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Health Care Quality Improvement Network in the Asia Pacific Region

Focused on Patient-Reported Indicators

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Summary

The Institute of Medicine(IOM, 2001) defined patient-centeredness as providing care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions. In order to enhance value for money, it is important to measure and evaluate how adequately a healthcare system accepted and reflected demands from patients. As the importance of patient-centeredness grew in healthcare system, performance measurement paradigm has shifted from effectiveness such as readmission rate, complication rate, and mortality rate to patient-centered care. As effectiveness cannot sufficiently reflect health status of patients, it has limited effectiveness in assessing the accurate value of healthcare system. For instance, survival rate, which is an efficiency-related outcome indicators, would not allow us to assess patients' quality of life.

That is why the adoption of Patient-Reported Indicators(hereafter PRI) is gaining more attention as an important step to enable monitoring of healthcare system performance and continuous improvement in healthcare quality in the perspective of patients-centeredness. PRI is used to assess the overall performance of the healthcare system rather than to compare hospital performances with each other, and to improve quality of care. There are two types of PRI: i) Patient-Reported Experience Measures(hereafter PREMs) evaluate patient's experience throughout the treatment including communication with doctors and nurses, and ii) Patient-Reported Outcome(hereafter PRO) evaluates the health status of patient, including quality of life and level of pain. In Korea, patients' satisfaction and experience are being measured in various healthcare fields. But there is no PRO survey at the national level. Patients' experience was measured for the first time in 2017 by Health Insurance Review and Assessment Service(hereafter HIRA)

on patients discharged from general hospitals with 500 beds or more, and the result was disclosed to the public.

The level of healthcare quality assessment varies country to country in Asia-Pacific region, and introduction of PRI is not an urgent task in some countries. Nevertheless, adopting PRI is definitely one of the future agendas in the region as the healthcare system gears toward patient-centered care. Therefore, this study aims to review some examples of PRI in Korea and abroad and to offer application methods in Korea and in Asia-Pacific region.

The main objective of this study is to review PRI cases home and abroad to provide measures that can connect them with quality improvement practices currently being carried out in Asia-Pacific region. More specifically, this paper looked into PRIs measured in Korea and overseas to understand outcome utilization and major issues. Also, by comparing and analyzing quality of care in Asia-Pacific countries, the possibility PRI introduction was reviewed. It also aims to offer insights as to cooperation measures for PRI adoption in the region, and application methods for quality improvement policies in Korea.

The contents and methods of this research are explained in the following. First, by conducting literature review, the concept and measurement of patient-centeredness were examined. Second, the use of PRI in Korea was investigated. The literature review included national-level patient experience assessment and medical service experience survey. The survey target was healthcare service providers in order to find out the current status of Patient-Reported Outcome Measures(hereafter PROMs) in clinical practice. Internally developed questionnaires were answered by some voluntary healthcare providers and clinical societies. Third, this study included cases of PRI development and utilization by OECD and other international organizations, and PROMs adoption experience in advanced countries. PROMs cases from overseas were investigated using on-line data and relevant research reports. Experience of measurement methods and result

utilization were also collected and organized. Fourth, this research suggests ways to connect PRI adoption efforts with the quality improvement activities in Asia-Pacific region. Through discussions with experts, level of quality assessment in the region was reviewed, and PRI adoption methods were offered for each group with different quality assessment levels.

According to the result of this study, as the importance of patient experience measurement grew, national-level PRI was introduced in a number of departments in Korea. To name a few, Assessment of Inpatient Experience by HIRA, National Health and Nutrition Examination Survey by Korea Centers for Disease Control and Prevention(hereafter KCDC), and Patient Experience Survey on Medical Service by Korea Institute for Health and Social Affairs(hereafter KIHISA). Unlike patient experience which began to be measured relatively recently, PRO has not been measured at the national level. Yet, standards for medical institution accreditation includes pain management, which means that a hospital (tertiary hospital, general hospital, and hospital) is assessed for pain management when it applied for accreditation. Frequently used pain assessment tools were VAS(Visual Analogue Scale) and NPRS(Numeric Pain Rating scale). To find out current application status of PRO in clinical areas in Korea, departments and conditions (hip/knee replacement surgery, urology, ophthalmology, breast cancer, mental illness) requiring PROMs measurement in tertiary hospitals were selected. According to the answers submitted by the eleven hospitals, PROMs were used in all 5 departments. In particular, it was noticeable that department of urology and department of psychiatry were using PROMs for various conditions. Hospitals used general PROMs, disease specific PROMs, and internally developed PROMs by the hospital or researcher. In each department, one to three general PROMs were used, and disease specific PROMs were used in most departments with the exception of ophthalmology. In urology and psychiatry where PROMs were applied to a wide variety of conditions, various disease specific PROMs were in use. In urology and

hip/knee replacement surgery, internally developed PROMs were being used.

Examples of PRI measurement in other countries are as follows. In UK, NHS England is mandated to collect PROMs data across the nation as to hip/knee replacement surgery. Collected PROMs data are turned into scores for Adjusted Health Gain, later published in the unit of each provider and Clinical Commissioning Group(CCG). Published report offers information of healthcare providers to patients, GP(General Practitioner), CCG in order to consumers make informed decision as to hospital and medical cost. Hospitals are given the opportunity to manage their performance and benchmark best practices. Doctors can reference the report when making clinical decisions. In 2017, U.S. collected values of 19 indicators in 6 priority domains to achieve the strategic goal of quality improvement in accordance with Meaningful Measure Framework(hereafter MMF) in CMS(Center for Medicare and Medicaid Services). Patient Functional Status indicator, a part of patient-centered care, was applied to hip/knee replacement surgery. Australia does not conduct nation-wide PROMs, but it is carried out in the form of pilot research in collaboration with clinicians, research institutes, and universities. Surveyed domains include psychiatry, palliative medicine, and patients (age 18 and older) who received hip/knee replacement surgery. Canada uses a single standardized PROMs set across the nation. But if needed, for instance in certain districts, additional PROMs can be used. Routine use of PROMs for quality improvement and monitoring health insurance is in its early stage and is mainly for research and patient enrollment. In Canada, there are a few independent local PROMs programs, but the federal government is not fully engaged and a nation-wide research is limited.

In the effort to introduce PRI used in advanced countries into Asia-Pacific region, quality of care in the region was assessed and PRI measurement methods were offered. The level of quality assessment system in the region was produced in three grades in terms of governance, infrastructure,

indicators, publication, etc. Twenty-five countries were studied, and high-performing group included Republic of Korea, Australia, and Japan, mid-performing group Cambodia, China, and New Zealand, and low-performing group Bhutan, Laos, and Pakistan.

Followings are ways to measure PRI in Asia-Pacific region to strengthen patient-centered care. In Asia-Pacific region, each nation has different healthcare system and infrastructure for quality assessment. Therefore, PRI application strategy should vary from country to country. Countries ranked high such as Korea and Australia have the infrastructure for quality assessment and measurement. Therefore, adoption of PRI should be a priority task with an establishment of a long-term roadmap. Countries situated in the middle, such as China and India, have some infrastructures in place but lack the PRI measurement system. They would need both infrastructure enhancement and political and technological complementary measures for adoption of PRI. Mid-level countries, excluding Cambodia, Indonesia, Mongolia, Sri-Lanka, East-Timor, and Vietnam, are reporting quality indicators at the national level, and should consider adopting PRI in their quality assessment process by benchmarking best practices in advance countries. Establishing necessary infrastructure must come before adoption of PRI in Butane, Laos and other countries listed at the bottom.

The conclusion and suggestion of this research are as follows. First of all, as patient-centeredness gained significance in healthcare system, it became important to measure how well the system reflected patients' demands. Patient experience is being measured in many countries including Korea, and the results were used as the basis in the effort to strengthen patient-centered healthcare system. On the other hand, PRO is in use in some countries such as Canada and the Netherlands. But the tool hasn't been developed fully. PROMs are also used to strengthen patient-centered healthcare system. Provided, because the outcomes are reflected in the treatment process, there

are prerequisites for the adoption of PROMs, which include development and standardization of tools, information collection system, and health literacy. There are various tools to measure PROMs, and they should be used in the context of the culture and characteristics of the country. For country or region comparison, it is required to use standardized tools. For national level measurement of outcome, a web system is necessary where patients can register or enter their own data directly. Because patients are reporting about their own condition, efforts to enhance health literacy is essential so patients can submit data based on a full understanding of the research.

Regarding measures to expand patient-centeredness quality assessment, Korea saw expansion of patient satisfaction and patient experience survey as patient-centered care gained more and more attention. PRO is not conducted at the national level yet, but are internally carried out in some departments and in some hospitals for independent use. PRO is necessary in order to reflect patients' needs and demands and to provide better care to patients. It is required to fully understand the measurement, develop and standardize tools with the participation of different stakeholders which include patient and medical circle. To expand PROMs in Korea, the first priority is to have a good understanding of concept, necessity, and utilization methods of the measurement. PROMs are measured in Korea either by using measurement tools developed in other countries translated into Korean, or tools developed internally by each entity. It is clear that standardization of those tools should take place to allow objective comparison and facilitate benchmarking. In Korea, PROMs are used in some Korean healthcare providers and for hospital accreditation, but is not linked to national level system assessment. Therefore, the adoption of PROMs should start with departments that need to be assessed for its patient-centeredness, and expand gradually. Also, currently limited use of PRO in clinical practice, new drug approval and post evaluation, hospital accreditation should expand to connect with national systematic assessment. Healthcare quality assessment level in Asia-Pacific region varies

country by country. Taking into account assessment infrastructure in each country, discussion should take place to learn from advance countries' experience through network of professionals in quality improvement.

Ⅰ. Introduction

1. Background

Patient-centeredness was defined by the Institute of Medicine(IOM, 2001) as providing care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions.

In order to enhance value for money, it is important to measure and assess how adequately a healthcare system accepted and reflected demands from patients. As the importance of patient-centeredness grew in healthcare system, performance measurement paradigm has shifted from effectiveness such as readmission rate, complication rate, and mortality rate to patient-centeredness. As effectiveness cannot sufficiently reflect health status of patients, it has limited effectiveness in assessing the accurate value of healthcare system. For example, five-year survival rate of prostate cancer is an outcome indicator in effectiveness. But for patients, more relevant outcomes would be quality of life and level of incontinence.

That is why the adoption of Patient-Reported Indicator(hereafter PRI) is gaining more attention as an important step to enable monitoring of healthcare system performance and continuous improvement in healthcare quality in the perspective of patients-centeredness. As a follow up to the 2017 Health Ministerial Meeting, OECD has formed a task force for Patient-Reported Indicator Survey(hereafter PaRIS) to develop and standardize PRI. PRI is mainly used in advance countries like Canada, the Netherlands, and Sweden where data are built and operated at the national or state level. PRI is used to measure the overall performance of the healthcare system rather than to compare hospital performances with each other, and to improve quality of

service and patient care.

There are two types of PRI which complement each other: i) Patient -Reported Experience Measures(hereafter PREMs) measure patient's experience throughout the treatment including communication with doctors and nurses, and ii) Patient-Reported Outcome(hereafter PRO) measures the health status of patient, including quality of life and level of pain.

