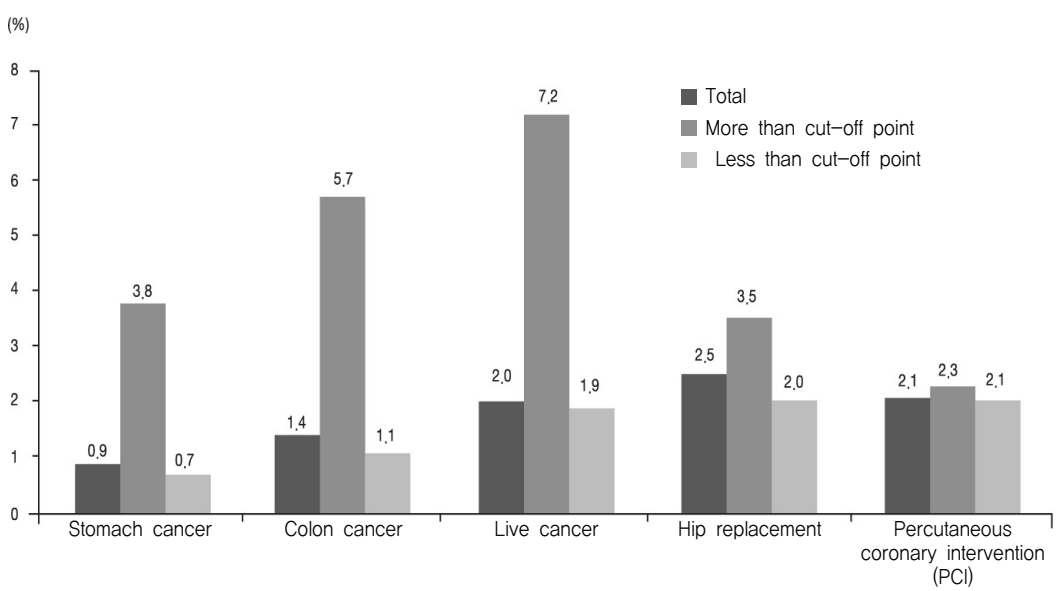


Figure 2.25 The fatality rates of surgery according to the standard volume for each type of surgery

2) Results by medical care institution

- A total of 242 institutions reported 18,271 cases of stomach cancer surgery. Of these, 69 (28.5% of the total) 1st-grade institutions (★★) reported 16,786 cases (91.9% of the total).
- A similar trend was noted for other types of surgery subject to assessment. 1st-grade institutions (★★) represented 50% or less of the total billing institutions for other types of surgery, except for percutaneous coronary artery bypass grafting. Surgery cases by 1st-grade institutions represented 70% or more of the total number of billing cases for all types of surgery.

Table 2.26 Overall assessment results of surgical volume by cancer type and type of institution

(Unit: institution, case, %)

Classification		Total		Tertiary hospital		General hospital		Hospital		Clinic	
		No. of institutions	No. of cases	No. of institutions	No. of cases	No. of institutions	No. of cases	No. of institutions	No. of cases	No. of institutions	No. of cases
Stomach cancer	Total	242	18,271	44	13,036	156	5,107	39	122	3	6
	1st grade	69	16,786	43	12,964	26	3,822	0	0	0	0
		(28.5)	(91.9)	(97.7)	(99.4)	(16.7)	(74.8)	(0.0)	(0.0)	(0.0)	(0.0)
	2nd grade	173	1,485	1	72	130	1,285	39	122	3	6
		(71.5)	(8.1)	(2.3)	(0.6)	(83.3)	(25.2)	(100.0)	(100.0)	(100.0)	(100.0)
Colon cancer	Total	297	17,861	44	11,457	183	5,319	64	1,074	6	14
	1st grade	82	15,822	41	11,001	36	3,911	5	910	0	0
		(27.6)	(88.6)	(93.2)	(96.0)	(19.7)	(73.5)	(7.8)	(84.7)	(0.0)	(0.0)
	2nd grade	215	2,039	3	456	147	1,408	59	164	6	14
		(72.4)	(11.4)	(6.8)	(4.0)	(80.3)	(26.5)	(92.2)	(15.3)	(100.0)	(100.0)
Live cancer †	Total	124	8,160	43	6,486	75	1,611	6	13		
	1st grade	54	7,579	36	6,310	18	1,269	0	0		
		(43.5)	(92.9)	(83.7)	(97.3)	(24.0)	(78.8)	(0.0)	(0.0)		
	2nd grade	70	581	7	176	57	342	6	13		
		(56.5)	(7.1)	(16.3)	(2.7)	(76.0)	(21.2)	(100.0)	(100.0)		
Hip replacement	Total	820	19,267	44	5,014	248	8,473	415	5,510	113	270
	1st grade	177	13,497	43	4,985	98	6,186	36	2,326	0	0
		(21.6)	(70.1)	(97.7)	(99.4)	(39.5)	(73.0)	(8.7)	(42.2)	(0.0)	(0.0)
	2nd grade	643	5,770	1	29	150	2,287	379	3,184	113	270
		(78.4)	(29.9)	(2.3)	(0.6)	(60.5)	(27.0)	(91.3)	(57.8)	(100.0)	(100.0)
Percutaneous coronary intervention (PCI)	Total	137	48,844	44	27,451	92	21,187	1	246		
	1st grade	83	39,947	37	23,575	45	16,126	1	246		
		(60.6)	(81.8)	(84.1)	(85.9)	(48.9)	(76.1)	(100.0)	(100.0)		
	2nd grade	54	8,897	7	3,876	47	5,061	0	0		
		(39.4)	(18.2)	(15.9)	(14.1)	(51.1)	(23.9)	(0.0)	(0.0)		

† Surgery conducted in two years

5. Other key factors

▪ A total of 775.8 billion won was claimed for 108,455 cases subject to assessment in 2009.

- The average number of days in the hospital for hip replacement was 27.0 days, which was the longest, while the length of hospitalization for PCI was 7.3 days, which was the shortest.
- The medical cost for liver cancer was the highest at 8,950,000 won in average, while the stomach cancer was found to have cost the lowest at 5,990,000 won.

Table 2.27 Claiming status of surgical volume assessment

Classification	Total	Colon cancer surgery	Stomach cancer surgery	Live cancer surgery	Hip replacement	Percutaneous coronary intervention (PCI)
Total medical cost claimed (100 million won)	7,758	1,243	1,095	377	1,422	3,621
No. of cases	108,455	17,861	18,271	4,212	19,267	48,844
Length of hospitalization (day)		18.4	16.4	21.8	27.0	7.3
Medical cost per case (10,000 won)		696	599	895	738	740

2.2 Long-term care area

2.2.1 Long-term care hospital

1. Background to and objective of assessment

- Due to the necessity for the quality assessment system to establish the functions and roles of long-term care hospitals, an assessment for medical costs in long-term care hospitals was conducted for treatments from July to September in 2008.
- The demand of long-tem care hospitals has been significantly growing. The number patients reached 205,658 in December 2009, which had increased by 6.3 times from 2004. The total medical cost for the inpatients also grew to the amount of 1.7640 trillion won in 2009, 13 times more than 2004.

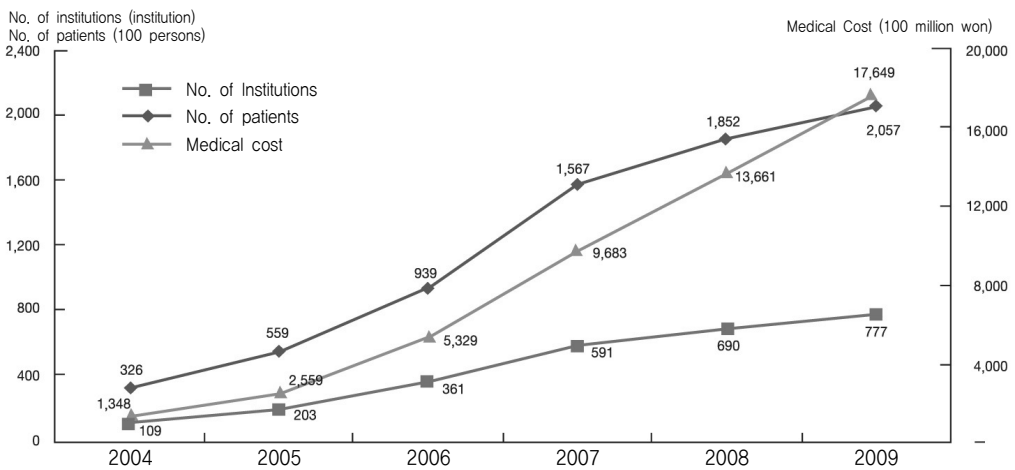


Figure 2.26 Inpatient treatments in long-term care hospitals

- Insufficiencies were found in many long-term care institutions in the aspect of structure, such as safety facilities and equipment, and workforce like pharmacists. In the aspect of quality of medical service, variations among the institutions also were found considerable.
- Therefore, the continuous assessment was conducted subject to the treatments from October to December in 2009 in order to maintain the adequacy of medical service of long-term care institutions by inducing their autonomous efforts on quality improvement and to provide the public with information for making reasonable decisions on choosing a medical institution.

2. Subject to assessment

1) Institutions

- As the long-term care hospital was founded pursuant to Article 3 paragraph 5 of the Medical Service Act, the 718 subject institutions were founded before October 2009 and are being operated at present, December 2009.

2) Assessment period

- Inpatient treatments were conducted from October to December in 2009.

3. Methods

1) Assessment index

- The existing indicators (24 indicators) were revised and supplemented based on the results from the first year assessment, and the new indicators of 35 in total (23 for structure, and 12 for treatments), which were demanded by the assessment results and necessities, have been selected through verification with data and references from the specialists.

Domain	Item	Indicator code	Indicator
Structure	Basic facilities	LTC_F_01	Average space per ward beds
		LTC_F_02	Percentage of multi-bed wards
		LTC_F_03	Rate of wards with toilets
		LTC_F_04	Availability of adequate bathrooms
		LTC_F_05	Rate of patient amenities furnished (lounge, restaurants)
	Safety facilities	LTC_F_11	Rate of thresholds or bumps removed (wards, bathrooms, and toilets)
		LTC_F_12	Rate of non-slip floors installed (bathrooms, toilets, stairs)
		LTC_F_13	Rate of emergency call system installed beds, bathrooms, and toilets)
		LTC_F_14	Rate of safety grip installed (bathrooms, toilets, hallways)
	Medical workforce	LTC_P_31	No. of beds per doctor
		LTC_P_41	No. of beds per nurse
		LTC_P_42	No. of beds per nursing personnel
		LTC_P_43	Turnover rates of nursing personnel
		LTC_P_44	On-call doctor availability in nights/ holidays

Domain	Item	Indicator code	Indicator
Structure	Other human resource	LTC_P_52	No. of beds per physical therapist
		LTC_P_53	Availability of pharmacy (including pharmacist)
		LTC_P_54	Availability of radiography room(including radiologist)
		LTC_P_55	Availability of clinical laboratory (including medical lab, technologist)
		LTC_P_56	Availability of social worker
	Equipment	LTC_E_61	No. of EKG monitor per 100 beds
		LTC_E_62	No. of pulse oxymeter per 100 beds
		LTC_E_63	No. of oxygen supply equipment per 100 beds
		LTC_E_64	No. of aspirator per 100 beds
Treatment	Process	LTC_Q_11	Rate of patients with an indwelling urinary catheter (high-risk group)
		LTC_Q_12	Rate of patients with an indwelling urinary catheter (low-risk group)
		LTC_Q_13	MMSE test rate for patients aged 65 years or older when hospitalized
		LTC_Q_14	HbA1c test rate for diabetic patients
	Outcome	LTC_Q_02	Rate of patients with declined ability to perform daily activities - dementia
		LTC_Q_03	Rate of patients with declined ability to perform daily activities _ non-dementia
		LTC_Q_04	Rate of patients with improved ability to perform daily activities_ dementia
		LTC_Q_05	Rate of patients with improved ability to perform daily activities_ non-dementia
		LTC_Q_22	Rate of patients with newly appeared bedsores _ high risk group
		LTC_Q_23	Rate of patients with newly appeared bedsores _ low-risk group
		LTC_Q_24	Rate of patients with worsened bedsores _ high risk group
		LTC_Q_25	Rate of incontinent patients _ low risk

† MMSE (Mini Mental State Exam): simple mental state examination

2) Method of data collection

- Survey sheet
  - Survey of structural parts, such as the wards and safety facilities of long-term care hospitals
- Declaration data concerning care hospital status (changes)
  - Survey of structural parts, such as the medical service workforce and equipment of long-term care hospitals
- Medical expense invoices and patient assessment charts
  - Survey of processes and outcomes, including in-patient services provided by long-term care hospitals and patient status

3) Grading method

▪ Graded into →5 groups by computing inclusive scores according to assessment areas

<table>
<tr><th>Stage</th><th>Calculation method</th></tr>
<tr><td>1st</td><td>■ Grouping the indicators into several areas and establishing weights
– Weighting for structure is 5.4 and medical services 4.6
– Establish weights for the detailed areas of structure and medical service
• The weights established for the structure: basic facility, 2.1; safety facility, 2.0; medical workforce, 2.8; other human resources, 1.8; equipment, 1.3.
• For the medical service area, the weights of 4.0 for process and 6.0 for outcome were given.

■ Standardization of Indicator
– Indicators in Structure
• The indicators for different forms (rate, ratio, and availability, etc.) are standardized into 0–4 points.
• Continuous indicators: 5 level sections in the order of institutional ranks; categorical indicators: indicator values × 4
– Indicators in Medical Service
• As the directions of indicators are different, the indicators are standardized by the percentile ranks.
• When calculating indicator values by institution, the institutions with nine or less denominator cases and with seven or less indicators are excluded.</td></tr>
<tr><td>2nd</td><td>■ Calculating composite indicator
$\text{Composite indicator of structure} = \left[\Sigma \frac{\text{Sum of standardized scores within the group by indicators}}{\text{No. of indicators by group} \times 4} \times \frac{\text{Weights by group}}{10}\right] \times 100$
$\text{Composite indicator of medical service} = \left[\Sigma \frac{\text{Sum of standardized scores within the group by indicators}}{\text{No. of indicators calculated by group}} \times \frac{\text{Weights by group}}{10}\right] \times 100$
$\text{Final composite indicator} = \frac{(\text{Structure Indicator} \times 5.4) + (\text{Medical Service (Process Outcome)Indicator} \times 4.6)}{10}$</td></tr>
<tr><td>3rd</td><td>■ Classified into 5 grades using the composite indicator
<table><tr><th>Grade</th><th>CQS Section</th></tr><tr><td>★★★★★(1stgrade)</td><td>70and over</td></tr><tr><td>★★★★☆(2ndgrade)</td><td>60~70</td></tr><tr><td>★★★☆☆(3rdgrade)</td><td>50~60</td></tr><tr><td>★★☆☆☆(4thgrade)</td><td>40~50</td></tr><tr><td>★☆☆☆☆(5thgrade)</td><td>Less than 40</td></tr></table></td></tr>
</table>

4. Assessment results

1) Structure area

- The total mean of the space of ward per bed was 6.5㎡, which increased by 0.2㎡ from 2008, and the institutional mean was 6.4㎡. The total mean of the rate for multi-patient wards (with seven or more patients) was 48.7%, which decreased by 0.9%p from 2008, and the institutional mean was 47.3%.
- The Total Mean of the rate for the wards with toilet was 48.4%, and the availability of adequate bathroom was found as 76.5%, indicating that more than half of the institutions are equipped with the adequate bathrooms. However, the indicator value of the rate for the patient amenities furnished was only 19.8%, representing that most of the institutions did not have those facilities.
- The indicator value of the rate for the emergency call system installation (ward, bathroom, toilet) was 13.1%, which has increased by 6.1% over 2008.
- The number of beds per a doctor and a nurse was 35.7 and 13.2 beds respectively, decreased by 1.7 and 1.8 beds from 2008. The number of beds per nursing personnel (nurses, nursing assistants) was 6.0, which also decreased by 0.8 over the last year.
- The rate of equipping human resources other than doctors and nurses for the long-term care hospitals was found in the order of radiologist (61%), social worker (47.5%), medical lab technologists, and pharmacist (32.3%). Pharmacists were the least equipped human resource in long-term care hospitals.
- As for the basic medical equipments, the Total Mean number of EKG monitor and pulse oxymeter per 100 beds were 2.7 and 3.7, which were not changed from 2008, and the average numbers of oxygen supply equipment and aspirator per 100 beds were 22.2 and in total.

Table 2.28 Assessment results of long-term care hospital structure indicator

(Unit: Institution, %)

Classification		Indicator		Total Mean (Variations from 2008)		Institution						
						Mean	Standard Deviation	Median	Maximum	Minimum	Q1	Q3
Facility	Basic facility	Average space per ward bed	'09	6.5	(0.2↑)	6.4	2.5	6.0	49.8	1.7	5.4	7.0
			'08	6.3		6.3	1.5	5.9	14.9	1.7	5.3	7.0
		Percentage of multi-bed wards	'09	48.7	(0.9↓)	47.3	31.6	46.6	100	0.0	20.8	73.5
			'08	49.6		48.0	32.2	46.5	100	0.0	19.7	78.3
		Rate of wards with toilet	'09	48.4		44.7	38.1	40.0	100	0.0	0.0	81.2
		Availability of adequate bathroom	'09	76.5		–	–	–	–	–	–	–
		Rate of patient amenities furnished (lounge, restaurants)	'09	19.8		–	–	–	–	–	–	–

Table 2.29 Assessment results of long-term care hospital structure indicator

(Unit: institution, %)

Classification		Indicator			Total Mean (Variations from 2008)		Institution						
							Mean	Standard deviation	Median	Maximum	Minimum	Q1	Q3
Facility	Safety facility	Rate of thresholds or bumps removed	(wards, bathrooms, and toilets)	'09	50.1		–	–	–	–	–	–	–
			(wards)	'08	78.6		–	–	–	–	–	–	–
		Rate of non-slip floors installed	(bathrooms, toilets, stairs)	'09	50.7		–	–	–	–	–	–	–
			(bathrooms, toilets, slopes)	'08	53.4		–	–	–	–	–	–	–
		Rate of safety grip installed (bathrooms, toilets, hallways)		'09	35.1		–	–	–	–	–	–	–
		Rate of emergency call system installed	(beds, bathrooms, and toilets)	'09	13.1	(6.1↑)	–	–	–	–	–	–	–
			(wards, bathrooms, and toilets)	'08	7.0		–	–	–	–	–	–	–
Workforce	Medical workforce	No. of beds per doctor		'09	–		35.7	7.0	34.8	73.4	11.2	31.6	40.5
				'08	–		37.3	8.4	37.0	112.0	9.7	32.6	42.0
		No. of beds per nurse		'09	–		13.2	6.1	13.0	69.0	4.4	9.2	15.7
				'08	–		14.9	9.8	13.4	85.3	1.4	9.4	16.6
		No. of beds per nursing personnel		'09	–		6.0	1.3	5.8	16.7	3.6	5.4	6.5
				'08	–		6.8	1.7	6.6	20.7	1.4	5.7	7.5
		On-call doctor availability in nights/ holidays		'09	–		30.2	–	–	–	–	–	–
		Turnover rates of nursing personnel		'09	–		35.7	26.2	29.4	195.0	0.0	17.7	45.6
	Other human resources	No. of beds per physical therapist		'09	–		68.1	51.6	57.0	573.9	3.6	34.8	88.0
				'08	–		84.3	419.7	51.2	8800.0	4.0	31.5	75.3
		Availability of pharmacy (including pharmacist)		'09	–		32.3	–	–	–	–	–	–
		-Existence of pharmacy		'08	–		80.7	–	–	–	–	–	–
		-Existence of pharmacist		'08	–		41.7	–	–	–	–	–	–
		Availability of X-ray room (including radiologist)		'09	–		61.0	–	–	–	–	–	–
		- Existence of X-ray room		'08	–		76.9	–	–	–	–	–	–
		- Existence of radiologist		'08	–		68.8	–	–	–	–	–	–
		Availability of clinical laboratory(including clinical lab, technologist)		'09	–		39.8	–	–	–	–	–	–
		-Existence of clinical lab technologist		'08	–		51.8	–	–	–	–	–	–
		-Existence of clinical lab		'08	–		48.3	–	–	–	–	–	–
		Availability of social worker		'09	–		47.5	–	–	–	–	–	–
				'08	–		55.0	–	–	–	–	–	–
		Availability of physical therapist		'08	–		95.4	–	–	–	–	–	–
		Rate of physical therapist service days		'08	–		90.6	28.0	100.0	100.0	0.0	100.0	100.0

Classification	Indicator		Total Mean (Variations from 2008)		Institution						
					Mean	Standard deviation	Median	Maximum	Minimum	Q1	Q3
Equipment	No. of oxygen supply equipment per 100 beds	'09	22.2		21.3	21.1	15.1	185.4	0.0	7.2	27.7
	No. of aspirator per 100 beds	'09	21.2		20.2	21.6	13.6	185.4	0.0	5.5	26.9
	No. of EKG monitor per 100 beds	'09	2.7	(0.1↑)	2.7	3.3	1.9	30.7	0.0	0.9	3.3
		'08	2.6		2.6	3.3	1.6	32.9	0.0	0.7	3.4
	No. of pulse oxymeter per 100 beds	'09	3.7	(0.2↑)	3.6	3.4	2.8	30.5	0.0	1.5	4.8
		'08	3.5		3.4	3.6	2.6	35.3	0.0	1.4	4.4

Note. 1. Other human resources show the ratio possessed by a hospital, while the medical equipment figure shows the number possessed per 100 beds.
2. "–" denotes that the value was not computed for the following reasons:
– The average results per institution of the safety-facility-related indicator cannot be computed as the indicator value refers to the "existence" or "availability" (or specific value) of the safety facility, while the indicator means the ratio of institutions in which all safety facilities have been installed.
– The total results value of the indicator for doctors, nursing workforce and physical therapists cannot be computed as the indicator has different ratios between their numerator and denominator.
– The average value per institution regarding other human resources indicators cannot be computed since the value refers to the "existence" or "availability," which means by the ratio of institutions that possess the given facilities or workforce.

2) Medical service area

▪ Process

- The total mean of the MMSE test rate for patients aged 65 years or older when hospitalized was 58.6%, while the institutional mean indicated 57.2%, which was the highest rate in the medical service area. The total mean of the HbA1c test rate for diabetic patients was 45.6%, whereas the institutional mean was rated at 42.8%, the second highest.
- The total and institutional means regarding the rate of patients with an indwelling urinary catheter within the high-risk group were 24.1% and 25.2% respectively, which presented a similar rate from 2008, while the low-risk group was rated at 3.6% in total, and 3.8% within the long-tem hospitals, which decreased by 0.4%p over the total mean of 2008.

▪ Outcome

- The mean of the rate of patients with declined ability to perform daily activities by dementia was 11.7% in total and 12.7% in long-term care hospitals, while the rate for the non-dementia patients was found to be 9.8% in total, and 10.5% within the institution. – The mean rate of the patients with an improved ability to perform daily activities for the dementia group was 14.6% in total, and 15.34% in long-term care hospitals, while for the non-dementia patients, the mean was rated 14.8% in total and 15.2% in the institution, presenting a slight difference between the two groups of patients.
- The mean rates of incontinent patients with low risk were 25.3% in total and 25.2% institutionally, the highest rate in the medical service (outcomes) area.
- The mean rates of the high-risk group of patients with newly appeared bedsores were 2.7% in total and 2.9% in long-term care hospitals, while the total and institutional means of the low-risk group were 0.2% for both, representing the lowest rate in the medical service (outcomes) area.

- The rate of patients with worsened bedsores in the high-risk group was 1.3% in total average and 1.4% within the institution.

Table 2.30 Assessment results of medical service (process, outcome) indicators for long-term care hospitals

(Unit: institution, %)

Classification	Indicator	No. of institution	Total mean	Institutional						
				Mean	Standard deviation	Median	Maximum	Minimum	Q1	Q3
Process	MMSE test rate for patients aged 65 years or older when hospitalized	'09	58.6	57.2	31.3	61.3	100	0.0	30.4	86.0
	Rate of patients with an indwelling urinary catheter (high-risk group)	'09	24.1 (-)	25.2	16.9	22.2	100	0.0	12.8	34.2
		'08	24.1	25.5	16.4	22.6	100	0.0	13.7	34.8
	Rate of patients with an indwelling urinary catheter (low-risk group)	'09	3.6	3.8	4.9	2.0	37.8	0.0	0.4	5.1
		'08	4.0	3.9	5.0	2.3	42.3	0.0	0.5	5.5
	HbA1c test rate for diabetic patients	'09	45.6	42.8	36.5	42.2	100	0.0	2.9	78.4
Outcome	Rate of patients with declined ability to perform daily activities - dementia	'09	11.7	12.7	8.3	11.1	54.5	0.0	7.3	16.7
	Rate of patients with declined ability to perform daily activities _ non-dementia	'09	9.8	10.5	7.8	9.1	47.4	0.0	4.9	13.9
		'08	19.3	20.4	12.4	17.7	77.6	0.0	12.0	25.9
	Rate of patients with improved ability to perform daily activities_ dementia	'09	14.6	15.3	10.4	13.0	56.4	0.0	7.5	20.8
	Rate of patients with improved ability to perform daily activities_ non-dementia	'09	14.8	15.2	10.7	12.9	66.3	0.0	7.3	21.0
	Rate of incontinent patients _ low risk	'09	708	25.3	25.2	14.6	24.3	87.1	14.5	33.6
	Rate of patients with newly appeared bedsores _ high risk group	'09	702	2.7	2.9	2.4	2.4	13.0	1.1	4.4
		'08	563	12.2	12.6	7.5	11.9	50.5	7.3	17.4
	Rate of patients with newly appeared bedsores _ low-risk group	'09	692	0.2	0.2	0.5	0.0	4.8	0.0	0.0
	Rate of patients with worsened bedsores _ high risk group	'09	702	1.3	1.4	1.7	0.9	11.0	0.0	2.1

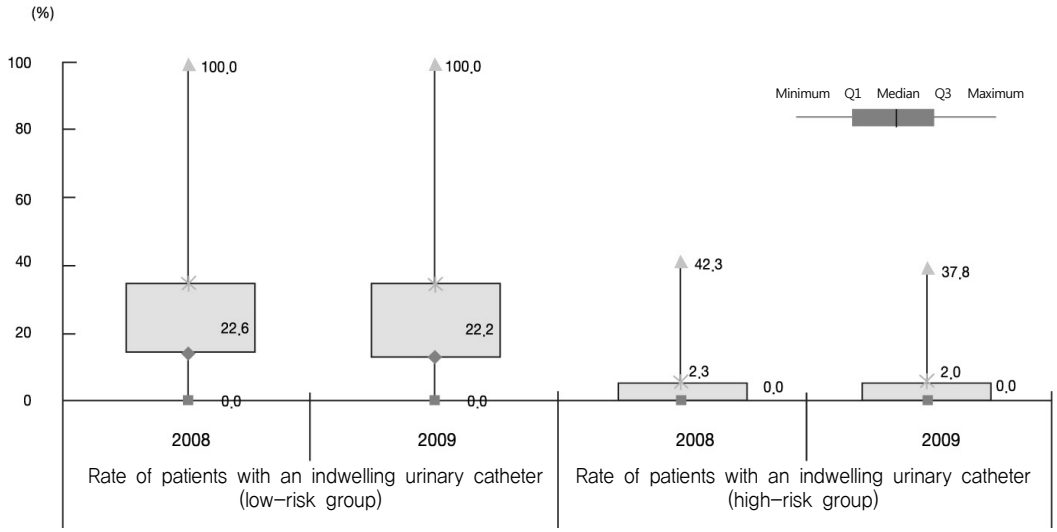


Figure 2.27 Annual rate of patients with an indwelling urinary catheter (high-risk/low-risk group)

3) Overall results

- The number of institutions belonging to each grade has been found as follows: 33 institutions for 1st grade (70 and over), 137 institutions for 2nd grade (60~70), 269 institutions for 3rd grade (50~60), and 214 institutions for 4th grade (40~50). The 3rd grade institutions were outnumbered by those of other grades, occupying 37.5%.

Table 2.31 Overall assessment results of long-term care hospitals

(Unit: institution, %)

Grade	Composite quality score section	No. of institution
Total		718(100)
★★★★★ (1st grade)	70 and over	33(4.6)
★★★★☆ (2nd grade)	60~70	137(19.1)
★★★☆☆ (3rd grade)	50~60	269(37.5)
★★☆☆☆ (4th grade)	40~50	214(29.8)
★☆☆☆☆ (5th grade)	Less than 40	48(6.7)
Excluded		16(2.2)

Note. 1. 16 institutions whose CQSs were not calculated were reported as "excluded."

- The mean of the composite indicator was 53.5% with a minimum of 28.7% and a maximum of 87.7%.
- The distribution of overall results regarding the size of a ward in long-tem care hospitals presented a total mean of 53.5%, from the minimum of 28.7% to the maximum of 87.7%. The institutions with 250 beds or more were the highest at 62.9%, while those with 30-50 beds were the lowest with 48.7%. The values of composite indicators were found to have a tendency to increase when the number of beds increase.

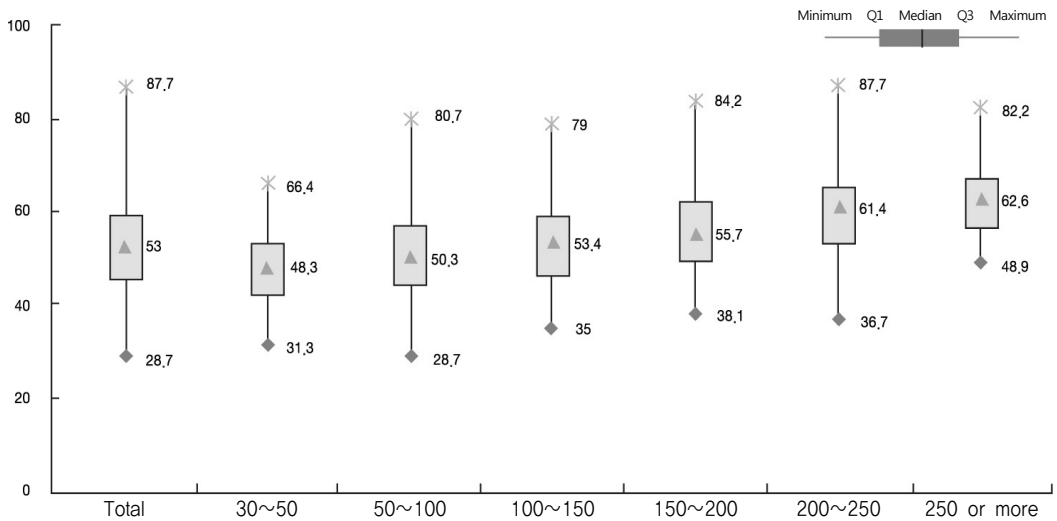


Figure 2.28 Distribution of composite indicators by the number of beds

5. Other key statuses

- Among the indicators regarding the safety facilities, the rates of thresholds or bumps removed (ward, bathroom, toilet) and non-slip floors installed (ward, toilet, hallway) presented indicator values of 50.1% and 50.7% respectively, which means that more than half of the institutions have removed the bumps in every space. On the other hand, the rate of safety grip installation was found to be only 35.1%, revealing that a majority of institutions have failed to install them.
- The incidence of pneumonia was found to be 1.0 case per 1,000 days of hospitalization in total, and 1.0 case in the long-term care hospitals. The incidence of septicemia was 0.7 cases per1,000 days of hospitalization both in total and in the institution.
- The duration of the pneumonia ratio treatment rated 1.0% in total, and 1.0% within the long-term care hospitals, and that of septicemia treatment rated 0.7% both in total and institutionally.

2.2.2 Mental hospital within medical aid

1. Background of assessment and purpose

- There has been a continuous increase of mental patients and disease burden cost.
- The assessment request has been made from the Ministry of Health and Welfare to ensure the adequacy of medical service under the daily wage flat rate system, which was changed into the sliding scale payment system based on the level of securing the workforce with an increased fixed medical fee for mental hospitals within medical aid in October 2008.
- It aims to induce the voluntary quality improvement activities from the medical care institutions by assessing the medical care conditions of mental care hospitals and giving feedback about the assessment results.

  ※ Mental care hospital: A medical care institution established under the "Medical Treatment Law," which aims to provide medical treatment for mental patients, including hospitals and clinics, or the department of psychiatry installed in medical institution whose level is a hospital or higher, satisfying the standards of facilities according to the "Mental Health Act," Article 12, paragraph 1(「Mental Health Act」, Article 3, no. 3).

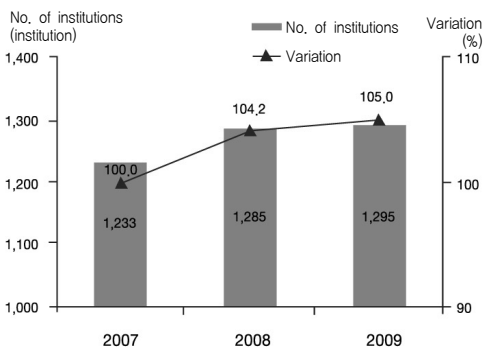


Figure 2.29 Annual status of mental care hospitals(Compared to 2007)

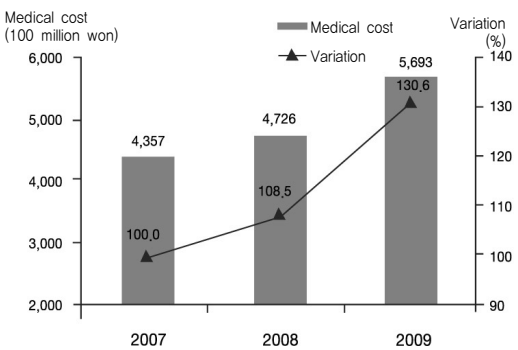


Figure 2.30 The inpatient care cost of mental hospital for the medical fee beneficiary

2. Subject to assessment

1) Institution assessed

- Institutions that claimed the inpatient care fee for the mental hospital within medical aid during the three months from September to November of 2009 (470 institutions).

2) Assessment period

- September to November2009, for three months, regarding the inpatient care fee for mental hospital within medical aid.

▪ For the structure area such as facilities, the survey sheets were completed on October 25, 2009.

3. Assessment method

1) Assessment indicators

▪ The indicators with high priority that are suitable for our circumstances were selected to improve the quality of mental care service within medical aid, considering the importance of the problem, measurability, and possibility to enhance care quality based on the professionals' opinions.

Domain	Area	Indicator code	Indicator
Structure	Facility	MH_F_01	Floor size of a ward per bed
		MH_F_02	Rate of wards with less than 10 beds
		MH_F_03	Capacity per ward
	Workforce	MH_P_01	Number of daily inpatients per psychiatrist
		MH_P_02	Number of daily inpatients per psychiatric nurse
		MH_P_03	Number of daily inpatients per psychiatric nursing staff
		MH_P_04	Number of daily inpatients per psychiatric & mental health specialist
Process	Medication	MH_Q_01	Number of daily inpatients per psychiatric & mental health specialist(schizophrenia)
	Psychotherapy	MH_Q_02	Fulfillment rate of psychotherapy implementation standard
		MH_Q_03	Fulfillment rate of individual psychotherapy implementation standard
Outcome	Days of hospitalization	MH_Q_04	Days of hospitalization_ median (schizophrenia)
		MH_Q_05	Days of hospitalization_median (alcoholism)
	Readmission rate	MH_Q_07	Readmission rate within 30 days of discharge (schizophrenia)

2) Data collection method

▪ Data survey using survey sheets and online questionnaires

▪ The status report of medical care institutions and claims data for the calculation of inpatient care cost with the sliding scale payment system of the mental hospital within the medical aid.

▪ Statements of medical care cost

▪ To check the reliability of the data, some of the institutions were selected considering their types and regional distributions, and were visited in person to be compared with the survey sheets.

3) Grading method

▪ Composite Quality Scores were calculated within each sector and graded into 5 groups.