In Korea, patients' satisfaction and experience are being measured in various public and private healthcare fields. But there is no PRO survey in place at the national level. Patients' experience was measured for the first time in 2017 by Health Insurance Review and Assessment Service (hereafter HIRA) on patients discharged from general hospitals with 500 beds or more, and the result was disclosed to the public.

The level of healthcare quality assessment varies country to country in Asia-Pacific region, and introduction of PRI is not an urgent task in some countries. Nevertheless, adopting PRI is definitely one of the future agendas in the region as the healthcare system gears toward patient-centered care going forward. Therefore, this study aims to review some examples of PRI in Korea and abroad and to offer application methods in Korea and in Asia-Pacific region.

2. Objective

The main objective of this study is to review PRI cases home and abroad to provide measures that can connect them with quality improvement practices currently being carried out in Asia-Pacific region. More specific goals are as follows. First, investigate PRI experience in Korea and abroad and understand outcome utilization and major issues. Second, compare and analyze the level of quality of care in Asia-Pacific region and review the possibility of PRI adoption. Third, offer cooperation measures to help adopt PRI in the region.

And fourth, propose application methods on healthcare policies in Korea for quality improvement.

3. Content and method

First, we conduct literature review to examine the concept and assessment methods of patient-centeredness.

Second, we Investigate the use of PRI in Korea. In details, i) Review national-level patient experience assessment and medical service experience survey. ii) The survey target was healthcare service providers in order to find out the current status of Patient-Reported Outcome Measures(hereafter PROMs) measurement in clinical practice. A set of questionnaires was internally developed and answered by some voluntary healthcare providers and clinical societies.

Third, we review cases of PRI development and utilization by OECD and other international organizations, and PROMs adoption experience in advanced countries. PROMs cases from overseas were investigated using on-line data and relevant research reports. Experience of measurement methods and result utilization were also collected and organized.

Finally, we suggest the challenges to measure the PRI in Asia-Pacific region. Through discussions with experts, level of quality assessment in the region was reviewed, and PRI adoption methods were offered for each group with different quality assessment levels.

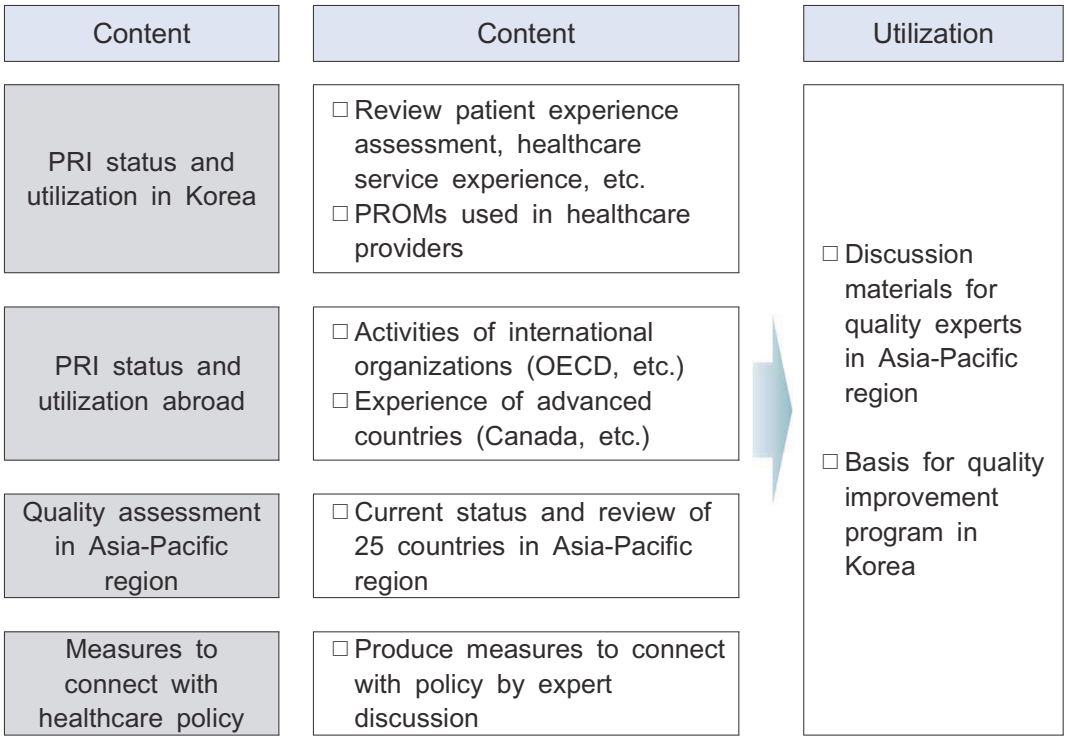

Figure 1. Content and method of study

II. Patient-Reported Indicators

1. Review of Patient-centeredness and PRI

1.1. What is patient-centeredness?

To provide care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions(IOM, 2001).

For better value for money, performance measurement of healthcare system is important with an emphasis on how well a healthcare system reflected demands from patients. Outcome data such as readmission rate, complication, death has limited effectiveness in assessing the accurate value of healthcare system, and these outcome cannot sufficiently reflect health status of patients.

PRI is gaining more attention to enable monitoring of healthcare system performance and continuous improvement in healthcare quality.

Table 1. Definition of patient-centeredness

Patient-centeredness	Definition/concept
Bauman, et al. (2003)	Interaction and partnership focused on patient's condition, health improvement, and healthy daily routine based on communication between practitioner and patient
Beach, et al. (2006)	Being respectful of patients' value, preference, and expressed needs Being coordinated and integrated Providing information, communication and education Ensuring physical confort Providing emotional support and easing fear and anxiety Involving family and friends Transition and persistency of treatment
Berwick (2009)	Care that is respectful of and responsive to individual patient's characteristics, value, ethnicity, preferences, needs

	for medical information. The main concept is that the patient is included in the management of treatment. It aims to provide a customized medical service in accordance with individual needs, desire, and environment. It also involves a high level of transparency and responsibility of healthcare services.
European Patient's Forum(EPF) (2015)	Individual: the extent to which patients and their families or caregivers, whenever appropriate, participate in decisions related to their condition (e.g. through shared decision-making, self-management) and contribute to organizational learning through their specific experience as patients. Collective: the extent to which patients, through their representative organizations, contribute to shaping the health care system through involvement in health care policy-making, organization, design and delivery.
Institute of Medicine(IOM) (2001)	Care that is respectful of, and responsive to, individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions
Ishikawa, et al. (2013)	In patient-centered communication, the doctor and the patient are not separated but systematically connected when considering certain matter. In previous researches on communication, response of health professionals to patient's concerns (discussion of medical history, forming common ground between the patient and medical team) was measured as hierarchy. Additionally, the level of measurement of each other's perspectives (belief, emotion, value) between the team and the patient.
Leplege, et al. (2009)	The principle of patient-centered care is to build mutual trust, to develop the treatment process together, and to respect each other.
Little, et al. (2001)	There are three important areas in patient-centered care, which are communication, partnership, and health improvement. Identifying medical history and condition: issue, emotion, expectation, opinion of the patient of the influence on bodily function Understanding the patient fully: personal issues (understanding emotional patients) and environment (family history) Finding common ground (partnership): issues, preference,

	purpose of care, role of patient or professional Health improvement: better health, less risk, early detection of disease Improved relation between doctor and patient: sharing leadership, relation in the healthcare service
Longtin (2010) Lusk&Fater (2013)	The conceptual framework such as encouraging patient to lead the treatment, attitude of nurse, patient-tailored care. In preceding concept, it means need for intervention and the ability to care by patient or caregiver. In consequential concept, it means self-medication ability and patient satisfaction level.
McCormack &McCance (2006)	Treatment process that involves mutual trust, understanding and information sharing between medical team and patient.
Millar, et al. (2015)	Five main elements, person-centered approach, sharing decision making process, expressed opinion of the patient, care in the perspective of the patient, treatment and feedback in an amicable relation
The International Alliance of Patient's Organizations (IAPO)	Respect: the underlying right of respect for patient, family and caregiver means respect for their own needs, preference, value, and sovereignty and independence. Choice and right: in the decision making process that will affect patient's life, the patient holds the right and responsibility to participate in the process as a partner to choose for their preference and ability Patient participation in health policy - patient and patient group hold a valuable role in healthcare policy making. Access and support, safe healthcare access, quality care, treatment, prevention, and health promotion with the promise of fair and affordable access to care of all patient Information: accurate and relevant information is necessary for the patient and caregiver to control health and choose life conditions
Wiig, et al. (2013)	Medical professionals observe the treatment process in the perspective of patient, reflect the pain of patients from the disease, emphasize the pain and fear, and let patients participate in the process. It can be explained as the urge of patients to participate and share information in the treatment decision making process.

Source: Patient empowerment, patient participation and patient-centeredness in hospital care: A concept analysis based on a literature review;Patient Education and Counseling 99; 2016

1.2. Patient-Reported Indicator

1.2.1. Definition of Patient-Reported Indicator

There are two types of PRI which complement each other: i) PREMs measure patient's experience throughout the treatment including communication with doctors and nurses. ii) PRO measures the health status of patient, including quality of life and level of pain.

PREMs measure the experience of patient throughout the treatment (whether the instruction was easy to understand, whether the patient participated in the decision making process). Although it is not quantified, it is an indicator representing quality of care.

PRO is directly reported by the patient without interpretation of the patient's response by a clinician or anyone else and pertains to the patient's health, quality of life, or functional status associated with health care or treatment. PROMs are the tools or instruments used to measure PRO. PROMs are standardized, validated questionnaires that are completed by patients during the perioperative period to ascertain perceptions of their health status, perceived level of impairment, disability, and health-related quality of life. PROMs allow the effectiveness of a clinical intervention to be measured from the patients' perspective. Questionnaires are given to patients both pre and post operatively to allow comparison of outcomes pre and post procedure. In addition to outcomes relating to interventions, PROMs measure patients' perceptions of their general health or their health in relation to a specific disease. PROMs are a means of measuring clinical effectiveness and safety. There are a number of specialties that employ the use of both PROMs and PREMs to evaluate their patient management: rheumatology, paediatrics, respiratory medicine, and cardiology. There are few validated tools available for use in anaesthesia.

PROMs and PREMs differ from satisfaction surveys by reporting objective

patient experiences, removing the ability to report subjective views. Patient experience differs from patient satisfaction. While patient experience investigates what the patient experienced during the care, patient satisfaction measures the level of satisfaction as to the treatment outcome. Also, patient experience allows to find out departments/domains for improvement. But patient satisfaction only shows an overall satisfaction level without pointing out areas to be improved.

Both PROMs and PREMs improve comprehensive understanding of patient outcome. They are used for diverse purposes such as clinical trial, quality improvement efforts, audit, economic evaluation, and else, ultimately enhancing patient-centered care. PROMs provide insight into the impact of an intervention or therapy on the patient, whilst PREMs provide insight into the quality of care during the intervention. The two measures are often used in parallel to present the patients' perceptions of both the process and outcome of their care. There is a positive relationship between PREMs and PROMs. A patient can discern clinical effectiveness, safety, and experience. Patient outcome can improve patient experience grade by 10%, and patient satisfaction grade improvement leads to 3% of outcome growth, meaning that PROMs and PREMs are inherently related and they represent the importance of quality improvement in care and treatment(Black et al, 2014).

PROMs and PREMs acquire values of patient level, hospital level, and national level. At the patient level, decisions are shared between patient and healthcare provider, and support patient-centered care. For example, change of care plan, patient management, patient condition assessment, development of disease, and treatment effectiveness are monitored based on the PROMs and PREMs data. At the hospital level, they are used as quality improvement method. Performance of institution is analyzed and compared, and the quality level of the hospital is disclosed to the public. At the national level, PROMs are used in public health monitoring and medical expense decision making,

and PREMs are used to measure achievements of healthcare system. By measuring PROMs and PREMs, data are collected for priority determination among public health policies (disease prevention, health promotion, health imbalance, intervention evaluation, etc.)

1.2.2. Importance of Patient-Reported Indicator

To enhance value for money, performance measurement of healthcare system is emphasized. In particular, it is important to measure how adequately a healthcare system accepted and reflected demands from patients. Aside from readmission rate, complication, and death data, value and outcome related information of healthcare system is limited. Cancer survival rate, an effectiveness indicator cannot sufficiently reflect patient's health status. Five-year survival rate of prostate cancer in Germany, Sweden, and Martini Klinik showed similar level, but incontinence and severe erectile dysfunction showed difference which better reflected actual status of patients.

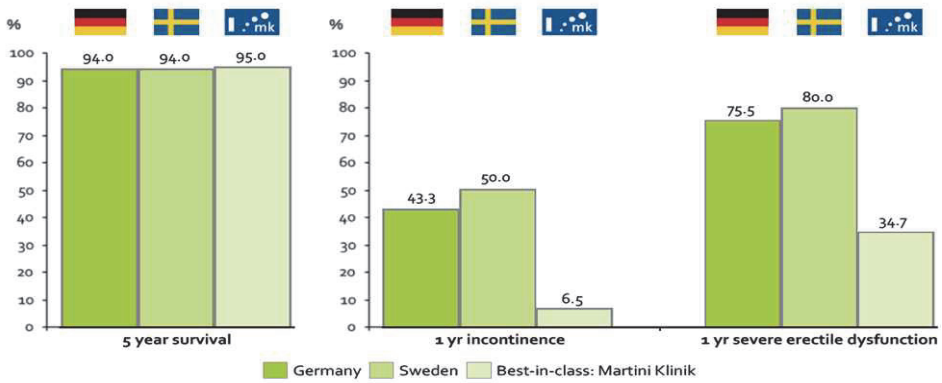

Figure 2. comparison outcome of prostate cancer patients

Note. Martini-Klinik(MK) is German Clinic of University Hospital Hamburg-Eppendorf(UKE)

With (un)structured tools (EQ-5D, SF-36, etc.), PRO measures health

status of patients that affects quality of life, such as symptom, physical function, mental function, and social function. Generally self-reported questionnaires are used, which include questions of functional status, health level related to quality of life, symptom and burden from the symptom, and health-related behavior like anxiety and depression.

PROMs can be classified as either generic, disease-specific and domain-specific. Generic PROMs does not target specific condition or surgery. They are designed to compare different interventions or within a intervention, different conditions, and different treatment area. Generic PROMs measure the wellbeing of patients (quality of life), and they are less sensitive to subtle clinical changes. Disease-specific PROMs tend to be more responsive to subtle changes. However, the measures of health they produce do not allow comparisons of health across patients with different sorts of conditions. There is no gold standard to measure PRO, but disease-specific PROMs are frequently used in some area.

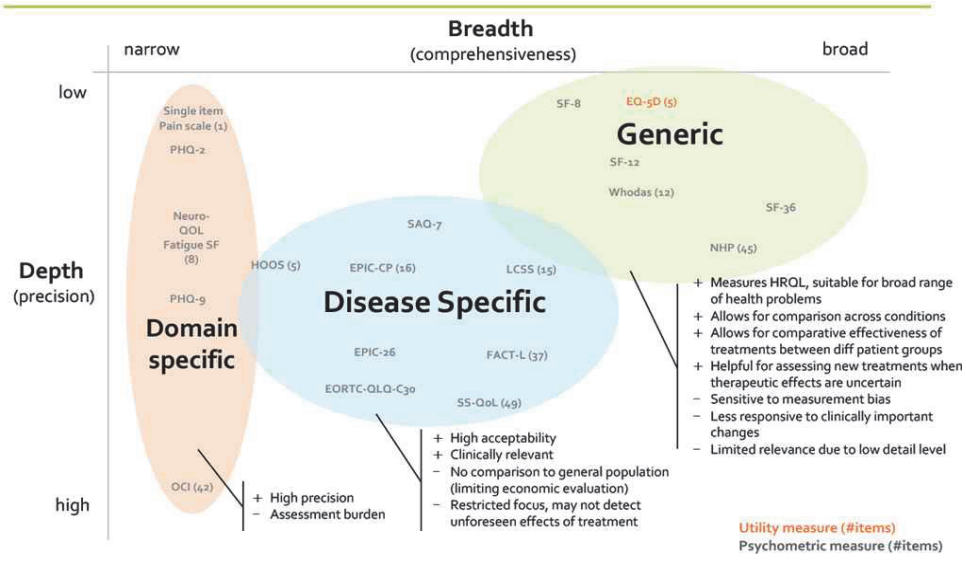

Figure 3. Classification of PROMs

1.2.3. Development and Selection of PROMs

Choosing measuring tool is a difficult task, and developing one is even more difficult. According to Barnett et el, PROMs and PREMs are frequently used to compare pre and post operatively. However, there are insufficient psychometric testing available to measure patient outcome and experience. To develop a proper measurement tool requires psychometric development process and validation, along with patient participation in every step of development. It is easy to think that using validated tool will bring a valid result, but it is not guaranteed even if a statistically validated tool was chosen for questionnaire. Utilizing a topic and questionnaires already validated previously can increase the likelihood of a reliable outcome.

The majority of PROMs and PREMs questionnaires are given to patients in preoperative clinics at the point of initial contact (on-site feedback), with the postoperative form being posted to each individual participating in the data collection (post-contact feedback). The data should be collected at a pre-specified time point in relation to the event or disease being studied. The optimal timing to complete the questionnaire will vary with each disease and procedure. The target data are independent, patient perceptions of their health status and care; therefore questionnaires should be completed away from health care professionals, only aided by a friend or relative if required. PROMs and PREMs can be distributed via email, telephone calls, and more recently text messages, giving instant feedback on patient care. Online surveys and face-to-face interviews can also be used to collect data.

PROMs and PREMs should be considered by healthcare organizations embarking on implementing these tools to help guide their patient care. The correct measuring instrument, how the data are collected, the understanding by health care providers and cost are all key factors that need to be evaluated. Choosing the correct tool to measure PROMs or PREMs for the

specific population and the data to be collected is crucial. The tool must be validated for the data collected to have any meaning. A number of PROMs, in particular, have been originally developed for use in research methodology. Their extrapolation to clinical practice may make interpretation of the data inaccurate.

In data collection, on-site feedback and post-contact feedback can be considered. On site feedback collects data when the patients may not be in a physical or psychological state to give accurate opinions of their experience of health status, in addition to missing information relating to discharge and recovery. Patients may also be concerned about the negative impact of their answers on the care given by health care providers and adjust their responses accordingly. Post-contact feedback relies upon an adequate sample size of patients filling out the questionnaires, with potential for low-response rates. Time constraints may also affect the data collection process, with disruptions to outpatient and inpatient clinical encounters in order to distribute the questionnaires. To reduce bias, completing the questionnaires at home, in the patient's own time may be beneficial.

Patient demographics can impact on the reliability of the data. The national PROMs data set collects patient identifiable information, however this is not used in analysis. In order to avoid skewed results nationally, statistical analysis is performed to adjust for variances in case-mix between providers. Translation of PROMs and PREMs questionnaires is frequently required to ensure all patients within our multi-cultural population are included in the data collection. However, the loss of meaning of the questions by literal translations, in addition to the cost of translation results in most questionnaires being translated for the patient by a translator. Potential loss of data from certain patient populations as a consequence of this must be considered when interpreting results. In addition, surveys may exclude those with inadequate literacy, resulting in selection bias. Finding out correlation between

patient groups can be difficult with questionnaires. The measuring tool itself does not provide methods to thoroughly interpret and understand collected data. Clinicians' knowledge and familiarity with PROMs, PREMs and how to use the data is important. Education programs may be needed to allow clinicians to utilize these instruments correctly and apply their data beneficially to their clinical practice.

Current health care resources are already stretched and so the cost of new data collection must be considered. Funding is required to develop the tool itself, provide training programs and implementation of these measuring instruments, as well as the cost of analysing the data. Cost maybe a limiting factor for some health care providers in using PROMs and PREMs. Data collected from PREMs must be interpreted in conjunction with data from PROMs. Disparities in patient experience data compared to clinical effectiveness and safety data can occur and therefore it is important to remember patient experience is an indicator of quality, not a direct measure for it.

PROMs and PREMs are tools that are increasingly being used to obtain data on patients' perceptions of their health and experiences whilst receiving care, with the aim of improving quality of care. Choosing the correct measuring tool is vital to ensure validated, reliable data for the population is obtained. The limitations of PROMs and PREMs must be considered prior to implementing these tools.

2. Measuring PRI in Korea

2.1. Patient experience survey

In Korea, patient satisfaction and patient experience are surveyed. Healthcare providers perform this survey independently to use the outcome to

improve treatment environment.

National level patient experience survey includes Assessment of Inpatient Experience and Patient Experience Survey on Medical Service. National Health and Nutrition Examination Survey was conducted in 2015, and since hasn't been updated.

Table 2. Patient survey in Korea

Patient satisfaction[1] Survey	Patient Experience[2] Survey
○ Public-Service Customer Satisfaction Survey (Ministry of Economy and Finance) ○ Healthcare provider Accreditation(Korea Institute for Hospital Accreditation, KOIHA) ○ Assessment on regional hub public hospitals(National Medical Center) ○ Assessment on emergency providers (National Emergency Medical Center) ○ Hospital Accreditation Programme(Korean Hospital Association)	○ Assessment of Inpatient Experience (HIRA) ○ National Health and Nutrition Examination Survey(KCDC) ○ Patient Experience Survey on Medical Service(KIHISA)

2.1.1. Quality assessment on Inpatient Experience

HIRA began Assessment on Inpatient Experience in 2017. The survey was conducted between January to March in 2017 in tertiary hospitals and general hospitals (with 500 or more beds) on discharged patients aged 19 and older. To minimize recall bias, target patients were limited to those discharged

1) The degree of convergence between patient's expectation of ideal care and the perception of care actually received (Risser, 1975). The patient rates (or evaluates) on what happened during treatment.
2) A survey to investigate patient experience of service during admission or outpatient visit. It reports what actually happened during the service use.

between 2 days to 58 days (8 weeks) ago. Departments excluded from this survey were pediatrics, palliative medicine, and psychiatry.

There are 24 items of 7 domains which include service of nurse, service of doctor, drug administration and treatment, hospital environment, patient's right, overall evaluation, and individual characteristics. Survey method was telephone call by a contracter. After data collection and analysis, the first result was published in August 2018.