<table>
<tr><th>Stage</th><th>Calculation method</th></tr>
<tr><td>1st</td><td>■ Subject of Composition
– Seven indicators from structure and six indicators from medical service are included in the subject of composition.
■ Weights by indicators
– The probability of quality improvement, the influence on the quality of service, and the distribution of indicator values are considered along with the experts' opinions for weighting each indicator.
– Three sectors of structure, process and outcome, the six areas included in those three sectors, such as workforce, and indicators within the areas are given weights.
– The weights given for structure, process and outcome are 56, 20, and 24 respectively. The six areas are also weighted, including facilities (24) and medical workforce (32).
■ Standardization of indicators
– Indicators are standardized into 0–4 points since they are presented in different forms, such as ratio, rate, and availability.</td></tr>
<tr><td>2nd</td><td>■ Calculating Composite Quality Score
$CQS = \sum_{n=\text{no. of indicator}} \frac{(\text{Standardized score by indicator}}{4} \times \text{Weight}$</td></tr>
<tr><td>3rd</td><td>■ Classifying the 5 grades by CQS
<table>
<tr><th>Grade</th><th>CQS</th></tr>
<tr><td>★★★★★(1grade)</td><td>73 or higher</td></tr>
<tr><td>★★★★☆(2grade)</td><td>64~73</td></tr>
<tr><td>★★★☆☆(3grade)</td><td>57~64</td></tr>
<tr><td>★★☆☆☆(4grade)</td><td>51~57</td></tr>
<tr><td>★☆☆☆☆(5grade)</td><td>Less than 51</td></tr>
<tr><td>Excluded</td><td>Institutions with less than 7 indicators assessed in structure and two or less indicators assessed in medical service.</td></tr>
</table></td></tr>
</table>

4. Assessment results

1) Structure

- The average floor size of a ward per bed was found to be 5.0㎡, which met the standard stipulated by the "Mental Health Act"(6.3㎡/person for a single ward, 4.3㎡/person for a ward for 2 or more). However, five institutions were found to have operated with an average of less than 3㎡ of a ward per bed(1.1%).
- The enforcement regulations of the "Mental Health Act" stipulates the capacity of a ward as less than 10 persons. The rates of wards with less than 10 beds were found to be 99.5% on average, with 34.3% at the minimum and 100.0% at the maximum. Also nine institutions were found presenting 100% of the rate for the wards with less than 10 beds (1.9%).
- The average capacity of a ward was 6.2 persons, with a minimum of 1 and a maximum of 10.
- The number of daily inpatients per psychiatrist was 47.2% on average, which satisfied the standard of the "Mental Health Act" (60 inpatients per psychiatrist), but the minimum and maximum ranged from 0.9 to 311.4 patients per psychiatrist. The number of institutions found to have exceeded 60 patients per psychiatrist was 78 (16.9%).

- Since 2007, the number of beds per psychiatrist has been decreasing.
  ※ The number of beds per psychiatrist: 56.3 beds in 2007→46.9 beds in 2008→38.0 beds in 2009
- According to the type of medical care institution, the averages varied in order of the hospital, 59.9 persons>clinic, 42.5 persons>general hospital, 22.6 persons>tertiary hospital, 4.4 persons, representing a great variation.

▪ The average number of daily inpatients per psychiatric nurse was discovered to be 21.2 persons (according to the standard, 13 patients are to be assigned to a nurse, and nursing assistants can substitute for nurses up to half of the capacity), ranging from a minimum of 0.5to a maximum of 156.9.

- The mean by the type of institution has been found as follows: clinic, 31.9 >hospital, 19.0 >general hospital, 9.2 >tertiary hospital, 4.8. Significant variations among the different types of institution were found.

▪ The mean of the number of daily inpatients per psychiatric nursing staff was 10.1 persons, and 77 institutions were found to have exceeded 13 patients (17.0%).

▪ The mean number of daily inpatients per psychiatric & mental health specialist was found to be 74.4 persons, which met the standard of the mental health act, stating 100 patients per a psychiatric & mental health specialist, but 28 institutions were revealed to have exceeded 100 patients per day (13.8%).

Table 2.32 Assessment results of the structural indicators from mental hospital within medical aid

(Unit: ㎡, %, person)

Classification	Indicator	Mean	Standard deviation	Median	Minimum	Maximum	Q1	Q3
Facility	Floor size of a ward per bed	5.0	1.6	4.7	2.0	19.8	4.0	5.4
	Rate of wards with less than 10 beds	99.5	4.7	100.0	34.3	34.3	100.0	100.0
	Capacity per ward	6.2	1.8	6.1	1.0	10.0	4.9	7.7
Workforce	Number of daily inpatients per psychiatrist	47.2	29.1	51.6	0.9	311.4	31.3	58.2
	Number of daily inpatients per psychiatric nurse	21.2	17.1	18.2	0.5	156.9	12.2	23.8
	Number of daily inpatients per psychiatric nursing staff	10.1	4.7	10.0	0.5	48.3	7.3	12.1
	Number of daily inpatients per psychiatric & mental health specialist	74.7	88.9	62.8	3.6	1161.1	44.0	84.1

2) Process

- The mean of the atypical medication prescription rate for schizophrenia, schizotypal and delusional disorders (F20~F29) among the prescriptions of antipsychotic drugs was 65.5% in total and the mean by the type of institution was 65.2%, with the minimum at0% and the maximum at100%.
  - The institutions that prescribed atypical medications to all inpatients were found to be 14, while there were 5 institutions that did not prescribe them at all.
- The total mean of the fulfillment rate of the psychotherapy implementation standard was 87.8% with an institutional mean of 89.3%, and the rates ranged from a minimum of 2.6% to a maximum of 100.0%.
  - There were 11 institutions that presented lower than 30% of the fulfillment rate of the psychotherapy implementation standard (2.6%).
- The total mean of the fulfillment rate of the individual psychotherapy implementation standard was 85.4% with an institutional mean of 88.9%. The range of the rates covered from 3.0%, the minimum, to 100.0%, the maximum.
  - Nine institutions were revealed to have fulfilled only 30% of the rate of the individual psychotherapy implementation standard (2.1%).

Table 2.33 Assessment results of structure indicators of mental hospital within medical aid

(Unit: %)

Classification	Indicator	Total mean	Institutional						
			Mean	Standard deviation	Median	Minimum	Maximum	Q1	Q3
Medication	Atypical medication prescription rate (schizophrenia)	65.5	65.2	24.7	70.0	0.0	100.0	50.0	85.3
Psychotherapy	Fulfillment rate of psychotherapy implementation standard	87.8	89.3	20.0	98.7	2.6	100.0	90.4	100.0
	Fulfillment rate of individual psychotherapy implementation standard	85.4	88.9	18.6	97.8	3.0	100.0	86.7	100.0

3) Outcome

- The mean number of days of hospitalization_ median (schizophrenia) was 379.4 days with a minimum of 12.0 days to a maximum of 2,484.5 days.
  - The mean by the type of medical institution was found to be 348.0 days for general hospitals, 465.5 days for hospitals, and 241.8 days for clinics. Hospitals were the longest, and clinics were the shortest.
- The mean value of the days of hospitalization median (alcoholism) was 130.0, and the values ranged from a minimum of 11.5 to the maximum of 748.5.

- The mean for each type of institution was found to be 117.3 days for general hospitals, 140.9 days for hospitals, and 106.6 days for clinics respectively.

▪ The readmission rate within 30 days of discharge for schizophrenia was 36.2% on total average, while the institutional mean rated 38.2%. The values ranged from 0% to 78.6% as the maximum.

- The mean values by type of institution were found in the order of general hospitals (34.2%), hospitals (36.2%), and clinics (43.0%). The institutional mean was found to be the lowest in general hospitals and the highest in clinics.

Table 2.34 Assessment results of outcome indicators of mental hospital within medical aid

(Unit: day, %)

Classification	Indicator	Total Mean	Institutional						
			Mean	Standard deviation	Median	Minimum	Maximum	Q1	Q3
Days of Hospitalization	Days of hospitalization_ median (schizophrenia)	–	379.4	429.5	232.5	12.0	2,484.5	120.5	395.0
	Days of hospitalization_ median (alcoholism)	–	130.0	116.7	93.0	11.5	784.5	64.0	158.0
Readmission rate	Readmission rate within 30 days of discharge (schizophrenia)	36.4	38.2	14.8	36.7	0.0	78.6	27.7	46.6

3) Overall Results

▪ The mean of the composite quality scores was61.2 points(maximum 98.5, minimum 25.5), and the institutional mean by type of institution was found to be the highest in general hospitals with 70.0 points and the lowest in hospitals with 58.3 points.

▪ The mean of CQS by grades was found to be the highest in G4 with 63.9 points and the lowest in G3 with 53.2 points.

Table 2.35 CQS Status of mental hospital within medical aid

(Unit: institution, %)

Classification[1]		No. of institutions	Mean	Standard deviation	Coefficient of variation	Median	Maximum	Minimum	Q1	~	Q3
Total		349	61.2	13.3	21.7	60.0	98.5	25.5	53.0	~	69.3
Type of medical institution	Tertiary hospital	–	–	–	–	–	–	–	–		–
	General hospital	24	70.0	15.1	21.6	63.8	96.5	49.5	57.9	~	85.3
	Hospital	215	58.3	13.6	23.3	57.0	98.5	25.5	49.0	~	66.8
	Clinic	110	65.1	10.3	15.9	65.0	92.6	42.5	57.6	~	70.9
Grade of mental hospital within medical Aid	G1	–	–	–	–	–	–	–	–		–
	G2	176	63.1	13.5	21.3	59.9	98.5	37.5	53.5		73.0
	G3	35	53.2	7.9	14.9	53.5	64.8	36.5	48.0	~	58.8
	G4	86	63.9	13.1	20.5	65.0	92.6	25.5	57.3	~	70.5
	G5	52	55.8	12.6	22.5	54.5	84.5	29.5	46.4	~	65.3

Note. 1) Tertiary hospitals and G1 institutions are excluded for their low possession of target indicators.

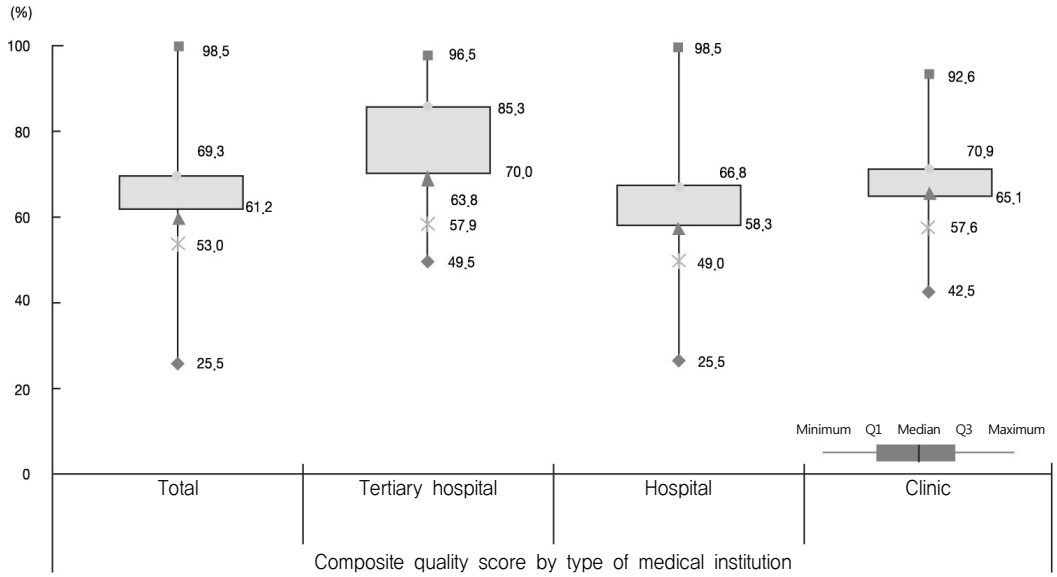


Figure 2.31 Composite quality score by type of medical institution

5. Other key factors

- As of October 15, 2009, 1,792 psychiatrists were in 461 institutions; 1,386 of them were psychiatric specialists and 406 of them were majoring in psychiatry.
  - The average number of beds per psychiatrist has been found in the order of Gyeongbuk, 69.3 beds, Gyeongnam, 65.8 beds, and Jeonnam and Chungnam, 56.4 beds from the highest, and Seoul shows the lowest rate of 13.6 beds per psychiatrist.
- A total number of 7,067 psychiatric nursing personnel are working in 456 institutions, consisting of 4,211 of nurses, 278 as psychiatric & mental health nurses, and 2,578 as nursing assistants.
  - The average number of beds per psychiatric nursing personnel has been found in the order of Chungbuk, 15.1 beds, Gyeongbuk, 11.4 beds, and Gyeongnam, 11.3 beds from the highest, and Seoul presents the lowest rate of 6.1.
- The number of inpatients that claimed medical care benefits in a mental hospital within medical aid has been found to be 72,555, which has decreased by 2.5% since 2007.
- The inpatient care cost for the mental hospital within medical aid in 2009 is 569.3 billion won, which has increased by 30.6% compared to 2007.

2.2.3 Hemodialysis

1. Assessment background and purpose

- Medical care costs have been increasing due to the continuous growth of hemodialysis patients, while the fatality rate caused by stroke, heart diseases, and infection has also been high.
  - Compared to 2005, the number of patients in 2008 increased by 26.9%, while medical costs increased by 43.3%
  - The 5 year-survival rate for hemodialysis patients with diabetes is 55.9% (The Korean Society of Nephrology, 2009).

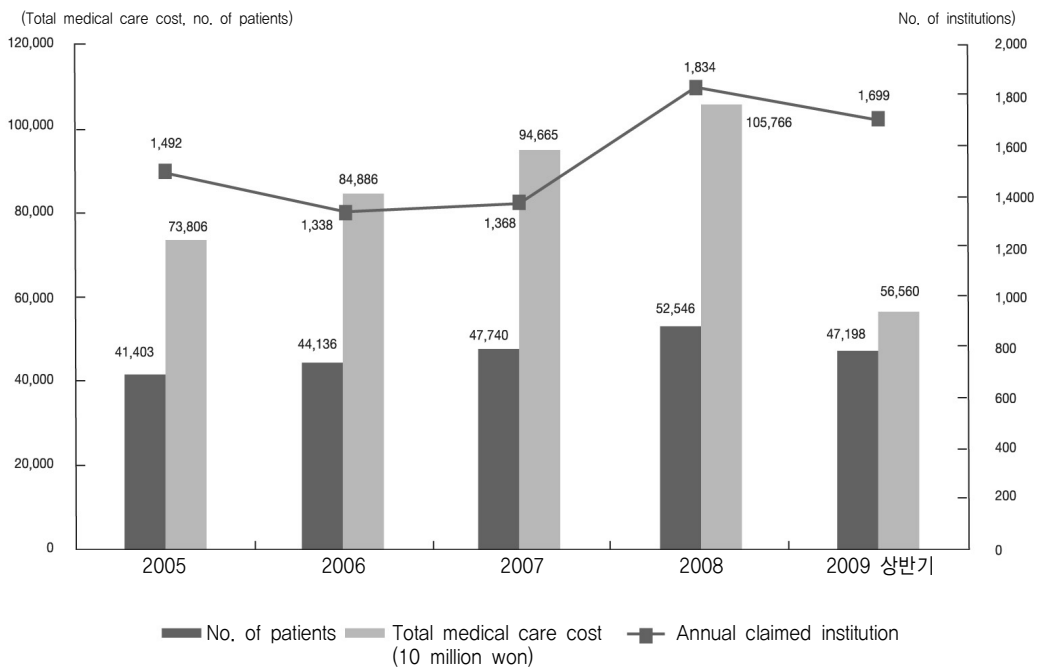


Figure 2.32 Yearly Trend of the number of hemodialysis patients and medical cost

- According to the results from the quality indicator development in 2008 and the preliminary assessment, variations among the institutions are found to be significant.
  - The demand for a quality assessment regarding the management of hemodialysis patients has arisen due to the imposition of a flat rate system in medical aid and the frequent turnover of patients.
- It aims to protect patients' health by promoting voluntary quality improvements from healthcare institutions, and providing people with information needed for using medical care services.

2. Subject to assessment

1) Subject institutions

- 621 institutions at the level of clinics or higher that have filed claims for hemodialysis (O7020, O9991), possess the hemodializer as of July 1, 2009 (tertiary hospital, 44;general hospital, 175;hospital, 94;clinic, 308).

2) Subject period

- Outpatient treatment from July 2009 to September 2009 (for 3 months)

3) Subject patients

- Outpatients aged 18 or older who have received hemodialysis twice or more per week at the same institution.

3. Assessment methods

1) Assessment indicators (7 for structure, 11 for medical service; 18 in total)

- Availability of specialists, thorough inspection of water quality, availability of emergency equipment, and appropriately conducted treatments are crucial to the hemodialysis patients' survival and treatment outcomes. Thus, the indicators have been selected to assess if an institution satisfies the standards for workforce, facilities, and equipment and properly conducts periodic tests and management of anemia and blood pressure.

Area	Item	Indicator code	Indicator
Structure (7)	Human Resource	HD_01	Rate of doctors who specialize in hemodialysis
		HD_02	Mean number of daily hemodialysis per doctor
		HD_03	Rate of nurses who have 2years or more experience in hemodialysis
		HD_04	Mean of daily hemodialysis per nurse
	Equipment	HD_05	Fulfillment rate of minimum number of isolated hemodializers for hepatitis B patients
		HD_06	Availability of emergency equipment in hemodialysis ward
	Facility	HD_07	Fulfillment rate of water examination cycle
Process (4)	Adequacy of hemodialysis	HD_08	Fulfillment rate of hemodialysis adequacy test cycle
	Blood vessel management	HD_09	Fulfillment rate of arteriovenous fistula monitoring
	Periodic test	HD_10	Fulfillment rate of periodic test cycle
	Anemia management	HD_M_01	Iron injection rate †
Outcome (7)	Other Human resource	HD_M_02	Hemodialysis adequacy level fulfillment rate †
	Anemia management	HD_M_03	Rate of patients with Hb 10g/dℓ or under †
		HD_M_04	Iron storing fulfillment rate †
	Blood pressure management	HD_M_05	Systolic blood pressure satisfactory rate †
		HD_M_06	Diastolic blood pressure satisfactory rate †
	Mineral & nutrition management	HD_M_07	Calcium × phosphorus fulfillment rate †
		HD_M_08	Density of albumin †

† : Monitoring Indicators

2) Data collection method

▪ Use of medical care benefit claims data and survey sheets

3) Grading methods

▪ Grading into 5 groups by calculating the Composite Quality Score

<table>
<tr><th>Stage</th><th>Method of calculation</th></tr>
<tr><td>1st</td><td>■ Selecting subject indicators
– Subject to the 7 indicators in structure and 3 in process, excluding the monitoring indicators.
■ The institutions with any denominator cases of 5 or less in process indicators are excluded.
■ Standardization of Indicators
– Indicators in various forms, such as ratio and availability, are standardized into 0–4 points.
• Categorical indicator: Indicator value × 4
• Continuous indicator: Divided into 4 sections considering the distribution of indicators</td></tr>
<tr><td>2nd</td><td>■ Weighting the indicators
– Establishing weights for each indicator considering the degree of effort to improve the indicators, distribution, etc.
• Equipment: 0.5, daily hemodialysis rates per doctor and per nurse: 1.5, others: 1
■ Calculation of Composite Quality Score
– Calculating CQS for each institution(Σsection score by indicator × weight)
– Converting the CQS into the 100 point scale
$CQS = \frac{\text{Institutional CQS} - \text{Minimum score}}{\text{Maximum score} - \text{Minimum score}} \times 100$</td></tr>
<tr><td>3rd</td><td>■ Classifying the institutions into 5 grades based on the CQS
<table>
<tr><th>Grade</th><th>CQS</th></tr>
<tr><td>★★★★★ (1st grade)</td><td>90 and over</td></tr>
<tr><td>★★★★☆ (2nd grade)</td><td>80~90</td></tr>
<tr><td>★★★☆☆ (3rd grade)</td><td>70~80</td></tr>
<tr><td>★★☆☆☆ (4th grade)</td><td>60~70</td></tr>
<tr><td>★☆☆☆☆ (5th grade)</td><td>Less than 60</td></tr>
</table></td></tr>
</table>

4. Assessment results

1) Structure

▪ The majority of assessment indicators presented outstanding results in the order of tertiary hospital, general hospital, clinic, and hospital. The results for hospitals were not better than clinics.

▪ Significant variations among the institutions were found regarding the workforce, such as the fulfillment rates of doctors and nurses and the daily number of hemodialysis per medical personnel.

- Fulfillment rates for doctors and nurses were indicated at76.1% and 74.0% respectively. In the case of the mean of daily hemodialysis per medical care personnel, doctors performed them22.1 times with a minimum of 0.7 and a maximum of 131.9, and nurses were at 4.4 times with a minimum of 0.7 and a maximum of 9.7, representing considerable variations by institution.

- Isolated hemodializers for hepatitis B patients were possessed by all institutions except for 3, but the emergency equipment in the hemodialysis ward was not properly prepared by 227 institutions equaling 36.6%, but occupied by clinics at 56.8%.
- The mean of the fulfillment rate for the water examination cycle was 85.8%, while the clinics and hospitals presented lower rates than average of 85.8% and 81% respectively.

Table 2.36 Assessment results for structure indicators of hemodialysis

(Unit: %, times)

Classification	Indicator	Type of institution	Mean	Standard deviation	Median	Minimum	Maximum	Q1	Q3
Workforce	Rate of doctors who specialize in hemodialysis	Total	76.1	39.8	100.0	0.0	100.0	60.1	100.0
		Tertiary hospital	84.7	14.9	83.3	60.0	100.0	72.5	100.0
		General hospital	78.6	39.3	100.0	0.0	100.0	82.1	100.0
		Hospital	50.5	48.4	50.0	0.0	100.0	0.0	100.0
		Clinic	81.3	36.7	100.0	0.0	100.0	100.0	100.0
	Mean number of daily hemodialysis per doctor[1)]	Total	22.1	13.8	19.6	0.7	131.9	13.2	27.9
		Tertiary hospital	13.3	5.9	12.3	5.6	31.7	9.5	15.0
		General hospital	19.6	9.8	19.1	0.7	61.7	12.9	25.2
		Hospital	17.8	15.6	14.6	2.0	131.9	9.7	21.9
		Clinic	26.2	14.6	23.2	2.0	108.9	16.6	31.4
	Rate of nurses who have 2 years or longer experience in hemodialysis	Total	74.0	20.0	75.0	16.7	100.0	60.0	90.9
		Tertiary hospital	77.4	16.8	80.0	30.1	100.0	69.0	88.3
		General hospital	72.5	20.3	71.5	25.0	100.0	60.0	87.2
		Hospital	73.5	22.3	71.4	22.6	100.0	54.1	100.0
		Clinic	74.6	19.5	75.0	16.7	100.0	60.1	90.4
	Mean of daily hemodialysis per nurse[1)]	Total	4.4	1.2	4.2	0.7	9.7	3.7	4.9
		Tertiary hospital	4.8	1.1	4.7	2.8	7.3	4.0	5.5
		General hospital	4.5	1.3	4.6	0.7	9.2	3.8	5.2
		Hospital	4.6	1.6	4.5	1.0	9.4	3.6	5.5
		Clinic	4.1	0.9	4.0	2.0	9.7	3.6	4.5
Equipment	Fulfillment of minimum number of isolated rates of hemodializer for hepatitis B patients	Total	99.5	–	–	–	–	–	–
		Tertiary hospital	97.7	–	–	–	–	–	–
		General hospital	99.4	–	–	–	–	–	–
		Hospital	100.0	–	–	–	–	–	–
		Clinic	99.7	–	–	–	–	–	–
	Availability of emergency equipment in hemodialysis ward	Total	63.4	–	–	–	–	–	–
		Tertiary hospital	97.7	–	–	–	–	–	–
		General hospital	73.1	–	–	–	–	–	–
		Hospital	46.8	–	–	–	–	–	–
		Clinic	58.1	–	–	–	–	–	–
Facility	Fulfillment rate of water examination cycle	Total	85.8	–	–	–	–	–	–
		Tertiary hospital	97.7	–	–	–	–	–	–
		General hospital	92.8	–	–	–	–	–	–
		Hospital	81.6	–	–	–	–	–	–
		Clinic	81.5	–	–	–	–	–	–

Note. 1. Daily no. of hemodialysis per doctor / nurse: in the case of exceeding a certain level, serious quality problems may occur (doctors 50 times, nurses 6.5 times)

2) Process

A. Total results

- Favorable result have been found in the order of tertiary hospitals, general hospitals, hospitals, and clinics.
- The indicators of the fulfillment rate of hemodialysis adequacy test cycles and fulfillment rate of periodic test cycles have shown more than 90.0% of fulfillment rates in every type of institution, while the fulfillment rate of arteriovenous fistula monitoring presented a mean of 81.1%, indicating 99.3% in tertiary hospitals and 74.4% in clinics, which represented significant variations among the different types of institutions.

Table 2.37 Assessment results 1 for process indicators of hemodialysis

(Unit: institution, case, %)

Classification	Indicator	Type of Institution	No. of institutions	No. of cases	Total results
Adequacy of hemodialysis	Fulfillment rate of hemodialysis adequacy test cycles	Total	620	14,460	94.5
		Tertiary hospital	44	1,260	99.2
		General hospital	175	3,926	96.9
		Hospital	93	1,476	93.0
		Clinic	308	7,798	92.8
Blood vessel management	Fulfillment rate of arteriovenous fistula monitoring	Total	620	14,243	81.1
		Tertiary hospital	44	1,224	99.3
		General hospital	175	3,839	89.1
		Hospital	93	1,453	80.4
		Clinic	308	7,727	74.4
Periodic test	Fulfillment rate of periodic test cycles	Total	620	14,460	94.4
		Tertiary hospital	44	1,260	97.4
		General hospital	175	3,926	97.4
		Hospital	93	1,476	92.2
		Clinic	308	7,798	92.9

Note. 1. Calculation made subject to the institutions with 5 or more denominator cases per indicator

B. Results by institution

- All indicators have shown great variations according to the type of institutions, resulting from a minimum of 0.0% to a maximum of 100% with the exclusion of tertiary hospitals.
- The interquartile range (Q3-Q1) of the fulfillment rate of arteriovenous fistula monitoring has been found in the order of clinics (23.1%p), hospitals (14.3%p), tertiary hospitals and general hospitals (0.0%p), representing the largest institutional variation within clinics.
- The interquartile range (Q3-Q1) for the fulfillment rate of periodic test cycles has been found in the order of hospitals (8.5%p), clinics (7.1%p), general hospitals (2.9%p), and tertiary hospitals (2.8%p), representing that the variation within hospitals are the most significant.

Table 2.38 Assessment results 2 for process indicators of hemodialysis

(Unit: %)

Classification	Indicator	Type of institution	Mean[1)]	Standard deviation	Median	Minimum	Maximum	Q1	Q3
Adequacy of hemodialysis	Fulfillment rate of hemodialysis adequacy test cycles	Total	94.4	21.0	100.0	0.0	100.0	100.0	100.0
		Tertiary hospital	99.2	4.7	100.0	69.0	100.0	100.0	100.0
		General hospital	95.5	19.1	100.0	0.0	100.0	100.0	100.0
		Hospital	93.9	21.7	100.0	0.0	100.0	100.0	100.0
		Clinic	93.2	23.0	100.0	0.0	100.0	100.0	100.0
Blood vessel management	Fulfillment rate of arteriovenous fistula monitoring	Total	80.6	38.7	100.0	0.0	100.0	96.4	100.0
		Tertiary hospital	99.4	2.4	100.0	86.2	100.0	100.0	100.0
		General hospital	86.9	33.1	100.0	0.0	100.0	100.0	100.0
		Hospital	77.9	40.9	100.0	0.0	100.0	85.7	100.0
		Clinic	75.2	42.4	100.0	0.0	100.0	76.9	100.0
Periodic test	Fulfillment rate of periodic test cycles	Total	94.4	10.6	98.5	0.1	100.0	94.0	99.7
		Tertiary hospital	97.5	4.5	99.3	77.2	100.0	97.1	99.9
		General hospital	97.4	4.6	99.2	75.6	100.0	97.0	99.9
		Hospital	92.0	15.4	96.6	0.1	100.0	90.8	99.3
		Clinic	92.9	11.6	97.7	12.8	100.0	92.4	99.5

Note. 1. Calculation made subject to the institutions with 5 or more denominator cases per indicator

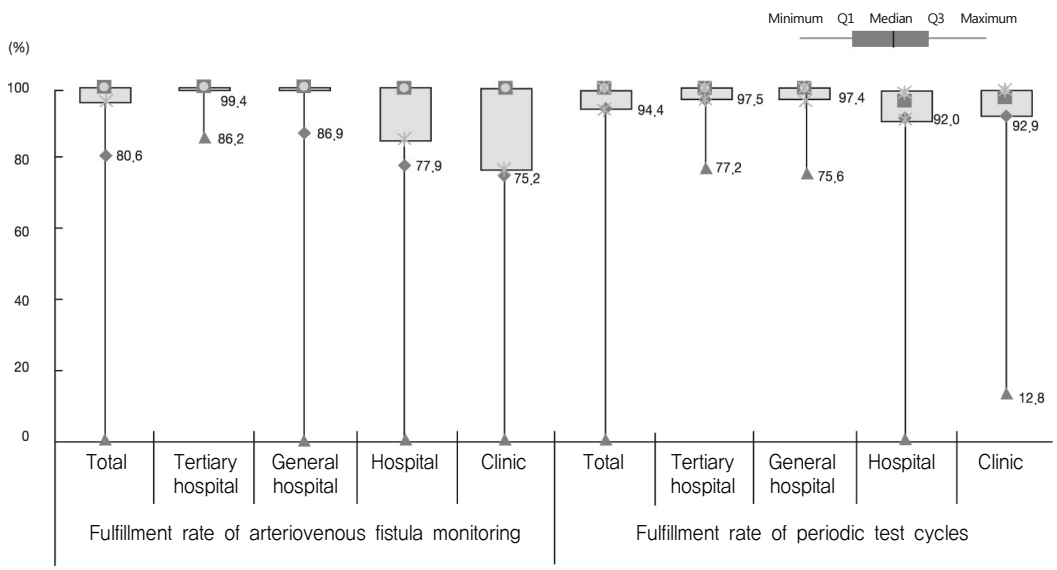


Figure 2.33 Assessment results by institution for major process indicators of hemodialysis

3) Overall results

- Overall results have been produced from 597 institutions (96.1%) out of 621 institutions subject to assessment.
- The number of institutions for each grade is as follows; 170 institutions for 1st grade, 194 institutions for 2nd grade, 132 institutions for 3rd grade, 68 institutions for 4th grade, and 33 institutions for 5th grade. 2nd grade has been found to occupy the largest portion by 32.5% in total.
  - 59.1% of the tertiary hospitals were found as 1st grade institutions.

Table 2.39 Overall assessment results of hemodialysis by type of institution

(Unit: institution, %)

Grade	Total	Tertiary hospital	General hospital	Hospital	Clinic
Total	621 (100.0)	44 (100.0)	175 (100.0)	94 (100.0)	308 (100.0)
★★★★★ (1st grade)	170 (27.4)	26 (59.1)	50 (28.6)	9 (9.6)	85 (27.6)
★★★★☆ (2nd grade)	194 (31.2)	11 (25.0)	61 (34.9)	24 (25.5)	98 (31.8)
★★★☆☆ (3rd grade)	132 (21.3)	7 (15.9)	38 (21.7)	16 (17.0)	71 (23.1)
★★☆☆☆ (4th grade)	68 (11.0)	–	13 (7.4)	23 (24.5)	32 (10.4)
★☆☆☆☆ (5th grade)	33 (5.3)	–	5 (2.9)	7 (7.4)	21 (6.8)
Excluded	24 (3.9)	–	8 (4.6)	15 (16.0)	1 (0.3)

Note. 1) Institutions with 5 or less denominator cases in any process indicators are excluded

5. Other key factors

- The number of medical care benefits claims and the total amount of medical care costs in 2008was52,546 cases at a cost of 1.0576 trillion won. The medical care cost per patient is 20.13 million won, and the number of hemodialysis per patient is 101 times.

Table 2.40 Claims status of hemodialysis assessment

Classification	Total	Tertiary hospital	General hospital	Hospital	Clinic
Total medical care Cost (100 million won)	10,576	2,440	3,145	845	4,145
No. of patients(person)	52,546	18,629	22,780	6,708	25,513
Medical cost per patient (10,000 won)	2,013	1,310	1,381	1,260	1,625
No. of hemodialysis per patient (times)	101	38	61	68	108

Note. 1) Patients are double-counted by type of institution

- The Status of Institutions Conducting Hemodialysis and the Patients
  - The average number of doctors per institution has been the highest in tertiary hospitals by 4.8, and the other types of institutions have indicated 1.2-1.4 doctors per institution. The average number of nurses also has been found to be the highest in tertiary hospitals, at 12.5 per institution, followed by clinics (7.3), general hospitals (5.9), and hospitals (4.4).

- Among the emergency equipment for hemodialysis, the ventricular defibrillation has been less equipped than other equipment, representing 69.2%.
- 74.8% of hemodialysis patients have been found to have health insurance, 3.2 times more than the patients with medical care benefits, and male patients are more likely to have insurance than females by 57.0%, and 36.1% of the patients are aged 65 or older.
- The causal diseases of chronic renal failure have been found in the order of diabetes (36.0%), hypertension (26.6%), and glomerulonephritis (13.9%).
- The duration of dialysis is 5.1 years in average, while the longest is at clinics for 5.7 years and the shortest is in hospitals for 4.3 years.

▪ Results of Monitoring Indicators

- Among the anemia management indicators, the iron storing fulfillment rate indicates 52.0% in average, while the iron injection rate presents a low fulfillment rate of 23.0%. Ir on has been administered orally more frequently than by injection (injection, 17.p%; oral administration, 69.4%)
- The rate of patients with less than Hb 10g/dl is 28.4%, mainly distributed within 10g/dl -12g/dl (69.8%).
- The indicators of the hemodialysis adequacy level fulfillment rate, calcium × phosphorus fulfillment rate, and albumin concentration, calculated by adjusting the patients' severity adjustment factors, have shown minimal variations within different types of institutions.
- Diastolic blood pressure satisfactory rate is found at 86.4%, which is higher than the systolic blood pressure satisfactory rate of 45.1%. The mean of the blood pressure rate is 143.7±17.4 ㎜Hg in systole, and 82.0±9.2㎜Hg in diastole.

Table 2.41 Assessment results of hemodialysis monitoring indicators

(Unit: %, g/dℓ)

Classification	Indicator	Total	Tertiary hospital	General hospital	Hospital	Clinic
Process	Iron administration rate	23.0	27.9	18.2	20.7	25.5
Outcome	Hemodialysis adequacy level fulfillment rate[1)]	85.2	86.0	84.7	85.4	85.3
	Rate of patients with Hb 10g/dℓ or under[2)]	28.4	25.9	29.7	34.1	27.0
	Iron storing fulfillment rate	52.0	60.0	52.6	45.0	51.8
	Systolic blood pressure satisfactory rate	45.1	60.0	48.5	41.5	41.7
	Diastolic blood pressure satisfactory rate	86.4	88.8	85.7	83.8	86.9
	Calcium × phosphorus fulfillment rate[1)]	73.9	74.4	74.7	75.8	73.0
	Albumin concentration[1)]	3.97	3.96	3.96	3.95	3.98

Note. 1) The results have been adjusted with the patients' severity
2) The lower the rates, the better the results
3) Institutions with 5 or less denominator cases are excluded.

2.3 Outpatient services

2.3.1 Prescription

1. Background and purpose

▪ The cost of medications in health insurance increased 3.1 times between 2001 (4.1085 trillion won) and 2010 (12.7694 trillion won), and its share as a proportion of total medical costs also rose from 23.1% in 2001 to 29.2% in 2010.

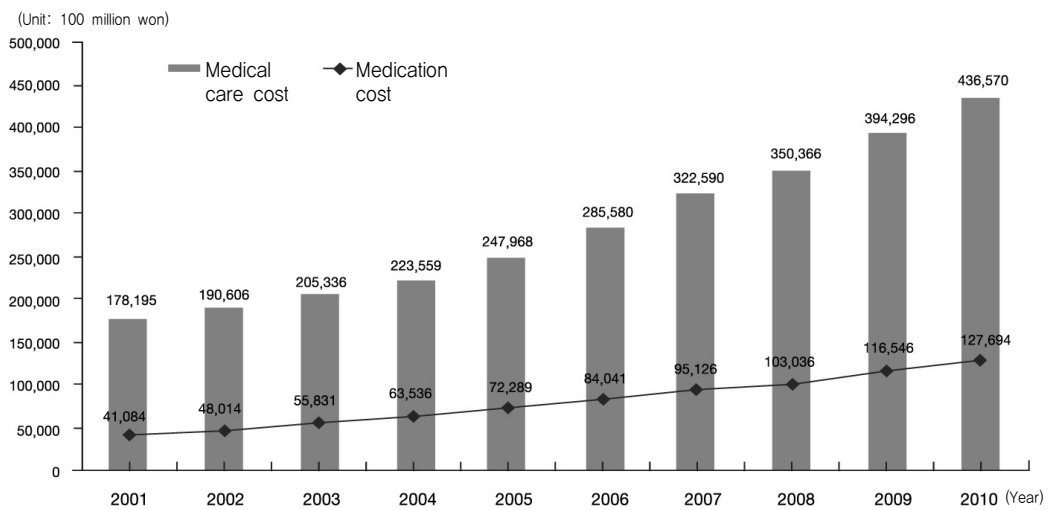


Figure 2.34 Increase of medication costs in terms of total medical expenses (health insurance)

▪ There was necessity to evaluate medicines that account for a large proportion of the medication supply, and cause concerns over the possibility of the misuse or abuse of antibiotics, injections and high-priced prescriptions.

※ Ministry of Health and Welfare, order “Implementation of Quality Assessment for Prescription” (No. 65720-10484, Dec. 19, 2000)

▪ The three categories - including antibiotics, injections, and the medication cost per day of application have been evaluated since 2001.

- The number of drugs per prescription (2003), the proportion of high-priced prescriptions (2003), and the duplication rate of NSAIDs (2005) have also been included in recent years to make six evaluation categories in total.