Table 3. Survey target and method of Inpatient Experience Survey

Classification	Content
Target hospitals	○ Tertiary hospitals, General hospitals with 500 beds or more. In total, 53 hospitals (as of March 2017)
Period	○ July 17, 2017 - November 14, 2017 (4 months)
Target patient	○ Patients aged 19 and older , discharged between 2 days to 58 days (8 weeks) ago - Exclusion: daytime ward, palliative ward, pediatrics, psychiatry - Target selection: using benefit claims from July 2017, sample was extracted between 150 to 250 in grades depending on the size of wards
Data collection	○ Considering inpatient case mix (sex, age, department), patients' phone numbers were collected from providers ○ The survey was outsourced to a research company that conducted phone interview with structured questionnaires.
Assess-ment method	○ Case-mix was adjusted for each provider ○ For each provider, scores were produced for each question and area of patient experience

Table 4. Domains and questionnaire of Inpatient Experience Survey

Domain	Questionnaire	Domain	Questionnaire
Service of nurse	1. Respect/manners	Hospital environ-ment	14. Cleanness
	2. Attentiveness		15. Safety
	3. Introduction of hospital stay	Patient rights	16. Equal treatment
	4. Efforts in response to seeked help		17. Easy to file a complaint
Service of doctor	5. Respect/manners		18. Opportunity to participate in the treatment decision
	6. Attentiveness		19. Consideration for unwanted body exposure, etc.
	7. Opportunity to meet and talk to doctor	Overall evaluation	20. Comprehensive evaluation on admission experience
	8. Information about rounds		
Drug admini-stration and treatment	9. Explanation of reason on drug/test/treatment		21. Recommendation for others
	10. Explanation of adverse effect on drug/test/treatment		
	11. Efforts to manage pain	Individual character-istics	22. Admission course (ER or not)
	12. Consolation and sympathy about the condition		23. Subjjective health condition
	13. Information about life after discharge and treatment plan		24. Level of education

Source; 2017 Patient experience measurement in Korea(HIRA, 2018)

Result of Inpatient Experience Survey are followed. First, The scores were higher in the order Service of nurse, Hospital environment, Service of doctor, Drug administration and treatment, Patient right by domains. Second, concerning by questionnaire, Three questions in Service of Nurse were at the top, and one question in Patient Rights and two questions in Service of Doctor were at the bottom.

The results are disclosed on the HIRA website, and sent to providers

Table 5. Results of Inpatient Experience Survey by domains

Domain	Mean(std*)
1. Respect/Manners	88.73 (2.57)
2. Service of doctor	82.38 (2.79)
3. Drug administration and treatment	82.35 (2.53)
4. Hospital environment	83.74 (5.09)
5. Patient rights	81.16 (2.52)
6. Overall evaluation	83.01 (3.46)

Source: 2017 Patient experience measurement in Korea(HIRA, 2018)
* standard deviation

Table 6. Results of Inpatient Experience Survey by questionnaire

Domain	Questionnaire	Mean(std*)	Rank
Service of nurse	1. Respect/Manners	89.86(19.00)	1
	2. Attentiveness	89.30(18.90)	2
	4. Efforts in response to seeked help	88.91(19.32)	3
Service of doctor	7. Opportunity to meet and talk to doctor	74.63(28.13)	20
	8. Information about rounds	76.96(29.73)	19
Patient rights	17. Easy to file a complaint	72.96(28.58)	21

Source: 2017 Patient experience measurement in Korea(HIRA, 2018)
* standard deviation

2.1.2. National Health and Nutrition Examination Survey

Korea Centers for Disease Control and Prevention(hereafter KCDC) started to conduct the National Health and Nutrition Examination Survey in 2015. Target patients are those aged 19 and order who received outpatient service during the past 1 year.

The questionnaire consisted of basic service-related questions (2) and patient experience questions on service of doctor (4).

Table 7. Questionnaire of National Health and Nutrition Examination Survey

No.	Questionnaire
1.	When did you see your doctor?
2.	What was the type of provider you most frequently used?
3.	**Was the time spent with doctor sufficient?**
4.	**Was the explanation of the doctor easy to understand?**
5.	**Were you given an opportunity to voice your concerns about treatment?**
6.	**Did the doctor reflect your opinion as muc as you wanted in the treatment decision?**

Source: National Health and Nutrition Examination Survey(2015)

According to the result, positively responded questions were, in order, easy explanation of doctors, reflecting patient's opinion in treatment, opportunity to speak concerns, and sufficient time for talk. Outpatient experience result was relatively positive.

This part is going to be eliminated after the last patient experience survey in 2019.

Table 8. Positive response of National Health and Nutrition Examination Survey

Questionnaire	Positive response[1)]
3. Was the time spent with doctor sufficient?	77.9
4. Was the explanation of the doctor easy to understand?	87.1
5. Were you given an opportunity to voice your concerns about treatment?	81.7
6. Did the doctor reflect your opinion as muc as you wanted in the treatment decision?	81.8

Source: National Health and Nutrition Examination Survey(2015)
Note :"Totally yes" and "Mostly yes" were combined and reflected.

2.1.3. Patient Experience Survey on Medical Service

Ministry of Health and Welfare and Korea Institute for Health and Social Affairs(hereafter KIHISA) adopted Patient Experience Survey on Medical Service in 2017. Target is ordinary households. 5,000 households in all family members aged over 15 years old are surveyed every year. Questionnaire consisted of overall survey, and medical service experience as an inpatient and outpatient separately.

Table 9. Questionnaire of Patient Experience Survey on Medical Service

Domain		Questionnaire	No. of Qs
I. Perception of medical service		Experience of inpatient/outpatient	1
	I-1. Outpatient service	Time of visit, type of provider, name of provider, whether the patient has a frequently visiting provider, department, reason for selection, outpatient experience (service of doctor, service of nurse, overall evaluation, safety), waiting time	27
	I-2. Inpatient Service	LOS, appropriateness of LOS, type of provider, name of provider, main department, reason for admission, inpatient experience, (service of doctor, service of nurse, overall evaluation, safety), waiting time	29
II. Perception of healthcare system		Trust, need to change, satisfaction, policy priority, unmet medical needs, willingness to pay more premium	6
III. Health condition		Subjective health, objective health	2
IV. Perceived burden of cost		Gave up visiting, gave up treatment, gave up buying medicine	3
V. Individual characteristics		Sex, age, educational background, type of insurance	5
VI. Household characteristics (only for the head of family)		Monthly family income on average	1

Source: 2017 Patient Experience Survey on Medical Service (2017)

According to the result, safety, service of nurse, service of doctor, overall evaluation received highest score in order. In particular, Inpatient service received higher score than that of outpatient. As to the score of each question, safety (identification check) > nursing (respect and manners) > nursing (Information about life after discharge) received the highest score in order in inpatient service. Outpatient result was somewhat similar, with safety (identification check) > overall evaluation (cleanness) > nursing (respect and manners) from the top. However, Scores were low for questions about waiting time, overall evaluation (safety infra), and overall evaluation (billing, etc.) in both inpatient and outpatient service.

Table 10. Summary results of Patient Experience Survey on Medical Service

(%)

Domain			Service of Doctor[1)]	Service of Nurse[1)]	Overall Evaluation[1)]	Safety[2)]
Total			86.9	89.9	84.1	90.2
Health status[3)]	I/P	Mean	89.2	90.8	86.4	91.2
		Yes	91.1	91.8	89.6	93.4
		No	87.3	89.8	83.1	88.9
	O/P	Mean	84.5	88.9	81.9	89.3
		Yes	85.7	91.1	83.5	90.2
		No	83.3	86.7	80.2	88.3

Note 1. For questions on Service of Doctor, Service of Nurse, and Overall Evaluation, rate of patients who answered "Totally yes" and "Mostly yes" were combined and reflected.

2. For questions on Safety, positively responded patients were combined and reflected, excluding patients who answered "I don't know (N/A)".

3. Patients with normal condition were not included in the table.

Table 11. Survey results of Patient Experience Survey on Medical Service by domain

Domain	Questionnaire	Rate of positive answer[1)]	
		I/P	O/P
Service of doctor	Was the doctor respectful and polite?	88.2	89.1
	Did you have sufficient conversation with the doctor?	-	81.1
	Was doctor's explanation about your health condition, test, and treatment easy to understand?	89.1	80.0
	Were you given sufficient opportunity to present your concerns and ask questions?	81.3	78.4
	Did the doctor reflect your opinion in the treatment?	86.6	83.3
	Were you satisfied with the doctor's consultation or treatment?	90.3	87.4
Service of nurse	Was the nurse respectful and polite?	91.8	88.5
	Was nurse's explanation about treatment procedure easy to understand?	87.9	84.7
	When called your nurse, were you served immediately?	85.6	-
	Did the nurser give you full information about life after discharge?	91.7	-
Overall evalua -tion	Was the institution clean?	90.4	90.8
	Was the facility of the institution comfortable?	85.3	79.3
	Were you satisfied about administration (registration, billing)?	75.0	73.5
	Do you think your privacy was protected while using the institution?	78.1	74.2
	Would you like to recommend this institution to others?	85.9	81.9
Safety	Did the medical professional check your identity?	97.2	95.0
	Have you experienced drug-related adverse effect?*	6.9	7.7
	Did you feel anxious about infection while using the institution?*	11.8	7.0
	While using the institution, were safety facilities (fire exit, fire extinguisher, etc.) readily available?	66.8	50.1
	While using the institution, did you fall (from the bed), or see others fall?*	3.9	-
Waiting time	Was the waiting time appropriate?	33.8	52.3

Source: 2017 Patient Experience Survey on Medical Service (2017)
Note 1. Rate of "Mostly yes" and "Totally yes"

This survey was statistics recognized by states, and the result is released on the website of Statistics Korea.

2.2. Patient Reported Outcome indicators

2.2.1. Accreditation standards for healthcare provider

Standards for medical institution accreditation include pain management[3] are used as assessment tools. Tertiary hospitals, general hospitals, and hospitals that applied for accreditation are assessed for pain management (5 items). Most frequently used tools are VAS[4], NPRS[5].

Table 12. Composition of accreditation standards(Partial)

Chapter	Category	Standard		Questions	Grade
II. Patient treatment system	17	47(1)		265(9)	
4. Patient treatment	4.1 Patient treatment system	4.1.1	Treatment plan for inpatients	8(1)	Regular
		4.1.2	Collaborative treatment system	4	Regular
		4.1.3	Pain management	5	Regular
		4.1.4	Nutrition management	5	Regular
		4.1.5	Intensive nutrition service	5	Regular
		4.1.6	Bedsore management	6	Regular

3) By establishing pain management and a proper system for pain management, prevent pain from influencing patients physically and mentally which may cause adverse outcome
4) Visual Analogue Scale
5) Numeric Pain Rating scale

Table 13. Accreditation standard for pain management

Questionnaire	Type	Result
1. There are regulations for pain management.	S	□High □Mid □Low
2. Pain assessment is performed for outpatients.	P	□High □Mid □Low
3. Initial pain assessment is performed for inpatients.	P	□High □Mid □Low
4. Appropriate intervention is performed according to the pain assessment result.	P	□High □Mid □Low
5. Re-assessment is performed for inpatients.	P	□High □Mid □Low

Note: Questionnaires are classified into structure, process, and outcome, and each represents. S (System), P (Process), O (Outcome)

Pain management rule is a regular, and examines regulations and performance level of pain assessment using tools. The process of pain management is as follows.

1) Pain management rule includes:
   - ○ Initial pain assessment: pain(Y/N, location, intensity, pattern, frequency, length, etc.
   - ○ Pain assessment tools
   - ○ Intervention method: medication, non-medication, etc.
   - ○ Pain reassessment
2) According to the rule, check whether the outpatient has pain in the initial assessment. If pain is reported, measure the pain level with tools and document.
3) According to the rule, perform initial pain assessment of the inpatient and document.
4) Perform appropriate intervention according to the pain assessment result, and document.
5) According to the rule, re-assess the inpatient's pain and document.

Pain management and measurement tools at accredited hospitals are decided internally. Measurement tools vary with patients. Pain management contains Pain screening, pain assessment, pain management, pain re-assessment, in-house training, etc.

Table 14. Pain management content at accredited hospital

	Pain screening	Pain assessment	Pain management	Pain re-assessment	In-house training
Content	At the point of admission, visit, and pain report	Location, intensity, pattern, frequency, and length of pain	- Appropriate management (medicine /non -medicine) - Educate patient /care taker on pain management method	Assess intervention method, location, intensity, pattern, etc.	- Consider and respect demand of patients in assessment and intervention - Continue to train clinicians on pain management

Table 15. Example of pain management PROMs used at accredited hospital

Patients	PROMs
Patients under 3 years, Patients who can communicate, Unconscious patients	- FLACC(Face, Legs, Activity, Cry, Consolability)
Patients who can communicate over 3 years	- NRS(Numeric Rating Scale)/NPIS(Numerical Pain Intensity Scale) - VAS(Visual Analog Scale) - Wong-Baker Faces Pain Rating Scale
Newborn	- CRIES Scale(Crying, Requires oxygen, Increased vital sign, Expression of face, Sleeplessness)

2.2.2. Survey results of Current status of PROMs

The purpose of the survey was to understand PROMs use in Korea. Provided, the questionnaire was developed to minimize burden of answering by varying measurement targets. The questionnaire consisted of measurement tool, time of measurement, method of measurement, and utilization. To ease answering process, the questionnaire was developed in an Excel file.

1. What institution do you work for?
2. Does your institution use PROMs to check patient outcome?
   □ ① Yes □ ② No **→ Go to No. 5**
3. A few details about PROMs used in your institution.
   3-1. On which condition PROMs are used? ex) Hip replacement surgery
   3-2. What type of tool is used?
   ① Independently developed(Modified tools from Korea and abroad) ② AVVQ ... ⓝ Else
   3-2-1. If you chose else, what is the name of the tool?
   3-2-2. If you used independently developed tools, can you share it?
   □ Yes □ No
   3-2-3. If you can share it, please attach it with this survey.
   3-3. How many times do you conduct the assessment?
   □ Once **→ Go to No. 3-3-1** □ Twice or more **→ Go to No. 3-3-2**
   3-3-1. If the assessment is conducted once, when is it performed?
   e.g.: At the point of admission, at the point of discharge
   3-3-2. If the assessment is conducted twice or more, when is it performed?
   e.g.: Before the surgery and 1 monoth after the surgery / within 6 months
   3-4. What is the assessment method?
   □ Interview □ Mail □ Internet(e-mail, etc.) □ Else
   3-4-1. If you chose else, please describe it briefly.
   3-5. What is the objective of assessment?
   □ Research □ To assess treatment efficacy
   □ To trace and manage treatment outcome
   □ Healthcare quality management □ Else
   3-5-1. If you chose else, please describe it briefly
4. Is there any other assessment aside from No. 3?
   □ ① Yes □ ② No
5. Do you plan to use PROMs or are you getting ready to use PROMs?
   □ ① Yes **→ Go to No. 5.1** □ ② No **→ The end**
   5-1. If you are going to use PROMs, please describe the target, method (frequency, tool, etc), and purpose briefly.

Population as a target were 42 tertiary hospitals selected based on possibility of PROMs use and response rate. Hospitals were asked to answer the questionnaire for departments and conditions (surgery) that need to adopt PROMs. Instructions about the questionnaire were given to academic societies and providers through phones. Answered questionnaires were collected. Request for cooperation was sent to relevant academic societies and providers, and the information was uploaded on their website to share with members.

Eleven tertiary hospitals returned the questionnaire, and one of them answered it did not use PROMs. Survey responses from 10 hospitals were organized. Data included highly relevant 5 departments (hip/knee replacement surgery, urology, ophthalmology, breast cancer, mental illness) which have high likelihood of using PROMs or which need to adopt PROMs. Most hospitals were using PROMs in all 5 departments. Department of urology and department of psychiatry were using PROMs for various conditions.

Table 16. Survey results: Target conditions in each department

Urology	Psychiatry
Urological cancer, prostate cancer, dysuresia, urinary incontinence, overactive bladder, prostatic hypertrophy, lower urinary tract symptoms, bladder cancer, andropause, pelvic pain and urinary urgency/frequent urination, interstitial cystitis, chronic prostatitis, prostatic disease, sexual dysfunctions, dysuria	All conditions, depression, anxiety disorder, alcohol disorder, obsession, insomnia, schizophrenia and etc, ADHD

Assessment was performed for each type of tool - General PROMs, Disease specific PROMs, and independently developed PROMs by the hospital or researcher. In particular, General PROMs used 1 to 3 tools for a department. Disease specific PROMs were used in all departments except for ophthalmology. It was noticeable that department of urology and department of psychiatry used various PROMs for diverse conditions. Independently developed PROMs were used for hip/knee replacement surgery and department of urology.

Table 17. Survey results: Usage PROMs by department

	Hip/knee replacement	Breast cancer	Urology	ophthal -mology	Mental illness	etc
Number of hospitals	5	8	4	5	8	3
General PROMs	1	1	3	1	3	1
Specific PROMs	3	5	30	-	17	3
developed PROMs	1	-	2	-	-	-

Regarding Hip/knee replacement surgery, Five hospitals used PROMs. In details, Tools for pain management (NPRS, HARRIS HIP SCORE, WOMAC, KOOS-PS) and independently developed PROMs were used. If the assessment is conducted only once, measurement performed at the first visit If the assessment is conducted twice or more, it is performed regularly from the first visit depending on the pain management or progress. Main method was interview, and self-report was also used. The outcome was mostly used for treatment efficacy assessment and tracking.

Table 18. Survey results: Hip/knee replacement surgery

PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
NPRS	4 hospitals	over twice	at the time of admission, during inpatient, during intervention for pain, After surgery / invasive procedures, Continuous therapeutic intervention for pain (twice daily)	Interview	2
		once	at the time of admission,	Interview	1, 2, 3, 4
		over twice	at the time of admission, during inpatient, after surgery, during intervention for pain, When the patient's condition changes (when pain changes or new pain occurs)	Interview	2, 3
		once	during diagnosis (back pain)	Interview	2
HARRIS HIP SCORE	1hospital	-	the patient designated by the clinic after the outpatient treatment,	Self-report	1, 2, 3, 4
WOMAC	1hospital	once	during diagnosis	Interview	2
KOOS-PS	1hospital	once	during diagnosis	Interview	2
Developed	1hospital	over twice	surgery after 6 weeks, 3 months, 6 months, every 1 year	Interview	1, 2, 3

Note: Result utilization: ① Research ② Treatment efficacy assessment ③ Treatment outcome tracking ④ Quality management ⑤ Else

In breast cancer, five hospitals used PROMs. NPRS was used for pain management. The tool for breast-cancer, ECOG, was used. Tools for cancer management EORTC QLQ-C30, EORTC QLQ-BR23, HADS, and DT were used for treatment. If the assessment is conducted only once, it is performed at the first visit. There were cases where the assessment was performed twice or more before and after surgery. Assessment was conducted through interview and self-report. Results are mainly used for treatment efficacy assessment and quality management.

Table 19. Survey results: Breast cancer

PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
NPRS	4 hospitals	over twice	at the time of admission, during inpatient, during intervention for pain, After surgery / invasive procedures, Continuous therapeutic intervention for pain (twice daily)	Interview	2, 4
					2, 3
		twice	at the first time of admission,	Interview	1, 2, 3, 4
		over twice	at the time of admission, during inpatient, after surgery, during intervention for pain, When the patient's condition changes (when pain changes or new pain occurs)	Interview	2, 3
ECOG	3 hospitals	over twice	at the time of admission, during inpatient	Interview	2, 4
		over twice	at the time of admission, during inpatient, during intervention for pain, After surgery / invasive procedures, Continuous therapeutic intervention for pain (twice daily)	Interview	2, 4
		over twice	at the time of admission	Interview	2, 4
EORTC QLQ-C30, EORTC QLQ-BR23	1 hospital	over twice	pre-post surgery of Breast cancer	Self-report	1, 2, 3, 4
HADS	1 hospital	once	pre-post surgery of Breast cancer	Self-report	1, 2, 3, 4
DT	1 hospital	-	at the first time of admission	Self-report	1, 2, 3, 4

Note: Result utilization: ① Research ② Treatment efficacy assessment ③ Treatment outcome tracking ④ Quality management ⑤ Else

In Urology, Eight departments used PROMs. Specifically, NPRS was used for pain management. Tools for cancer EORTC QLQ-C30, and tools for urology OABSS, ECOG, I-QOL and etc. were used. If the assessment is conducted only once, it is performed at the first visit. Assessment was conducted twice or more for breast cancer to compare before and after surgery, and when regular measurement was required. Main method was interview and self-report. Results are mainly used for treatment efficacy assessment, research, treatment outcome tracking, and quality management.