▪ The prescribing tendency of each medical institution will be comparatively analyzed and feedback about the results will be provided, in an effort to reduce misuse and abuse and to promote proper usage by improving each institution's autonomous management in regard to the use of medications.

2. The subjects of Assessment

1) Subject medications and diseases

▪ Outpatient medications prescribed by physicians in medical care institutions.

- The subjects are determined according to the primary disease (Korean Outpatient Group and Korean Classification of Diseases, Middle Classification), KOPG and KCD indicated in the medical cost claims.

※ Subject drugs and diseases are referenced in Appendix 1.

- Exclusion criteria

■ In cases where the secondary disease is included in the severity adjustment target disease.
– Severity adjustment target disease
• Severe diseases, assigned specific symbol codes, including cancer, organ transplant, and rare and incurable diseases.
■ Cases of hemophilia treatment
– In the KCD classification, D66~D69, M36.2

2) Subject period

▪ January 2010 to December 2010 (Review Results)

3) Subject organizations

▪ Medical care institutions that have filed more than 30 cases of outpatient prescriptions.

Table 2.42 Number of subject institutions of prescription assessment (4th quarter based)

(Unit: year, institution)

Classification		2002	2006	2007	2008	2009	2010
Antibiotics, etc.		30,270	37,779	38,470	39,610	39,604	40,414
Osteoarthritis[1)]	NSAIDs	–	12,341	12,729	12,572	11,220	11,197
	Corticosteroids	–	11,771	12,120	11,987	10,824	10,800

Note. 1) Subject to the institutions with more than 30 cases of prescriptions for osteoarthritis

3. Assessment method

1) Assessment indicator

Item	Indicator code	Indicator
Injections	PRES_01	Prescription rate of injections
Antibiotics	PRES_02	Prescription rate of antibiotics (all diseases)
	PRES_03	Antibiotics prescription rate for acute upper respiratory infection
No. of drugs per prescription	PRES_04	Number of drugs per prescription (all diseases)
	PRES_05	Number of drugs per prescription (respiratory diseases)
	PRES_06	Number of drugs per prescription (musculoskeletal diseases)
	PRES_07	Rate of prescription with more than 6 items
	PRES_08	Rate of prescription for digestive system
Medication cost per day of administration	PRES_09	Medication cost per day of administration
High-priced medicine (the highest price within the ingredient) prescription	PRES_10	Proportion of prescribing high-priced medicine
	PRES_11	Proportion of cost for high-priced medicine
NSAIDs/corticosteroids for osteoarthritis	PRES_12	Duplicate prescription rate for NSAIDs
	PRES_13	Prescription rate of corticosteroids

2) Data collection method

- Medical care benefit claims were used.

3) Grading method

- Classified into two levels for each category, including the rate of prescription of antibiotics for acute upper respiratory infections, the rate of prescription for injections, and the number of drugs per prescription.

<table>
<tr><th>Stage</th><th>Method of calculation</th></tr>
<tr><td>1st</td><td>
■ Calculating the value of indicators by institutional type
– Prescription rate of injections
– Prescription rate of antibiotics for acute upper respiratory infections
– Number of drugs per prescription for respiratory/ musculoskeletal diseases
■ Within the same assessment group of the no. of drugs per prescription (all diseases), a relative indicator was calculated first, and the levels were then determined at every 25% from the lowest A through D.
※ The same assessment groups are established by the type of medical institutions, and the specialties of clinics.
⊙ Formula for calculating relative indicator
$\sum_{j=1}^{n}{}_{disease}$ (Indicator by disease of the institution concerned x No. of cases by disease of the institution concerned)
———————————————————————
$\sum_{j=1}^{n}{}_{disease}$ (Indicator by disease of the same assessment group x No. of cases by disease of the institution concerned)
n = No. of diseases
</td></tr>
<tr><td>2nd</td><td>
<table>
<tr><th>Result</th><th>Classification</th></tr>
<tr><td>★★(1st grade)</td><td>Lower than the mean obtained from the same type of medical care institution</td></tr>
<tr><td>★☆(2nd grade)</td><td>Higher than the mean obtained from the same type of medical care institution</td></tr>
</table>
</td></tr>
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4. Results

1) Total results

▪ The results of the 2010 showed that most indicators, including the antibiotics prescription rate for acute upper respiratory infections, has improved slightly compared to 2009.

Table 2.43 Assessment Results of Prescription by Indicator (Health Insurance)

Classification		2009			2010			Variation (B−A)
		1st Q	2nd Q	Total (A)	1st Q	2nd Q	Total (B)	
Prescription rate of injections(%)		23.0	21.4	22.2	21.5	20.9	21.2	1.0%p ↓
Prescription rate of antibiotics (%)(all diseases)		28.6	25.2	26.9	27.3	25.0	26.1	0.8%p ↓
Antibiotics prescription rate for acute upper respiratory infection(%)		56.2	50.4	53.4	52.6	51.6	52.1	1.3%p ↓
Number of drugs per prescription	All (no.)	4.02	3.87	3.94	3.98	3.83	3.91	0.03 ↓
	Respiratory(no.)	4.73	4.55	4.64	4.67	4.60	4.64	None
	Musculoskeletal (no.)	3.72	3.68	3.70	3.69	3.64	3.66	0.04 ↓
	Rate of prescribing more than 6 items(%)	17.2	14.4	15.8	16.4	14.4	15.4	0.4%p ↓
	Prescription rate of drugs for digestive system (%)	54.8	53.0	53.9	53.0	52.0	52.5	1.4%p ↓
Medication cost per day (won)		1,907	1,942	1,925	1,937	1,935	1,936	11 won ↑
High−priced medicine (highest price within the ingredients)[1)]	Rate of prescription (%)	25.1	24.1	24.6	23.2	22.4	22.8	−
	Proportion of the cost for prescription (%)	39.9	38.7	39.3	37.6	37.9	37.8	−
Osteoarthritis	Duplicate prescription rate for (oral)(%)	1.2	1.2	1.2	1.0	1.0	1.0	0.2%p ↓
	Corticosteroids prescription rate for (%)	2.8	2.9	2.9	2.9	3.0	3.0	0.1%p ↑

Note. 1) The differences cannot be determined for the proportion of prescribing high−priced medicine and the cost for medicine because the list of subject medicines is changed quarterly.

2) Results by institution

▪ The mean of the prescription rate of injections is 25.0%, and it decreases in the order of clinics, hospitals, general hospitals, and tertiary hospitals.

- The results from tertiary hospitals showed a narrow range among the institutions with a minimum of 1.4% to a maximum of 5.0%. The range by the type of institution increased in the order of general hospitals, hospitals, and clinics; clinics revealed the biggest range of 0%~100%.

▪ The mean of the prescription rate of antibiotics for acute upper respiratory infections is 45.4%, which decreases in the order of clinics, general hospitals, hospitals, and tertiary hospitals.

- The ranges among the institutions within the same type increase in the order of tertiary hospital, general hospital, hospital, and clinic.

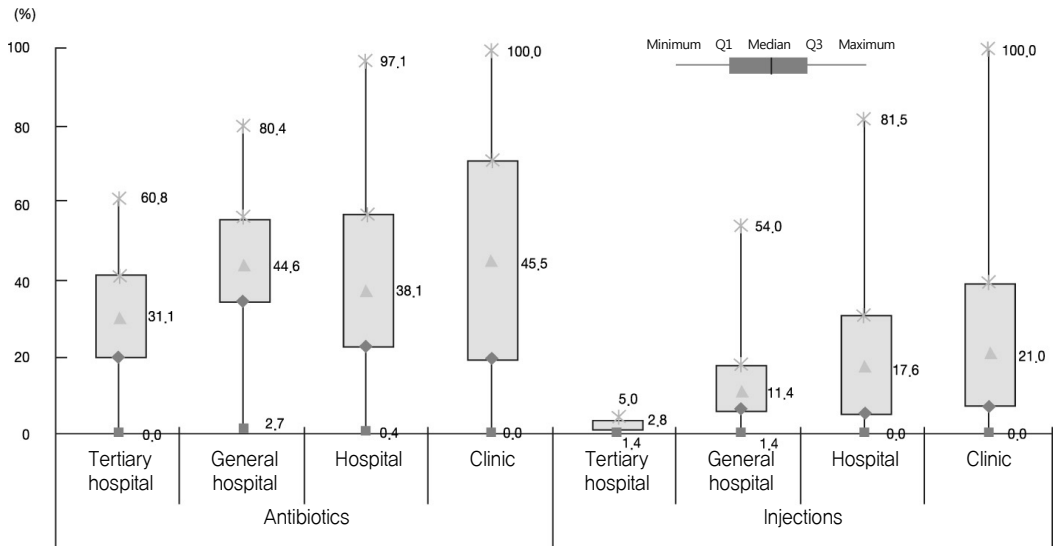

Figure 2.35 Results by institution for the prescription rate of injections and antibiotics for acute upper respiratory infections (4th quarter, 2010)

Note. Subject to the institutions with 100 or more claims for injections and acute upper respiratory infections (applied the criteria for public reporting)

▪ Number of drugs per prescription

- The range within the same type of institution regarding the number of drugs per prescription has been found to be the smallest in tertiary hospitals, followed by general hospitals, hospitals, and clinics as it increases. Clinics have presented the biggest range from a minimum of 1.0 to a maximum of 8.8.
- The mean of the number of drugs per prescription for all diseases is 3.6. Tertiary hospitals have shown a relatively narrow range between the minimum 2.5 and the maximum 4.0, while clinics have shown the largest range from 1.0 (minimum) to 8.1 (maximum).
- For respiratory and musculoskeletal diseases, the mean numbers of drugs per prescription are 4.6 and 3.7 respectively. General hospitals and hospitals have presented a larger range than tertiary hospitals, and there is little difference between them. The maximum range shown by general hospitals and hospitals is about five items, while the average number of medicines per prescription in clinics ranged widely from 1.0, the minimum to 8.8, the maximum.

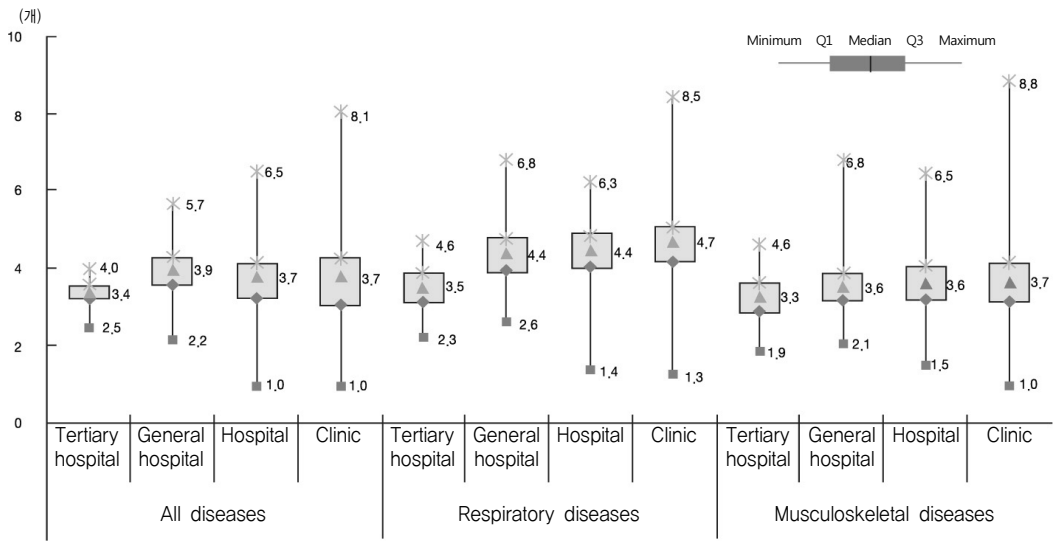

Figure 2.36 Results by institution for the number of drugs per prescription (all diseases, respiratory diseases, musculoskeletal diseases) (4th quarter, 2010)

Note. Subject to the institutions with 100 or more cases of claims and 30 or more cases of outpatient prescriptions for respiratory diseases (acute upper respiratory infection(J00∼J06), other acute lower respiratory infection(J20∼J22), other diseases in upper respiratory(J30∼J39)and musculoskeletal diseases (arthropathy (M15∼M19), other dorsopathies (M50∼M54)).

3) Overall results

▪ First-rated (★★) institutions, whose mean prescription rate for injections is lower than the overall mean, account for 54.6%(14,368 institutions)of the total.

Table 2.44 Overall assessment results of prescription rate of injections by type of institution for (2nd half, 2010)

(Unit: institution, %)

Grade	Total	Tertiary hospital	General hospital	hospital	Clinic
Total	26,299(100.0)	44(100.0)	274(100.0)	1,294(100.0)	24,687(100.0)
★★(1st grade)	14,368(54.6)	19(43.2)	100(36.5)	704(54.4)	13,545(54.9)
★☆(2nd grade)	11,931(45.4)	25(56.8)	174(63.5)	590(45.6)	11,142(45.1)

▪ First-rated (★★) institutions whose rate of prescription of antibiotics for acute upper respiratory infection is lower than the mean represent 54.9% (8,293 institutions) of the total.

Table 2.45 Overall Assessment Results of Antibiotics Prescription Rate for Acute Upper Respiratory by Type of Institution (2nd half, 2010)

(Unit: institution, %)

Grade	Total	Tertiary hospital	General hospital	Hospital	Clinic
Total	15,107(100.0)	44(100.0)	271(100.0)	776(100.0)	14,016(100.0)
★★(1st grade)	8,293(54.9)	24(54.5)	144(53.1)	493(63.5)	7,632(54.5)
★☆(2nd grade)	6,814(45.1)	20(45.5)	127(46.9)	283(36.5)	6,384(45.5)

▪ First-rated (★★) institutions that filed a lower number of drugs per prescription than the mean account for 51.4% (14,603institutions) of the total.

Table 2.46 Overall assessment results of number of drugs per prescription by type of institution (2nd half, 2010)

(Unit: institution)

Grade		Total	Tertiary hospital	General hospital	Hospital	Clinic	Other[1)]
Total		28,385	41	258	1,166	25,652	1,268
★★ (1st grade)	Total	14,603(51.4)	23(56.1)	131(50.8)	584(50.1)	13,227(51.6)	638(50.3)
	Level A	7,386	10	64	312	6,670	330
	Level B	7,217	13	67	272	6,557	308
★☆ (2nd grade)	Total	13,782(48.6)	18(43.9)	127(49.2)	582(49.9)	12,425(48.4)	630(49.7)
	Level C	7,013	7	62	298	6,326	320
	Level D	6,769	11	65	284	6,099	310

Note. 1) 'Other' includes long-term care hospitals, local health centers and branches, and public medical centers.

5. Other key factors

1) Differences in type and year

▪ Prescription rate of injections

- The prescription rate of injections was 21.0% in the 4thquarter of 2010, which decreased by 0.3%p from the same time in the previous year.
- The rate decreased in the order of clinics (23.2%), hospitals (19.9%), general hospitals (8.8%), and tertiary hospitals (2.7%).

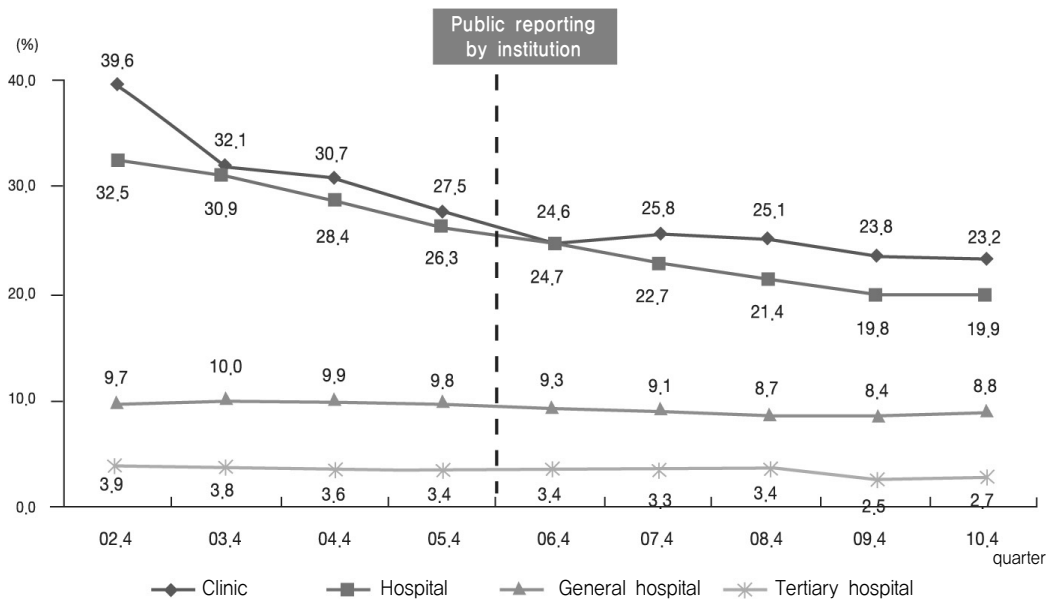

Figure 2.37 Yearly differences in the prescription rate of injections by type of institution (Health insurance)

▪ Prescription rate of antibiotics for acute upper respiratory infections

- The prescription rate of antibiotics for acute upper respiratory infections in the 4th quarter of 2010 was 50.4%, presenting an increase of 0.7%p from the same period in the previous year (49.7%).
- The rate decreased in the order of clinics (50.8%), general hospitals (47.4%), hospitals (46.7%), and tertiary hospitals (32.4%).

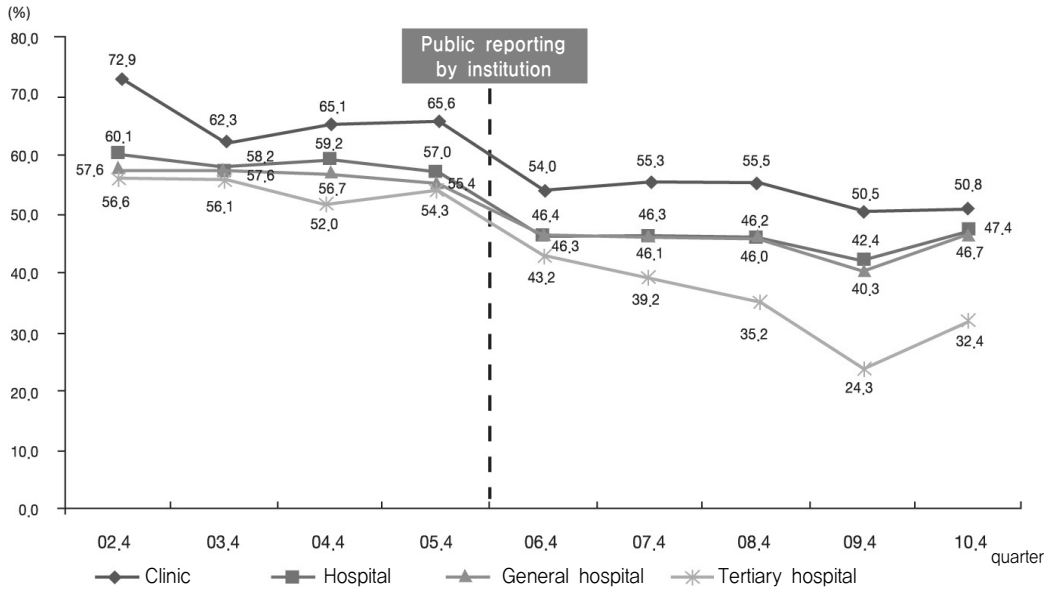

Figure 2.38 Yearly differences in the antibiotics prescription rate for acute upper respiratory infection by type of institution (Health insurance)

▪ The number of drugs per prescription

- The total mean of the number of drugs per prescription in the 4th quarter of 2010 was 3.90, which presented a decrease of 0.06 from the same period of the previous year (3.96).
- The rate for each type of institution has decreased in the order of clinics (3.99), hospitals (3.82), general hospitals (3.72), and tertiary hospitals (3.18).

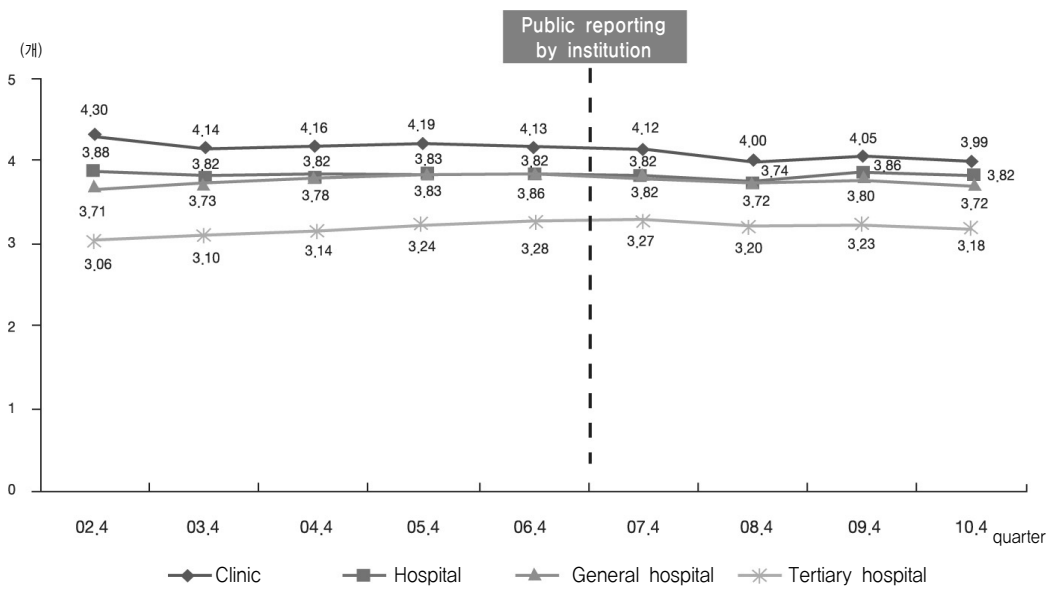

Figure 2.39 Yearly differences in the number of drugs per prescription by type of institution (Health insurance)

2) Current status of clinics by location

- In the case of clinics, five regions including Seoul showed a lower rate (18.2 %) than the mean (23.6%), while Gyeongnam rated the highest (33.1%).
- Clinics where the rate of prescription of antibiotics was lower than the mean (50.7%) are located in 6 regions including Jeonbuk (43.5%), while Gwangjupresented the highest rate (54.3%).

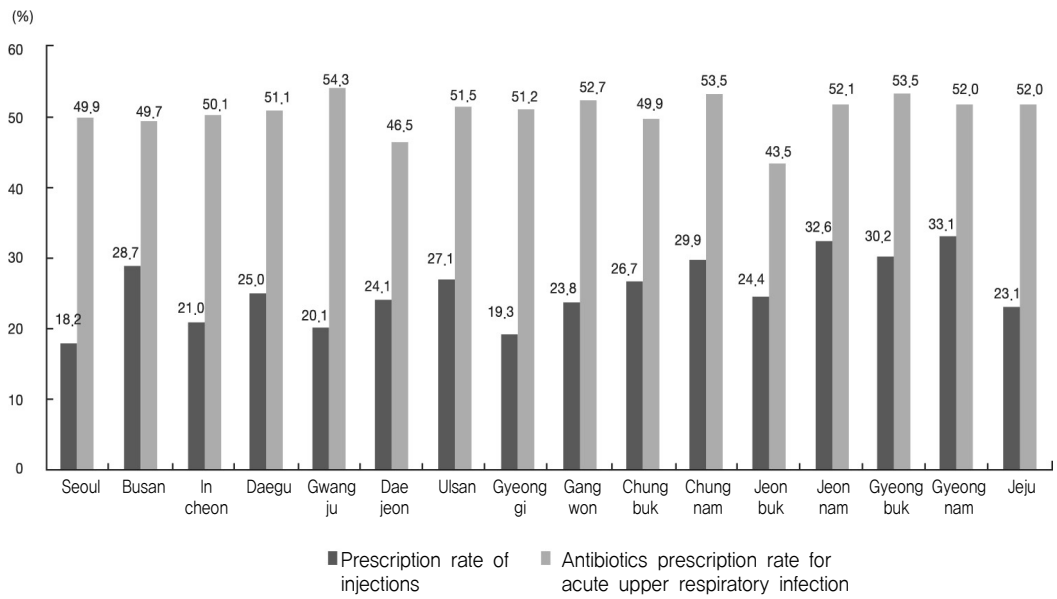

Figure 2.40 Current status of prescription rates of injections and antibiotics for acute upper respiratory infection by location of clinic (4th quarter, 2010)

Part. 03

Quality Improvement Program

1. Public Reporting of the Assessment Results
2. "HIRA Value Incentive Program" Demonstration Project
3. Quality improvement (QI) support program

- Quality improvement consists of two mechanisms: "Selection and accountability" and "Health care providers' voluntary change."
  - Reporting of the results of quality assessment helps consumers to make choices and offers health care providers an external motivation for quality improvement; people and policy makers, the stakeholders, are responsible for this.
  - Health care providers are encouraged to change by being provided with the knowledge and technology that can support their quality improvement efforts.
- The Health Insurance Review & Assessment Service pursues health care providers' voluntary change by opening up the assessment results to the public, by running the incentive & disincentive provision “HIRA Value Incentive Program” demonstration project, and by conducting quality improvement support program.

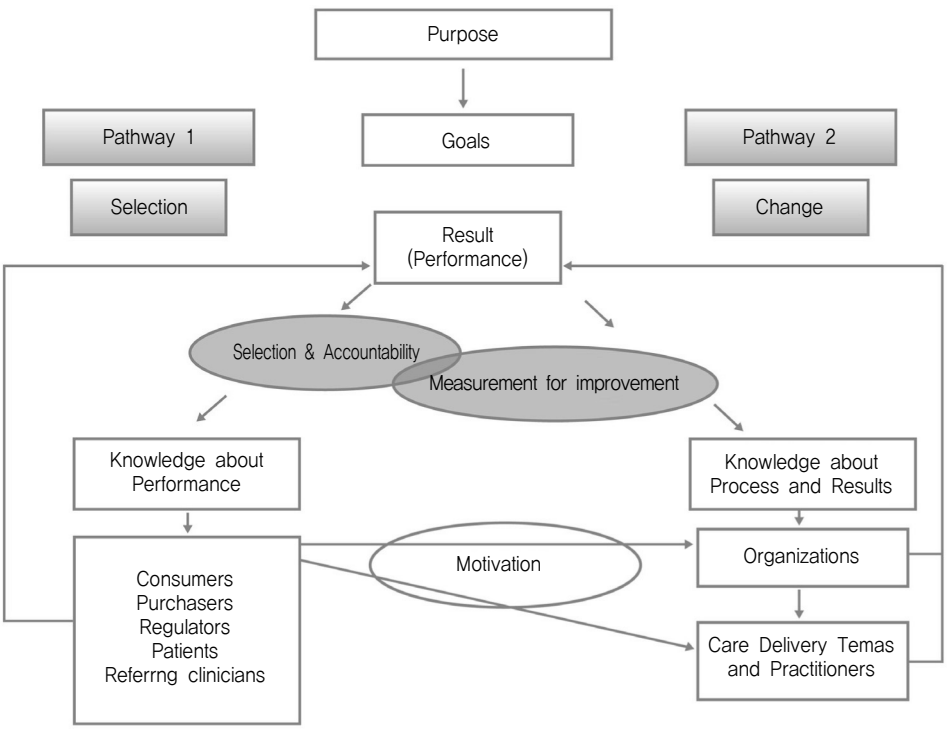

Figure 3.1 Quality improvement mechanism

(Source: Berwick MD James B, Coye JM. Connections Between Quality Measurement and Improvement. Medical Care 2003; 41: 1 supp I-30-I-38)

1. Public Reporting of the Assessment Results

1.1 Background and purpose

- The governments and assessment agencies of advanced countries such as the U.S. and the U.K. have been issuing public reports of the assessment results since 1990.
  - CMS, PHC4 and Leapfrog of the U.S. and the National Health Service of the U.K. are publicly presenting the assessment results with the information about the volume of medical treatment and the amount of medical costs.
- The Health Insurance Review & Assessment Service (HIRA) also provides consumers with information about the assessment results to help them choose institutions which offer high-quality medical services.

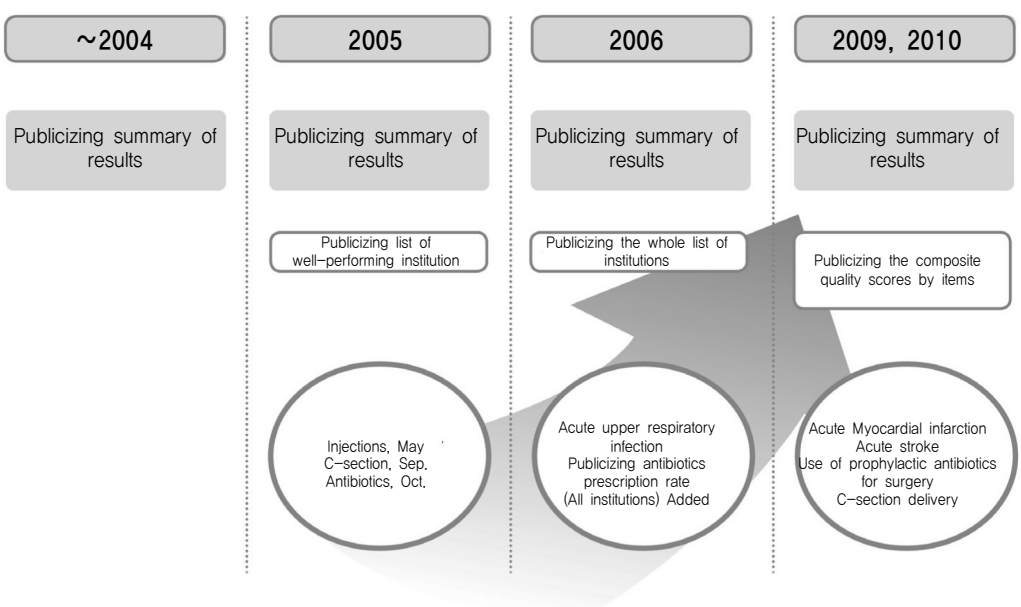

Figure 3.2 Change in the method of reporting assessment results

1.2 Method of public reporting

▪ In accordance with the Article 21 of the Enforcement Decree of the National Health Insurance Law, which states, "If the quality assessment for medial benefit is conducted, the results should be disclosed publicly," the results are posted on the HIRA homepage by assessment items.

- In the early years of quality assessment, only a summary of the results was reported. However, in 2005, a list of those medical care institutions with a good record was presented.
- Since 2006, the whole list of subject medial institutions has been disclosed regardless of their performances, and the indicator values - such as the number and the rate of Caesarean operations - have been reported by institution.
- Since 2009, the summary of the results by category has been presented as a star-based system (★★★★★), and the indicator results have also been provided.
- Detailed information about each institution, such as the medical care costs and days to be hospitalized for 38 kinds of surgeries, and grades of care, etc. has been reported with the information about the hospitals for specific treatments.

Figure 3.3 Outline of HIRA's public reporting information

▪ How to refer to the assessment results

- On the main screen of the HIRA homepage, click "Search Hospital Assessment Information" (www.hira.or.kr/병원평가정보검색) and move on to it.

Figure 3.4 Main Screen of HIRA website

- On the Hospital Assessment Information page, the results can be selected and referred either by items or by body parts.

Figure 3.5 Screen of hospital assessment information

- Overall results for each item can be viewed by downloading the slides on the screen above.

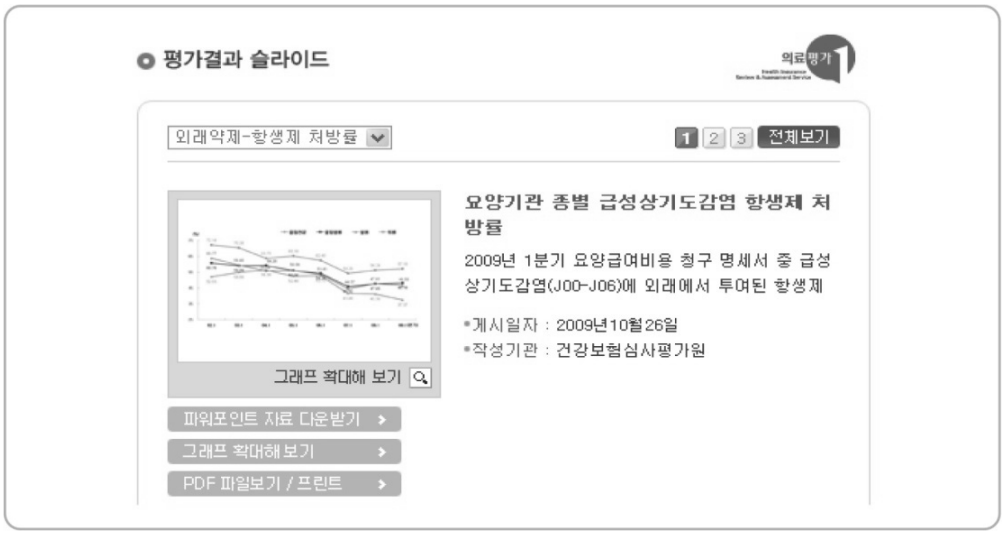

Figure 3.6 Screen of downloading the assessment result slides

- Assessment results can be viewed either for a specific item or as a whole. Data can also be inquired by items or by regions.

선택	병원	소재지	외래약제			급성심근경색증	급성기 뇌졸중	수술예방적 항생제		수술 별 진료량	제왕절개 분만
			항생제 처방률	주사제 처방률	약품목수			종합결과	위	위암	
☐		서울 영등포구	★★	★☆	★☆	★★★☆☆	★★★★★	★★★☆☆	★★★★★	★★	★★★★★
☐		서울 중구	★☆	★☆	★★	★★☆☆☆	★★★★☆	★★★★☆	★★★★★	★★	★★★☆☆
☐		서울 동작구	★☆	★☆	★☆	★★☆☆☆	★★★★★	★★★★★	★★★★★	★★	★☆☆
☐		서울 종로구	★★	★★	★★	★★★☆☆	★★★★★	★★★★★	★★★★★	★★	★★★★★
☐		서울 종로구	★★	★☆	★★	★★☆☆☆	★★★★★	★★★☆☆	★★★★☆	★★	★★★☆☆
☐		서울 성북구	★★	★★	★☆	★★☆☆☆	★★★★★	★★★★☆	★★★★★	★★	★★★☆☆
☐		서울 동대문구	★☆	★★	★☆	★☆☆☆☆	★★★★★	★★★★★	-	★★	★★★★☆
☐		서울 성동구	★☆	★☆	★★	★☆☆☆☆	★★★★★	★★★★★	★★★★★	★★	★☆☆☆☆
☐		서울 서대문구	★★	★★	★★	★★★★★	★★★★★	★★★★★	★★★★★	★★	★★★★☆
☐		서울 용산구	★☆	★☆	★☆	★☆☆☆☆	★★★★★	★★★☆☆	-	★★	★★★★☆

Figure 3.7 Screen of assessment results by institution

- By clicking the icon that shows the results of an individual institution for each assessment item, such as acute myocardial infarction, the results of indicator results are presented with graphs and tables. The values of hospitals in similar sizes are also provided for comparison and benchmarking.

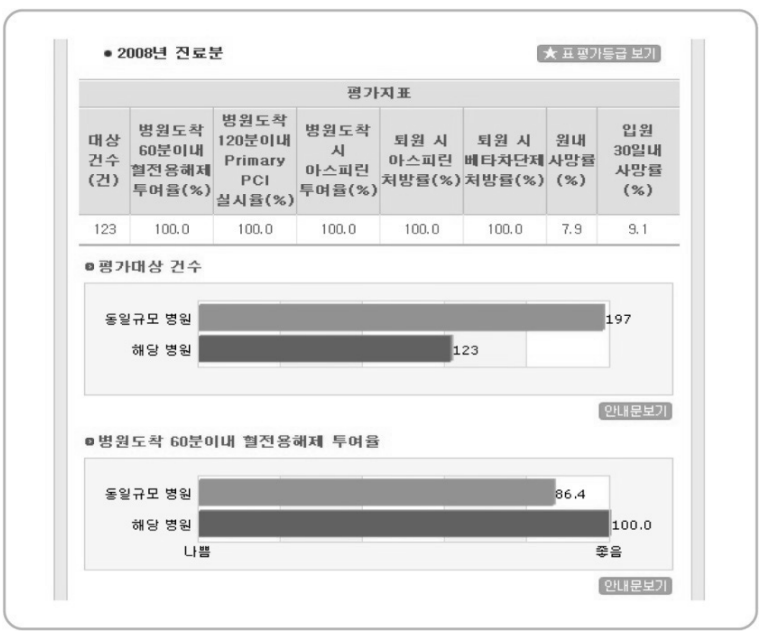

Figure 3.8 Screen of detailed assessment results of an institution on the HIRA homepage

선택	병원	수술명	입원일수(일)		진료비(천원)	
			해당병원	동일규모	해당병원	동일규모
☐		위절제술(전체)	16.7	16.2	7552	5923
		위절제술(부분)	13.7	13.8	5433	4698
☐		위절제술(부분)	18.6	13.8	5007	4698
		위절제술(전체)	20.9	16.2	6611	5923
☐		위절제술(전체)	19.4	19.7	7290	6571
		위절제술(부분)	20.4	16.1	6699	5005
☐		위절제술(부분)	14.9	13.8	4768	4698
		위절제술(전체)	17.3	16.2	5901	5923
☐		위절제술(부분)	14.0	13.8	5915	4698
		위절제술(전체)	17.9	16.2	7507	5923

Figure 3.9 Screen of reporting the medical care cost information

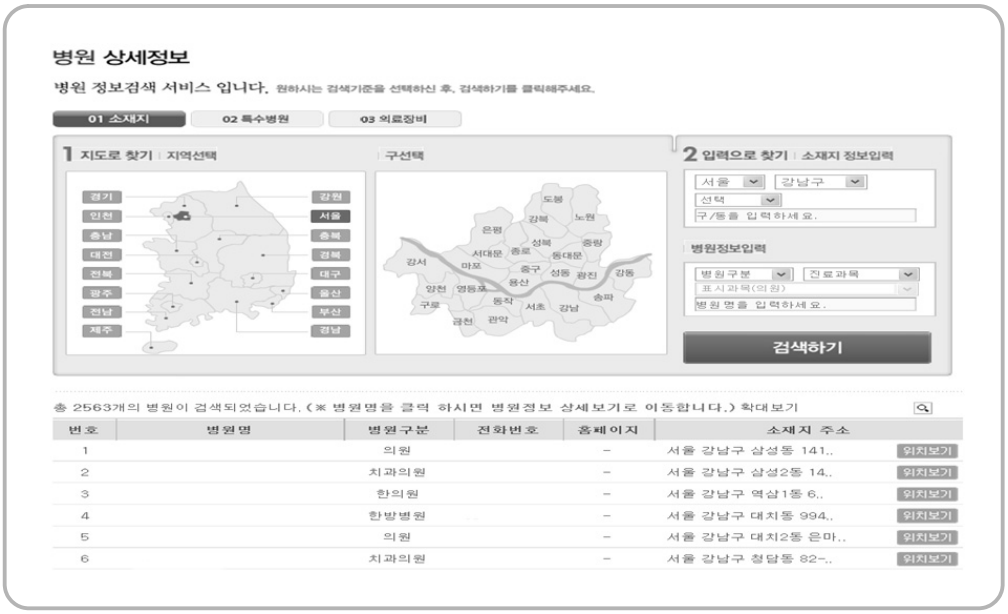

Figure 3.10 Screen of detailed information about a hospital

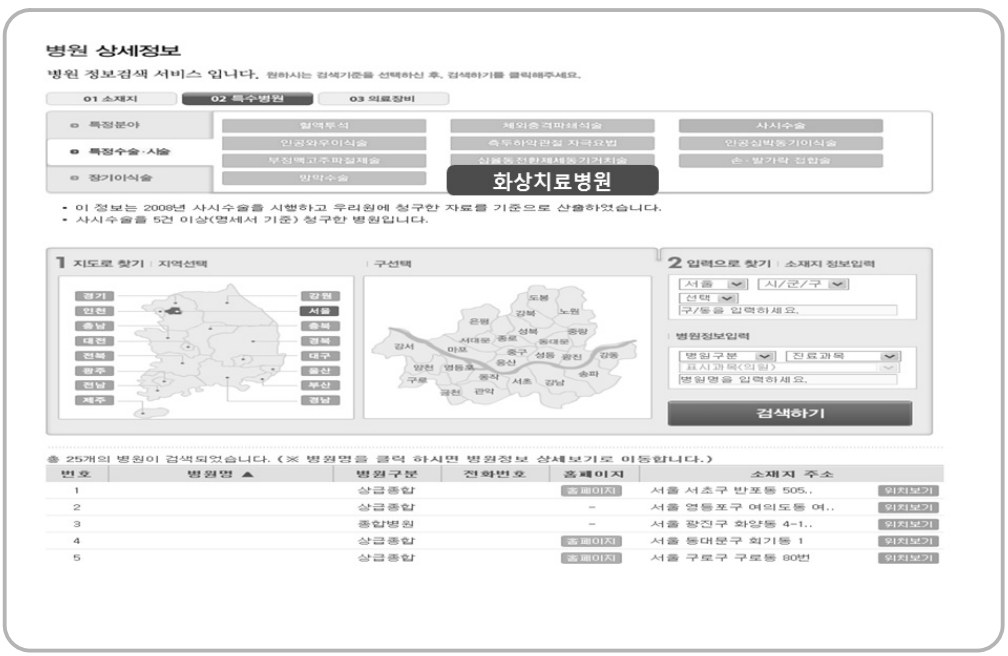

Figure 3.11 Screen of information about hospital for specific treatments

1.3 Effects of public reporting

▪ Results of analysis of the differences due to public reporting of the rates of antibiotics prescription and Caesarean section

The antibiotics prescription rate has been falling continuously since the disclosure of the assessment results of every medical care institution began in 2006.

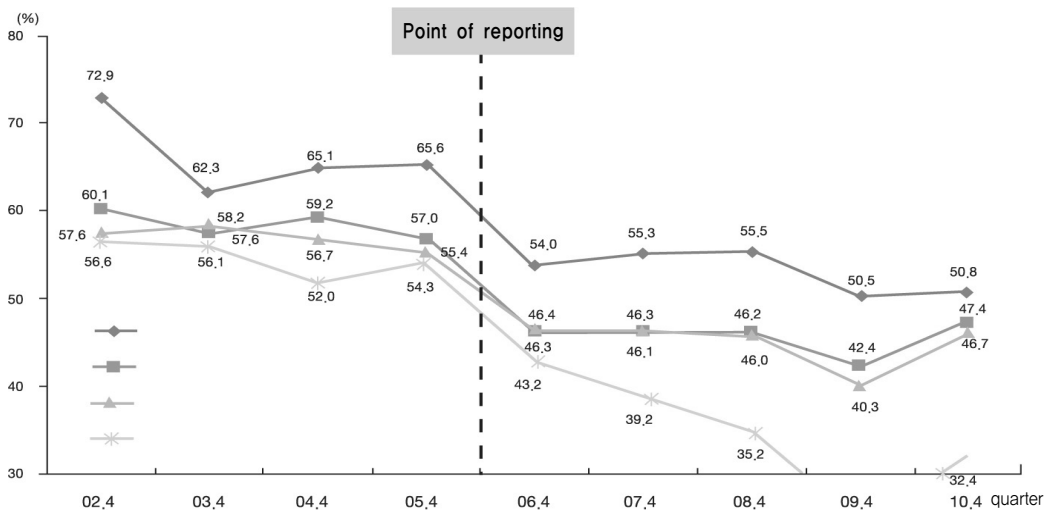

Figure 3.12 Differences in the antibiotics prescription rate before and after public reporting

- The Caesarean delivery rate has been falling continuously since reporting of the assessment results began.

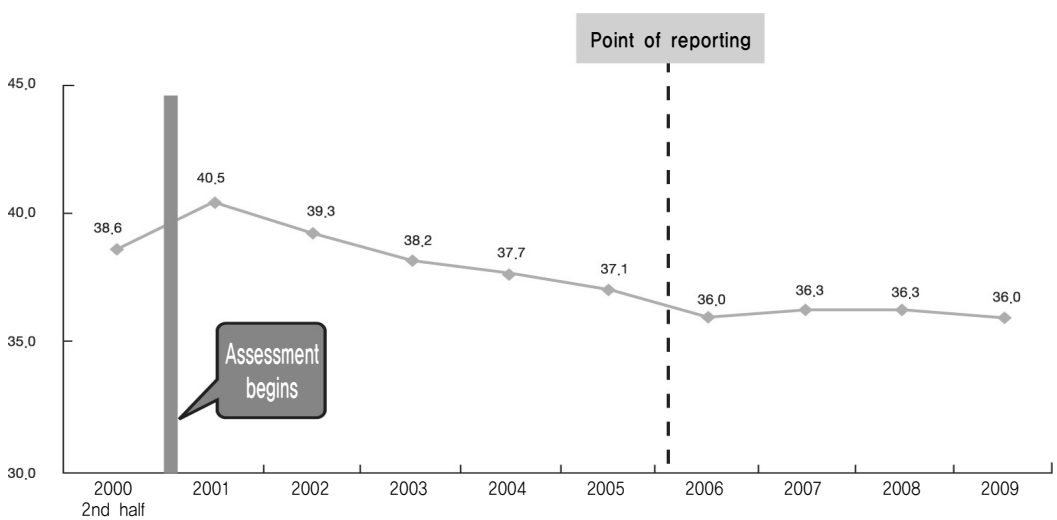

Figure 3.13 Differences in the Caesarean delivery rate before/after reporting.

2. "HIRA Value Incentive Program" Demonstration Project

2.1 Background and objective

- Inducing the quality improvement of medical care service through the application of economic incentives (or disincentives for underachieving institutions) based on the results of quality assessments.
- Building a foundation for expanding a value incentive program suitable for our own status through the implementation and results analysis of the demonstration projects
- Increased demands from home and abroad for the application of a value incentive program
  - There have been criticisms about the delayed application of a legally stated value incentive program and its expansion
- Providing more effective and safe medical care service for people by increasing the effects of quality improvement, which have been being achieved through the public reporting and circulation of the assessment results with the health care institutions
- Pay for Performance (P4P), a system which aims to enhance quality by providing financial incentives has already been adopted by many countries including the U.S., U.K., Australia, and 19 countries in OECD.

> ■ Introduction of our value incentive program to the OECD Health Ministerial Meeting
> – Introduced as an exemplary case in the OECD Health Ministerial Meeting, participated in by the chief delegates (health ministers) from 33 OECD member countries. (Paris, France; Oct. 2010)

- The Value Incentive Program Demonstration Project has been executed since July 2007, providing incentives for the institutions with excellent quality and disincentives for those with poor quality.

> 〈Overview of the Value Incentive Program Demonstration Project〉
> ■ Period: Jul. 2007 ~ Oct. 2012 (3 years and 6 months)
> ■ Subject Institution: tertiary hospitals
> ■ Subject Items: acute myocardial infarction, Caesarean section delivery (health insurance & medical care benefits)
> ■ Assessment Method: classify the institutions into 5 grades by relative evaluation
> ■ Rate of Adjustment: the share of corporation for the assessed items and one percent of the share of medical care benefit funds

Related Laws & notices

- The National Health Insurance Act
  - Article 43 (Claims for and Payment of Medical Care Benefit Cost) ⑤In paying the medical care benefit cost, where the Health Insurance Review and Assessment Service referred to in paragraph (2) evaluates the reasonableness of a medical care benefit referred to in Article 56 and notifies it to the Corporation, the Corporation shall adjust the payment by increasing or reducing the cost of the medical care benefit in accordance with the results of the evaluation.
- The enforcement decree of the National Health Insurance Act
  - Article 11(The criteria of addition and deduction for health care fee payment) Under the terms of the Law, Article 43 Section 5, the amount of the addition or deduction of the health care fee payment based on the adequacy assessment is determined by the criteria notified by the Minister of Health and Welfare, within the range of 10 100th of the share of the corporation according to the institutional judgment of the previous year.
- The Medical Care Assistance Act
  - Article 11(Medical Care Benefit Cost Claims and Payment) ④ When paying the fee, in cases where the adequacy of the health care fee has been evaluated and reported to the mayor, county governor, and ward head, the mayor, county governor, and ward head pay the fee with an addition or a deduction according to the results.
- The enforcement decree of the Medical Care Assistance Act
  - Article 23 (The Criteria for Addition and Deduction of Payment) The amount of the addition to or deduction from the fee payment according to the adequacy assessment results of the health care fee payment based on the terms of Article 11 Section 4 is determined by the criteria decided and notified by the Minister of Health and Welfare within the range of ten 100ths of the share of the subject health care institution that has been evaluated and determined in the previous year.
- Demonstration Project Criteria for the Flexible Payment of Medical Care Benefits (Notice No. 2007-56)
- Quality Assessment of Medical Care Benefits and Criteria for the Flexible Payment of Medical Care Costs (Notice No. 2010-13)

Proceedings

- 'A study on establishing detailed criteria for providing incentives and disincentives on medical service payments' was performed (Sep. 2005).
- An incentive/disincentive provision pilot project team was organized (Nov. 2006).
- A "survey about the opinions of providers and consumers regarding the implementation of the incentive and disincentive provision pilot project" was assigned (Dec. 2006).
- "A plan for promoting the incentive and disincentive provision pilot project" was reported to the Ministry of Health and Welfare (Jan. 2007).
- The Ministry of Health and Welfare approved the 'plan for promoting the incentive and disincentive provision pilot project' (Mar. 2007).
- An advisory board for the incentive and disincentive provision demonstration was formed and operated (Apr. 2007).
- A public hearing on the incentive and disincentive provision demonstration project was held (May 2007).
- Demonstration Project Criteria for the Flexible Payment of Medical Care Benefits (Notice No. 2007-56, 29 June 2007))
- The first-year assessment for the incentive and disincentive provision demonstration project (named "HIRA Value Incentive Program" was launched (May 2007).
- A presentation meeting was held for health care service institutions regarding the "HIRA Value Incentive Program (HIRA VIP)" demonstration project (July 2007).

- The first-year assessment results of the "HIRA VIP" demonstration project and the baseline for the disincentive (the upper limit of level 5), etc. were announced (Nov. 2008).
- Public reporting of the second year's assessment results of the value incentive program(Nov. 2009)
  - Incentives were provided for the 1st grade and quality improved institutions.
- Quality Assessment of Medical Care Benefits and Criteria for the Flexible Payment of Medical Care Costs (Notice No. 2010-13, 14 Apr. 2010)
- The "HIRA VIP" demonstration project 2nd-year assessment results were reported (Nov. 2009).
  - Incentives for 1st-rated and quality-improved institutions were provided.
  - ※ No institutions were found below the baseline and subject to disincentives.
- The baseline for the disincentive of the Value Incentive Expansion Project was announced (will be applied from 2012).

2.2 Business framework

A. Subject items

▪ Acute myocardial infarction and Caesarean section

☞ Among the items under assessment, two items that are expected to achieve quality improvement via the provision of incentives, considering the size of problem, severity, feahibility, probability of improvement, and social effects, were selected first.

Reason for selection

- Acute myocardial infarction
  - The death rate of AMI has almost doubled during the past 10 years. (The number of deaths per 100,000 people increased from 13.1 persons in 1995 to 29.1 persons in 2006)
  - The death rate of AMI in South Korea is high among the OECD members and quality improvement is urgently needed.
- Caesarean Section
  - In spite of the 6-year pilot implementation, the Caesarean delivery rate is still high compared to other OECD members, and is over 2 times higher than the WHO recommendation, 5-15%.

B. Subject institutions

▪ Tertiary hospital

Reason for selection

- Tertiary hospitals play the leading role in medical services and thus assume the corresponding responsibilities.
  - Social responsibilities based on the differential payment of incentives according to institutional type.
  - Considering the standards for tertiary hospital certification such as educational hospital designation
- Superior infrastructure including the organization and information system, and extensive experience of assessment

C. Business model

▪ The project was conducted for three consecutive years.

☞ It was executed sequentially to enhance the receptivity of the demonstration project.

Classification	1st year	2nd year	3rd year
Data	– Treatment record for the 2nd half of 2007	– Treatment record for 2008	– Treatment record for 2009
Reporting	2008	2009	2010
Contents	– Announcement of disincentive threshold	– Incentives: 1st grade and quality improved institutions	– Incentives: 1st grade and quality improved institutions – Disincentives: under the disincentive threshold, institutions with 5th grade

▪ A model for diminishing the quality gap among the health care service institutions and improving all institutions to a certain level of quality

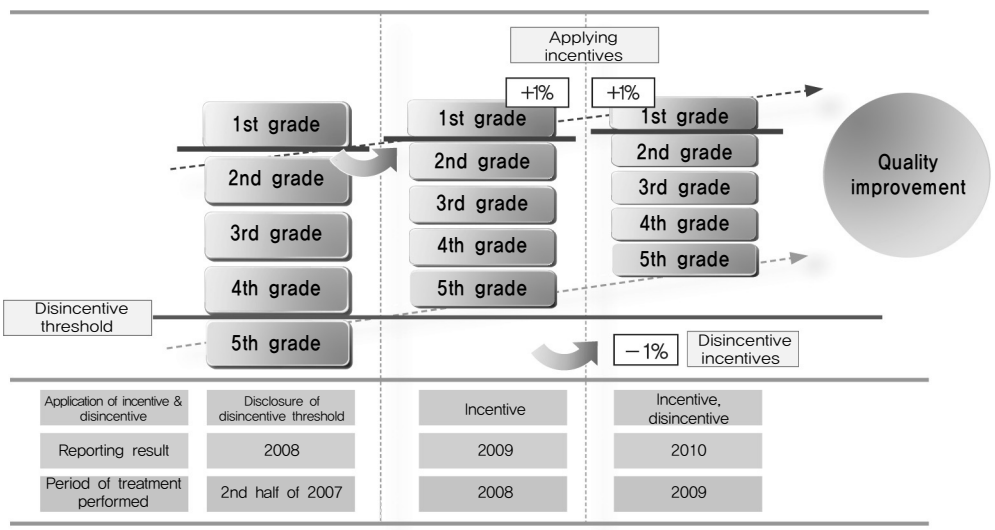

Figure 3.14 Model of HIRA incentive program demonstration project

Note. Incentives were also provided for the institutions whose quality improved in 2009 and 2010.

D. Assessment method

▪ Assessment indicator

Acute myocardial infarction	Caesarean section
■ AMI_01 No. of AMI inpatient cases ■ AMI_02 Thrombolytics administration rate within 60 minutes of hospital arrival ■ AMI_03 Primary PCI rate within 120 minutes of hospital arrival ■ AMI_04 Aspirin administration rate of hospital arrival ■ AMI_05 Aspirin prescription rate at discharge ■ AMI_06 Beta-blocker prescription rate at discharge◦ AMI_07 Fatality rate (in-hospital/30-day case fatality rate)	■ CSEC_01 Caesarean delivery rate

▪ Data collection method

Acute myocardial infarction	Caesarean section
■ Claims and survey data	■ Claims data

▪ Grading method

Stage	Calculation method	
	Acute myocardial infarction	Caesarean section
1st	■ Calculating the composite quality score (CQS) with the same method used in 2.1 Inpatient Care	■ Using the "Caesarean Risk Adjustment Model" Calculating the standard score1)of Caesarean delivery rate by institution – Formula $\frac{\text{Actual Caesarean delivery rate-Predicted Caesarean delivery rate after risk adjustment}}{\text{Standard error}}$ ※ Standard error[2] = $\sqrt{\sum \hat{p}i(1-\hat{p}i)}/n$: predicted value of C-section with risk adjustment for each case $1-i$: error of each prediction value, n : number of deliveries by institution
2nd	■ Classify into 5 grades using the institutional CQS – even division	■ Classify into 5 grades using the institutional standard score – 5th grade3): upper 10th percentile of the standard score – 1st~4th grade: even division (excluding institutions with 5th grade)

Note. 1) The lower the standard score, the lower the number of C-sections practiced.
2) Standard error is applied to adjust the differences such as the number of deliveries.
3) Caesarean section has been evaluated only by the result indicator and classified into 5 grades, considering medical disputes and socio-cultural influence.

2.3 Incentive provision

A. Criteria for calculating incentives

▪ Subject institutions

- Superior institutions: 1st-rated institutions
- Quality improved institutions: Institutions that scored over the median and upgraded their levels in assessment.

※ No institutions received disincentives in 2009 owing to the continuous support for the quality improvement projects of institutions belonging under the threshold after the announcement of the disincentive threshold.

▪ Subject Amount of Money

- 1 /100 of the share of corporation and the share of medical payment fund.
- Including the medical costs for complex diseases included in the assessment items.
- Excluding the share of corporation which exceeds the upper-limit of deductible according to the Decree under the National Health Insurance Act, Article 22.

B. Paid incentives and amount

▪ A total of 857 million won has been paid as incentives during the Value Incentive Program demonstration projects; in the second year of the project, 453 million won was paid for 21 institutions, and in the third year, 404 million won was given for 47 institutions.

▪ 6.44 billion won of economic benefit has been appeared during the demonstration project period.

- The net profit of 5.583 billion won has been gained after 857 million won of payment for incentives excluded.

· The effects for acute myocardial infarction can be estimated as the decrease in average days of hospitalization from 9.1 days to 8.7 days.

· In case of Caesarean section, the effects can be presented as the conversion of 562 cases to the natural delivery.

Table 3.1 The payment status of incentives and disincentives

(Unit: institution, 10,000 Won)

Classification			1st year (Treatment record of 2nd half of 2007)	2nd year (Treatment record of 2008)	3rd year (Treatment record of 2009)
Application			Set the disincentive threshold	Applied incentives	Applied incentives and disincentives
Incentives*	No. of institution	Total	–	21***	26***
		AMI	–	15	13
		C-section	–	15	17
	Amount of money	Total	–	45,300	40,400
		AMI	–	31,000	25,000
		C-section	–	14,300	15,400
Disincentives**			–	–	None

Note. * 1st grade and quality improved institutions
** Institutions under the disincentive threshold
*** The number of overlapped institutions: 9 institutions for the 2nd year (1st grade for both items: 5 institutions, 1st grade or quality improved: 4 institutions); 4 institutions for the 3rd year (1st grade for both items: 1 institution, quality improved in both items: 1 institution, 1st grade or quality improved: 2 institutions).

2.4 Results

A. Acute myocardial infarction

□ Summary of results

▪ The composite quality scores (CQS) of acute myocardial infarction assessment has increased.

- An increase of 5.28point in the mean of CQS (92.10→ 93.65→ 97.38)
- An decrease of 6.18 point in the standard deviation of CQS(9.37→ 7.22→ 3.19)
- An increase of 28.69 from the lowest point of CQS (59.08→ 64.71→ 88.04)

▪ Overall results show that appropriate quality improvements for the model of the HIRA VIP demonstration project have been induced by the decrease of deviations among the institutions, and the sharp increase of the lowest points.

Table 3.2 Annual CQS

(Unit: institution, case, point)

Classification		Subject		CQS					Disincentive threshold[3]
		No. of institutions	No. of cases[1]	Mean	Standard deviation	Median	Minimum	Maximum[2]	
2nd half of 2007		28	3,225	92.10	9.37	94.20	59.08	101.88	86.66
2008		41	8,414	93.65	7.22	96.10	64.71	100.74	
2009		44	9,166	97.38	3.19	98.53	88.04	101.78	
Variation (over the previous year)	2009	3	752	3.73	4.03 ↓	2.43	23.33	1.04	
	2008	13	–	1.55	2.15 ↓	1.90	5.63	1.14 ↓	

Note. 1) Institutions with 30 or fewer cases or indicators with fewer than 10 cases were excluded.
2) Since the fatality rate has been converted to the survival rate, the maximum value can exceed 100.0.
3) The disincentive threshold: the upper limit for 5th grade based on the assessment results of the 2nd half of 2007.

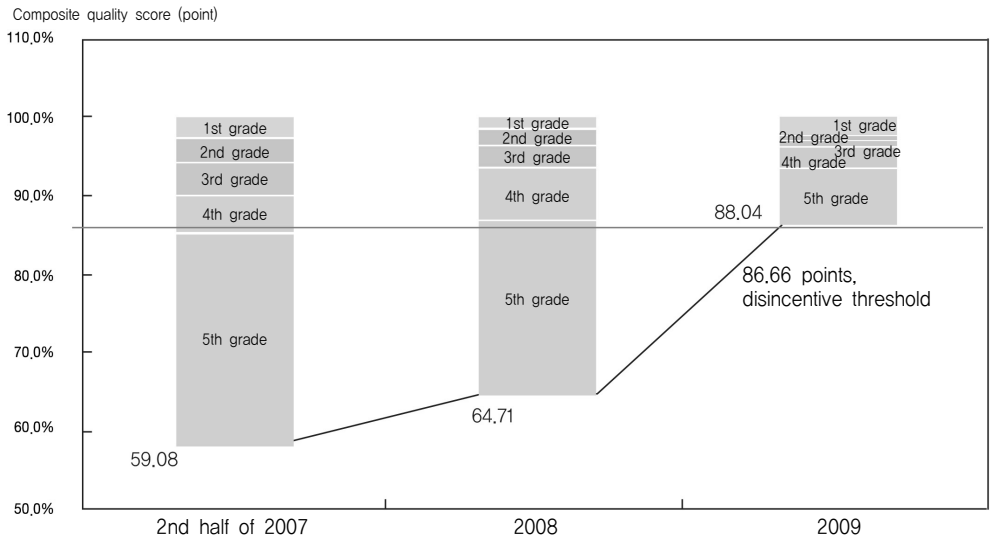

Figure 3.15 Annual variations of CQS by grades

- The results of the appropriate quality improvements for the model of the HIRA VIP demonstration project have been completed; the mean, minimum, and maximum have increased in all grades, and the standard deviation within the same grade has been reduced. Particularly, the quality improvement effects have been found to be more prominent in the lower grades.
- The upper limit of the 5th grade is 95.20, which has increased by 8.54 since the 2nd half of 2007 (disincentive threshold: 86.66 points).

Table 3.3 The composite scores of ami AMI assessment by year & grade

Grade	Classification	CQS				Variation (over the previous year)		
		Mean	Standard deviation	Maximum	Minimum	Mean	Maximum	Minimum
1st grade	2nd half of 2007	100.39	0.86	101.88	99.41			
	2008	99.93	0.57	100.74	99.30	↓ 0.45	↓ 1.15	↓ 0.11
	2009	100.37	0.78	101.78	99.69	0.44	1.04	0.39
2nd grade	2nd half of 2007	98.00	0.66	99.03	97.29			
	2008	98.16	0.64	99.30	97.45	0.16	0.27	0.15
	2009	99.06	0.25	99.38	98.75	0.90	0.08	1.30
3rd grade	2nd half of 2007	94.17	1.56	95.85	92.05			
	2008	95.96	0.73	97.07	94.57	1.79	1.23	2.52
	2009	98.48	0.23	98.72	97.99	2.52	1.65	3.42
4the grade	2nd half of 2007	90.63	1.15	91.76	89.35			
	2008	92.19	2.15	94.21	88.03	1.57	2.45	↓ 1.32
	2009	97.26	0.66	97.91	95.93	5.07	3.70	7.90
5the grade	2nd half of 2007	78.04	10.39	86.66	59.08			
	2008	81.73	7.20	87.68	64.71	3.69	1.02	5.63
	2009	91.85	2.19	95.20	88.04	10.12	7.52	23.33

Medical care institutions of each grade are evenly located throughout the nation.

Table 3.4 Location of medical care institutions by grade

(Unit: institution)

Classification	1st grade	2nd grade	3rd grade	4the grade	5the grade
Subject institution	9	9	8	9	9
Total: 44 institutions	Seoul 2 Incheon 1 Daegu 1 Gwangju 2 Daejeon 1 Gangwon1 Jeonbuk 1	Seoul 2 Busan 1 Daegu 3 Gyeonggi1 Chungbuk 1 Jeonbuk 1	Seoul 4 Busan 1 Gyeonggi 2 Daejeon 1	Seoul 4 Busan1 Gyeonggi 2 Chungnam 1 Gyeongnam 1	Seoul 5 Busan1 Incheon 1 Daejeon 1 Chungnam1

Note. Subject Institutions (44institution): Seoul 17, Busan4, Incheon2, Daegu4, Gwangju2, Daejeon2, Gyeonggi 5, Gangwon2, Chungnam2, Chungbuk1, Gyeongnam1, Jeonbuk2

□ Results by indicator

▪ Medical Care Process

- Overall improvements have been made in the results of process indicators during the HIRA VIP demonstration project.
- As for the results of 2009 compared to 2007, outstanding quality improvements have been found in the indicator of revascularization within the proper time of hospital arrival, and in cases of oral administration of drugs, the values of indicators have reached almost 100%.

Table 3.5 Results of process indicators by year

Classification	2nd half of 2007			2008			2009			Variation (over the previous year)	
	No. of institutions	No. of cases	Results	No. of institutions	No. of cases	Results	No. of institutions	No. of cases	Results	2008	2009
Thrombolytics administration rate within 60 minutes of hospital arrival	28	101	70.3	33	228	86.4	34	273	91.2	16.1	4.8
Primary PCI rate within 120 minutes of hospital arrival	40	543	85.3	42	2,037	88.9	44	3,364	96.0	3.6	7.1
Aspirin administration rate of hospital arrival	43	1,673	98.0	43	4,801	98.8	44	6,842	99.7	0.8	0.9
Aspirin prescription rate at discharge	43	3,489	99.5	43	7,098	99.6	44	7,964	99.6	0.1	0.0
Beta-blocker prescription rate at discharge	43	2,847	96.1	43	5,967	97.7	44	6,823	98.7	1.6	1.0

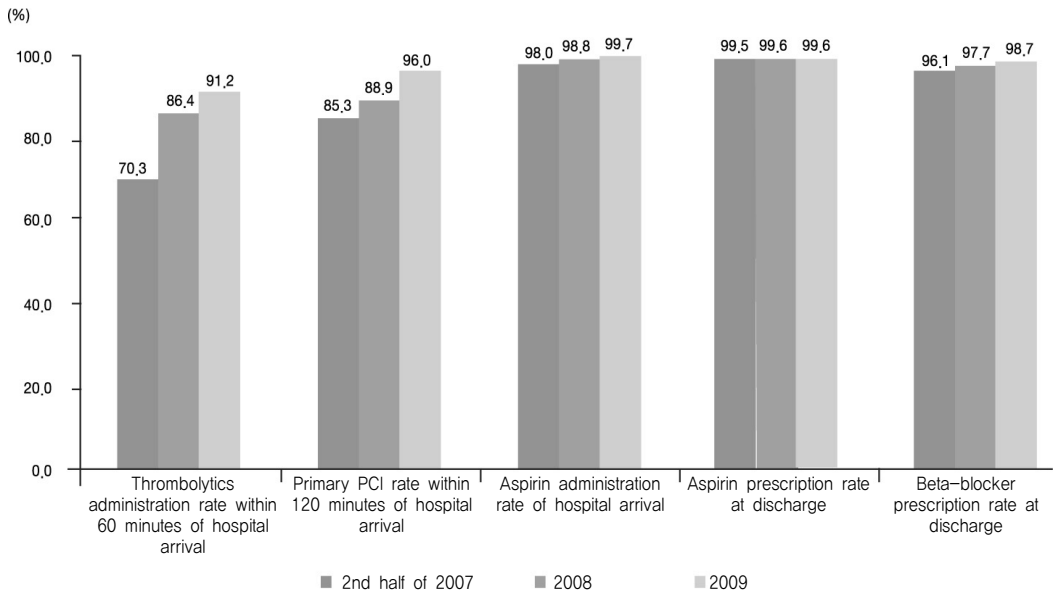

Figure 3.16 Annual results of process indicators

- During the execution of the HIRA VIP demonstration project, deviations among the institutions in the process indicators were reduced. Particularly, a prominent decrease in the institutional deviation has been found in the thrombolytics administration rate within 60 minutes of hospital arrival.

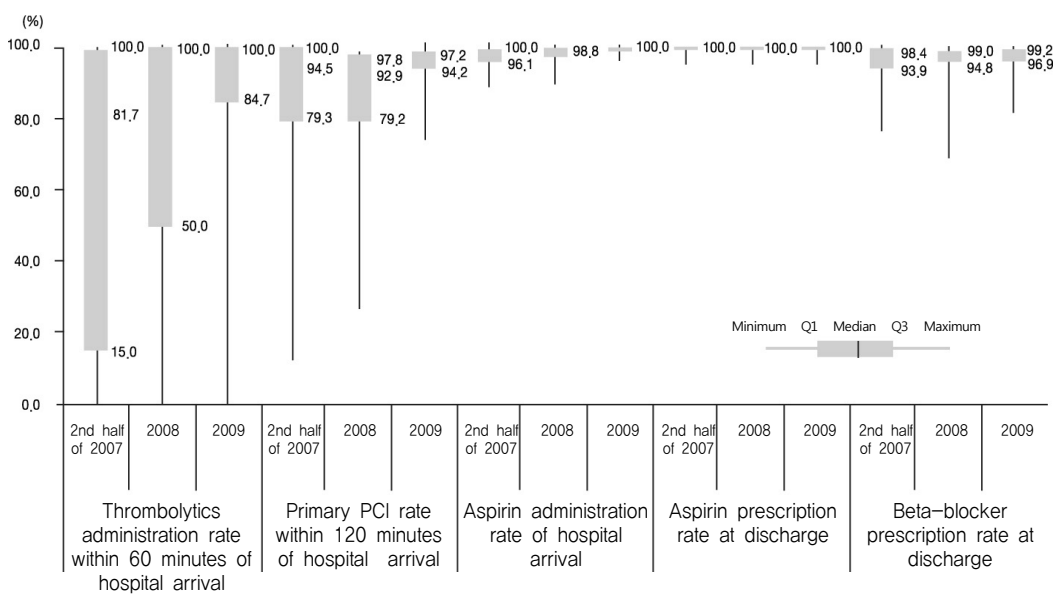

Figure 3.17 Institutional distributions of annual process indicators

▪ Medical care outcome

- As the results of 2009 showed, the actual in-hospital fatality rate was 5.6%, and the fatality rate within 30 days of admission was 6.4%, presenting a decrease of 1.8%p for both indicators over the previous year.
- According to the quarterly transitions of the actual fatality rates(in-hospital, within 30-days of admission), the rates went up from the 3rd quarter of 2007, the starting point of the project, to the 1st quarter of 2008, and decreased afterwards.

Table 3.6 Results of fatality rate by year

Classification	2nd half of 2007			2008					2009				
	Total	3Q	4Q	Total	1Q	2Q	3Q	4Q	Total	1Q	2Q	3Q	4Q
In-hospital	7.3	7.1	7.6	7.4	8.8	6.6	7.2	7.2	5.6	5.1	5.8	6.1	5.6
Within 30 days of admission	7.9	7.4	8.4	8.2	8.9	7.8	8.0	7.6	6.4	6.5	6.3	6.5	6.3

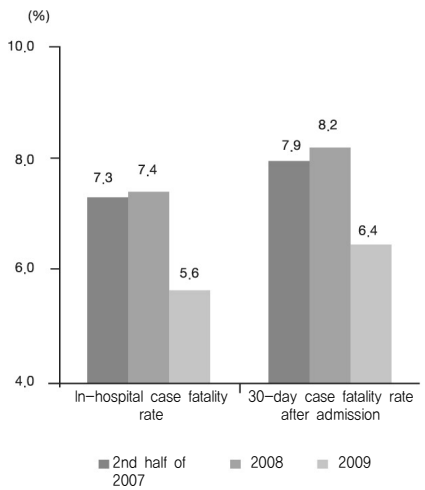

Figure 3.18 Actual fatality rate of AMI patients

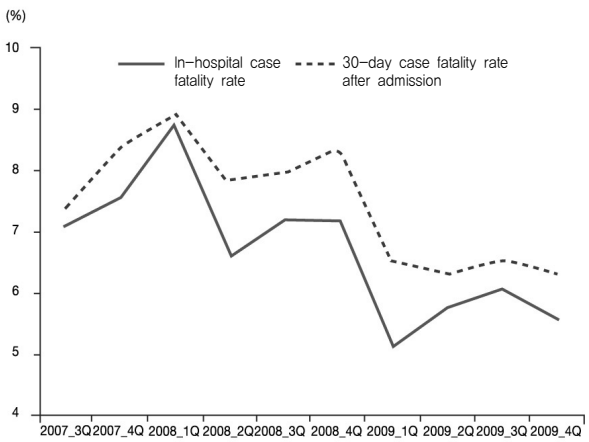

Figure 3.19 Quarterly transition of fatality rate of AMI patients

B. Caesarean section

▪ The range of decrease in the mean and the maximum of composite quality scores has been gradually increasing during the years of the HIRA VIP demonstration project.

- The decrease of the mean of CQS has grown from 0.559 to 1.007 over the previous year.
- The decrease of the maximum (the lowest-rated) has increased from 2.118 to 2.423 over the previous year.

▪ The interquartile range (Q3-Q1) has decreased by 0.513 in 2009, as well as deviations among the institutions.

Table 3.7 Standard scores by year

Classification		Subject		Distribution of institutional CQS					Disincentive threshold[2]
		Institution	Case	Mean[1]	Standard deviation	Median	Minimum	Maximum	
2nd half of 2007		42주[3]	13,710	−0.347	5.989	−0.188	−27.375	9.333	5.632
2008		43	25,554	−0.906	6.031	−0.006	−29.291	7.215	
2009		44	25,623	−1.983	5.512	−0.624	−24.871	4.792	
Variation (over the previous year)	2009	1	69	↓ 1.077	↓ 0.519	↓ 0.618	4.420	↓ 2.423	
	2008	1	–	↓ 0.559	0.042	0.182	↓ 1.916	↓ 2.118	

Note. 1) The lower the mean scored, the less the C-sections were practiced
2) The disincentive threshold is determined by the results from the 2nd half of 2007 and the upper limit (minimum) of 5th grade.
3) One institution with fewer than 30 cases was excluded.