Table 20. Survey results: Urology

Domain	PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
Urology	NPRS	3hos pitals	over twice	at the time of admission, during inpatient, during intervention for pain, After surgery / invasive procedures, Continuous therapeutic intervention for pain (twice daily)	Interview	2, 4
General	EQ-5D/(5L) (prostate cancer)	1hos pital	over twice		Interview	1, 2 3, 4
	NPRS (Urological disease)	3hos pitals	over twice	at the time of admission, during inpatient, during intervention for pain, After surgery / invasive procedures, Continuous therapeutic intervention for pain (twice daily)	Interview	2, 4
			over twice	at the time of admission, during inpatient, after surgery, during intervention for	Interview	2, 3

Domain	PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
				pain, When the patient's condition changes (when pain changes or new pain occurs)		
			once	at the first time of admission,	Interview	2, 3, 4
Urological cancer	DT	1hospital	once	at the first time of admission,	Self-report	1, 2, 3, 4
prostate cancer	CARE EORTC QLQ-C30 EPIC-CP FACT-VCI* FKSI-15** IIEF-5 IPSS SHIM	1hospital	over twice	before surgery, every admission (f/u protocol : before surgery/surgery after 1, 3, 6, 9, 12, 18, 24, 30, 36, 48, 60, 120months) *before surgery, every admission (f/u protocol before surgery/surgery after 2 weeks, 3-6 months, yearly check after 5 years) **before surgery, every admission (f/u protocol before surgery/surgery after 2 weeks, yearly check after 6-12 months)	Interview	1, 2 3, 4
	ECOG	1hospital	once	during inpatient		1, 2
	IPSS/OABSS /ICIQ	1hospital	once	during inpatient (before surgery)	Interview	3, 4
	SHIM	1hospital	once	during inpatient (before surgery)	Interview	3, 4
	FACT-P	1hospital	over twice	baseline visit, 6 months, 12months	Interview	1
	IIEF5 IPSS EORC QLQ-C30 PHQ-9 Duke-UNC	1hospital	over twice	pre-operation day, after 3 months 6 months, 1 year of surgery	Interview	1, 2, 3, 4
	CTCAE 4.0	1hospital		At the time of inpatient, at the time of discharge	Interview	2

Domain	PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
	EPIC-26	1hos pital		At the time of inpatient, at the time of discharge	Interview	2
	ECOG	1hos pital		At the time of inpatient	Interview	2
	EORTC QLQ-C30	1hos pital		at the time of discharge	Interview	2
dysuresia	IPSS, OABSS	1hos pital	over twice	baseline visit, On occasional need	Interview	2
	ICS male-SF	1hos pital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
	BFLUTS-SF _Korean Bristol	1hos pital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
urinary inconti-nence	OABSS/ICIQ	1hos pital	over twice	at the time of admission, during inpatient, After surgery / invasive procedures,	Self-report	2, 3, 4
	Voiding diary (72 hrs), I-QOL BFLUTS, SEAPI Score, Urge Score, developed	1hos pital	over twice	at the first time of admission, run every 3 months	Self-report	1, 2, 3, 4
	I-QOL	1hos pital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
	SANDVIK-VAS	1hos pital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
overactive bladder	OAB V8 /OABSS	1hos pital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
overactive bladder, prostatic hypertrophy	IPSS, OABSS	1hos pital	over twice	baseline visit, on occasional need	Interview	2
lower urinary tract symptoms	IPSS	1hos pital	over twice	at the time of admission, during inpatient, After surgery / invasive procedures,	Interview	2, 3, 4

Domain	PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
	Voiding diary (72hrs), IPSS, PH, UPS-OABSS, PPTB	1hospital	over twice	at the first time of admission, run every 3 months	Interview	1, 2, 3, 4
	Voiding diary (72 hrs) BFLUTS UPS-OABSS	1hospital	over twice	at the first time of admission, run every 3 months	Interview	1, 2, 3, 4
bladder cancer	IIEF5 IPSS EORTC QLQ-C30 PHQ-9 Duke-UNC	1hospital	over twice	pre operation day, run every 3 months during 2 years	Interview	1, 2, 3, 4
andropause	ADAM	1hospital	once	at the first time of admission	Interview	1, 2
pelvic pain and urinary urgency/ frequent urination	PUF	1hospital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
interstitial cystitis	IC-Q	1hospital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
chronic prostatitis	NIH-CPSI	1hospital	over twice	at the time of admission(revisit)	Interview	1, 2, 3, 4
prostatic disease	IPSS	1hospital	over twice	at the time of admission(first, revisit)	Interview	1, 2, 3, 4
sexual dys -functions, dysuria	IIEF	1hospital	over twice	at the time of admission(first, revisit)	Interview	1, 2, 3, 4
	FSFI	1hospital	over twice	at the time of admission(first, revisit)	Interview	1, 2, 3, 4

Note: Result utilization: ① Research ② Treatment efficacy assessment ③ Treatment outcome tracking ④ Quality management ⑤ Else

Regarding ophthalmology department, three hospitals used PROMs. NPRS was used for pain management. Number of assessment varied upon the hospital. Assessment was conducted once at the first outpatient visit, or twice or more during the treatment. Interview was used, and results were used for treatment efficacy assessment, treatment outcome tracking and quality management.

Table 21. Survey results: ophthalmology

PROMs	Usage	No. of Measurement	Measurement time	Measure-ment Way	Result utilization
NPRS	3hospitals	over twice	at the time of admission, during inpatient, during intervention for pain, After surgery / invasive procedures, Continuous therapeutic intervention for pain (twice daily)	Interview	2, 4
		once	at the first time of admission	Interview	2, 3, 4
		over twice	at the time of admission, during inpatient, after surgery, during intervention for pain, When the patient's condition changes (when pain changes or new pain occurs)	Interview	2, 3

Note: Result utilization: ① Research ② Treatment efficacy assessment ③ Treatment outcome tracking ④ Quality management ⑤ Else

In Mental illness, nine hospitals used PROMs. To assessment patients' condition, general PROMs and diverse types of disease-specific PROMs were used. General PROMs (EQ-5D, VAS, NPRS) and PROMs for mental health (CGI, GAF, PHQ-9, etc.) were applied to various condition. If conducted once, the assessment is to understand the patient's condition and performed at the point of admission or first visit. If conducted twice, assessment is performed on a regular basis if required based on observation or pain management.

Interview and self-report are used. Results are mainly used to understand the patient's condition, and also to assess treatment efficacy and track treatment outcome.

Table 22. Survey results: Mental illness

Domain	PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
All conditions	EQ-5D	1hospital	over twice	after inpatient, before discharge, every 1 months after a month(inpatient)	Interview	1, 2, 3
	VAS		once	at the first time of admission	Interview	4
	NPRS	2hospitals	over twice	at the time of admission, during inpatient, during intervention for pain, After surgery / invasive procedures, Continuous therapeutic intervention for pain (twice daily)	Interview	2, 4
			over twice	at the time of admission, during inpatient, after surgery, during intervention for pain, When the patient's condition changes (when pain changes or new pain occurs)	Interview	2, 3
	CGI	1hospital	over twice	at the time of admission, during inpatient	Interview	2, 4
	CGI	1hospital		after inpatient, before discharge, every 1 months after a month(inpatient)	Interview	1, 2, 3
	GAF		over twice	after inpatient, before discharge, every 1 months after a month(inpatient)	Interview	1, 2, 3

Domain	PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
depression	PHQ-9	3hospitals	over twice	after inpatient, before discharge, every 1 months after a month(inpatient)	Interview	1, 2, 3
			once	at the first time of admission	Self-report**	etc
			over twice	at the time of admission, during inpatient	Interview	1, 2, 3
	MIBDI	1hospital	once	At the end of the drug treatment,	Interview	2
	CDI, STAI (Children & Youth)	1hospital	once	during inpatient	Interview	etc
	BDI(adult)	1hospital	once	during inpatient	Interview	etc
	BAI(adult)		once	during inpatient	Interview	etc
	SCL-90-R (adult)		once	during inpatient	Interview	etc
	BDI	1hospital	once		Self-report	2
anxiety	PHQ-9	2hospitals	over twice	after inpatient, before discharge	Interview	1
			once	at the first time of admission	Self-report	etc
	BAI	1hospital	once		Self-report	2
depression and anxiety	HADS	1hospital	over twice	at the first time of admission, after inpatient, before discharge, Outpatient observation	Interview	1, 2, 3, 4
alcohol disorder	AUDIT	1hospital	over twice	at the first time of admission, after inpatient, before discharge, Outpatient observation	Interview	1, 2, 3, 4
obsession	Y-BOCS	1hospital	over twice	after inpatient, before discharge	Interview	1, 2, 3
insomnia	PHQ-9	1hospital	once	at the first time of admission	Self-report*	etc
schizoph-renia, etc	ESI	1hospital	over twice	after inpatient, before discharge	Interview	1, 2, 3

Domain	PROMs	Usage	No. of Measure-ment	Measurement time	Measure-ment Way	Result utiliza-tion
ADHD	Korea ARS	1hospital	over twice	after inpatient, before discharge	Self-report	1, 2, 3, 4
dementia	CDR	1hospital	over twice	every a year	Interview	2

Note 1: Result utilization: ① Research ② Treatment efficacy assessment ③ Treatment outcome tracking ④ Quality management ⑤ Else

2: In self-report, guardian of an ADHD patient sent the survey to school and the teacher answered the questionnaire. (symptom assessment) "Else" in utilization means that the assessment is conducted to learn information to better understand the patient at the first diagnosis.

In overall, Almost half (5) of all respondents (11) answered that they plan to adopt PROMs.

In order to use main measurement tools properly, translation into Korean and reproducibility assessment are required. Development of tools for Korean context (general and disease-speciric) is also required. Hospitals had different plans as to which department they would adopt PROMs into. The adoption domain will be expanded to include glaucoma and psychiatry. For PROMs adoption, one hospital plans to introduce Computer adaptive test(CAT) in measurement and tracking.

Table 23. Opinions on PROMs use in the future

Hospital	Content
Hospital A	Effect of long-term medication on glaucoma patient and his/her quality of life Effect of impaired vision due to glaucoma on the quality of life Regarding depression occurrence due to glaucoma, effect of treatment details (number of drugs used, length of medication, etc.) on depression level and quality of life
Hospital D	It is continuously reviewed and improved.
Hospital H (Mental)	- Patients with sleep disorder, ESS(Epworth Sleepiness Scale), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research

Hospital	Content
	- Patients with sleep disorder, sleep journal, outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients with sleep disorder, Dysfunctional Beliefs and Attitudes about Sleep scale(DBAS), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients with sleep disorder, Insomnia Severity Index(ISI), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients with bipolar disorder, Hypomania/Mania Symptom Checklist (HCL-32), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients with bipolar disorder, Mood Disorder Questionnaire(MDQ), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients with post-traumatic stress disorder, Impact of Event Scale (IES), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients with attention deficit hyperactivity disorder, Adult ADHD Self-Report Scale(ASRS), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients with generalized anxiety disorder, Penn State Worry Questionnaire (PSWQ), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research - Patients suffering from suicide ideation, Beck Scale for Suicide Ideation (BSS), outpatient first visit and progress observation, interview, treatment efficacy assessment, treatment outcome tracking, research
Hospital H (Overall)	Symptom measurement by treatment - Korean version of PRO_CTCAE is used - We made Korean version of PRO Common Toxicity Criteria for Adverse Events(CTCAE) with a partnership with NCI (U.S) in 2017. Currently, we are testing assessment using an application in clinical setting. - In case of PRO-CTCAE, we collect symptom data of patients receiving chemotherapy and radiation therapy once 7 days (a week). Thanks to the application, the collection is done regardless of the location or place of the patient. Collected symptom data are used by

Hospital	Content
	the patient and clinicians as a reference. - More detailed information about the tool can be found on this webpage. https://healthcaredelivery.cancer.gov/pro-ctcae/instrument.html - In 2017, Memorial Sloan Kettering Cancer Center, JAMA, U.S., published that using PRO-CTCAE system to treat and manage symptoms led to higher survival rate. Currently, most hospitals in U.S. use PRO-CTAE to monitor and manage patients' symptom. - In clinical trial of new drug, FDA recommends to use PRO-CTCAE fromm Phase IIb. State-funded researches are mandated to use the tool. By establishing PROMIS(Patient-Reported Outcomes Measurement Information System), measure all chronic disease patients for physical, mental, and societal health condition. (going to apply to all patients who visit hospital) - Physical health - fatigue, pain, difficulty of daily living due to pain, physical function, insomnia, shortness of breath, digestive symptoms, difficulty of daily living due to insomnia, etc. - Mental health - anxiety, depression, habitual drinking, anger, cognitive function, overall satisfaction of life, smoking, addition, self-management of chronic disease, self-efficacy, etc. - Societal health - social role, ability to participate in social activity, isolation, social support, etc. - More detailed information about the tool can be found on this webpage. http://www.healthmeasures.net/index.php ○ Time of measurement – The goal is to measure outpatients when they visit the hospital, and use the development of change in treatment. ○ Objective – Assessment items vary according to the disease and condition of patient, but in U.S., most hospitals use PROMIS integrated in EMR to assess physical function, depression, and pain in all patients. In advance countries, PRO assessment is performed in the form of Computer adaptive test (CAT) using the algorithm developed with response theory.
Hospital G (Mental)	To assess, track and research patient's progress more objectively, we plan to add more tools for other mental conditions.
Hospital B (Mental)	Perform every 2 weeks or every month depending on the assessment tool for patients with mental disorder (symptom, progress, etc.)