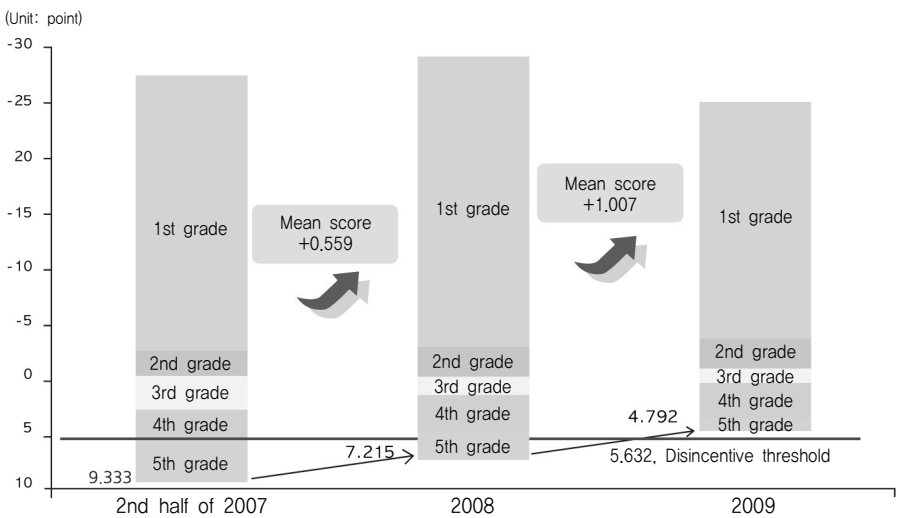

Figure 3.20 Annual variations of CQS by grades

▪ In 2009 compared to the second half of 2007, every grade has shown a decrease in the mean of CQS and the maximum; the decrease especially found in the lower grades (4th-5th) has been greater than the other grades, satisfying the objectives of the HIRA VIP demonstration project.

Table 3.8 Variations of CQS in Caesarean section by year and grade

(Unit: point)

Classification	Year	Distribution of institutional CQS					
		Mean	Minimum	Maximum	Variation of mean	Variation of minimum	Variation of maximum
					(based in the 2nd half of 2007)		
Total	2009	−1.983	−24.871	4.792	↓ 1.636	2.504	↓ 4.541
	2008	−0.906	−29.291	7.215	↓ 0.559	↓ 1.916	↓ 2.118
	2nd half of 2007	−0.347	−27.375	9.333			
1st grade	2009	−9.227	−24.871	−3.697	↓ 1.076	2.504	↓ 1.125
	2008	−8.229	−29.291	−3.043	↓ 0.078	↓ 1.916	↓ 0.471
	2nd half of 2007	−8.151	−27.375	−2.572			
2nd grade	2009	−2.243	−3.681	−1.015	↓ 0.937	↓ 1.226	↓ 0.562
	2008	−1.307	−2.743	−0.439	↓ 0.001	↓ 0.288	0.014
	2nd half of 2007	−1.306	−2.455	−0.453			
3rd grade	2009	−0.331	−0.927	0.106	↓ 0.974	↓ 0.655	↓ 1.536
	2008	0.335	−0.126	1.122	↓ 0.308	0.146	↓ 0.520
	2nd half of 2007	0.643	−0.272	1.642			
4th grade	2009	0.924	0.260	1.896	↓ 2.450	↓ 2.511	↓ 3.163
	2008	2.613	1.515	4.294	↓ 0.761	↓ 1.256	↓ 0.765
	2nd half of 2007	3.374	2.771	5.059			
5th grade	2009	4.237	3.451	4.792	↓ 2.903	↓ 2.181	↓ 4.541
	2008	5.649	4.855	7.215	↓ 1.491	↓ 0.777	↓ 2.118
	2nd half of 2007	7.140	5.632	9.333			

▪ Institutions of 1st- 5th grades are evenly distributed throughout the nation.

Table 3.9 Regional distribution of hospital locations by grade (2009)

Classification	1st grade	2nd grade	3rd grade	4th grade	5th grade
Subject institution	10	10	9	10	5
Total: 44 institutions	Seoul 6 Busan 1 Gyeonggi 2 Chungbuk 1	Seoul 3 Incheon 1 Daegu 2 Gangwon 1 Chungnam 1 Jeonbuk 1 Gyeongnam 1	Seoul 4 Gwangju 2 Daejeon 1 Chungnam 1 Jeonbuk 1	Seoul 3 Busan 1 Daegu 2 Gyeonggi 3 Gangwon 1	Seoul 1 Busan 2 Incheon 1 Daejeon 1

Note. Subject institutions (44 institutions): Seoul 17, Busan 4, Incheon 2, Daegu 4, Gwangju 2, Daejeon 2, Gyeonggi 5, Gangwon 2, Chungnam 2, Chungbuk 1, Gyeongnam 1, Jeonbuk 2

2.5 Value incentive program expansion project

A. Background and necessity

- Prominent quality improvement effects have been achieved through the establishment of the quality assessment system for the healthcare institutions and reinforcement of their competences by the implementation of the HIRA VIP demonstration project, however, there still remain the variations among the institutions and room for the improvement of quality.
- Political demands for the Payment for Performance system (P4P), linking the quality of medical care and the cost.
- There are the proactive atmosphere within the medical field for quality improvement and demands for the value incentive program (long-term care hospitals, etc.)
- Countries with prior experience of the assessment have been continuing and expanding the incentive programs on the same assessment items after the demonstration projects.
  - The development and implementation of value-based purchasing (VBP) program is scheduled (2013).

※ VBP: a method to link the medical performances with the payment

2) Details

Classification	Acute myocardial infarction	Caesarean section
Subject institution	■ Institutions higher than general hospitals that claimed 10 or more inpatient cases	■ Tertiary hospitals and general hospitals with 200 or more cases of delivery annually
Grading method	■ Even distribution with 9 grades	■ After the establishment of the 8th&9th grades by the 10th percentile from the bottom, evenly distribute the other grades, 1st–7th.
The Rate of incentives and disincentives	■ Incentives: given to the 1st and 2nd graders, 2% and 1% for each ■ Disincentives: given to the 8th and 9th graders that are below the threshold, 1% and –2% respectively	
Upper limit of 8th grade	73.51 point	4.68 point
Upper limit of 9th grade	67.82 point	5.62 point
Remarks	■ Thrombolytics administration rate within 30 minutes of hospital arrival/ P.PCI rate within 90 minutes of hospital arrival are calculated before the exclusion of "other proper reasons for delay"	■ Some of the risk adjustment factors are modified and applied/hemorrhage factors before or during the delivery are excluded /some venereal diseases and hypertensive disorders are modified

※ Institutions that improved grades and maintained these upper grades for 2 years or longer will be provided the incentives, but the rate will be applied at less than 1%.

※ The disincentive threshold will be applied in 2012 (as a results of the simulation with 140 institutions for AMI, and 93 institutions for Caesarean section).

C. The value incentive program expansion project model

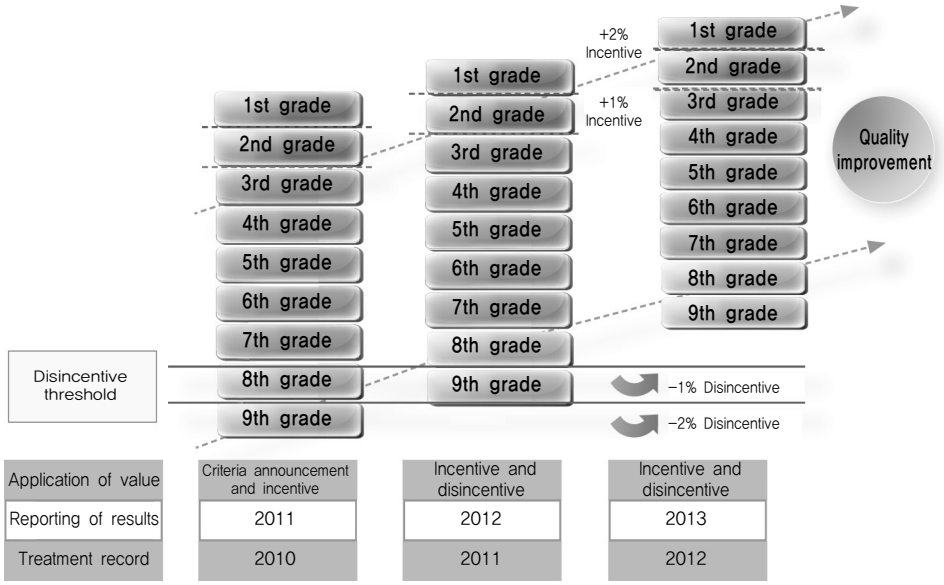

Figure 3.21 The value incentive program expansion project model

D. Future directions of the value incentive program

- ▪ Expanding the range of subject institutions for the value incentive program
  - The range will be expanded from tertiary hospitals to general hospitals and more (2011)
  - The incremental expansion will be incorporated to hospitals and clinics, which present a higher level of quality variations.
- ▪ Expanding the range of items subject to the assessment for incentives or disincentives
  - The subject items will be annually expanded from acute myocardial infarction and Caesarean section to the applicable assessment items such as acute stroke (2011) and prophylactic use of antibiotics for surgery
- ▪ Expanding the focus from a single disease to a comprehensive assessment
  - The focus of the assessment needs to be expanded from a single disease to a comprehensive assessment system, such as cardiovascular diseases (e.g. AMI, CABG, PCI, etc.)
- ▪ Improving to the P4P (Pay For Performance) system.
  - The P4P system that gives out incentives based on the quality of medical service and cost will be incorporated.

3. Quality Improvement (QI) Support Program

- Countries with prior experience of assessment have developed a quality improvement program and supported their medical care institutions in many ways [for example, the QIO (Quality Improvement Organizations) and IHI (The Institute for Healthcare Improvement) of the U.S.A.]
- HIRA developed a quality improvement program, which it has supported since 2007, to enable individual medical care institutions to make the most of the quality assessment results.
- Its main activities include the publication of a QI newsletter, the QI community operation, the QI case activities conference, awards for outstanding practices, QI training sessions and so on.
  - According to the survey results of the program, over 90% of the responses indicated that it was helpful in terms of both knowledge improvement and practical activities.

Proceedings

■ Sep. 2007	Survey on the need for a quality improvement project
■ Nov. 2007	Publication of the first issue of the QI Newsletter
■ Nov. 2007	Case presentation on excellent institutions in the quality assessment
■ May 2008	QI community launched
■ June 2008	QI training course set up
■ Sep.~Nov. 2008	Contest for excellent cases, prizing, and presentation held.
■ Dec. 2008	Production and distribution of QI informational kit (2008 QI Theories and Latest Trends in Medical Field)
■ 2009	QI training introductory course for medical care institutions set up
■ Jun. 2009	Set up QI training advanced course for medical care institutions
■ Nov. 2011	Selection and awarding the institutions with excellent cases of QI activities (11/20, 6 institutions), Holding a conference (11/26)
■ Dec. 2009	publication of "QI Theories and Practices"
■ Jan. 2010	publication of "Catching up the QI Activities"
■ Apr. 2010	Open QI training introductory course for medical care institutions
■ Jun. 2010	Open QI training advanced course for medical care institutions
■ Nov. 2010	Conference for excellent QI activity awards and case presentation

3.1 Distribution of newsletter

A. QI newsletter

- Provision of information covering QI-related issues from home and abroad, QI rooms of medial care institutions, cases of quality improvement activities, and the latest news about medical cost quality assessment.
  - Publication of a bi-monthly (even-numbered months), with 1,300 subscribers as of December 2009.
- Requests for subscription can be made at the HIRA homepage (www.hira.or.kr/information /periodicals/QInewsletter)

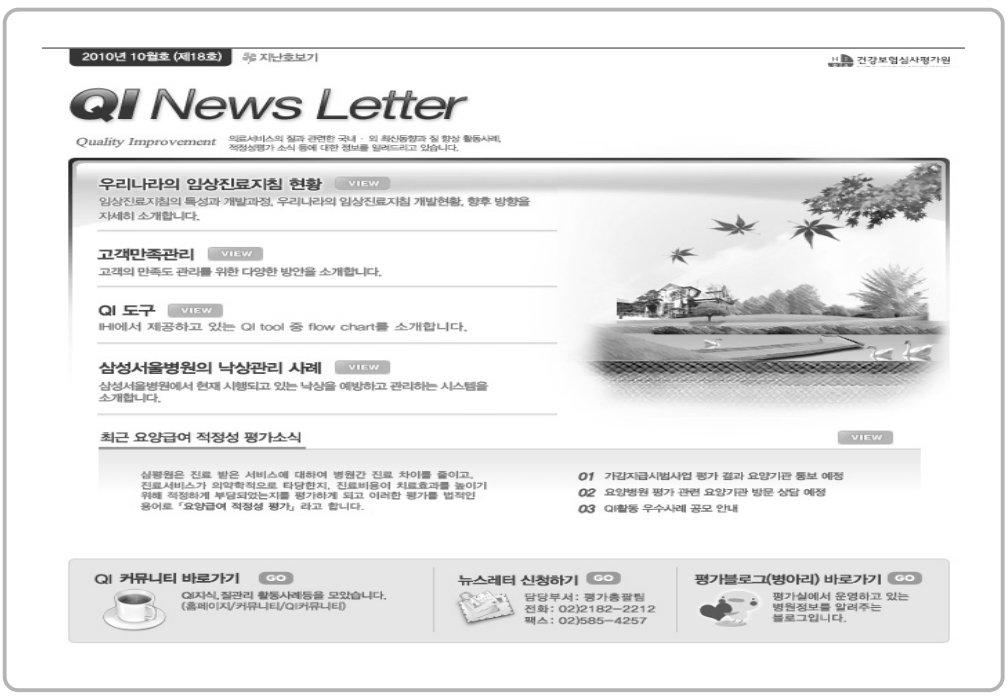

Figure 3.22 Screen of the QI news letter

Table 3.10 Yearly contents of the QI Newsletter

Classification		Content
2007	Nov. (No. 1)	■ "Saving 100,000 lives" movement of the U.S.A. ■ Case of reducing the time from arrival at E.R. to percutaneous coronary intervention
2008	Feb. (No. 2)	■ "Protecting 5 million" campaign of the U.S.A. ■ Quality improvement activities for acute stroke patients in medical centers (Chosun University, Chung-Buk National University)
	Apr. (No. 3)	■ National patient safety guidelines (NPSGs) ■ Introduction of a QI department at Severance Hospital ■ Event news of 3 hospitals including Kwang-Myong Seong-Ae

Classification		Content
	Jun. (No. 4)	■ IQIP(International Quality Indicator Project) ■ Introduction of the customer satisfaction and proper care task force of Bundang Seoul National University Hospital ■ Event news of 2 institutions including St. Paul's Hospital
	Aug. (No. 5)	■ Care Planner (CP) of electronic medical records ■ Introduction of the QI department of Bundang Cha Hospital
	Oct. (No. 6)	■ VBP execution plan ■ Six Sigma and medical quality improvement ■ Quality improvement activities for stroke patients (Yonsei Univ. Severance Hospital)
	Dec. (No. 7)	■ VBP program of CMS, U.S.A. ■ Six Sigma project promotion procedure (QI team of Soonchunhyang Buchon Hospital) ■ Reform activities for the use of prophylactic antibiotics for surgery (Busan Univ. Hospital)
2009	Feb. (No. 8)	■ Leadership of hospital executives and medical quality improvement ■ Story Boards ■ Introduction of the QI department of Sung-Ga Hospital ■ Event news of 3 institutions including National Seoul Hospital
	Apr. (No. 9)	■ Safe Surgery Saves Lives of the WHO, the QI team of Sung-Ae Hospital ■ Short survey ■ Event news: Busan Merinol Hospital
	Jun. (No. 10)	■ Root Cause Analysis (RCA) ■ Introduction of tools for quality assessment ■ Brainstorming, Affinity grouping, Multivoting ■ Infection control activities of Seoul National Univ. Hospital ■ Event news: Samsung Seoul Hospital
	Aug. (No. 11)	■ Types of events and cause analysis ■ International hospital accreditation systems and our current status ■ Just Clean your hands ■ How to stage an effective meeting
	Oct. (No. 12)	■ Detailed introduction of the criteria of JCI accreditation and domestic application ■ A guidebook for executives ■ Safety management system for patients of Samsung Seoul Hospital ■ Event news: Bundang Seoul National Univ. Hospital
	Dec. (No.13)	■ Improvement Map of IHI ■ Project planning form ■ Improvement of the execution rate of revascularization for myocardial infarction, Gangnam Severance Hospital ■ Event news: Bundang Cha Hospital
2010	Feb. (No. 14)	■ WHO's patients' safety improvement activities ■ 2010 NPSGs (National Patient Safety Goals) ■ Cause and effect diagram ■ Introduction of PI room of Asan Medical Center ■ News for events: QI practitioners' advanced course of Bundang Cha Hospital
	Apr. (No. 15)	■ WHO's patient safety improvement activities ■ Histogram ■ QI organization in hospital ■ Introduction of QI team at St. Mary's Hospital, Uijeongbu ■ Event news: Soonchunhang Univ. Bucheon (6-sigma school)
	Jun. (No. 16)	■ Drug management of hospitals through the medicine utilization review ■ The role of quality improvement practitioners ■ Pareto diagram ■ Medical care quality improvement team in Jeonbuk Univ. Hospital ■ Event news: patient's safety and infection management, Busan Merinol Hospital

Classification		Content
	Aug. (No. 17)	■ Falling management ■ 10 stages of QI activities ■ Scatter diagram ■ Introduction of medical quality management team of Kyungbuk Univ. Hospital
	Oct. (No. 18)	■ Clinical practice guidelines in South Korea ■ Customer satisfaction management ■ Flow chart ■ Case studies of falling management of Samsung Seoul Hospital
	Dec. (No. 19)	■ Team management ■ QI activities on the use of prophylactic antibiotics for surgery, Inha Univ. Hospital ■ QI activities for AMI, Busan Univ. Hospital

B. Yak! Baru-Baru (Medicine! Right away) newsletter

- Provision of information on the proper prescription of medication, news about medication cost quality assessment, and so on.
  - Differentiated publications provided for the general public and experts since 2009.
- Published quarterly (March, June, September, and December), and subscribed to by 67,000 experts and 35,000 members of the general public.
- Subscription request can be made at the HIRA homepage (www.hira.or.kr)/newsletter/Yak! Baru Baru newsletter/ mailing request

Figure 3.23 Yak! Baru Baru newsletter (for experts))

Table 3.11 Yearly contents of Yak! Baru Baru newsletter

Classification			Contents
2007	Sep. (No. 1)		■ Multiple prescription ■ Behavior of prescription digestive system medications ■ Dangers arising from elderly patients' combined use of multiple medications, and the relevant care ■ Major diseases of the digestive system and medication ■ Adding the prescription rate indicator for digestive system medications, and changing the target medicines of corticosteroids (for respiratory diseases)
2008	Jan. (No. 2)		■ Reporting on the results of assessment: the number of drugs per prescription ■ Assessment results of the 1st quarter of 2007 ■ Guidelines on taking medicines ■ Proper prescription for children's respiratory diseases ■ Opening the site of assessment results concerning the number of drugs; changing the format of the prescription assessment results report
	Apr. (No. 3)		■ Significance of assessment results, etc. ■ Elderly people's medicine consumption ■ Reorganization of the website for the prescription assessment results ■ Changing the format of the prescription assessment results report; the problems of respiratory infections treatment and the proper medication
	July (No. 4)		■ Summer diseases (sun burn, eye infections) ■ The right use of medications for skin and eye diseases ■ Drug interactions and clinical applications ■ Posting lists of the ingredients of corticosteroids (respiratory diseases) and NSAIDs ■ Reorganization of the website for the prescription assessment results
	Oct. (No. 5)		■ To what extent do we use antibiotics for colds or acute upper respiratory infections? ■ Safety management for antibiotics resistance in Korea ■ Overseas public relations materials on inducing the appropriate use of antibiotics ■ The medical basis of acute upper respiratory infection; explanation of the payment criteria for phlegm expectorant ■ Disclosing the ratings concerning the number of drugs ■ Adding the indicator of the proportion of the high-priced prescription ■ Reorganization of the prescription assessment results site
2009	For experts	Mar. (No. 6)	■ According to the results of the prescription assessment in the 3rd quarter of 2008, the number of drugs per prescription and other categories' values were continuously decreasing ■ Overview of medications for peptic ulcers and acid reflux
		Jun. (No. 7)	■ The total injection prescription rate in the 3rd quarter of 2008 was 22.82%, showing a decrease of 0.32%p compared to the 23.14% for the same period of the previous year ■ Analysis of the prescribing pattern for high-blood pressure patients' first medication
		Sep. (No. 8)	■ Preview: more convenient and renewed prescription assessment results! ■ Introduction of an antimicrobial care program for the proper use of antibiotics (Samsung Seoul Hospital, Seoul St. Mary's Hospital)
		Dec. (No.9)	■ Prescription assessment results, 1st quarter of 2009 ■ Clinical pharmacological understanding of oral administration and short injection
	For general public	Mar. (No. 6)	■ Taking a handful of medicines at every meal: will it make you healthy? ■ I'm feeling bloated and belching up sour vomit, should I take a digestive?
		Jun. (No. 7)	■ How to measure your blood pressure and practice life style management ■ Blood pressure medicines, how should I take them?
		Sep. (No. 8)	■ Antibiotics, have you checked? ■ H1N1, hepatitis A, epidemic conjunctivitis, influenza!! The first step of prevention is..?
		Dec. (No. 9)	■ Are injections always good? ■ Winter health care for patients for high blood pressure

Classification			Contents
2010	For experts	Mar. (No. 10)	■ Understanding the indicator of the combined prescription rate of NSAIDs for osteoarthritis ■ Differing medication quality assessment of 2010
		Jun. (No. 11)	■ Case studies of high blood pressure and diabetes management in public health centers ■ Introduction of the quality assessment for high blood pressure
		Sep. (No. 12)	■ Are the antibiotics really needed for acute respiratory infection? ■ Let's find out the information about hospitals and disease!!
		Dec. (No. 13)	■ Trends of managing chronic diseases in abroad ■ What is WHO's ATC code?
	For general public	Mar. (No. 10)	■ Exercise therapy for osteoarthritis patients ■ How to take drugs for osteoarthritis?
		Jun. (No. 11)	■ Overcoming high blood pressure with unsalty foods ■ 'Tonometer', how to use it smartly?
		Sep. (No. 12)	■ Weight loss diet for patients with high blood pressure and diabetes ■ Joyful Han-ga-we, stay healthy!
		Dec. (No. 13)	■ Planning a diabetic diet using the food substitution table ■ High blood pressure medications, how to take them?

3.2 QI Community operations

- The purpose of QI community operation is to share information for the hospitals to practice QI activities.
- Provision of information including QI trends at home and abroad, newsletter and related materials, QI activities and hospital introduction, information about quality assessment, QI training materials, news on hospital QI events, etc.
  - HIRA homepage (www.hira.or.kr)/community/QI community

3.3 QI Training services for medical care institutions

- Training for the administrators of quality assessment or QI practitioners has been implemented since 2008.
- The video clips of training and educational materials are provided on the website of QI community.
- Since 2010, the training has been divided into two levels: one for QI beginners, and the other for advanced QI trainees.
  - In 2010, beginners' courses were conducted twice in April, and advanced courses were conducted twice in June.
  - According to the post-training survey, 95.5% of beginners were satisfied, and 95.3% of advanced trainees also were satisfied.

▪ Training Program of 2010

QI beginners	QI advanced
■ Changes in medical environment and quality assessment trends at home and abroad ■ The direction of quality assessment ■ QI concepts and methodologies ■ QI tools ■ QI using the internal computer system in hospital ■ Case presentations of QI activities ■ Application of QI activities in hospitals	■ Changes in medical environment and quality assessment trends at home and abroad ■ The direction of quality assessment ■ Process of developing clinical quality indicators ■ Quality indicators of patients' safety ■ Methods of severity adjustment ■ Clinical quality activities in hospitals

3.4 Holding a contest for QI excellent cases and presentation

▪ Collection of superior QI cases practiced by medical care institutions, in relation to the quality assessment, for the purpose of sharing information and benchmarking.

▪ Excellent cases are selected and awarded

- In 2010, one institution was awarded 1st prize, three institutions received 2nd prize, three for 3rd, and a special award was given for one institution. A total of 8 institutions were awarded.

▪ A conference for the presentation of excellent cases has been held for other institutions to benchmark.

- Presentation Cases

Classification	Contents
2008	■ Team work(improvement of the medical care process) (Bundang Cha Hospital) ■ Team work(the change of perception in the organization (Busan Univ. Hospital) ■ Case activities (6-sigma) (Yonsei Univ. Young-Dong Severance Hospital) ■ Case activities (PDCA) (Samsung Seoul Hospital)
2009	■ Improvement of the execution of revascularization within the proper time for AMI (Kangnam Severance Hospital) ■ Increase in the quality assessment indicator rate of prophylactic antibiotics for surgery (Soonchunhyang Univ. Hospital, Buchon) ■ Clinical quality indicator regarding the use of prophylactic antibiotics for surgery (Incheon St. Mary's Hospital) ■ Quality improvement for stroke patients (with the application of CP and EQMASS) (Bundang Seoul National Univ. Hospital)
2010	■ Adequacy improvement of prophylactic antibiotics for surgery through the management of quality indicators(Inha Univ. Hospital) ■ Improvement of AMI proper treatment through the management of quality indicators (Busan Univ. Hospital) ■ Improvement activities for hemodialysis quality assessment indicators(East-West Neo Medical Center) ■ Improvement in proper treatment for AMI patients (Hanmaeum Hospital (Jeju)) ■ Quality improvement strategy for the proper use of prophylactic antibiotics for surgery (Gachon Medical School Gil Hospital) ■ Quality improvement through the monitoring of AMI patients (Korean Univ. Hospital, Ansan) ■ Improvement activities for the use of prophylactic antibiotics for surgery (Gangseo Mizmedi Hospital) ■ Adequacy improvement of prophylactic antibiotics used for surgery through the clinical quality indicators (St. Paul Hospital)

3.5 Consultation for medical care institutions

▪ Reinforcement of consultations for medical care institutions

- Visits are paid to institutions that urgently require quality improvement according to the quality assessment, or which request support for quality improvement, and consulting is provided to the executives, doctors and nurses (insurance review team, QI team) in charge of the quality assessment.
- Consulting includes the details of the risk adjustment factors, assessment methods, methods of calculating the indicator, the introduction of other institutions' cases, and a plan for quality improvement.
- In 2010, a total of 184 visiting consultations and small group intensive consultations have been conducted regarding the nine items including acute myocardial infarction.

▪ Holding presentations and conferences

- Presentations have been held for the medical care institutions by region to cover the detailed promotional plan for quality assessment, such as the criteria for assessment and how to fill out the questionnaire, and the results of assessment.
- In total, 40 presentations were conducted by assessment topics in 2010.

Part. 04

Appendix

I. Indicator List for Assessment Items

2. Results by Assessment Items and Healthcare Institutions

Appendix I. Indicator List for Assessment Items

1. Acute Myocardial Infarction

1) List of indicators

□ Assessment indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Structure	AMI_1	No. of AMI inpatient cases	No. of hospitalizations with AMI as a main reason	–
Process	AMI_2	Thrombolytics administration rate within 60 minutes of hospital arrival	No. of patients given thrombolytic agents within 60 min. of hospital arrival and indicated for reperfusion[1)] / No. of patients given thrombolytic agent within 6 hours of hospital arrival and subjected to reperfusion × 100	▪The time of thrombolytics administration is one of the important indicators for predicting the patient's results. ▪ACC/AHA advises to conduct thrombolytics treatments within 30 min. of arrival at the hospital for ST segment elevated AMI. ▪Common Exclusion ▪Those transferred from other hospitals ▪Those with contraindication to a thrombolytic agent ▪Patient who has a record with justification for no treatment with a thrombolytic agent
	AMI_3	Primary PCI rate within 120 minutes of hospital arrival	No. of patients given P.PCI within 120 min. of hospital arrival and subjected to reperfusion / No. of patients given P.PCI within 12 hours of hospital arrival and subjected to reperfusion × 100	▪Immediate execution of PCI for AMI patients with ST segment elevation or LBBB to prominently lower the fatality rate. ▪ACC/AHA advises to conduct P.PCI within 90 min. of hospital arrival. ▪Common Exclusion ▪Those transferred from other hospitals ▪Patient who has a record with justification for no treatment of P.PCI within 90 minutes
Process	AMI_4	Aspirin administration rate of hospital arrival	No. of AMI patients given aspirin within 24 hours of hospital arrival / No. of AMI patients hospitalized via emergency room × 100	▪It is advised to use aspirin within 24 hours, as early use of aspirin decreases the danger of death. ▪Common Exclusion ▪Those transferred from other hospitals ▪Those transferred to another hospital on the same day of the visit ▪Those who died on the day of the visit ▪Those discharged from the hospital on the day of admission

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
				▪Those with contraindication to aspirin
	AMI_5	Aspirin prescription rate at discharge	$\frac{\text{No. of AMI patients with aspirin prescription when discharged from hospital}}{\text{No. of AMI patients hospitalized via emergency room}} \times 100$	▪It is advised to take aspirin long-term for the secondary prevention of cardiovascular diseases. ▪Common exclusion ▪Those transferred to other hospitals ▪Those who died during the hospitalization ▪Those with contraindication to aspirin ▪Those discharged from the hospital for patients' refusal of care or for the purpose of hospice care
	AMI_6	Beta-blocker prescription rate at discharge	$\frac{\text{No. of AMI patients with beta-blocker prescription at discharge}}{\text{No. of AMI patients hospitalized via emergency room}} \times 100$	▪Beta-blockers are recommended to use for the secondary prevention of cardiovascular diseases if the patient has no contraindications. ▪Common exclusion ▪Those transferred to another hospital ▪Those who died during the hospitalization ▪Those with contraindication to beta-blockers ▪Those discharged from the hospital for patients' refusal of care or for the purpose of hospice care
Outcome	AMI_7	Case fatality rate[2] (in-hospital/30-day case fatality rate)	$\frac{\text{No. of patients who died during hospitalization or within 30 days of hospital admission}}{\text{No. of AMI patients hospitalized via emergency room}} \times 100$	▪The AMI patients' fatality rate is closely related to the quality of medical care ▪Common exclusion ▪Those transferred from another hospital ▪Those transferred to another hospital ▪DOA

Note. 1) Those who show ST segment elevation in an ECG or those who have a new onset of LBBB in an ECG
2) Fatality rate will be assessed as a risk-adjusted fatality.

□ Monitoring Indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Structure	AMI_M_1	Percentage of patients who used ambulance	$\frac{\text{No. of patients admitted to hospital using ambulance}}{\text{No. of patients hospitalized via emergency room}} \times 100$	▪To consider the role and functions of the emergency care system on the early responses of acute diseases ▪Common exclusion ▪Those transferred from another hospital
	AMI_M_2	Median time from chest pain onset to arrival at hospital	Median time from chest pain onset to arrival at hospital for the patients who were hospitalized via emergency room	▪To analyze and consider the external factors from outside of the medical care institutions that have an affect on AMI fatalities ▪Common exclusion ▪Those transferred from another hospital ▪Patient with no known symptom onset time and arrival time to hospital
Process	AMI_M_3	Percentage of AMI patients given thrombolytic agent	$\frac{\text{No. of patients given thrombolytic agent}}{\text{No. of patients subjected to reperfusion}^{3)} \text{ who were hospitalized via emergency room}} \times 100$	▪Administration of thrombolytic agents for AMI patients with ST segment elevation or LBBB has advantages of making reperfusion easier when PCI cannot be performed. However, possible contraindications should be considered. ▪Common exclusion ▪Those transferred from another hospital
	AMI_M_4	Percentage of AMI patients given P.PCI	$\frac{\text{No. of patients given P.PCI}}{\text{No. of patients subjected to reperfusion who were hospitalized via emergency room}} \times 100$	▪Immediate PCI execution for AMI patients with ST segment elevation or LBBB can prominently decrease the fatality rate. ▪ Common exclusion ▪Those transferred from another hospital
	AMI_M_5	Median time from arrival at hospital to thrombolytic agent administration	Median time from arrival at hospital to thrombolytic agent administration for AMI patients subjected to reperfusion	▪Among the factors that affect the fatality rate of AMI, the emergency medical delivery system within the medical care institutions is to be analyzed and considered. ▪Common exclusion ▪Those transferred from another hospital ▪Patients with no known time arrival to hospital and time for thrombolytic administration

Area	Indicator code	Indicator	Formula	Reason for selection Exclusion criteria
	AMI_M_6	Median time from arrival at hospital to balloon inflation	Median time from arrival at hospital to balloon inflation for AMI patients subjected to reperfusion	▪Among the factors that affect the fatality rate of AMI, the emergency medical delivery system within the medical care institutions is to be analyzed and considered. ▪Common exclusion ▪Those transferred from another hospital ▪Patients with no known time arrival to hospital and time for P.PCI treatment
Outcome	AMI_M_7	Fatality rate (Death within 1 year of discharge from hospital)	$\frac{\text{No. of patients who died within 1 year of discharge from hospital}}{\text{No. of patients hospitalized via emergency room}} \times 100$	▪The AMI patients' fatality rate is closely related to the quality of medical care. ▪Common exclusion
	AMI_M_8	Hospitalization days per episode(hospitalization days LI, lengthiness index)	Mean hospitalization days of patients who were discharged from hospital and applied to DRG	▪To assess the cost-effectiveness of the resources provided for the medical service ▪Common exclusion ▪Those who died during the hospitalization ▪Those transferred from another hospital ▪Those transferred to another hospital
	AMI_M_9	Medical cost per episode (Medical cost CI, costliness Index)	Mean medical cost of patients who were discharged from hospital and applied to DRG	

Note. 3) Those who show ST segment elevation in an ECG or those who have a new onset of LBBB in an ECG

□ Indicators finished assessment: None

2. Acute Stroke

1) List of indicators

□ Assessment indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Structure	STR_01	Organization of specialist personnel	Healthcare facilities will be classified into 4 levels according to the no. of fulltime doctors, specialists among neurology, neurosurgery, and rehabilitation medicine A: a facility with fulltime doctors from all three specialty areas B: a facility with fulltime doctors from two specialty areas C: a facility with fulltime doctors from one specialty area D: a facility with no fulltime doctors from any of the three specialty areas	▪It is critical to provide care as a team by cooperating in the various areas of expertise including neurology, neurosurgery, and rehabilitative medicine. ▪None
Process	STR_11	Documentation rate of smoking history	$\frac{\text{No. of smoking history screenings by medical doctor}}{\text{No. of acute phase stroke (I60–I63) cases}} \times 100$	▪Smoking itself is an important risk factor that causes arteriosclerosis and heightens the incidence of stroke by increasing the chances for blood coagulation. Thus, it requires proper management. ▪None
	STR_12	Neurological examination rate	$\frac{\text{No. of neurological examinations (including all 5 tests)}}{\text{No. of acute phase stroke (I60–I63) cases}} \times 100$	▪It is important to check if the patient has any change in consciousness or functional disorders in the cerebral nerves and accurately diagnose the stroke for early treatment. ▪None
	STR_13	Dysphagia examination rate within 2 days	$\frac{\text{No. of dysphagia screenings performed within 2 days of admission to hospital}}{\text{No. of acute phase stroke (I60–I63) cases}} \times 100$	▪Dysphasia occurs very often in acute stroke and may cause complications such as aspiration pneumonia. Thus, prompt screening and accurate assessment for dysphagia and early treatment is required. ▪Cases for discharge, transfer, or death within 2 days of admission
	STR_21	Brain imaging test rate (within 24 hours)	$\frac{\text{No. of brain imaging tests (CT or MRI)performed within 24 hours of arrival at hospital}}{\text{No. of acute phase stroke (I60–I63) cases}} \times 100$	▪A brain imaging test (CT or MRI) is a basic diagnostic test to determine if the symptom is ischemic or hemorrhagic within 24 hours, which is important to set the direction for treatment. ▪When the patient refuses treatment or to be discharged for hospice ▪Cases of discharge, transfer, or death within 24 hours of admission ▪When the brain imaging test was performed at another hospital

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Process	STR_23	Brain imaging test rate (within 1 hour)	(No. of brain imaging test (CT of MRI)performed within 1 hour of arrival at hospital / No. of acute phase stroke (I60–I63) cases) × 100	▪A brain imaging test(CT or MRI) is a basic diagnostic test for patients that should be conducted immediately upon arrival at hospital. ▪Cases of the patient's refusal of treatment or being discharged for hospice. ▪When brain imaging was conducted at another hospital ▪When it takes more than 2 hours from the first occurrence of symptoms (final check time of normality) to the arrival at hospital ▪When the time the symptoms first occurred or the final time of normality were not known ▪When CPR was conducted within 1 hour of arrival to hospital without performing a brain imaging test.
	STR_22	Lipid profile test rate	(No. of blood lipid tests performed during the hospitalization within 30 days prior to the hospital admission / No. of acute phase ischemic stroke(I63) cases) × 100	▪When cholesterol is stored in the blood vessels in brain, arteriosclerosis and cerebral infarction are caused by the narrowed blood vessels. The risk of stroke is high when LDL cholesterol is abnormally high or HDL cholesterol is abnormally low. Thus, it is important to prevent, manage, and treat hyperlipidemia. ▪Cases of death during hospitalization ▪Cases of the patient's refusal of treatment or being discharged for hospice. ▪When transferred to another hospital for acute phase treatment within 3 days of admission ▪When the lipid profile test was performed in another hospital within 30 days prior to admission
	STR_33	Consideration rate of early rehabilitation (within 3 days)	(No. of considerations for rehabilitation within 3 days / No. of acute phase stroke (I60–I63) cases) × 100	▪It is advised to perform the test for rehabilitation and start rehabilitation as early as possible, as stroke patients can become disabled after the treatments. ▪Cases of discharge, transfer, or death within 3 days of admission

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Process	STR_31	Consideration rate of IV t-PA initiation	No. of considerations for intravenous administration of thrombolytic agent / No. of acute phase ischemic stroke(I63) cases × 100	▪The intravenous administration of t-PA within 3 hours of symptom development can reduce the symptoms of stroke and effectively prevent permanent disorders. Thus, it is important to consider if the treatment is efficacious to the disease. ▪When it took more than 2 hours to arrive at the E.R. from the onset of the symptoms (last time identified as normal) ▪When the exact time the symptom first occurred and the last time indentified as normal were not known.
	STR_34	Administration rate of IV t-PA	No. of intravenous administrations of thrombolytic agent (t-PA) / No. of acute phase ischemic stroke(I63) cases × 100	▪The intravenous administration of t-PA within 3 hours of symptom development can reduce the symptoms of stroke and effectively prevent permanent disorders. Thus it is important if the medicine efficacious to the patient's disease has been properly administered. ▪When it took more than 2 hours to arrive at the E.R. from the onset of the symptoms (last time identified as normal) ▪When the exact time the symptom first occurred and the last time indentified as normal were not known. ▪When there is a reasonable reason recorded for not giving t-PA to the patient
	STR_32	Administration rate of antithrombotics (within 48 hours)	No. of antithrombotics administrations within 48 hours after hospital arrival / No. of acute phase ischemic stroke(I63) cases × 100	▪Antithrombotics are effective to reduce the fatality rate of strokes, complications, and reoccurrences. Early treatments, such as removing the thrombosis in blood vessels within 48 hours of stroke development, and preventing deterioration and reoccurrence, are particularly important because the damaged brain cells cannot recover. ▪Cases of patient's refusal of treatment or being discharged for hospice ▪Cases of discharge, transfer, or death within 48 hours of admission ▪When there is a reasonable reason recorded for not giving antithrombotics, such as contraindications.

Area	Indicator code	Indicator	Formula	Reason for selection Exclusion criteria
Process	STR_41	Prescription rate of antithrombotics at discharge	No. of antithrombotics prescriptions on hospital discharge / No. of acute phase ischemic stroke(I63) cases × 100	▪Since the reoccurrence rate of cerebral infarction is high, treatments for secondary prevention, such as administration of anticoagulants for thinning blood, or antiplatelet agents for controlling thrombosis are important. ▪Cases of death during the hospitalization ▪Cases of the patient's refusal of treatment or being discharged for hospice. ▪Cases of transfer to another hospital ▪When there is a reasonable reason recorded for not giving antithrombotics, including contraindications
	STR_42	Prescription rate of anticoagulants (atrial fibrillation patient)	No. of anticoagulant prescriptions on hospital discharge / No. of acute ischemic stroke(I63) with arterial fibrillation cases × 100	▪Among the complications for the patients of arterial fibrillation, a stroke is the most dangerous disease. The long-term use of anticoagulants can remarkably reduce the occurrence of a stroke. ①When the patient died during the hospitalization ②When the patient refused to get treatment or when the patient was discharged from the hospital because of an untreatable condition ③When the patient was transferred to another hospital ④When there is no record for the diagnosis of atrial fibrillation ⑤When a patient has a contraindication to a thrombolytic agent or when there is a reasonable reason for not giving thrombolytic agent to the patient

□ Monitoring indicator: None

□ Indicator finished assessment: None

3. Prophylactic antibiotics for surgery

1) Indicator list: calculation and exclusion criteria

□ Assessment indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Process	SIP_***_11	Initial prophylactic antibiotic prescription rate within 1 hour before skin incision	No. of patients given prophylactic antibiotics through a non-oral route for the first time within 1 hour prior to skin incision / Total no. of patients given prophylactic antibiotics administration × 100 ※In the case of Caesarean section, the cases where prophylactic antibiotics administration were performed after cord entanglement were added to those performed within 1 hour prior to the surgery. In the cases of vancomycin, quinolones, and metronidazole, injections administered within 2 hours were added to the numerator.	▪It is most effective when prophylactic antibiotics are administered non-orally within 30 minutes to 1 hour prior to skin incision, which ensures that the antibiotics remain sufficiently on the site of operation at the time of surgery. ▪Common Exclusion (before surgery) ▪Non-administration of prophylactic antibiotics ▪Unilateral replacement operation on a latter day when bilateral replacement operations were performed on different days.
	SIP_***_22	Aminoglycosides administration rate	No. of patients given aminoglycoside antibiotics / Total no. of patients given prophylactic antibiotics administration × 100	▪Aminoglycoside is not recommended as a prophylactic antibiotic for toxicity such as nephrotoxicity or ototoxicity, except in the cases of β -lactam allergy or valvular heart disease. ▪Common Exclusion (before surgery) ▪Patients with a fever of 38℃ or higher 3 days after surgery (POD#3) ▪When surgical site infection occurred ▪When infectious diseases occurred after surgery ▪When the patient was kept on a ventilator for 24 hours or more after surgery (including cardiac surgery) ▪When the patient was given a transfusion of 4 pints or more of blood within 24 hours of surgery (7pints or more for cardiac surgery) ▪Non-administration of prophylactic antibiotics

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Process	SIP_***_23	3rd or later generation cephalosporin antibiotics administration rate	No. of patients given 3rd or later generation cephalosporin antibiotics / Total no. of patients given prophylactic antibiotics administration × 100	▪3rd or later generation cephalosporin antibiotics are not recommended as prophylactic antibiotics, since they have lower antibacterial activities, and the viruses that they have, have high antibacterial activities and do not cause infections after surgery. Moreover they only to increase the resistance of bacteria. ▪The same as SIP_***_02 (· also as SIP_***_22)
	SIP_***_24	Prophylactic antibiotics combination rate	No. of patients given more than 2 different antibiotic families / Total no. of patients given prophylactic antibiotics administration × 100	▪The combined administration of prophylactic antibiotics is not recommended except for on some special occasions, since there are possibilities of toxicity, allergic reactions, side effects, and the generation of strains with resistances. ▪The same as SIP_***_02 (also as · SIP_***_22)
	SIP_***_32	Antibiotics prescription rate at discharge	No. of patients with antibiotics prescription on hospital discharge / No. of patients assessed in surgery × 100	▪Administration of prophylactic antibiotics is recommended up to 24 hours (or 48 hours) after the surgery, for once is usually enough if the time of first administration was appropriate. ▪The same as SIP_***_06 (but the case of non-administration of prophylactic antibiotics is excluded)
	SIP_***_33	Total mean of the days of prophylactic antibiotics administration (in-hospital administration+ prescription at discharge)	Total no. of days for prophylactic antibiotics administration during and after hospitalization / Total no. of patients given prophylactic antibiotics administration	▪The same as SIP_***_05 ▪The same as SIP_***_02 ▪Unilateral replacement operation on a latter day when bilateral replacement operations were performed on different days.

Note. ***: Abbreviation of operations (gas: gastric surgery, col : colon surgery, LLC : laparoscopic laser cholecystectomy, hip : hip replacement, kne : knee replacement, hys : hysterectomy, cse : Caesarean section, hea : heart surgery)

□ Monitoring indicators

Area	Indicator code	Name of indicator	Formula	Criteria for selection Criteria for exclusion
	SIP_kne_13	Administration rate of prophylactic antibiotics before proximal tourniquet inflation	No. of patients who were conducted non-oral administration of prophylactic antibiotics before proximal tourniquet inflation for the first time / Total no. of knee arthroplasty patients given prophylactic antibiotics × 100	▪Administration should be made before the proximal tourniquet inflation to maintain enough antibiotics on the site of operation at the time of surgery. ▪Common Exclusion (before surgery) ▪The second operation of the bilateral replacement operations when they were performed on different days.
	SIP_***_43	Documentation rate for the history of allergic reactions to antibiotics	No. of patients with a history record of allergic reactions to antibiotics / Total no. of patients administered prophylactic antibiotics × 100	▪It is recommended to administer other kinds of antibiotics such as vancomycinor or clindamycin rather than cephalosporin if the patient has β -lactam allergy. ▪Non-administration of prophylactic antibiotics
	SIP_***_44	ASA class documentation rate	No. of patients with ASA class documentation / No. of patients who received the assessed surgeries × 100	▪It is an assessment conducted by anesthesiologists regarding the patient's condition in surgery. Patients with ASA Class 4 or higher are excluded from the assessment. ▪Common exclusion (before surgery)

□ Indicators finished assessment

Area	Code of indicator	Indicator	Time to finish assessment[1)]	Remarks
Process	SIP_***_01	Administration rate of prophylactic antibiotics	2008	▪High fulfillment rate for the indicator
	SIP_cse_12	Prophylactic antibiotics administration rate after umbilical cord clamping	2008	▪Overlapped with the administration rate prior to 1 hour of skin incision
	SIP_***_21	Administration rate by antibiotics	2008	▪Overlapped with the indicator of antibiotics selection
	SIP_***_31	The discontinuance rate of prophylactic antibiotics after surgery by date	2008	▪Overlapped with the indicator for the duration of administration
	SIP_***_41	Documentation rate related to surgery	2009	▪High fulfillment rate for the indicator, requirements for calculating antibiotics indicators
	SIP_***_42	Documentation rate of antibiotics administration	2009	▪High fulfillment rate for the indicator, requirements for calculating antibiotics indicators

Note. 1) Time to finish assessment: applied when the assessment for the given year finished

2) Practice fee code for assessable surgeries

Operation	Classification number	Classification	Code
Gastric surgery	Ja-253	Total gastrectomy	Q2533, Q2536, Q2534, Q2537
	Ja-259	Subtotal gastrectomy	Q2594, Q0251, Q0252, Q0253, Q0254, Q0255, Q0256, Q0257, Q0258, Q2598
Colon surgery	Ja-267	Colectomy	QA671, Q2671, Q1261, Q1262, QA672, Q2672, QA673, Q2673, QA679, Q2679
	Ja-292	Proctosigmoidectomy	QA921, QA922, QA923, QA924, Q2921, Q2922, Q2923, Q2924
	Ja-292-1	Total proctosigmoidectomy	QA925, Q2925, QA926, Q2926
Laparoscopic Laser cholecistectomy	Ja-738	Cholecistectomy	Q7380
Hip replacement	Ja-71	Artificial articulation replacement-hip joint	N0711, N0715
Knee replacement	Ja-71	Artificial articulation replacement -knee joint	N2072
Hysterectomy	Ja-414	Total hysterectomy	R4145
	Ja-420	Operation on procidentia	R4202, R4203
Caesarean section	Ja-451	Caesarean section delivery	R4517, R4518, R4514
Heart surgery	Ja-164	Vascular bypass operation (Artery)	O1641, OA641, O1642, OA642
	Ja-178	Valvuloplasty	O1781, O1782, O1783
	Ja-179	Valve replacement	O1791, O1792, O1793, O1797

4. Caesarean section

1) Indicator List: Definitions and calculations

□ Assessment indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Outcome	CSEC_01	Caesarean section rate	$\frac{\text{No. of C-sections}}{\text{Total delivery number}} \times 100$	▪Definition: the ratio of the Caesarean section delivery among the total number of deliveries ▪Reason for selection: the Caesarean delivery rate in South Korea was 40.5% in 2001, which was higher than the WHO recommended rate of 5–15% and that of OECD countries, 14.0 – 39.9%. ▪None

□ Monitoring Indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Outcome	CSEC_02	C-Sec Rate in primipara	$\frac{\text{No. of C-sections in primipara}}{\text{No. of deliveries in primipara}} \times 100$	▪Definition: the ratio of C-section deliveries among primipara * The indicator has been calculated after the differentiation of primipara and multipara was possible in the delivery fee code since 2005. ▪Reason for selection: C-section delivery in primipara increases the possibility of repeated C-sections. Thus it has been selected as an indicator to understand the change in the total Caesarean delivery rate. ▪None
	CSEC_03	VBAC rate	$\frac{\text{No. of VBAC}}{\text{No. of repeated C-sections+No. of VBAC}} \times 100$	▪Definition: the rate of mothers who delivered by natural birth after experiencing a C-section. * VBAC(Vaginal Birth after Caesarean Section) ▪Reason for selection: The rate of VBAC can be a secondary indicator by reducing the repeated C-sections. ▪None

□ Indicators finished assessment: None

2) Delivery fee codes

Classification	Classification number	Classification	Code
Natural birth	Ja-435	Delivery	R3131, R3133, R3136, R3138, R3141, R3143, R3146, R3148, R4351, R4353, R4356, R4358, RA311, RA312, RA313, RA314, RA315, RA316, RA317, RA318, RA431, RA432, RA433, RA434
	Ja-436	Breech birth	R4360, R4361, R4362, RA361, RA362
	Ja-438	Vaginal Birth After C-section	R4380, RA380
	Ka-1	Midwifery fee	V0111, V0112, V0121, V0122, V0131, V0132
Caesarean section	Ja-451	C-section delivery	R4513, R4514, R4515, R4516, R4504, R4505, R4506, R4517, R4518, R4519, R4520
	Ja-450	Caesarean hysterectomy	R4507, R4508, R4509, R4510, R5001, R5002

Note. 1. Practice List is subject to the reimbursement/negative list in the Health Insurance System (Ministry of Health and Welfare, Regulation 2009-235)
Note. 2. R4360, R4513, R4515, R4504, R4505, R4506 (deleted in Nov. 2005)

5. Surgical volume indicators

1) List of indicator list

Surgery	Indicator Code	Indicator
Surgery for gastric cancer	Vol_gas_1	Fulfilling the cut-off point
Surgery for colon cancer	Vol_col_1	
Surgery for liver cancer	Vol_liv_1	
Surgery for hip replacement	Vol_hip_1	
Percutaneous coronary intervention	Vol_pci_1	

2) Assessable surgery fee codes

Surgery	Disease		Surgery		
	Diseases code	Name of Disease	Classification code	Classification	Code
Surgery for gastric cancer	C16	Malignant neoplasm of the stomach	Ja253 Ja259	Total gastrectomy Subtotal gastrectomy	Q2533, Q2534, Q2535, Q2537 Q2594, Q0251, Q0252, Q0253, Q0254, Q0255, Q0256, Q0257, Q0258, Q2598
Surgery for colon cancer	C180~C189 C19 C20 D010~012	Malignant neoplasm of the colon Malignant neoplasm of the rectosigmoid junction Malignant neoplasm of the rectal carcinoma in situ	Ja267 Ja292 Ja292-1	Colectomy Rectal and sigmoid resection Total coloprotectomy	QA671, Q2671, Q1261, Q1262, QA672, Q2672, QA673, Q2673, QA679, Q2679 QA921, Q2921, Q2927, QA922, Q2922, QA923, Q2923, QA924, Q2924 QA925, Q2925, QA926, Q2926
Surgery for liver cancer	C220 C221 C787	Hepatocellular carcinoma Intrahepatic bile duct carcinoma Secondary malignant neoplasm of liver	Ja722	hepatectomy	Q7221, Q7222, Q7223, Q7224
Surgery for hip replacement	–	–	Ja71	Total hip arthroplasty Hip arthroplasty	N0711, N0715
Percutaneous coronary intervention (PCI)	–	–	Ja655 Ja656 Ja657	Percutaneous transluminal coronary angioplasty Percutaneous transcatheter placement of intracoronary stent Percutaneous transluminal coronary atherectomy	M6551, M6552 M6561, M6562, M6563, M6564 M6571, M6572

6. Long-term care hospital

1) List of indicators

□ Assessment indicators

A. Structure (Status) area

Area		Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Facility	Basic facilities	LTC_F_01	Average space of ward per bed	Sum of total room size / Total no. of beds	▪To ensure a pleasant environment for patients to have some privacy and enough space when moving in a wheelchair. ▪None
		LTC_F_02	Percentage of multi-patient wards (over seven people)	(No. of beds in multi-bed rooms / Total no. of beds) × 100	▪To check that the facilities are providing a stable environment for patients to receive medical service ▪None
		LTC_F_03	Rate of wards with toilet	(No. of wards with toilet / Total no. of beds) × 100	▪To check that the facilities are securing accessibility for patients to keep conditions sanitary and clean and to solve their basic needs ▪None
		LTC_F_04	Availability of adequate bathroom	Available: 1, Not available: 0	▪To check the availability of facilities for maintaining personal hygiene and cleanliness None
		LTC_F_05	Rate of patient amenities furnished(lounge, restaurants)	(Sum of the scores from each space / No. of spaces (Maximum of 2)) × 100	▪To assess the physical and emotional aspects of the service provided by the long-term care hospitals ▪None
	Safety facilities	LTC_F_11	Rate of thresholds or bumps removed (wards, bathrooms, and toilets)	No. of spaces where thresholds or bumps on floor are removed / No. of spaces(Maximum of 3)	▪To confirm that the institution is equipped with accident prevention facilities, as securing the patients' safety is essential ▪None
		LTC_F_12	Rate of non-slip floors installed (bathrooms, toilets, stairs)	No. of spaces where non-slip floors are installed / No. of spaces (Maximum of 3)	▪To confirm that the institution is equipped with accident prevention facilities ▪None

Area		Indicator code	Indicator	Formula	Reason for selection Exclusion criteria
		LTC_F_13	Rate of emergency call system installed (wards, bathrooms, and toilets)	No. of spaces equipped with emergency call system / No. of spaces(Maximum of 3)	▪To assess the ability to provide prompt medical services in an emergency. ▪None
Facility	Safety facilities	LTC_F_14	Rate of safety grip installed (bathrooms, toilets, hallways)	No. of spaces that safety grips are installed in / No. of spaces(Maximum of 3)	▪To check if the institution is equipped with a safety grip, stated as law. .For the convenience and insurance for disabled, elderly, and pregnant people, for it is essential for patients to prevent accidents ▪None
Workforce	Medical care workforce	LTC_P_31	No. of beds per doctor	Average no. of beds / Average no. of doctors	▪To see the level of the basic workforce who provides proper medical service. ▪None
		LTC_P_41	No. of beds per nurse	Average no. of beds / Average no. of nurses	▪The medical law stipulates that no more than 18 patients should have one nurse. The indicator shows the level of the basic workforce to provide proper medical care. ▪None
		LTC_P_42	No. of beds per nursing personnel	Average no. of beds / Average no. of nursing personnel	The medical law stipulates that no more than6 patients should have one nursing personnel. The indicator shows the level of the basic workforce to provide proper medical care. ▪None
		LTC_P_43	Turnover rates of nursing personnel	(Total no. of nursing personnel who worked in the institution × 100) / Average no. of nursing personnel − 100	▪Reducing the turnover rate of nursing personnel to secure the continuity of care is required to improve the quality of service. The effort to reduce nursing personnel's turnover rate should be made by improving their work condition. ▪ None

Area		Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
		LTC_P_44	On-call doctor availability in nights/ holidays	The sum of the given days spent with doctor / Sum of the given days 1= available 〈1= not available	▪To check the basic response system to emergency ▪ None
Workforce	Other human resources	LTC_P_52	No. of beds per physical therapist	Average no. of beds / Average no. of physical therapists	▪Senior welfare law states that there should be at least one physical therapist for 100 or less inpatients (the annual average no. of daily inpatients), and one more physical therapist should be hired in excess of every 100 inpatients. ▪None
		LTC_P_53	Availability of pharmacy (including pharmacist)	1available 0unavailable	▪For the accurate administration and safety management of drugs ▪None
		LTC_P_54	Availability of X-ray room (including radiologist)	1available 0unavailable	▪Selected as a facility and workforce to respond promptly and properly to medical requests. ▪None
		LTC_P_55	Availability of clinical laboratory (including medical lab. technologist)	1available 0unavailable	▪It is important to equip the infrastructure for conducting emergency tests, which indicates the reliability of the institution ▪None
		LTC_P_56	Availability of social worker	1 available 0unavailable	▪It is to assess the availability of a service to improve the patient's quality of life. ▪None
Medical equipment	Medical equipment	LTC_E_61	No. of EKG monitor per 100 beds	No. of EKG monitors / Total no. of beds × 100	▪Cardiovascular diseases are the highest cause of death for people aged 65years or older. Thus, it is important to have the structural foundation to find and treat symptoms properly in urgent situations. ▪None

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
	LTC_E_62	No. of pulse oxymeter per 100 beds	$\frac{\text{No. of pulse oxymeter}}{\text{Total no. of beds}} \times 100$	▪Preventing readmission to an acute phase hospital is one the major functions of long-term care hospitals. It is basic equipment to monitor the patient's overall physical condition. ▪None
	LTC_E_63	No. of oxygen supply equipment per 100 beds	$\frac{\text{No. of oxygen supply equipment}}{\text{Total no. of beds}} \times 100$	▪It is emergency equipment for treating patients with dyspnea. ▪None
	LTC_E_64	No. of aspirator per 100 beds	$\frac{\text{No. of aspirator}}{\text{Total no. of beds}} \times 100$	▪It is an essential piece of equipment to secure the airway ▪None

B. Process, outcome area

Area	Indicator code	Indicator	Formula		Reason for selection / Exclusion criteria
Process	LTC_Q_11, 12	Rate of patients with an indwelling urinary catheter (high-risk* /low-risk group**)	No. of patients with an indwelling urinary catheter / No. of patients classified as a high-risk (low-risk) group from the assessment performed in the current month	× 100	▪It aims to see if the quality of medical service has decreased by using the indwelling urinary catheter for the convenience of the institution. ▪In the case where the assessment of the current month is the assessment for admission
	LTC_Q_13	MMSE*** test rate for patients aged 65 years or older when hospitalized	MMSE tested patients when assessed for admission / No. of inpatients aged 65 years or older	× 100	▪A screening the patient's cognitive functions on admission is one of the basic medical practices performed by long-term care hospitals. ▪Those recorded as "in coma" and whose daily-life-performance test results are mostly "completely dependent" or "no performance of activities conducted."
	LTC_Q_14	HbA1c test rate for diabetic patients	No. of patients who have received theHbA1c test for 1 year / No. of diabetic patients	× 100	▪The periodic testing of HbA1c is emphasized in most of the clinical guidelines for diabetic patients. The indicator intends to assess the adequacy of disease management of long-term care hospitals. ▪In the case where the assessment of the current month is the assessment for admission
Outcome	LTC_Q_2, 3	Rate of patients with declined ability to perform daily activities - dementia/ non-dementia)	No. of patients whose ability to perform daily activities in the current month has declined from the previous month / No. of patients with dementia (non-dementia) who have been assessed in both the previous and current months.	× 100	▪Prevention of deterioration and maintenance of current status can be assessed as the results of successful medical services. ▪When one or more of the following are the case: 1. When the assessment results from the previous months indicate "completely dependent" or "no performance of the activities in daily-life-performance" in 10 kinds of daily activities, and the condition cannot deteriorate more. 2. When deterioration and improvement occurred at the same time.

* high-risk group: Patients with one or more of the following
1. Incontinent Patients
2. Patients with severe bedsores
3. Patients with quadri-paralysis
4. Patients in coma

** low-risk group: Patients other than high-risk group

*** MMSE: mini mental state examination

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Outcome	LTC_Q_4 , 5	Rate of patients with improved ability to perform daily activities_ dementia/ non-dementia	No. of patients whose ability to perform daily activities in the current month has improved from the previous month / No. of patients with dementia (non-dementia) who have been assessed in both the previous and current months. × 100	▪Prevention of deterioration and maintenance of current status can be assessed as the results of successful medical services. ▪When one or more of the following are the case: 1. When the patient was assessed in the previous month as "totally independent" in 10 kinds of daily activities, therefore cannot improve more. 2. When deterioration and improvement occurred at the same time.
	LTC_Q_25	Rate of Incontinent patients*_low risk	No. of patients incontinent in the current month / No. of patients who have been assessed for the current month excluding the high-risk group × 100	▪The prevention and proactive management of incontinency can improve the quality of life. ▪When one or more of the following are the case: 1. When the assessment of the current month is for that of admission 2. Those recorded as "in coma" and whose daily-life-performance test results are mostly "completely dependent" or "no performance of activities conducted." 3. When using an indwelling urinary catheter 4. When the patient is worried about urostomy.
	LTC_Q_22, 23	Rate of patients with newly appeared bedsores _high-risk**/ low-risk group***	No. of patients who have newly appeared bedsores of level 1 or higher, which were not found in the previous month / No. of patients classified as a high-risk (low-risk) group from the assessments performed in the current and the previous month × 100	▪The bedsores of the high-risk group patients who cannot move, or are malnourished, or in a coma, reflect the quality level of the institution. ▪None
	LTC_Q_24	Rate of patients with worsened bedsores _ high risk group	No. of patients whose bedsores have become worse compared to the previous month / No. of patients classified as high-risk group from the assessments performed in the current and the previous month × 100	▪The bedsores of the high-risk group patients who cannot move, or are malnourished, or in coma, reflect the quality level of the institution. ▪None

* low-risk group: Patients including neither of the following
1. Patients with impaired cognitive function
2. Patients who completely need help when positioning change(or sitting up), changing seats or moving out of room

** high-risk group: Patients with one or more of the following
1. Patients who need lots of help for changing position
2. Patients who need help for sitting up
3. Patients who need help for changing a seat
4. Patients who help when moving out of room

*** low-risk group: Patients other than high-risk group

□ Monitoring indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Monitoring	LTC_M01	Incidence of pneumonia	Sum of claims filed for pneumonia during the subject period / Sum of hospitalization days of all patients who were admitted during the subject period × 100	▪Pneumonia can be prevented by the proactive and systematic management of the hospital in ways such as absorptions and postural changes. Thus the indicator will present the rate of inpatients that developed pneumonia during the subject period. ▪Patients who were admitted with pneumonia during the subject period
	LTC_M02	Incidence of septicemia	Sum of claims filed for septicemia during the subject period / Sum of hospitalization days of all patients who were admitted during the subject period × 100	Septicemia can be prevented by the proactive and systematic management of the hospital in ways such as absorptions and postural changes. Thus the indicator will present the rate of inpatients that developed septicemia during the subject period. ▪Patients who were admitted with septicemia during the subject period
	LTC_M03	Rate of duration for pneumonia treatment	Sum of the days for treatment spent by each patient with pneumonia during the subject period / Sum of hospitalization days of all patients who were admitted during the subject period × 100	▪The indicator is to assess the adequacy of treatment by comparing the duration of pneumonia treatment to the total duration of the patient's hospitalization. ▪Patients who were transferred or died during the pneumonia treatment ▪ Patients who were admitted with pneumonia during the subject period
	LTC_M04	Rate of duration for septicemia treatment	Sum of the days for treatment spent by each patient with septicemia during the subject period / Sum of hospitalization days of all patients who were admitted during the subject period × 100	▪The indicator is to assess the adequacy of treatment by comparing the duration for septicemia treatment to the total duration of the patient's hospitalization. ▪Patients who were transferred or died during the septicemia treatment ▪Patients who were admitted with septicemia during the subject period

□ Indicators finished assessments

Area	Indicator code	Indicator	Time to finish assessment	Remarks
Other human resources	LTC_P_51	Rate of days at work for physical therapists	2009.12.31.	Unified the indicator to the no. of beds per physical therapist
	LTC_P_53	Availability of pharmacist		Combined the availability of pharmacy (including pharmacist)
	LTC_P_54	Availability of radiologist		Combined the availability of X-ray room (including radiologist)
	LTC_P_55	Availability of medical lab technologist		Combined the availability of medical lab (including medical lab technologist)
Medical facilities	LTC_F_22	Availability of physical therapy room		Unified to no. of beds per physical therapist
Outcome	LTC_Q_21	Bedsores prevalence rate_high risk group		Specified the rate of patients with newly appeared bedsores (high-risk, low-risk group)

7. Mental hospital within medical aid

1) List of indicators

□ Assessment indicator

A. Structure area (Facilities)

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Facility	MH_F_01	Floor size of a ward per bed	$\frac{\text{Sum of the size of wards}}{\text{Total no. of wards}} \times 100$	▪When it comes to consider that the patients in mental hospitals are usually hospitalized for a long-term, securing adequate space for patients to protect their privacy and safety has a significant effect on the patients' quality of life. ▪Beds in specialized wards, such as delivery room, nursery, rooming-in, operating room, recovery room, emergency room, hemodialysis room, and physical therapy room, etc., and the beds of mental patients who are admitted in different wards, and beds in the day ward.
	MH_F_02	Rate of wards with less than 10 beds	$\frac{\text{No. of wards with less than 10 persons per ward}}{\text{Total no. of wards}} \times 100$	▪The Enforcement of the Mental Health Law stipulates the capacity of a ward as 10 persons or less, and it has been selected to check the level of the facilities of mental hospitals, which is important for the patients' psychological stability. ▪ Beds in specialized wards, such as delivery room, nursery, rooming-in, operating room, recovery room, emergency room, hemodialysis room, and physical therapy room, etc., and beds in the day ward.
	MH_F_03	Capacity per ward	$\frac{\text{Total no. of beds}}{\text{Total no. of wards}}$	▪The capacity per ward is a very important factor for the patients' stability of mind, considering that they usually have been hospitalized for a long time. The indicator intends to see the level of the wards in mental hospitals as a secondary indicator of 10 or less beds per ward. ▪Beds in specialized wards, such as delivery room, nursery, rooming-in, operating room, recovery room, emergency room, hemodialysis room, and physical therapy room, etc., and beds in the day ward.

B. Structure area (Workforce)

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Workforce	MH_P_01	Number of daily inpatients per psychiatrist	Average no. of inpatients per day / Average no. of psychiatrists per day	▪Mental Health Law stipulates that 1 psychiatrist needs to be provided for 60 inpatients, which directly influences the mental patients. ▪Those who are on maternity leave, and in long-term paid vacations longer than 16 days (in case there are substitute doctors, the doctors who are in vacation less than 15 days also are excluded).
	MH_P_02	Number of daily inpatients per psychiatric nurse	Average no. of inpatients per day / Average no. of psychiatric nurses per day	▪Mental Health Law states that one nurse is required for 13 inpatients. It has been selected as an indicator to examine the workforce of psychiatric nurses who are conducting patient management and care for mental patients. Aims to examine the level of preparedness. ▪ Nursing personnel who are placed in the ward of psychiatry, but are not charged the care for patients ※Director of nursing department, full-timers of labor union, home nurses, and hospice nurses, etc. - Those who are placed in the general ward, not in the psychiatric ward, to care for both mental and general patients. - Those that are circulated or detached between the general and psychiatric wards (PRN included). - Those who are on maternity leave(including those who are on a long-term paid vacation longer than 1 month)
	MH_P_03	No. of daily inpatients per psychiatric nursing personnel (nurses and nursing assistants)	Average no. of inpatients per day / Average no. of psychiatric nursing personnel per day	▪The same with the psychiatric nurses.
	MH_P_04	No. of daily inpatients per mental health specialist (psychiatric & mental health nurse, mental health clinical psychologist, mental health social worker)	Average no. of inpatients per day / Average no. of mental health care specialists per day	▪Mental Health Law indicates that a mental health specialist is required for every 100 inpatients. It has been selected to see if the rate is well maintained. ▪ Those who are on maternity leave, and on long-term paid vacations longer than 16 days, etc.

C. Process area

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Medication	MH_Q_01	Atypical medication prescription rate (schizophrenia)	No. of atypical medication prescription / No. of total prescriptions × 100	▪ The development of atypical antipsychotics has broadened the range of choosing medications, and led the treatments to cover the positive and negative symptoms of schizophrenia, cognitive functions, and the quality of life, increasing the overall quality of caring for schizophrenia. ▪Less than 10 denominator cases
Psychotherapy	MH_Q_02	Fulfillment rate of psychotherapy implementation standard	No. of implementations based on the minimum standards of psychotherapy / Total no. of admissions × 100 ※Minimum standards of psychotherapy by the grades of institutions: G1,G2: 4 times or more/week G3: more than 3 times/ week G4,G5: more than 2 times/ week	▪In the criteria for medical benefits cost amended in 2008, psychotherapy should be conducted to satisfy the minimum standards by the grades of institutions. The indicator is to see if the standards are fulfilled. ▪Less than 10 cases of subject denominators
	MH_Q_03	Fulfillment rate of individual psychotherapy implementation standard	No. of minimum cases of individual psychotherapy / No. of total admissions × 100	▪In the criteria for medical benefits cost amended in 2008, individual psychotherapy should be conducted to satisfy the minimum standards by the grades of institutions. The indicator is to see if the standards are fulfilled. ▪Less than 10 cases of subject denominators

D. Outcome area

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Days of hospitalization	MH_Q_04	Days of hospitalization_ median (schizophrenia)	The median of the accumulated days of hospitalization by patient	▪ The average length of hospitalization of mental patients in South Korea and Japan are known to be much longer than the other OECD countries. Thus the median has been selected as an indicator forinducing for inducing the proper use of the funds and the patients' proper return to society. ▪ Less than 10 cases of subject denominators
	MH_Q_05	Days of hospitalization_medi an(alcoholism)	The median of the accumulated days of hospitalization by patient	▪Alcoholism is an ongoing and chronic disease with a very high percentage of reoccurrence, which causes significant burden due to the expenses of long-term hospitalization and loss of income. Thus the median has been selected as an indicator for inducing the proper use of the funds and the patients' proper return to society. ▪ Less than 10 cases of subject denominators
Readmission rate	MH_Q_07	Readmission rate within 30 days of discharge (schizophrenia)	$\frac{\text{No. of patients readmitted within 30 days of hospitalization}}{\text{Total no. of discharges}} \times 100$	▪Unplanned hospitalization can cause reoccurrences or complications after admission and also can lead to an early discharge or noncompliance in outpatient care. Thus it aims to assess the adequacy of treatment for schizophrenia. ▪ Less than 10 cases of subject denominators

□ Monitoring indicator: None

□ Indicators finished assessment: None

8. Hemodialysis

1) List of indicators

□ Assessment indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Structure	HD_01	Rate of doctors who specialize in hemodialysis	$\frac{\text{Sum of days of employment of the doctors specialized in hemodialysis}}{\text{Sum of days of employment of all doctors in hemodialysis room}} \times 100$	▪The availability of a specialized doctor is closely related to the quality of hemodialysis ▪Interns and residents are excluded in the case of hospital of residency ▪Employees who have worked less than 15 days during the assessment period
	HD_02	Mean number of daily hemodialysis per doctor	$\frac{\text{Total no. of dialyses}}{\text{Sum of actual work-days of all doctors in hemodialysis room}}$	▪It aims to understand the status to set the criteria, since grounds for the level of adequacy are insufficient. ▪Interns and residents are excluded in the case of hospital of residency ▪Employees who have less than 15 days of employment during the assessment period.
	HD_03	Rate of nurses who have 2 years or longer experience in hemodialysis	$\frac{\text{Sum of the days of employment for the nurses with 2 years or longer experience in hemodialysis}}{\text{Sum of total days of employment of all nurses in hemodialysis room}} \times 100$	▪The availability of experienced nurses are closely related to the quality of treatment. ▪Employees who work concurrently with another department. ▪Employees who have less than 30 days of employment during the assessment period.
	HD_04	Mean of daily hemodialysis per nurse	$\frac{\text{Total no. of dialyses}}{\text{Sum of actual work-days of all nurses in hemodialysis room}}$	▪It was selected to understand the status to set the criteria, since grounds for the level of adequacy are insufficient. ▪Employees who work concurrently with another department. ▪Employees who have less than 30 days of employment during the assessment period.
	HD_05	Fulfillment rate of minimum number of isolated hemodializers for hepatitis B patients	No. of isolated hemodializers for hepatitis B patients ≧ minimum holdings ※Minimum holdings = $\frac{\text{No. of hepatitis B patients}}{[(3\times\text{night hemodialysis})+(2\times\text{day hemodialysis})]/\ 3}$	▪Isolated hemodializers are required to prevent the transmission of infectious diseases. ▪For the HbsAg positive patients, the designated isolated machines, apparatus, equipment, and drugs should be used. It is prohibited for the employees to treat other susceptible patients while the hepatitis B patients are undergoing dialysis. ▪None

Area	Indicator code	Indicator	Formula	Reason for selection Exclusion criteria
Structure	HD_06	Availability of emergency equipment in hemodialysis ward	Availability of all the given equipment ※Emergency equipment: Oxygen supplier, aspirator, ventricular defibrillator, ECG monitor, endotracheal intubation equipment	▪Emergencies such as low blood pressure can occur during the dialysis, and the 50% of the causes of death is from cardiovascular diseases; the emergency equipment is required to be prepared for immediate use. ▪None
	HD_07	Fulfillment rate of water examination cycle	$\frac{\text{No. of items that fulfilled the cycle during the water examination}}{\text{No. of items for water examination}} \times 100$ ※Minimum examination cycle –Microorganism test: once a month –Endotoxin test: every 3 months –Fine materials test: once a year	▪Safe and sanitary water management system is needed. ▪During the dialysis, much water is coming in. Thus, if the water is contaminated by chemicals and microorganisms, fatal results can occur. ▪Microorganisms cannot get through the membranes, while the endotoxins can; from a clinical point of view, an endotoxin test is more important than a microorganism test. ▪None
Process	HD_08	Fulfillment rate of hemodialysis adequacy test cycle	$\frac{\text{No. of patients that fulfilled the hemodialysis adequacy test cycle}}{\text{No. of outpatients}} \times 100$ ※Minimum test cycle: once every 3months	▪A hemodialysis adequacy test is for measuring the amount of urea eliminated during the dialysis and observing the change in the amount of dialysis. It helps to control the amount of dialysis based on the patient's condition, and increases the patient's compliance by taking appropriate actions, which in turn decreases the prevalence of associated diseases and death. ▪None
Process	HD_09	Fulfillment rate of arteriovenous fistula monitoring	$\frac{\text{No. of patients who measured the Static Intra-Access Pressure Ratio periodically}}{\text{No. of outpatients with arteriovenous fistula (AVF, AVG)}} \times 100$ ※Minimum execution period: once a month	▪Periodic monitoring regarding arteriovenous fistula (AVF,AVG) can reduce vascular stenosis or death caused by hemodynamic diseases. ▪In the case where the vascular stenosis of arteriovenous fistula is severe, the amount of hemodialysis decreases and the time for treatment becomes longer, for the influx and release of hemodialysis water is interfered with by the stenosis. In the case of AVG, periodic monitoring is required, since the longer the interval between the treatments gets, the higher the possibility of vascular stenosis with thrombosis. ▪None

Area	Indicator code	Indicator	Formula	Reason for selection Exclusion criteria
Process	HD_10	Fulfillment rate of periodic test cycle	$\frac{\text{No. of patients who fulfilled the periodic test cycle by items}}{\text{No. of outpatients}} \times 100$ ※fulfillment of periodic test cycle = Σno. of items that satisfied the cycle of periodic test÷total no. of items for periodic test	▪When the amount of erythropoietin (EPO) is being adjusted, hemoglobin needs to be measured every 2–4 weeks. After the amount of EPO is stabilized, it needs to be measured in 1–3 months. ▪While the amount of iron is being adjusted, the iron status needs to be measured once a month; after the amount gets stabilized, it is measured every 3 months. ▪Conducting the lipid profile test for hemodialysis patients is recommended before dialysis or on another day after dialysis (12 hours after dialysis). Conducting the lipid test is recommended in 3 months and 9 months after the hemodialysis. ▪The tests for total calcium, phosphorus and parathyroid hormone (intact PTH) are required to check the evidence of the calcification of blood vessels and tissues. It is recommended to be conducted every 12 months for the 3rd phase of chronic renal failure, and every 3 months for the 4thphase. In the 5th phase of renal failure, total calcium and phosphorus are recommended to be checked every month, and every 3 months for parathyroid hormone. ▪For the patients of the 4th and 5thphase of chronic renal failure, they are advised to check the serum albumin and weight every 1–3 months. ▪Hyperkalemia is a very dangerous complication which could cause death. Because it does not show any prodrome or suspectable symptoms, training for a low–potassium diet and adjustment of medications are conducted through periodic monitoring, along with medication for constipation if needed. ▪None

□ Monitoring indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Process	HD_M_01	Iron injection rate †	(No. of patients administered iron injections / Among the patients with anemia or having been administered hematinic, No. of patients whose iron storing ability has declined during the assessment period) × 100 ※Anemia: Hb〈11g/dℓ Patient with decline in iron-storing ability: TSAT〈20% or Ferritin〈100ng/mℓ	▪Iron storing ability can be assessed by measuring TSAT. ▪When the amount of serum ferritin is low, erythropoietin is administered to supplement iron lost during the dialysis. ▪For the hemodialysis patients who are administered hematinic, intravenous injection of iron is more effective than the oral administration. ▪Patients with TSAT≥50% or Ferritin≥800ng/mℓ in average.
Outcome	HD_M_02	Hemodialysis adequacy level fulfillment rate	(No. of patients that fulfilled the hemodialysis adequacy rate / No. of patients who conducted the hemodialysis adequacy test) × 100 ※Fulfillment of hemodialysis adequacy: spkt/v≥1.2 or URR≥65%	▪The mean value of 3 months of hemodialysis adequacy tests should be spKt/V≥1.2 or URR≥65%. ▪ Kt/V was calculated from the urea kinetic modeling (UKM); K indicates the urea cleaning rate of the dialysis membrane, t for time to take for dialysis, and V for volume of urea distribution. ▪If the urea cleaning rate (K) is to be multiplied by time for dialysis (t), it makes the volume that has been cleaned. When the cleaned volume (Kt) is to be divided by the volume of urea distribution, it turns out the score without measuring units, Kt/V, which indicate the volume of one-time hemodialysis. ▪The urea cleaning rate and the time to take for hemodialysis shall be properly adjusted to decrease the prevalence and admission. ▪Patients who were not conducting the hemodialysis adequacy test during the assessment period.