III. Use of PROMs overseas

1. OECD

In the OECD Health Ministerial Meeting(Jan. 2017), patient-centered healthcare gained much attention. Especially, it was stressed that patient-centeredness should be measured.

As a follow-up to the meeting, OECD health committee launched PaRIS (Patient-Reported Indicator Survey) initiative. Centered around the Health Committee, PaRIS initiative consists of 2 tasks. Task ① is a project to standardize PROMs used in member countries to strengthen application. Working Party on Health Care Quality and Outcome(HCQO) conducts the project, and targets include breast cancer, hip/knee replacement surgery, and mental illness. Task ② is a project to discover new areas to develop new PROMs. The Health Committee will develop tools for patients with multiple chronic diseases.

Task ① is scheduled to be completed by 2020 after conducting standardization and preliminary collection and analysis from 2019 to 2020. Task ② will be developed from 2019 to 2020, and completed by 2023.

Table 24. PaRIS Initiative of OECD

	Task ① (Standardization of PROMs)	Task ② (Development of new PROMs)
Content	Validate and standardize PROMs used in other member countries to expand the use	Develop new PROMs for conditions and areas with high value of use in policy
Target	Breast cancer, hip/knee replacement surgery, mental illness	Chronic diseases served at primary care

2. ICHOM(International Consortium for Health Outcomes Measurement)

Outcomes that matter most to patients are not being measured in clinical practice. Also, definitions used in outcome measurement vary country from country to country, making comparison and learning among countries difficult. ICHOM was established to resolve aforementioned issues. It develops and defines a core set of outcomes(standard sets) for different medical conditions across the globe.

ICHOM standard sets have been developed. Form a working group for each medical condition to develop a standard set. The working brings together patient representatives, leading physicians, healthcare providers, researchers, outcome expert, and policy makers. Working groups discuss a particular issue or topic through multiple number of conference calls, and develop a questionnaire. The final product should acquire consent from all members who participated in development. The outcome set reflects what matters most to patients. Standard sets are developed to assess routine clinical practice and clinical researches. Use of PROMs to improve clinical practice is a new attempt.

Standard sets of ICHOM shows diverse examples of clinical use. Some 185 organizations are implementing at lease one ICHOM standard set, and 33 are implementing more than one. The 14 condition registries are measuring at least one. There is almost non-international comparison of PROMs. OECD member countries are testing PROMs in their own countries, but not between the countries. Standard sets of ICHOM present the possibility of country comparison. Especially, the 12 standard sets developed by ICHOM (cataract, prostate cancer, low back pain, coronary artery disease, Parkinson's disease, cleft lip and palate, stroke, macular degeneration, Hip and Knee osteoarthritis, depression and anxiety, lung cancer) take up 35% of the global burden of disease. As of November 2018, 27 standard sets have been developed.

Currently 10 more standard sets are under development.

Standard sets of ICHOM consist of case mix, treatment, and outcome. Case mix includes information of demographic characteristics, baseline health status, previous treatment. Treatment includes procedure, intervention, mediation, and outcome includes clinical data, administrative data, and patient-reported data.

Table 25. ICHOM Standard Set

Developed	Under development
Type 1 and type 2 diabetes in adults, Paediatric facial palsy, Congenital upper limb anomalies, Inflammatory arthritis, Hypertension low and middle income countries, Chronic kidney disease, Pregnancy and childbirth, Inflammatory bowel disease, Overactive bladder. Colorectal cancer, Heart failure, breast cancer, Older person, Craniofacial microsomia, Dementia, Coronary artery disease, Low back pain, Localized prostate cancer, Cataracts, Parkinson's disease, Depression and anxiety, Advanced prostate cancer, Lung cancer, Cleft lip and palate, Hip and Knee osteoarthritis, stroke, macular degeneration	Personal disorders, Psychotic disorders, misuse of medicine, Depression and anxiety for children and young people, Hand and wrist conditions, Atrial fibrillation, Adult overall health, Pediatric overall health, Oral health, Disorders related to substance use and addition

3. U.K.

NHS England is mandated to collect nationwide PROMs data of hip and knee replacement surgery cases.[6)]

Collected PROMs are translated into scores and used for calculation of Adjusted Health Gain. Adjusted Health Gain is represented by the score gap of PROMs from before and after the surgery. Data collected before and after the surgery and Adjusted Health Gain are published in the unit of provider and CCG(Clinical Commissioning Group)[7)] in the form of report.[8)] The report includes PROMs score for each indicator, distribution of adjusted health gain, health condition change before and after surgery, number of patients who gave a perfect score to the tool, and readmission and reoperation data. The report shares provider information with patients, GPs, and CCGs to support informed decision on hospital choice and medical expenses. Relative assessment on quality of care provides hospitals with opportunities to manage their performance and benchmark best practices. Physicians can use the report in their clinical decision making.

Collected PROMs are translated into scores and used for calculation of Adjusted Health Gain. Adjusted Health Gain is represented by the score gap of PROMs from before and after the surgery.

When Adjusted Health Gain is produced in the unit of provider and CCG [9)], it is not produced when the sample size is less than 30.

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6) Only the data from England is collected. There are a small number of patients coming from Scotland and Wales, but because they receive treatment by providers in England, the data is treated as England data.

7) They commission health care services for their local area. Currently, all GPs, and some nurses and health experts are registered to CCG.

8) For more information, go to PROMs on the website of NHS Digital (https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/patient-reported-outcome-measures-proms)

9) They commission health care services for their local area. Currently, all GPs, and

Data collected before and after the surgery and Adjusted Health Gain are combined quarterly and yearly to produce a report.[10] The report includes PROMs score for each indicator of before and after surgery, distribution of adjusted health gain, yearly trend, health condition change before and after surgery, number of patients who gave a perfect score to the tool, and other issues after surgery such as readmission and reoperation data.

NHS provides the report in PDF and EXCEL file, and EXCEL file has PROMs values by provider. Reports released by NHS include health outcome by indicator and by tool. The report shares provider information with patients, GPs, and CCGs to support informed decision on hospital choice and medical expenses. Through relative assessment on quality of care, PROMs provide hospitals with opportunities to manage their performance and benchmark best practices. Physicians can use the report in their clinical decision making.

Table 26. PROMs of NHS

	Hip/knee replacement	hernia	varicos vein
Target	patient agreed with PROMs survey		
Data	Survey questionnaire that matching HES[11] and DB		
Measurement way	collected PROMs questionnaire, digitalized and send to NHS		
Measurement	Oxford Hip Score	EQ-5D^{TM}, EQ-VAS	Aberdeen Varicose Vein Questionnaire
Measurement time	pre-post operation (6 months, post mail)	pre-post operation (3 months, post mail)	pre-post operation (3 months, post mail)

some nurses and health experts are registered to CCG.

10) For more information, go to PROMs on the website of NHS Digital (https://digital.nhs.uk/data-and-information/data-tools-and-services/data-services/patient-reported-outcome-measures-proms)

11) Hospital Episodes Statistics of NHS

4. U.S.

PCORI(Patient-Centered Outcomes Research Institute) is researching ways to link EHR and PROMs by establishing a research network for PROMs.

PROMIS(Patient-Reported Outcomes Measurement Information System) was originally established to research PROMs. But its scope of work expanded for clinical application. It aims to provide research and infrastructure for development of PROMs tools. Various tools are developed in the area of physical function, fatigue, pain, emotional pain, and social role.

PatientsLikeMe and How Is Your Health(Darmouth College) are social media-based website where patients share their treatment experience and outcome.

NQF(National Quality Forum) researches measurement tools for PROs, PROMs, and PRO-PM(Patient Reported Outcomes in Performance Measurement). Developed tools are used as an indicator for benchmark.

In efforts to improve quality of care, CMS(Centers for Medicare & Medicaid Services) established CMS Quality Strategy Goal based on National Quality Strategy of the Ministry of Health. The objectives are Better Care, Healthier People, Healthier Community, and Smarter Spending. Six priorities are Patient safety, Person-and Family-Centered Care, Care Coordination, Effective Prevention and Treatment, Healthy Living, and Care affordability. To achieve the strategic goals, MMF(Meaningful Measure Framework) was prepared from 2017. MMF collects 19 indicators from 6 priorities. Among them, Patient Functional Status from Person-and Family-Centered Care is measured and collected. Currently, indicators for benchmark include hip and knee replacement surgery.

In 2017, according to MMF(Meaningful Measure Framework), CMS collected 19 indicator values from 6 priorities[12)] to achieve Quality Strategy

Goal.

Patient Functional Status indicator is included in Person and Family -Centered Care, and it measures hip and knee replacement surgery.

Table 27. PROMs of CMS

	hip replacement	knee replacement
Target	Patients over 18 years * Exclude: Patients with severe cognitive impairment, multiple fractures at the time of surgery, patients in hospice care	
Data	Patient Functional Status data reported eCQI Resource Center	
Measurement way	after surgery, outpatient measurement	
Measurement	VR-12, PROMIS-10-Global Health	
	HOOS	KOOS
Measurement time	before 90 days~to pre-operation day, after operation 270~365 days	

5. Australia

Australia does not collect national-level PROMs. Pilot researches are being conducted in collaboration with physicians, research institute, university, etc. To improve quality of care in psychiatry, AMHOCN(Australian Mental Health Outcome and Classification Network) measures PROMs and provides psychiatric data. Collected indicator data by AMHOCN are available in NOCC(National Outcome and Casemix Collection) Standard Reports[13] on its website. AMHOCN follows NOCC's initiatives. The goal of sharing information

12) Making care safer by reducing harm caused in the delivery of care, Person- and Family-Centered Care, Promoting effective communication and coordination of care, Promoting the most effective prevention and treatment practices for chronic diseases, Working with communities to promote wide use of best practices to enable healthy living, affordable care

13) https://data.amhocn.org/reports/standard/

is to improve quality of mental health care by better understand and better use psychiatric health outcome.