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Outcome	HD_M_03	Rate of patients with Hb 10g/dℓ or under	No. of patients with Hb〈10g/dℓ / No. of outpatients administered hematinic during the assessment period × 100	▪Anemia treatment for chronic renal failure patients can improve the quality of life and reduce the death rate. ▪According to a report, if the hemoglobin levels for the chronic renal failure patients are within the normal range, the complications of cardiovascular diseases and the death rate get higher. Thus, it is desirable for the hemodialysis patients to maintain the hemoglobin level within the lower range of 10.5～12.5g/dℓ, which may prevent the iron deficiency and maintain a proper iron storing ability. ▪The appropriate hemoglobin level for the patients using the hematinic is 11～12g/dℓ. ▪None
	HD_M_04	Iron storing fulfillment rate	No. of patients who fulfilled the iron storing ability / No. of outpatients with anemia or have been administered hematinic during the assessment period × 100 ※Anemia: Hb〈11g/dℓ Fulfillment of iron storing ability: TSAT≥20% and Ferritin≥100ng/㎖	▪Serum ferritin reflects the status of stored iron, but it can be elevated by infections as an acute phase reactant. TSAT shows the status of iron enabled for use. It is important for hemodialysis patients to maintain the serum ferritin over 100ng/dℓwith the 20% or higher of TSAT. ▪Patients who conductedan iron storing ability test on the day of confirming anemia or before the first administration of hematinic.
	HD_M_05	Systolic blood pressure satisfactory rate	No. of patients whose systolic blood pressure is 100～140㎜Hg / No. of subject outpatients × 100	▪Blood pressure control is to control the capacity of plasma, which indicates the status of hemodialysis patients' hypertension management. Proper blood pressure management can reduce the risk of cardiovascular diseases. ▪When systolic blood pressure before dialysis decreases under 110㎜Hg, relative risk increases by 2 times or more. The correlation between the chronic hemodialysis patients and fatality rate is presented in a "U" shape, representing that it is important to maintain the blood pressure at a level not too low or high. ▪ None

Area	Indicator code	Indicator	Formula	Reason for selection Exclusion criteria
	HD_M_06	Diastolic blood pressure satisfactory rate	$\frac{\text{No. of patients whose diastolic blood pressure is 60~90㎜Hg}}{\text{No. of subject outpatients}} \times 100$	▪Blood pressure control is to control the capacity of plasma, whichindicates the status of hemodialysis patients' hypertension management. Proper blood pressure management can reduce the risk of cardiovascular diseases. ▪The report indicates that low diastolic blood pressure at the time of starting hemodialysis increases the fatality rate. Thus, it is important to maintain the diastolic blood pressure at a level not to too low or high. ▪None
Outcome	HD_M_07	Calcium × phosphorus fulfillment rate	$\frac{\text{No. of patients with Ca×P 〈 55㎎2/㎗2}}{\text{No. of patients that conducted the test more than once during the assessment period}} \times 100$	▪The serum calcium and phosphorus should be checked periodically to find out about the evidence of calcification of blood vessels and tissues. The patients' death rate and prevalence can be reduced by carefully maintaining the concentration of serum Ca and P. ▪The total death rate, death of cardiovascular diseases, and the relative risk of parathyroid surgery increases when the multiplication of serum calcium and phosphorus increases by 5㎎2/㎗2 based on 55㎎2/㎗2. ▪The multiplication of serum calcium and phosphorus should be maintained under 55㎎2/㎗2. ▪Patients who have not performed the calcium and phosphorus tests during the assessment period.
	HD_M_08	Calcium × phosphorus fulfillment rate	Average concentration of serum albumin during the assessment period	▪Serum albumin reflects the body protein nutritional status. Hypoalbuminosis is usually found in the last period of malnutrition due to the albumin's relatively long period of half-life and the sufficient amount stored in liver to synthesize, and it is the strongest single indicator to predict the patient's prognosis. It has been reported that within the almost normal range of albumin of 3.5g/㎗, death rates for hemodialysis patients' can increase. ▪Hypoalbuminosis existed before dialysis and is a factor that increases the death rate of chronic renal failure patients, and the danger has a negative relation with thelevel of albumin concentration. ▪The stabilized range of serum albumin for chronic renal failure

Area	Indicator code	Indicator	Formula	Reason for selection Exclusion criteria
				patients should be maintained over the lower normal range of3.7g/dℓor 4.0g/dℓ. ▪Patients who were not conducting the albumin test during the subject period.

□ Indicators finished assessment: None

9. Prescription

1) List of indicators

□ Assessment indicator

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Process	PRES_01	Injections prescription rate	$\frac{\text{Total no. of prescriptions for injections}}{\text{Total no. of hospital visits}} \times 100$	▪Injections are limited for the cases where oral administration is not possible, and complications are expected, such as gastrointestinal disorders. Oral administration is not expected to have any effects, and immediate treatment resultsneed to be expected, such as an emergency. Injections are expressed faster than the oral drugs, while the decreases in the effects are also fast; the risk of complications is higher than the oral drugs and the rate of prescription is excessively high (recommendations from other countries: 1–5% or lower). ▪Except for some injections which were used for testing and treatment purposes, and must inevitably be given to outpatients in the hospital, including insulin, anti-cancer drugs, erythropoietin, antihemophilic factors, growth hormones, etc. ※Subject diseases for severity adjustment ▪Severe diseases including cancers and organ transplant, and rare and incurable diseases.
	PRES_02	Prescription rate of antibiotics (all diseases)	$\frac{\text{Total no. of antibiotics prescription}}{\text{Total no. of hospital visits}} \times 100$	▪Antibiotics have greatly contributed to the treatment of bacterial infections, while they have also created serious complications such as a 71.5% of tolerance of penicillin towards pneumococcus. ▪According to the reports, the amount of antibiotics used and revelation of resistance have been found to have positive correlations, thus the management for preventing inappropriate use of antibiotics is needed. Acute upper respiratory infection is usually caused by viruses, and it has been selected for proper use management of antibiotics. ※Same applications are made for the subject diseases for severity adjustment
	PRES_03	Antibiotics prescription rate for acute upper respiratory infection		

□ Monitoring indicators

Area	Indicator code	Indicator	Formula	Reason for selection / Exclusion criteria
Process	PRES_04	Number of drugs per prescription (all diseases)	No. of drugs prescribed for outpatients / No. of prescriptions for outpatients	▪The reason for selecting this indicator is that the higher the number of drugs increase, the higher the adverse reactions to drugs and the risk of drug interactions get. It also affects the compliance of medications and increases medical care cost.
	PRES_05	Number of drugs per prescription (respiratory diseases)		
	PRES_06	Number of drugs per prescription (musculoskeletal diseases)		※ Same applications are made for the subject diseases for severity adjustment

□ Monitoring Indicators

Area	Indicator code	Name of indicator	Formula	Criteria for selection / Criteria for exclusion
Process	PRES_07	Rate of prescription with more than 6 items	$\frac{\text{No. of prescription with more than 6 items}}{\text{Total no. of outpatient prescription}} \times 100$	▪It has been selected to manage the relative over-prescription referring to the results of claims analysis and the current status of other countries. ※Severity adjustment target diseases are equally applied
	PRES_08	Rate of prescription for digestive system.	$\frac{\text{No. of prescription for digestive system}}{\text{Total no. of outpatient prescription}} \times 100$	▪Drugs for digestive system are found to be closely related to the no. of items in prescription; as the number of drugs in prescription increases, the number of drugs for digestive system also increases. ▪The tendency of prescribing drugs for digestive system needs to be analyzed to provide detailed information for controlling the unnecessary use. ▪Some diseases that need to be prescribed drugs for digestive system (digestive system diseases (K20-K93), malignant neoplasms in digestive system (C15-C26), arthropathies (M00-M25), dorsopathies (M40-M45) ※Severity adjustment target diseases are equally applied
	PRES_09	Medication cost per day of administration	$\frac{\text{Total medication cost}}{\text{Total days of administration}} \times 100$	▪Analysis for the transition of medication cost in outpatient prescription ▪Drugs for testing and treatment purposes ※Severity adjustment items are equally applied
Process	PRES_10	Rate of prescribing high -priced medicine	$\frac{\text{No. of times high-priced medicines were prescribed}}{\text{No. of outpatient prescriptions including the ingredients assessed within the high-priced medicine}} \times 100$	▪It aims to promote the use of relatively low priced replaceable medicine of the same quality(ingredient, formulation, amount). ▪The highest price within the same ingredient is lower than 50 won. ▪When the other medicines with the same ingredient are not produced. When classified as going-away prevention medicines ※Same applications are made for the subject diseases for severity adjustment

Area	Indicator code	Name of indicator	Formula	Criteria for selection / Criteria for exclusion
	PRES_11	Proportion of cost for high-priced medicine	$\frac{\text{Total cost of prescribed high-priced medicines}}{\text{Total cost of outpatient prescriptions for the ingredients assessed within the high-priced medicine}} \times 100$	▪It aims to understand the tendency of prescribing high-priced medicines and analyze a proportion of the cost generated by the high-priced medicine prescription. ※Same applications are made for the subject diseases for severity adjustment
	PRES_12	NSAIDs combination rate	$\frac{\text{No. of prescriptions of NSAIDs combination}}{\text{Total no. of outpatient prescriptions}} \times 100$	▪Combined administration of NSAIDs is not recommended for it does not increase the effect, only to increase the risk of complications. ▪As the problem of misuse and overuse of NSAIDs has been continuously proposed, it has been selected as an indicator to optimize the use of medication. ▪Some of the drugs among NSAIDs, low-dose aspirin(100mg) used for external application and thrombosis prevention, acetaminophen, and acetaminophen tramadol combinations, which are not appropriate for the purpose of continuing management.
	PRES_13	Prescription rate of corticosteroids	$\frac{\text{No. of corticosteroids prescription}}{\text{Total no. of hospital visits}} \times 100$	▪Corticosteroids are widely used for the compensation therapy for primary or secondary adrenal dysfunction, anti-infection, anti-allergy, and immunosuppressive effects. However, the misuse and overuse of this medicine can cause serious side effects such as osteoporosis, fracture, aseptic necrosis of relic, glaucoma, cataract, thrombosis and embolism, worsening of infections, and growth retardation in infants (it is not recommended the systemic use of steroids for osteoarthritis). ▪It is selected to analyze the use of corticosteroids and improve the adequacy of its use. ※Same applications are made for the subject diseases for severity adjustment

2) Assessed drugs and codes of diseases

□ Assessment indicators

Area	Indicator code	Indicator	Subject of assessment
Process	PRES_01	Prescription rate of injections	▪Injections administered in and out of the hospital
	PRES_02	Prescription rate of antibiotics (all diseases)	▪Antibiotics made as injectable forms for in–hospital use for outpatients and antibiotics prescribed for outpatients(Efficacy group numbers 611∼615, 618, 619, 621 (except for sulfasalazine), 625, and Quinolone in 629) ▪Acute upper respiratory infection is based on the primary diseases, J00–J06. –J00(Acute nasopharyngitis), J01(Acute sinusitis) –J02(Acute laryngitis), J03(Acute tonsillitis) –J04(Acute laryngitis and trancheeitis) –J05(Acute obstructive laryngitis[croup]and epiglottitis) –J06(Other acute upper respiratory infections in multiple and unspecified sites)
	PRES_03	Antibiotics prescription rate for acute upper respiratory infection	
	PRES_04	Number of drugs per prescription (all diseases)	▪All drugs prescribed for outpatients ▪For the respiratory diseases, the primary diseases (J00–J06 Acute upper respiratory infection, J20–J22 Other acute lower respiratory infection, J30–39 Other unspecified diseases of the upper respiratory tract) are based. ▪For musculoskeletal diseases, the primary diseases (M15–M19 Arthrosis, M50–M54 Other dorsophathies) are based.
	PRES_05	Number of drugs per prescription (respiratory diseases)	
	PRES_06	Number of drugs per prescription (musculoskeletal diseases)	

□ Monitoring indicators

Area	Indicator code	Indicator	Subject of assessment
Process	PRES_07	Rate of prescription with more than 6 items	▪All drugs prescribed for outpatients
	PRES_08	Rate of prescription for digestive system.	▪Digestive medicine for outpatient prescription (Efficacy groups numbers 232, 234, 236, 237, 239)
	PRES_09	Medication cost per day of administration	▪All medicines prescribed for in– and outpatients of the hospital
	PRES_10	Rate of prescribing high –priced medicine	▪Calculated by classifying the high–priced subject medicines among the oral and external use of medicine prescribed for outpatients.
	PRES_11	Proportion of cost for high–priced medicine	
	PRES_12	NSAIDs combination rate	▪NSAIDs administered in and out of the hospital and oral corticosteroids prescribed for outpatients ▪Targeted for osteoarthritis (primary · secondary based) –M13 Other arthritis –M14 Arthritis in other specified diseases –M15 Polyarthrosis –M16 Coxarthrosis –M17 GonarthrosisM19 Other arthrosis
	PRES_13	Prescription rate of corticosteroids	

Appendix 2. Results by Assessment Items and Healthcare Institutions

<Introductory Note>

■ General information

- In this appendix contains the assessment results of individual healthcare institutions regarding the five items for the inpatient care, one item for the long-term care, and three items for prescription within the outpatient care.
- The data sources for the assessed items, the periods and the subjects of data collection are as below.

Area	Item		Data source		Period of assessment	Subject
			Administrative DATA	Survey sheet		
Inpatient Care	Acute myocardial infarction		O	O	Treatment recdords of 2009	Complete
	Acute stroke		O	O	Treatment records of Jan. - Mar. 2010	Sample
	Prophylactic use of antibiotics for surgery		O	O	Treatment records of Aug.-Octr. 2009	Sample
	Caesarean section		O		Treatment records of 2009	Complete
	Surgical Volume PCI	Stomach, colon cancer hip replacement esophagus, pancreatic cancer	O		Treatment records of 2008	Complete
		Hematopoietic stem cell transplantation	O		Treatment records of 2007-2008	
Long-term Care	Hemodialysis		O	O	Treatment records of Jul. - Sep. 2009	Sample
Outpatient Care	Prescription	Antibiotics prescription rate	O		Treatment records for screening Jan. - Dec. 2010	Complete
		Injection prescription rate				
		No. of drugs per prescription				

■ For understanding the institutional assessment results

- This appendix includes the institutional results regarding the quality assessment for tertiary hospitals and general hospitals (based in May 2011)
- The assessment results for each item have been classified into 2, 3, and 5 grades and marked with stars(★) to boost the application and understanding of medical care consumers
- The grades for each item have been classified as below.
  - The assessment results for acute myocardial infarction, acute stroke, prophylactic use of antibiotics for surgery, Caesarean section, and hemodialysis have been graded into 5 levels (★★★★★).
- In case of Caesarean section, tertiary hospitals, the target of the value incentive program demonstration project, have been classified into 5 grades(★★★★★), and the continuous assessment subjects have been done for 3 grades(★★★).
  - The assessment for surgical volume has been classified into 2 grades depending on whether or not the subject institution satisfy the standard volume of each surgery, including the cancers of stomach, colon, esophagus, and pancreas, hematopoietic stem cell transplantation, hip replacement, and PCI).
  - Prescription has been assessed with the items including the prescription rates of acute upper respiratory infection and injection, and number of drugs per prescription, and classified into 2 grades(★★).
- For the prescription rates of acute upper respiratory infection and injection, the grades have been decided based on the mean of each prescription rate; if the rate is lower than the mean, ★★ has been given, while ★☆ has been given to the counterpart.
- As for the number of drugs per prescription, the assessment results have been classified into 4 levels by 25% according to the relative percentile rank; the higher levels of A and B have been marked ★★, and ★☆ for C and D, the lower levels.

▪ Information about generalization and classification for each assessment item is as below.

Item	Generalization		No. of grades
	O/X	No. of indicator	
AMI	O	6	5
Acute stroke	O	13	5
Prophylactic use of antibiotics for surgery	O	6	5
Hemodialysis	O	10	5
Caesarean section		1	5(Tertiary hospital) 3
Surgical volume		1	2
Prescription		1 for each item	2

Note. See the main text regarding the methodology of the calculation of composite quality scores for each item

▪ Subject institutions for each assessment item and areas of assessment are presented as below.

Item		Institution				Area		
		Tertiary	General	Hospital	Clinic	Structure	Process	Outcome
Inpatient care	AMI	O	O			O	O	O
	Acute stroke	O	O			O	O	
	Prophylactic use of antibiotics for surgery	O	O	O			O	
	Caesarean section	O	O	O	O			O
	Surgical volume	O	O	O	O	O		
Long-term care	Hemodialysis	O	O	O	O	O	O	O
Outpatient care	Prescription	O	O	O	O		O	

▪ The grades for each assessment item have been classified based on the results calculated by the risk adjustments or weightings depending on the characteristics of individual items. (Thus, it should not be understood as the total number of stars represents the overall results of the institutions.)

▪ 『--』 in the results table stands for the excluded institutions that had no cases of treatment during the assessment period or less than the standard number of cases for each item.

▪ Criteria for grading exclusion

- In case of AMI, institutions with lower than 30 cases or indicators with less than 10 cases.
- For acute stroke, the cases with less than 4 process indicators within the subject.
- For prophylactic use of antibiotics for surgery, when the assessment for the proper use has not been completed (in case that the number of subject patients in the given area is less than 5).
- In case of having less than 5 patients for hemodialysis.
- In case of an institution having less than 30 cases of Caesarean section.

▪ The grading systems according to the number of stars are as below, and the excellent institutions are represented by the number of dark stars.

5 grades		3 grades		2 grades	
No. of Stars	Grade	No. of Stars	Grade	No. of stars	Grade
★★★★★	1st	★★★★★	1st	★★	1st
★★★★☆	2nd	★★★☆☆	2nd	★☆	2nd
★★★☆☆	3rd	★☆☆☆☆	3rd		
★★☆☆☆	4th				
★☆☆☆☆	5th				

Comprehensive Quality Report of National Health Insurance 2010

1. Tertiary Hospitals

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Catholic Univ. Seoul St. Mary's Hospital	★★★☆☆	★★★★★	★★★★★	★★★★★
Catholic Univ. Yeouido St. Mary's Hospital	★★☆☆☆	★★★★★	★★★★★	★★★★★
Kyungpook Nat'l Univ. Hospital	★★★★★	★★★★★	★★★★☆	★★★★☆
Gyeongsang Nat'l Univ. Hospital	★★☆☆☆	★★★★★	★★★★☆	★★★★☆
KyungHee Univ. Medical Center	★★☆☆☆	★★★★★	★★★★★	★★★☆☆
Keimyung Univ. Dongsan Medical Center	★★★★☆	★★★★★	★★★★★	★★☆☆☆
Korea Univ. Guro Hospital	★☆☆☆☆	★★★★★	★★★★☆	★★★☆☆
Korea Univ. Medical Center	★★☆☆☆	★★★★★	★★★★★	★★★☆☆
Kosin Univ. Gospel Hospital	★☆☆☆☆	★★★★★	★★★★★	★★☆☆☆
Dankook Univ. Hospital	★★☆☆☆	★★★★★	★★★★☆	★★★★☆
Daugu Catholic Univ. Medical Center	★★★★☆	★★★★★	★★★★☆	★★☆☆☆
Dong-A Medical Center	★★★☆☆	★★★★★	★★★★☆	★☆☆☆☆
Pusan Nat'l Univ. Hospital	★★☆☆☆	★★★★★	★★★★★	★☆☆☆☆
Seoul Nat'l Univ. Bundang Hospital*	★★★★☆	★★★★★	★★★★★	★★★★★
Samsung Medical Center	★★★★★	★★★★★	★★★★★	★★★★★
Kangbuk Samsung Medical Center	★☆☆☆☆	★★★★★	★★★★★	★★★★☆

Note. * stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★★	★★	★★	★★	★★	★★	★★	★★★★★		★☆	–
★★	★★	★☆	★☆	★★	★★	★★	★★★★★			–
★★	★★	★☆	★★	★★	★★	★★	★★★★☆		★☆	
★★	★★	★★	★☆	★☆	★☆	★★	★★★☆☆	★☆	★☆	
★★	★★	★☆	★☆	★☆	★★	★★	★★★★★	★☆		★☆
★★	★★	★☆	★★	–	★★	★★	★★★★★		★☆	
★★	★★	★☆	★☆	★☆	★★	★☆	★★★★★		★☆	
★★	★★	★☆	★★	★★	★★	★★	★★★★☆	★☆	★☆	★☆
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★★	★★	★★	★★	★★	★★	★★	★★★★★	★★	★★	★★
★★	★★	★☆	★★	–	★★	★★	★★★☆☆	★★	★☆	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke (5 Grades)	Prophylactic use of antibiotics for surgery (5 Grades)	Caesarean section (5 Grades)
Seoul Nat'l Univ. Hospital	★★★★☆	★★★★★	★★★★★	★★★★★
Asan Medical Center	★★☆☆☆	★★★★★	★★★★★	★★★★★
Soonchunhyang Univ. Hospital Seoul	★☆☆☆☆	★★★★★	★★★☆☆	★★☆☆☆
Ajou Univ. Medical Center	★★★☆☆	★★★★★	★★★★★	★★☆☆☆
Wonju Christian Hospital	★★★☆☆	★★★★★	★★★★★	★★☆☆☆
Gangnam Severance Hospital	★★★☆☆	★★★★★	★★★★★	★★★☆☆
Severance Hospital	★★★★☆	★★★★★	★★★★★	★★★★☆
Yeungnam Univ. Medical Center	★★★★☆	★★★★★	★★★★★	★★★★☆
Wonkwang Univ. School of Medicine & Hospital	★★★★★	★★★★★	★★★★★	★★★☆☆
Gachon Univ. Gil Hospital	★★★★★	★★★★★	★★★★★	★★★★☆
Ewha Womans Univ. Mokdong Hospital	★★★★★	★★★★★	★★★★★	★★★★☆
Inje Univ. Paik Hospital	★☆☆☆☆	★★★★☆	★★★★★	★★☆☆☆
Inje Univ. Sanggye Paik Hospital	★★★☆☆	★★★★★	★★★☆☆	★★★★★
Inje Univ. Busan Paik Hospital	★★★★☆	★★★★★	★★★★★	★★★★★
Inje Univ. Ilsan Paik Hospital*	★★☆☆☆	★★★★★	★★★★☆	★★★★★
Inha Univ. Hospital	★☆☆☆☆	★★★★★	★★★★★	★☆☆☆☆
Chonnam Nat'l Univ. Hospital	★★★★★	★★★★★	★★★★★	★★★☆☆
Chonbuk Nat'l Univ. Hospital	★★★★☆	★★★★★	★★★★★	★★★★☆

Note. * stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★★	★★	★★	★★	★★	★★	★★	★★★★★	★★	★★	★★
★★	★★	★★	★★	★★	★★	★★	★★★★★	★★	★★	★★
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★☆	★★	★☆	★☆	★☆	★★	★★	★★★★★	★☆	★☆	★☆

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke (5 Grades)	Prophylactic use of antibiotics for surgery (5 Grades)	Caesarean section (5 Grades)
Chosun Univ. Hospital	★★★★★	★★★★★	★★★★★	★★★☆☆
Chung-Ang Univ. Hospital*	★☆☆☆☆	★★★★★	★★★★☆	★★☆☆☆
Chungnam Nat'l Univ. Hospital	★★★★★	★★★★★	★★★★★	★☆☆☆☆
Chungbuk Nat'l Univ. Hospital	★★★★☆	★★★★★	★★★★★	★★★★★
Soonchunhyang Univ. Hospital Buchon*	★★★☆☆	★★★★★	★★★★★	★★☆☆☆
Soonchonhyang Univ. Hospital Cheonan	★☆☆☆☆	★★★★★	★★★★☆	★★★☆☆
Eulji Medical Center	★☆☆☆☆	★★★★★	★★★★☆	★★★☆☆
Hallym Univ. Medical Center	★★☆☆☆	★★★★★	★★★★★	★★☆☆☆
Hally Univ. Medical Center Chuncheon	★★★★★	★★★★★	★★★★☆	★★★★☆
Hanyang Univ. Medical Center	★★★☆☆	★★★★★	★★★★★	★☆☆☆☆

Note. * stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient Care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescrptionpre scription
★☆	★★	★☆	★☆	–	★★	★☆	★★★★☆	★☆	★★	★☆
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★★	★★	★☆	★★	★☆	★★	★★	★★★★★	★☆	★☆	★★

Surgical volume is the assessment results of 2009

2. General Hospitals

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
On Hospital	–	–	–	–
Davos Hospital	Grading exclusion	★★☆☆☆	★★★☆☆	–
Kaya Hospital	–	–	–	–
The Catholic Univ. of Korea Bucheon St. Mary's Hospital	★★☆☆☆	★★★★★	★★★★☆	★★★☆☆
The Catholic Univ. of Korea St. Paul's Hospital	★★★★★	★★★★☆	★★★★☆	★★★☆☆
The Catholic Univ. of Korea St. Vincent Hospital	★★★★☆	★★★★★	★★★★★	★☆☆☆☆
The Catholic Univ. of Korea Uijeongbu St. Mary's Hospital	★★★★★	★★★★★	★★★★★	★☆☆☆☆
The Catholic Univ. of Korea Incheon St. Mary's Hospital	★★★★★	★★★★★	★★★★★	★☆☆☆☆
Kangnam Korea Hospital	Grading exclusion	–	–	–
Kangnam General Hospital	Grading exclusion	–	–	–
Kyung Hee University International Medical Service	★★★★☆	★★★★★	★★★★★	★☆☆☆☆
Hallym Univ. Kangdong Medical Center#	★★★★☆	★★★★★	★★★★★	★★★☆☆
Kang Neung Asan Hospital	★★★★☆	★★★★★	★★★★☆	★☆☆☆☆
Kangwon Nat'l Univ. Hospital	★★★★☆	★★★★☆	★★★★★	★☆☆☆☆
Gangneung Medical Center	Grading exclusion	–	–	Grading exclusion
Samcheok Medical Center	–	–	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
	–	–	–	–	–	–	–	★☆	★☆	★☆
–	–	–	–	–	–	–	★★★★☆	★☆	★☆	★☆
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★☆	★★	–	★☆	–	★★	★☆	★★★★☆	★★	★★	–
★★	★★	★☆	★★	★☆	★★	★★	★★★☆☆	★★	★★	–
★★	★★	★☆	★☆	–	★★	★★	★★★★☆	★★	★★	–
★★	★☆	★☆	★☆	–	★★	★★	★★★★★	★★	★★	★★
–	–	–	–	–	★★	–	–	★☆	★☆	★★
–	★☆	–	–	–	★★	–	★★★★☆	★☆	★☆	★☆
★★	★★	★☆	★☆	–	★★	★☆	★★★★★	★☆	★★	★★
★★	★★	★☆	★☆	–	★★	★★	★★★★★	★★	★★	★★
★★	★★	★☆	★★	–	★☆	★★	★★★★☆	★★	★★	★★
★☆	★☆	★☆	★☆	–	★★	★★	★★★★☆	★★	★★	★★
★☆	–	–	–	–	★☆	–	–	★★	★☆	★★
–	–	–	–	–	–	–	★★★★☆	★★	★☆	★☆

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Sokcho Medical Center	–	–	–	–
Youngwol Medical Center	Grading exclusion	–	–	Grading exclusion
Wonju Medical Center	Grading exclusion	Grading exclusion	–	–
Konkuk Univ. Hospital	★★★★☆	★★★★★	★★★★☆	★★★☆☆
Konkuk Univ. Chungju Hospital	Grading exclusion	★★★☆☆	★★☆☆☆	★☆☆☆☆
Kumdan Top Hospital	Grading exclusion	Grading exclusion	–	–
Pochun Medical Center	Grading exclusion	–	★★☆☆☆	★★★★★
Suwon Medical Center	–	–	–	–
Ansung Medical Center	–	–	–	–
Uijungbu Medical Center	Grading exclusion	★★☆☆☆	–	–
Paju Medical Center	–	–	–	Grading exclusion
Masan Medical Center	–	★★★☆☆	Grading exclusion	
Jinju Medical Center	Grading exclusion	–	–	–
Gimcheon Medical Center	–	★★★☆☆	–	–
Andong Medical Center	Grading exclusion	–	–	–
Pohang Medical Center	–	–	–	–
Keimyeong Univ. Gyeongju Dongsan Hospital	–	–	–	–
Korea Univ. Ansan Hospital	★★☆☆☆	★★★★★	★★★☆☆	★☆☆☆☆

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
	–	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
★☆	★☆	–	–	–	★☆	–	–	★☆	★☆	★☆
★★	★★	★☆	★☆	★☆	★★	★★	★★★★★	★★	★★	★★
★☆	★☆	–	★☆	–	★☆	–	★★★★☆	★☆	★★	★★
–	–	–	–	–	–	–	–	★★	★☆	★★
★☆	–	–	–	–	★☆	–	–	★★	★☆	★☆
–	–	–	–	–	–	–	–	★☆	★☆	★★
★☆	★☆	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	★★	–	–	★★	★☆	★☆
–	★☆	–	–	–	★☆	–	–	★★	★☆	★★
★☆	★☆	–	–	–	★★	–	★★★★★	★☆	★☆	★☆
–	–	–	–	–	–	–	Grading exclusion	★★	★☆	★★
–	–	–	–	–	–	–	★★☆☆☆	★☆	★☆	★★
–	★☆	–	–	–	★☆	–	★★★☆☆	★★	★☆	★☆
★☆	★☆	–	–	–	★☆	–	–	★☆	★★	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
★★	★★	★☆	★☆	–	★★	★☆	★★★★☆	★★	★★	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Yunho 21 hospital, Goheung	–	–	–	–
Gwangju Hospital	Grading exclusion	★★☆☆☆	★★★★☆	–
Gwangju City Hospital	–	★★★☆☆	–	–
Il-Gok Hospital, Gwangju	Grading exclusion	–	–	–
Gwangju Hankook Hospital	–	–	–	–
Hyundae Hospital, Gwangju	–	★★★☆☆	–	–
Heemang Hospital, Gwangju	–	–	–	–
Kwang Hye Hospital, Medical Corp	Grading exclusion	–	–	–
Guro Sungsim Hospital	Grading exclusion	★★☆☆☆	–	–
Gumi Gangdong Hospital	Grading exclusion	–	–	–
National Police Hospital	–	–	–	Grading exclusion
National Cancer Center	–	–	★★★★★	–
National Medical Center#	Grading exclusion	–	–	★☆☆☆☆
National Medical Center	–	★★★★☆	★★★★★	–
Nat'l Health Insurance Corp. Ilsan Hospital	★★★☆☆	★★★★★	★★★★☆	★☆☆☆☆
Suncheon General Hospital, Korea Worker's Corp. & Welfare Service	–	–	–	–
Ansan General Hospital, Korea Worker's Corp. & Welfare Service	–	Grading exclusion	–	–
Changwon General Hospital, Korea Worker's Corp. & Welfare Service	–	Grading exclusion	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
–	–	–	–	–	–	–	★★★☆☆	★★	★☆	★☆
★☆	★☆	★☆	–	–	★★	★★	★★★★☆	★★	★☆	★☆
★☆	–	–	–	–	★☆	–	–	★★	★★	★★
★☆	–	–	–	–	★☆	–	★★★★★	★☆	★☆	★☆
–	★☆	–	–	–	★☆	–	–	★☆	★☆	★☆
★☆	–	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	–	–	–	★★	★☆	★☆
★☆	★☆	–	–	–	★☆	–	–	★★	★☆	★★
★☆	★☆	–	–	–	★☆	–	★★★★★	★★	★☆	★★
–	–	–	–	–	–	–	–	★☆	★☆	★☆
★☆	★☆	–	–	–	★☆	–	★★★★★	★★	★★	–
★★	★★	★★	★★	★★	★☆	–	–	★★	★★	★★
★☆	★☆	★☆	★☆	–	★★	★☆	–	–	–	–
–	–	–	–	–	–	–	★★★★☆	★☆	★★	–
★★	★★	★☆	★★	–	★★	★★	★★★★☆	★★	★★	–
–	–	–	–	–	–	–	–	★★	★☆	★☆
–	–	–	–	–	–	–	★★★★☆	★★	★☆	★★
–	–	–	–	–	–	–	–	★★	★☆	★☆

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Taebaik General Hospital, Korea Worker's Corp. & Welfare Service	–	–	–	–
Geum Gang Asan Hospital	–	–	–	–
Bong Seng Memorial Hospital	★★☆☆☆	★★★★★	Grading exclusion	–
Gimpo Woori Hospital	Grading exclusion	★★★★☆	★★★★☆	–
Gimhae Bokum Hospital	Grading exclusion	–	–	–
Naju General Hospital	–	–	–	–
Naju General Hospital	–	★☆☆☆☆	–	–
Woori General Hospital, Namyangju	Grading exclusion	–	–	Grading exclusion
Daniel Medical Center	Grading exclusion	–	–	–
Chilgok Catholic Hospital	Grading exclusion	★★☆☆☆	–	–
Daegu Medical Center	–	–	–	★☆☆☆☆
Daegu Fatima Hospital	★★★★★	★★★★★	★★★★★	★★★☆☆
Dae Dong Hospital	Grading exclusion	–	★★★☆☆	–
Daerim St. Mary's Hospital	Grading exclusion	–	–	★☆☆☆☆
Muan Hospital, Daesong Medical Corp	–	–	–	–
Veterans Hospital, Daejon	–	★★★☆☆	★★★☆☆	–
Daejeon Hankook Hospital	Grading exclusion	Grading exclusion	★★★★☆	★★★★★
Daejin Medical Center	★★★☆☆	★★★★★	★★★★☆	Grading exclusion

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
–	–	–	–	–	–	–	★★★☆☆	★★	★☆	★★
–	–	–	–	–	★☆	–	–	–	–	–
★☆	★☆	–	–	–	★☆	★☆	★★★★☆	★☆	★★	★☆
★☆	★☆	–	★☆	–	★★	★☆	★★★★☆	★☆	★☆	★★
–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	★☆	–	–	–	–	–
–	–	–	–	–	–	–	★☆☆☆☆	★★	★☆	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	★★
★☆	★☆	–	–	–	★☆	–	Grading exclusion	★☆	★☆	★☆
★★	★★	★☆	★☆	★☆	★★	★★	★★★★☆	★☆	★★	★★
★☆	★☆	–	★☆	–	★☆	★☆	★★★☆☆	★★	★☆	–
★☆	★☆	–	–	–	★★	–	–	★★	★☆	★☆
–	–	–	–	–	★☆	–	★★☆☆☆	★★	★☆	★☆
★☆	★☆	–	–	–	★★	–	–	★★	★★	★★
★☆	★☆	–	–	–	★★	–	Grading exclusion	★★	★☆	★☆
★☆	★★	–	★☆	–	★★	★☆	★★★★☆	★★	★★	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Dongkang Medical Center	★★★★☆	★★★★★	★★★☆☆	–
Dongguk Univ. Gyeongju Hospital	★★★☆☆	★★★★★	★★★☆☆	★☆☆☆☆
Dongguk Univ. Ilsan Hospital	★★☆☆☆	★★★★★	★★★★☆	★★★★★
Dongnam Inst. of Radiological & Medical Sciences	–	–	–	–
Dong Rae Bong Seng Hospital	Grading exclusion	★★★★★	–	–
Dong Masan Hospital	Grading exclusion	–	Grading exclusion	–
Dong-A Hospital	Grading exclusion	–	★★★★★	–
Dong-Eui Medical Center	★★★☆☆	★★★★★	★★★☆☆	★☆☆☆☆
Donngeuisung Danwon Hospital	Grading exclusion	–	★★★☆☆	–
Maryknoll Medical Center	Grading exclusion	★★★★☆	★★★★☆	★☆☆☆☆
Myongji St. Mary's Hospital	Grading exclusion	★★★★★	–	–
Mokpo Christian Hospital	–	★★★★★	★★★☆☆	–
Mokpo Medical Center	–	–	★★★★☆	–
Jung-Ang General Hospital, Mokpo	★☆☆☆☆	★★★★★	★★☆☆☆	
Mokpo Hankuk Hospital	★★★★★	★★★★☆	★★☆☆☆	Grading exclusion
Miraero 21 Medical Center	Grading exclusion	–	–	–
MizMedi Hospital	–	–	★★★★★	★★★★★
Bestian Hospital	Grading exclusion	–	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★★	★☆	★☆	–	★☆	★★	★★★★☆	★☆	★☆	★☆
★☆	★☆	–	★☆	–	★☆	★☆	★★★★★	★★	★★	★★
★★	★★	★☆	★☆	–	★☆	★☆	★★★★★	★★	★★	★★
–	–	–	–	–	–	–	–	–	★★	★★
–	★☆	–	–	–	★☆	–	★★★★★	★☆	★☆	★☆
★☆	★☆	–	–	–	★☆	–	★★☆☆☆	★☆	★☆	★☆
–	–	–	–	–	★★	–	★★★★☆	★★	★☆	★★
★☆	★☆	–	–	–	★☆	★☆	–	★★	★★	★☆
–	–	–	–	–	–	–	★★★☆☆	★☆	★★	★★
★★	★☆	–	★☆	–	★☆	★☆	★★★☆☆	★☆	★★	★☆
★☆	★☆	–	–	–	★☆	–	–	★★	★☆	★☆
–	–	–	–	–	–	–	★★★☆☆	★☆	★☆	★★
–	–	–	–	–	★☆	–	★★★☆☆	★★	★☆	★☆
★☆	★☆	–	–	–	★☆	★★	★★★★☆	★☆	★★	★☆
★☆	★☆	–	–	–	★☆	★★	★★★★☆	★☆	★☆	★☆
★☆	★☆	–	–	–	★☆	★☆	★★★★☆	★★	★☆	★☆
★☆	★☆	–	–	–	–	–	–	★★	★★	★★
–	–	–	–	–	★☆	–	–	★★	★☆	★★

Surgical volume is the assessment results of 2009

Name of Institution	Inpatient			
	AMI (5 Grades)	Acute Stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Boryeong Asan Hospital	Grading exclusion	–	–	Grading exclusion
Bumin Hospital	Grading exclusion	★★★★☆	★★★★★	–
Pusan Medical Center	Grading exclusion	★★★☆☆	★★★★☆	Grading exclusion
Busan St. Mary's Hospital	★☆☆☆☆	★★★★☆	★★★☆☆	★☆☆☆☆
Busan Adventist Hospital	Grading exclusion	★★★★☆	★★★☆☆	★★★☆☆
Buan Seongmo Hospital	Grading exclusion	★★★★☆	–	–
Daesung Medical Center, Bucheon	–	–	–	–
Samsung Changwon Hospital	★★★★★	–	★★★★★	★☆☆☆☆
Samhmyook Medical Center	★☆☆☆☆	★★★★☆	★★★☆☆	★☆☆☆☆
Sangmoo Hospital	Grading exclusion	–	–	–
Sang Ju Red Cross Hospital	Grading exclusion	–	–	–
Saehan Hospital	–	–	–	–
Suhgwang Hospital	–	–	–	–
Seonam Univ. Namgang Hospital	–	–	–	–
Seonam Univ. Hospital	–	–	–	–
Seosan Jungang General Hospital	Grading exclusion	★☆☆☆☆	–	–
Seo Ulsan Boram Hospital	–	–	–	Grading exclusion
Seoul Sungsim General Hospital	–	–	★★★★★	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical Volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic Stem cell Transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★☆	–	–	–	★☆	–	★★☆☆☆	★★	★☆	★★
★☆	★☆	–	–	–	★★	–	★★★★★	★☆	★☆	★☆
★☆	★☆	–	★☆	–	★★	–	★★★★☆	★☆	★★	★☆
★☆	★☆	–	★☆	–	★★	★☆	★★★☆☆	★☆	★☆	★★
–	–	–	–	–	★☆	–	Grading exclusion	★★	★☆	★★
–	–	–	–	–	–	–	–	★☆	★☆	★☆
–	★☆	–	–	–	★☆	–	–	★☆	★☆	★☆
★★	★★	–	★☆	–	★★	★★	★★★★☆	★★	★★	★★
★☆	★☆	–	★☆	–	★☆	★☆	★★★☆☆	★★	★★	★★
★☆	★☆	–	–	–	★☆	–	–	★★	★☆	★★
–	–	–	–	–	–	–	★★★★☆	★★	★☆	★☆
–	★☆	–	–	–	★☆	–	–	★★	★☆	★★
–	–	–	–	–	–	–	★★★★☆	★★	★☆	★★
–	★☆	–	–	–	–	–	–	★☆	★★	★☆
–	–	–	–	–	–	–	–	★★	★★	★★
★☆	★☆	–	★☆	–	★☆	–	★★☆☆☆	★★	★☆	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	★★
–	–	–	–	–	★★	–	★★★☆☆	★★	★☆	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute Stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Seoul Red Cross Hospital	–	–	–	Grading exclusion
Seoul Metropolitan Dongbu Hospital	–	–	–	Grading exclusion
SMG-SNU Boramae Hospital	★★★☆☆	★★★★★	★★★★★	★★★★★
Seoul Medical Center	Grading exclusion	★★★★★	★★☆☆☆	★☆☆☆☆
Gyeong Sang Hospital, Sung-Gyeong Medical Corp	–	–	–	–
Cha Medical Center, Sungkwang Medical Corp	–	–	★★★★☆	★☆☆☆☆
Seongnam Central Hospital	–	★★★☆☆	★★★★★	Grading exclusion
Seran General Hospital	–	★★★★☆	★★★★☆	
Sewoong General Hospital	Grading exclusion	–	★★★☆☆	★★★☆☆
Sejong General Hospital	★★★☆☆	★★★★★	★★★★☆	★★★☆☆
Sowha Children's Hospital	–	–	–	–
St. Carollo Hospital, Suncheon	★★☆☆☆	★★★★★	★★★☆☆	★★★★★
Suncheon Jeil Hospital	–	–	–	–
Suncheon Jungang Hospital		–	–	–
Shiwha Hospital	Grading exclusion	★★★☆☆	Grading exclusion	–
Singa Hospital	–	–	–	–
Shincheon Union Hospital	Grading exclusion	–	★★★☆☆	–
Andong Sungso Hospital	Grading exclusion	★★★★☆	★★★★★	★☆☆☆☆

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★☆	–	–	–	★★	–	★★★★☆	★★	★★	★★
★☆	★☆	–	★☆	–	★☆	★☆	★★★★★	★★	★★	★☆
★★	★★	★☆	★★	–	★★	★☆	★★★★★	★★	★★	–
★☆	★☆	★☆	★☆	–	★★	★★	★★★★★	★☆	★★	★★
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★☆	★☆	–	–	–	–	–	–	★★	★★	–
★☆	★☆	–	★☆	–	★★	–	★★★★☆	★☆	★☆	★★
–	★☆	–	–	–	★★	–	–	★★	★☆	★★
★☆	★☆	–	–	–	★☆	–	★★★☆☆	★☆	★☆	★☆
★☆	★☆	–	–	–	★★	★★	★★★★☆	★★	★★	–
–	–	–	–	–	–	–	–	★★	★★	★☆
★☆	★☆	★☆	★☆	–	★★	★★	★★☆☆☆	★☆	★★	★★
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★☆	★☆	–	★☆	–	★☆	–	★★★★☆	★☆	★☆	★☆
–	★☆	–	–	–	★☆	–	★★★★★	★★	★☆	★★
★☆	★☆	–	★☆	–	★☆	–	★★★★☆	★★	★☆	★★
★☆	★☆	–	–	–	★★	–	★★☆☆☆	★☆	★★	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Pusan Nat'l Univ. Yangsan Hospital	★★★☆☆	★★★★★	★★★★★	★☆☆☆☆
Yangji Hospital	–	Grading exclusion	–	Grading exclusion
Yeonsu Chonnam Hospital	Grading exclusion	★★★☆☆	★★★☆☆	Grading exclusion
Yeochon Chonnam Hospital	Grading exclusion	★★★☆☆	★★☆☆☆	★☆☆☆☆
Yongin Severance Hospital	Grading exclusion	–	–	★☆☆☆☆
Young Gwang General Hospital	–	★★☆☆☆	–	★★★☆☆
Youngnam Univ. Youngchon Hospital	Grading exclusion	★★★★☆	–	Grading exclusion
Young Do Hospital	–	★★★☆☆	–	–
Yesan Samsung Hospital	Grading exclusion	★☆☆☆☆	–	–
Osan hankook Hospital	Grading exclusion	★★☆☆☆	★★★☆☆	–
Dong Gunsan Hospital, Osung Medi. Corp	Grading exclusion	★★★★☆	★★★☆☆	–
Okcheon St. Mary's Horpital	Grading exclusion	–	–	–
Wallace Memoreal Baptist Hospital	★☆☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆
Wooridul Hospital	–	–	–	–
Woork Hospital	–	★☆☆☆☆	–	–
Kwak Hospital, WoonKyung Med. Corp	–	–	★★☆☆☆	–
Unam Hankook Hospital	–	–	–	–
Unam Hankook Hospital	–	★★☆☆☆	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach Cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
–	–	–	–	–	–	–	★★★★★	★★	★★	★★
–	–	–	–	–	★☆	–	–	★☆	★☆	★★
★☆	★☆	–	★☆	–	★☆	–	★★★★★	★★	★☆	★☆
★☆	★☆	–	–	–	★☆	–	★★★★★	★☆	★☆	★★
★☆	★☆	–	–	–	★☆	★☆	★★★☆☆	★★	★★	★★
–	–	–	–	–	★☆	–	★★★★☆	★★	★☆	★☆
–	–	–	–	–	★☆	–	★★★★☆	★☆	★★	★☆
–	–	–	–	–	★☆	–	★★★☆☆	★☆	★☆	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	–
–	–	–	–	–	–	–	★★★☆☆	★☆	★☆	★☆
★☆	★☆	–	–	–	★☆	–	–	★★	★☆	★☆
★☆	–	–	–	–	★☆	–	–	–	★☆	–
★☆	★★	★☆	–	–	★★	★★	★★★★☆	★★	★★	★★
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★☆	★☆	–	–	–	★☆	–	–	★☆	★☆	★★
–	–	–	–	–	–	–	–	★☆	★☆	★☆
–	–	–	–	–	–	–	★★★☆☆	★☆	★☆	★☆

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Wonkwang Univ. Sanbon Medical Center	Grading exclusion	★★★★★	Grading exclusion	–
Wonjin Green Hospital	Grading exclusion	★★★★★	–	Grading exclusion
e-Dongin Hospital, Kangneung	Grading exclusion	★★★★☆	★★☆☆☆	–
Geoboong Baik Hospital, Geoje	Grading exclusion	Grading exclusion	–	–
Sungae Hospital, Kwangmyoung	Grading exclusion	★★★★★	★★★★★	★★★☆☆
Goo Hospital, Ingoo Med. Corp	–	–	★★★☆☆	–
Nasaret International Hospital	–	★★★☆☆	–	–
Dong Suwon Hospital	★☆☆☆☆	★★★★☆	★★★☆☆	★★★☆☆
Iksan Hospital, Daesan Med. Corp	–	–	–	–
Hando Hospital, Dae-A Med. Corp	★★☆☆☆	★★★★☆	★★★☆☆	–
Daewoo General Hospital	Grading exclusion	★★☆☆☆	★★★★☆	★☆☆☆☆
Daejeon Sun Hospital	★☆☆☆☆	★★★★☆	★★★☆☆	★☆☆☆☆
Gimcheon Jeil Hospital	Grading exclusion	★★★★☆	★★★☆☆	★☆☆☆☆
Dongbu Jeil Hospital	–	–	–	–
Dongshin Hospital, Med. Corp	Grading exclusion	★★☆☆☆	–	–
Mungyeong Jeil General Hospital	Grading exclusion	★★★★☆	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient Care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★☆	–	–	–	★★	–	★★★★★	★☆	★★	★★
★☆	★☆	–	–	–	★★	–	★★★★★	★★	★☆	★★
★☆	★☆	–	–	–	★☆	★☆	★★★★☆	★☆	★★	★★
★☆	★☆	–	–	–	★☆	–	–	★☆	★☆	★☆
★☆	★☆	–	★☆	–	★★	★☆	★★★★☆	★☆	★☆	★★
★☆	★★	–	–	–	★☆	–	–	★☆	★☆	★★
–	–	–	–	–	–	–	–	★★	★☆	★★
★☆	★☆	–	–	–	★★	★☆	★★★★★	★☆	★★	★☆
–	–	–	–	–	★★	–	–	★★	★★	★☆
★☆	★☆	–	★☆	–	★☆	★☆	Grading exclusion	★☆	★☆	★☆
–	★☆	–	–	–	★☆	–	★★★★☆	★☆	★☆	★★
★☆	★☆	–	★☆	–	★★	★★	★★★★☆	★☆	★★	★★
–	–	–	–	–	–	–	★☆☆☆☆	★★	★☆	★★
–	–	–	–	–	★☆	–	–	★★	★☆	★★
–	★☆	–	–	–	★★	–	–	★★	★☆	★★
★☆	–	–	–	–	★☆	–	★☆☆☆☆	★★	★☆	–

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Donghae Dong-In Hospital	Grading exclusion	★☆☆☆☆	–	–
Naeun Hospital, Luca Med. Corp., M.F.	Grading exclusion	★★★★☆	★★★☆☆	–
Kwandong Univ. Myong Ji Hospital	★★★☆☆	★★★★★	★★★★☆	★☆☆☆☆
Bagae Hospital, Pyongtaek	–	Grading exclusion	–	–
Goodmorning Hospital, Baeksong Med. Corp	★★★☆☆	★★★★★	★★★☆☆	–
Baekje Hospital	Grading exclusion	★★★★☆	–	Grading exclusion
Sang-Ju Seongmo Hospital	–	★☆☆☆☆	–	–
Central Hospital, Sukkyong Med. Corp	–	–	★★★☆☆	–
Plumb Hospital, Sukyoung Med. Corp.	–	–	–	–
Gochang Hospital, Sukcheon Med. Corp	–	★☆☆☆☆	–	–
BHS Hanseo Hospital	★★★★☆	★★★★★	Grading exclusion	–
Kimhae Jungang Hospital	Grading exclusion	–	–	–
KB Hospital		–	–	–
Pyongtaek International Hospital	–	–	––	–
Sungmin Hospital, Sungse Med. Corp.	–	–	Grading exclusion	–
Yeosu Seongsim Hospital, M.F.	Grading exclusion	–	–	★★★☆☆
Sungae Hospital, M.F	Grading exclusion	★★★★★	★★★★☆	★☆☆☆☆

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
–	★☆	–	–	–	★☆	–	★★★☆☆	★★	★☆	★☆
–	★☆	–	–	–	★☆	–	★★★★★	★☆	★☆	★★
★☆	★★	–	★☆	–	★★	★☆	★★★★★	★★	★★	★★
–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
★☆	★★	–	★☆	–	★★	★★	★★★★☆	★☆	★☆	★★
–	★☆	–	–	–	★☆	–	★★★★★	★☆	★☆	★☆
–	–	–	–	–	–	–	★★★★☆	★☆	★☆	★☆
–	–	–	–	–	–	–	★★★☆☆	★☆	★☆	★★
–	–	–	★☆	–	★★	–	★★★☆☆	★☆	★☆	★☆
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★☆	★☆	–	–	–	★☆	★★	★★☆☆☆	★☆	★★	★★
★☆	★☆	–	–	–	★☆	–	★★★★★	★☆	★☆	★☆
–	★☆	–	–	–	★☆	–	★★★☆☆	★☆	★☆	★☆
–	–	–	–	–	–	–	–	–	★☆	–
–	★☆	–	–	–	★★	–	–	★☆	★☆	★☆
–	★☆	–	–	–	★☆	–	★★★☆☆	★☆	★☆	★☆
★☆	★☆	–	★☆	–	★☆	–	★★★★★	★★	★★	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute Stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Daehan General Hospital, Sungwha Med. Corp.	–	–	–	–
Seoul General Hospital, Sukyoung Med. Corp.	–	–	–	–
Andong Medical Group	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆
Bupyong Serim General Hospital	Grading exclusion	★★★☆☆	★★★☆☆	–
Central U Hospital, Yangkyoung Med. Corp.	–	–	–	–
Jeonju Hospital, Youngkyoung Med. Corp	–	★★★★☆	Grading exclusion	–
Youngnam General Hospital, M.F	–	–	–	–
Cheonan Chunmu Hospital	Grading exclusion	★★☆☆☆	–	–
Goheung General Hospital	–	Grading exclusion	–	–
Yuseoung Sun Hospital	–	–	–	–
Bethesda Hospital, Yesung Med. Corp	–	–	–	–
Jungang Hospital, OMC Med. Corp.	–	–	––	–
Good Gang An Hospital, Eunsung Med. Corp.	Grading exclusion	★★★★☆	★★★☆☆	★☆☆☆☆
Good Samsun Hospital, Eunsung Med. Corp	Grading exclusion	★★★★☆	★★★☆☆	–
Hwasung Jungang General Hospital	Grading exclusion	★★★☆☆	–	–
Eulji Medical Center	★☆☆☆☆	★★★★★	★★★★★	★☆☆☆☆

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
–	–	–	–	–	★☆	–	–	★★	★☆	★★
–	–	–	–	–	★☆	–	–	★★	★☆	★☆
★☆	★☆	–	★☆	–	★★	★★	★★★★☆	★☆	★★	★★
★☆	★☆	–	–	–	★★	–	★★★★★	★☆	★☆	★★
–	–	–	–	–	★★	–	–	–	–	–
★☆	–	–	–	–	★☆	–	★☆☆☆☆	★☆	★★	★☆
–	–	–	–	–	–	–	–	★★	★☆	★☆
★☆	★☆	–	★☆	–	★★	★☆	★★★★☆	★★	★☆	★☆
–	★☆	–	–	–	★★	–	★★☆☆☆	★☆	★☆	★☆
★☆	★☆	–	–	–	★☆	–	–	★☆	★★	★★
★☆	★☆	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	–	–	–	–	–	–
★☆	★☆	–	–	–	★☆	★☆	★★★☆☆	★☆	★☆	★★
★☆	★☆	–	–	–	★★	★☆	★★★★☆	★☆	★☆	★☆
–	–	–	–	–	–	–	–	★☆	★☆	★☆
★☆	★☆	★☆	★☆	–	★★	★★	★★★★☆	★★	★★	★★

Surgical volume is the assessment results of 2009

Name of Institution	Inpatient			
	AMI (5 Grades)	Acute Stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Metro Hospital, Insan Med. Corp	Grading exclusion	–	–	–
Good Samaritan Hospital, Insan Med. Corp	★★★★★	★★★★☆	★★★★★	★☆☆☆☆
Hallym Hospital, Insung Med. Corp	Grading exclusion	★★★☆☆	–	–
Incheon Saran Hospital	Grading exclusion	★★★☆☆	★★★★☆	–
Hankook General Hospital, In-Hwa Med. Corp	–	★★★★☆	★★★☆☆	–
Jecheon Seoul Hospital, Jasan Med. Found	–	–	–	–
Hyosung Hospital, Jungsan Med. Corp.	★★★★★	★★★★★	–	–
Jung-Ang General Hospital, Med. Found	–	–	–	–
Nat'l Health Insurance Corp. Gil Hospital	–	–	–	Grading exclusion
Chung Goo Sung Sim Hospital	Grading exclusion	★★☆☆☆	–	–
Chung-A Hospital, Chung-A Med. Corp	–	–	–	–
Hankook Hospital, Hankook Med. Corp	–	–	–	–
Hana General Hospital, Hanmaeum Med. Corp.	–	★★★☆☆	–	Grading exclusion
Pohang Semyoung Gidok Hospital	★★☆☆☆	★★★★☆	★★★☆☆	–
Namyangju Hanyang General Hospital	Grading exclusion	★★☆☆☆	–	–
Hanil General Hospital, Hanjeoun Med.Corp	★★☆☆☆	★★★★★	★★★☆☆	★★★☆☆
MH Yonsei Medical Center	Grading exclusion	–	–	–
Shincheon General Hospital, Haechang Med. Corp	Grading exclusion	–	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★☆	–	–	–	★☆	–	★★★★☆	★★	★☆	★★
–	–	–	–	–	–	–	★★★☆☆	★★	★★	★★
–	★☆	–	–	–	★☆	–	★★★★★	★★	★☆	★★
★☆	★☆	–	–	–	★★	★☆	★★★★★	★☆	★★	★★
★☆	★☆	–	★☆	–	★★	–	★★★★☆	★★	★☆	★★
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–	–	–	–	–	–	–	–	★☆	★☆	★★
★☆	★☆	–	★☆	–	★☆	–	★★★☆☆	★★	★☆	★☆
–	–	–	–	–	★☆	–	★★★☆☆	★★	★★	★☆
–	★☆	–	–	–	★☆	–	–	★★	★☆	★★
★☆	–	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	★☆	–	Grading exclusion	★★	★☆	★☆
★☆	★☆	–	★☆	–	★★	–	–	★★	★☆	★★
★☆	★☆	–	–	–	★★	★★	★★★☆☆	★☆	★★	★★
–	–	–	–	–	–	–	Grading exclusion	★★	★★	★☆
★☆	★☆	–	★☆	–	★★	★☆	★★★★★	★☆	★★	★★
–	–	–	–	–	★☆	–	★☆☆☆☆	★☆	★☆	★★
★☆	★☆	–	–	–	★☆	–	★☆☆☆☆	★☆	★☆	★☆

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Haenam Hospital, Hangchon Med. Corp	–	–	–	★★★☆☆
Hankook General Hospital, Heyin Med. Corp	Grading exclusion	★★★★☆	★★★☆☆	★☆☆☆☆
Joeun Geumgang Hospital	★☆☆☆☆	–	–	–
Anyang Sam Hospital, Hyosan Med. Corp.	★☆☆☆☆	★★★☆☆	★★★★☆	
Heemyoung Medical Center	–	★★★☆☆	–	–
Korea Univ. Medical Center of Kangneung	–	–	–	–
Good Samaritan Hospital, Euisun Med. Corp.	–	–	–	–
Uijungbu Baik General Hospital	Grading exclusion	★★☆☆☆	–	–
Inje Univ. Haeundae Baik Hospital	–	Grading exclusion	–	–
Incheon Medical Center	–	★★☆☆☆	–	–
Incheon Christian Hospital	Grading exclusion	★★★☆☆	★★★☆☆	Grading exclusion
Incheon Red Cross Hospital	–	–	–	–
Ilsin Christian Hospital	–	–	★★★★☆	★☆☆☆☆
Gimhae Jasung Hospital	–	–	–	–
Jangheung General Hospital	–	–	–	★★★☆☆
Kwangju Christian Hospital	★★★★☆	★★★★★	★★★★★	★★★★★

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
–	–	–	–	–	★☆	–	★★☆☆☆	★☆	★☆	★☆
★☆	★☆	–	–	–	★☆	–	★★★★☆	★☆	★☆	★★
★☆	★☆	–	–	–	★☆	★★	★★★☆☆	★★	★☆	★☆
★☆	★☆	–	★☆	–	★★	★☆	★★★☆☆	★★	★★	★☆
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–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
★☆	★☆	–	★☆	–	★★	★★	★★★★☆	★★	★★	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Gunsan Medical Center	–	★★★★★	★★★☆☆	★☆☆☆☆
Namwon Medical Center	–	★★☆☆☆	–	★☆☆☆☆
Jeonju Korea Hospital	–		–	–
Presbyterian Medical Center, Jeonju	★★★★★	★★★★★	★★★★★	★★★★★
Jeongeup Asan Hospital	–	★★★★☆	–	–
Cheil Hospital	Grading exclusion	–	★★☆☆☆	★★★☆☆
Cheil General Hospital & Women's Healthcare Cente	–	–	★★★★☆	★★★★★
Jeju Nat'l Univ Hospital	–	★★★★☆	★★★★☆	★★★☆☆
Seogwipo Medical Center	–	–	–	★★★☆☆
Cheju Halla General Hospital	★★★☆☆	★★★★★	★★★★★	★☆☆☆☆
Joeun Hyundae Hospital	Grading exclusion	–	–	–
Good Moonwha Hospital	–	–	★★★★☆	★☆☆☆☆
Chung-Ang Univ. Healthcare System#	★☆☆☆☆	★★★★★	★★★★★	★★★☆☆
Jinju Korea Hospital	–	–	★★★★☆	–
Jinhae Yonsei Hospital	Grading exclusion	★☆☆☆☆	–	–
Kumi Cha Hospital	Grading exclusion	★★★★☆	★★★★☆	★☆☆☆☆
Bundang Cha Hospital	★★☆☆☆	★★★★★	★★★★★	★☆☆☆☆

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★☆	–	–	–	★★	–	★★★★★	★☆	★☆	★☆
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–	–	–	–	–	★★	–	–	★★	★☆	★★
★★	★★	★☆	★☆	–	★☆	★★	★★★★☆	★★	★★	★★
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★☆	★☆	★☆	★☆	–	★☆	–	★★★☆☆	★☆	★☆	★☆
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–	★☆	–	–	–	★☆	–	–	★☆	★☆	★☆
★☆	★☆	–	★☆	–	★☆	–	★★★★☆	★☆	★★	★★
★★	★★	–	★☆	★☆	★★	★★	★★★★★	★☆	★★	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Changwon Fatima Hospital	★★☆☆☆	★★★★★	★★★★☆	★☆☆☆☆
Cheomdan Medical Center	Grading exclusion	★★★★★	★☆☆☆☆	Grading exclusion
Cheongju St. Mary's Hospital	★★★★☆	★★★★★	★★★★★	★★★☆☆
Choonhae Hospital	–	–	–	–
CM Hospital	–	–	–	Grading exclusion
Gongju Medical Center	–	–	★★★☆☆	Grading exclusion
Seosan Medical Center	Grading exclusion	★★★☆☆		–
Choenan Medical Center	–	–		–
Hongseong Medical Center	Grading Exclusion	★★★★☆	★★☆☆☆	★☆☆☆☆
Cheongju Medical Center	–	★★★☆☆	Grading exclusion	–
Choongju Medical Center	★☆☆☆☆	–	–	–
Daejeon Cental Hospital	–	–	–	–
Pohang St. Mary's Hospital	–	★★★★★	★★★★★	★☆☆☆☆
Hanam Sungshim General Hospital	–	★★★☆☆	––	
The Catholic Univ. of Korea Daejeon St. Mary's Hospital	★★☆☆☆	★★★★★	★★★★★	★☆☆☆☆
Konyang Univ. Hospital	★★★★☆	★★★★★	★★★★☆	★☆☆☆☆
Woosuk Medical Center, Kimje	–	–	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★★	–	★☆	–	★☆	★☆	★★★☆☆	★★	★★	★★
–	–	–	–	–	–	–	★★★★★	★★	★☆	★☆
★☆	★★	–	★☆	–	★★	★★	★★★★☆	★★	★★	★★
–	–	–	–	–	★★	–	–	★★	★☆	★☆
–	–	–	–	–	★☆	–	–	★★	★☆	★★
–	–	–	–	–	★☆	–	–	★★	★☆	★☆
–	–	–	–	–	★☆	–	–	★☆	★☆	★☆
–	–	–	–	–	★☆	–	–	★★	★☆	★☆
–	★☆	–	–	–	★★	–	★★★☆☆	★☆	★★	★☆
★☆	★☆	–	–	–	★★	–	–	★★	★☆	★☆
★☆	★☆	–	–	–	★☆	★☆	–	★☆	★☆	★☆
–	–	–	–	–	★★	–	–	–	–	–
★☆	★☆	–	★☆	–	★☆	★☆	★★★★★	★★	★★	★☆
–	★☆	–	–	–	★☆	–	★★★★☆	★☆	★☆	★☆
★☆	★☆	★☆	★★	–	★★	★★	★★★☆☆	★★	★★	★☆
★★	★★	★☆	★☆	–	★★	★★	★★★★★	★☆	★★	★★
–	–	–	–	–	★☆	–	–	★★	★☆	★☆

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Soon Chun Hyang Univ. Hospital, Gumi	Grading exclusion	★★★★☆	★★★☆☆	★☆☆☆☆
Samsung Changwon Hospital	–	★★★★★	–	–
Ulsan Univ. Hospital	★☆☆☆☆	★★★★★	★★★★☆	★☆☆☆☆
Inje Univ. Dong Rae Baik Hospital	–	–	–	–
Veterans Hospital, Gwangju	Grading exclusion	★★★☆☆	★★★★☆	–
Veterans Hospital, Busan	Grading exclusion	–	–	–
Veterans Hospital, Daegu		Grading exclusion	★★★☆☆	–
Veterans Hospital, Seoul	Grading exclusion	★★★★☆	★★★☆☆	★☆☆☆☆
Suncheon General Hospital, Kcomwel	–	–	–	–
Ansan Choongang General Hospital, Kcomwe	Grading exclusion	–	–	–
Changwon General Hospital, Kcomwel	–	–	–	–
Taebaik Choongang General Hospital, Kcomwel	–	–	–	★★★☆☆
Korea Cancer Center Hospital	Grading exclusion	–	★★★★☆	Grading exclusion
Hallym Univ. Hangang Sacred Heart Hospital#	Grading exclusion	★★★★★	★★★★☆	★★★☆☆

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
-	-	-	-	-	-	-	★★★★★	★★	★★	★★
-	-	-	-	-	-	-	-	★★	★★	★★
★★	★★	★★	★★	★★	★☆	★★	★★★★★	★★	★★	★★
★★	★☆	★☆	★☆	-	★☆	★☆	-	-	-	-
★☆	★☆	★☆	-	-	★★	★★	★★★★☆	★★	★★	★☆
★☆	★☆	-	-	-	★★	★★	★★★★☆	★★	★☆	★★
★☆	★☆	-	★☆	-	★★	★☆	★★★★★	★★	★★	★★
★★	★★	★☆	★☆	-	★★	★★	★★★★★	★★	★★	★★
-	★☆	-	-	-	★☆	-	-	-	-	-
★☆	★☆	-	-	-	★☆	-	-	-	-	-
-	★☆	-	-	-	★☆	-	-	-	-	-
-	-	-	-	-	★☆	-	-	-	-	-
★★	★★	-	-	-	★☆	-	★★★★★	★★	★★	★★
★☆	★☆	-	★☆	-	★★	★☆	★★★★★	★★	★★	★★

Surgical volume is the assessment results of 2009

Name of institution	Inpatient			
	AMI (5 Grades)	Acute stroke	Prophylactic use of antibiotics for surgery	Caesarean section
Hallym Univ. Gangnam Sacred Heart Hospital	★★★★★	★★★★☆	★★★★★	★★★★★
Han Ma Eum Medical Center, Kyeongnam	Grading exclusion	–	★★★★☆	★★★☆☆
Hanmaeum Hospital, Jeju	★★★★★	★★★★★	★★★★★	★☆☆☆☆
Hanseong Hospital	Grading exclusion	–	–	–
Hanyang Univ. Guri Hospital	★★★☆☆	★★★★★	★★★☆☆	★★★☆☆
Haedong Hospital	Grading exclusion	–	–	–
Hyundae Hospital	Grading exclusion	★★☆☆☆	–	–
Ulsan Hospital, Hyemyoungshim Med. Corp	★★★★★	★★★☆☆	★★☆☆☆	–
Hyemin General Hospital	Grading exclusion	★★★☆☆	★★★★☆	–
Hongik Hospital	★★☆☆☆	★★★☆☆	★★☆☆☆	–
Hongcheon Asan Hospital	–	–	–	Grading exclusion
Chonnam Nat'l Univ. Hwasun Hospital	–	Grading Exclusion	★★★★★	–
Honam Hospital	Grading exclusion	–	–	–

Note. # stands for the hospitals accredited as tertiary hospital since 2009

Care							Long-term care	Outpatient care		
Surgical volume (2 Grades)								Prescription (2 Grades)		
Stomach cancer	Colon cancer	Colon cancer	Hematopoietic stem cell transplantation	Hematopoietic stem cell transplantation	Hip replacement	PCI	Hemodialysis	Antibiotics prescription rate for acute upper respiratory infection	Injection prescription rate	Number of drugs per prescription
★☆	★★	★☆	★☆	–	★★	★★	★★★★☆	★★	★★	★★
★☆	★☆	–	–	–	★☆	–	–	★★	★☆	★★
–	–	–	–	–	–	–	★★☆☆☆	★☆	★★	★★
–	–	–	–	–	–	–	–	★★	★☆	★★
★★	★★	★☆	★★	–	★★	★★	★★★★★	★★	★★	★★
★☆	★☆	–	–	–	★☆	★☆	★★★★★	★☆	★☆	★☆
–	–	–	–	–	–	–	–	★★	★★	★★
★☆	★☆	–	–	–	★☆	★★	★★★★★	★★	★☆	★☆
–	★☆	–	★☆	–	★★	–	★★★★★	★★	★★	★★
★☆	★☆	–	–	–	★★	★★	★★★★★	★☆	★★	★★
–	–	–	–	–	★☆	–	Grading exclusion	★★	★☆	★☆
★★	★★	★★	★★	★★	★★	–	★★★★☆	★★	★★	★★
★☆	–	–	–	–	★☆	–	★★★★☆	★☆	★☆	★☆

Surgical volume is the assessment results of 2009

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