PCOC(Palliative Care outcome Collaboration) is a state-led program that regularly assesses palliative care, measures patient outcome, publish palliative care data, and benchmark indicators. Hospitals can join on a voluntary basis. Depending on the score, additional intervention of medical professional can be advised. PCOC releases its annual report on the website[14] in order to benchmark palliative care services and to improve quality of care. Among PCOC indicators in the report, symptom assessment standard outcomes are categorized into hospital, hospice, and community as to pain, fatigue, and respiratory issues. Patient outcome can be evaluated in comparison with benchmark indicator standards.[15] Patient outcome collected from the same symptom level are adjusted in relation to reference period (from January 2014 to June 2014) in order to adjust indicator values and compare health outcome changes.[16]

Target patients are aged 18 and older, who received hip/knee replacement surgery[17] from a provider participating ACORN(Arthroplasty Clinical Outcome Registry National). The measurement is conducted before surgery and 6 months after surgery. The produced information is standardized, reliable, and almost perfect. It is used to improve quality of care by helping the public, surgeons, and hospitals to make informed decision. Annual report on ACORN website includes outcome of each measurement tools, such as pain level before and after surgery, physical function and satisfaction level after surgery,

14) https:ahsri.uow.edu.au/pcoc/index.html
15) For No symptom and Weak symptom, the standard is 90% or more. For Normal and Severe, 60% or more.
16) Over 0 means getting better, lower than 0 means getting worse, around 0 means similar.
17) Exclusion criteria: unplanned hip/knee replacement surgery cases such as acute fracture, patients with cognitive disorder, patients who cannot understand the program.

readmission, reoperation, and mortality rate after surgery.

Table 28. PROMs of Australia

	AMHOCN[18]	PCOC[19]	ACORN[20]
Target	Psychiatry Patients (adults, both I/P and O/P)	Palliative care patient	hip/knee replacement patients over 18 years
Data	Data collection in psychiatric hospital, general hospital psychiatry	Collect data from participating hospitals	Collect data from participating hospitals
Measurement	MHI-38[21], Kessler 10+, BASIS-32 (choose one measurement)	SAS[22]	Oxford Hip Score, Oxford Knee Score, EQ-VAS, EQ-5D-5L
Measurement time	O/P: at admission and discharge I/P: at the first time, Re-measure after 3 months	during inpatient(daily at least), Measure at community / hospital consultation or contact services, palliative care , patient / family needed, at discharge	pre-operation: patient self-reported questionnaire post-operation (after 6 months) investigator calls, distribute the questionnaire by mail (if can not make a call more than 6 attempts)
Result utilization	released through website	release case-mixed score through website	released through website, provide information to patients, surgeons and hospitals

18) Australian Mental Health Outcome and Classification Network
19) Palliative Care Outcomes Collaboration
20) Arthroplasty Clinical Outcome Registry National
21) Mental Health Inventory
22) Symptom Assessment Scale

6. Denmark

There are movements to try PROMs measurement on the national level, but no clearly reported method or procedure. A PROMs development projected began in the first half of 2017 for stroke, hip/knee joint problems and depression. The result of project has not been published. Denmark plans to develop PROMs for 4 conditions, which are OBGY conditions, cardiac disorders, COPD, and diabetes.

Denmark is also interested in telemedicine using web and mobile services. Currently, a patient and his or her family can check the patient's medical records on e-Health Portal(sundhed.dk), but not many healthcare providers enter patients' medical information into the system. To enhance the access and ease of use for patients, the Ministry of Health is promoting e-Health Portal by collaborating with private enterprises such as web and mobile application developers.

7. Canada[23)]

Canada uses a single standard set of PROM in the entire country, and additional PROMs are used locally when required. Nationally conducted PROMs measurement includes Spinal Cord Injury Registry, Canadian Multi centre Osteoporosis Study, each on overall health condition, patients with traumatic spinal cord injuries, and patients with osteoporosis. Results are utilized in health monitoring programs, demographic health survey, measurement of functional disorder, and research and population policy. The national and local researches are conducted by Rick Hansen Research Institute, Statistics Canada, Saskatchewan, Alberta State, Manitoba State,

23) CIHI "PROMs Background Document", 2015

Saskatchewan, British Columbia State, and Ontario State. Routine use of PROM for quality improvement and monitoring of health insurance is in its early stage. In Canada, PROM is mainly for research and patient enrollment. According to an interview by CIHI on PROM environment evaluation between 2013 to 2014, there are a few independent local PROMs programs, but the federal government is not fully engaged and a nation-wide research is limited.

Table 29. PROMs of Canada(national level)[24]

	CCHS[25]	Spinal Cord Injury Registry[26]	Canadian Multi centre Osteoporosis Study
Target	Canadian Population * Exclude residents from military and protected areas	traumatic spinal cord injury patient (9 of 10 states)	Osteoporosis patient
Data	Annual cross-sectional survey * 65,000 samples	Survey data * Discharge Abstract Database and National Trauma Registry linked	yearly cross-sectional * 9,423 samples
Measure ment	Generic: HUI, RAND SF-36(optional) Others: health status, health utilization, health determinants	Generic: SF-36, the Functional Impairment Measure, FIM®, others	Generic: SF-36 (version2), HUI
Measure ment time	a year	after 2004 (base year, after a year, after 2 years, every 5 years)	yearly (after 1995)
Result utilization	health monitoring program and population health research	measuring dysfunction	research, population policy

24) Examples of large-scale research and projects in Canada, including PRIs proposed by CIHI.
25) Canadian Community Health Survey: Statistics Canada
26) Rick Hansen Research Institute

Figure 4. PROMs of Canada(national and territory level)

Source: CIHI(2014) PROMs and PREMs at CIHI

8. Other Countries

In the Netherlands, ICA(Dutch Institute for Clinical Reporting) is collecting clinical outcome from 19 institutions to collect, analyze, and benchmark the outcome data in collaboration with Dutch insurance companies. Recently, the country is reviewing linking PROMs and payment system in partnership with ICHOM.

German prostate clinic Martini Klinik uses PROMs to measure and monitor treatment of prostate diseases and quality of life of patients.

In Sweden, many healthcare providers use PROMs for benchmarking indicators. Hip/knee replacement surgery applies value-based bundled payment system using PROMs.

IV. Quality assessment status in Asia-Pacific region

1. Analysis of quality assessment level in Asia Pacific region

The level of quality assessment system in the region was produced in three grades. In the survey, questions were selected in relation to governance, infrastructure, indicators, publication, etc.

Table 30. Selected questions of quality assessment policy in Asia-pacific region

No.	Area	Questions
1.1	Overview of quality of care policies	Policies or documents for quality of care
		Organizations responsible for quality of care
1.2	Legal framework for quality of care	Legal and regulatory framework for quality of care
1.4	Accreditation and other external quality assessment mechanisms	Existence of accreditation
		Existence of national standards for hospitals
1.8	Quality indicators	Existence of quality indicators at national level
		Existence of consistency assuring mechanisms amongst the level of systems
		Quality of care feedback mechanisms for providers
1.9	The ability of patients to influence quality and policies on measuring patient experiences	Systematic measurement of patient experiences
		Patient organizations
1.10	Public reporting on quality of care	Existence of public report on quality of care
		Existence of regular national reports on quality of care
		Influence of regular reports on quality of care
1.11	Financial incentives	Pay for performance
2.5	Standards or guidelines for collecting the data	Standards or guidelines for data collection
2.6	Adherence to a global health data standard	Global health data standard

No.	Area	Questions
2.7	Records for patients	Data containing records for patients
2.8	Unique patient identification number	Data containing unique patient identification number
2.10	ID system to link the data	Link to another data set
2.11	Data used to regularly report on health-care quality	Regularly report on health-care quality
2.12	Indicators used to regularly monitor health-care quality	Examples of indicators on health-care quality
2.13	Difficulties in regular monitoring of health-care quality	Legal or policy barriers to the collection or analysis of data
		Concerns with the quality of the data that limits the usefulness
		Lack of resources or technical capacity for data collection, analysis and use
		Other challenges

Twenty-five countries were studied, and high-performing group included Korea, Australia, and Japan, mid-performing group Cambodia, China, and New Zealand, and low-performing group Bhutan, Laos, and Pakistan.

Table 31. Quality assessment level of Asia-pacific countries

high level	middle level	low level
ROK(21), Australia(19), Bangladesh(21), Japan(17), Malaysia(18), Myanmar(15), Singapore(17), Thailand(21)	Brunei(13), Cambodia(9), China(10), Hong Kong(12), Macao(11), DPRK(10), India(9), Indonesia(9), Maldives(11), Mongolia(11), Nepal(13), New Zealand(14), Philippines(12), Sri Lanka(10), Timor-Leste(10), Viet Nam(13)	Bhutan(6), Lao PDR(4), Pakistan(5)

* ( ) is the number of "agree" by Questions

Aside from Korea and Australia, most countries had difficulties related to legal limitations, data quality, and technology shortage.

Table 32. Reasons of regular health care monitoring in Asia-pacific countries

Area	high level	middle level	low level
data collection ·legal limitations ·policy limitations	Japan, Malaysia, Myanmar, Singapore	Brunei, Nepal, Sri Lanka	Lao PDR, Pakistan
data quality	Bangladesh, Japan, Malaysia, Myanmar, Thailand	Cambodia, China, Maldives, Indonesia, Mongolia, Viet Nam, Sri Lanka ,Timor-Leste	Lao PDR, Pakistan
data source and technology shortage	Bangladesh, Japan, Myanmar, Singapore	Brunei, Cambodia , China, Indonesia, Maldives, Mongolia, Nepal, Philippines, Sri Lanka , Viet Nam, Timor-Leste	Bhutan, Lao PDR, Pakistan

Table 33. Systematic measurement of patient experiences

Country	Patient Experiences*	Policies
Australia	+	The Australian Council on Healthcare Standards' EQuIP National and EQuIP5 accreditation programs Australian Commission on Safety and Quality in Health Care's paper: "Review of patient experience and satisfaction surveys conducted within public and private hospitals in Australia" Australian Bureau of Statistics' national survey Hospital-based surveys National Health Performance Authority's report
Bangladesh	+	Standardized tools were developed and used for systematic measurement
Brunei Darussalam	No response	
Cambodia	+	Guideline on Patient satisfaction Survey

Country	Patient Experiences*	Policies
China	No response	
China, Hong Kong SAR	+	Hospital Authority has engaged an independent patient satisfaction survey agency
China, Macao SAR	+	The Hospital Conde S. Januário has a “consumer participation policy”
Democratic People's Republic of Korea	+	Assessment committee of devotion established in Ministry of Public Health
India	-	
Indonesia	-	
Japan	+	Ministry of Health, Labour and Welfare conducts the Patient Experience Survey
Republic of Korea	+	Ministry of Health and Welfare and National Medical Center conduct surveys of patient experience
Lao People’s Democratic Republic		
Malaysia	+	The Institute of Health Management in collaboration with Programme heads in the Ministry of Health are responsible for the conduct of the various patient satisfaction surveys
Maldives	-	
Mongolia	-	
Myanmar	-	
Nepal	+	Quality Section under the Department of Health Services is responsible for the measurement of patient experiences
New Zealand	+	Health Quality & Safety Commission is developing a national patient experience indicators system in consultation with the Ministry of Health
Pakistan	-	
Philippines	-	
Singapore	+	Patient Satisfaction Survey ,supervised by the Ministry, is carried out annually for patients in public healthcare institutions

Country	Patient Experiences*	Policies
Sri Lanka	+	National guidelines on Quality and Safety in Healthcare provide a standard format to measure patient satisfaction
Thailand	+	The Healthcare Accreditation Institute is starting to collect patient experience information
Timor-Leste	+	Patient Suggestions centre at HNGV
Viet Nam	+	Patient survey annually with national standard questionnaires for every hospital obligation

* : Existence of systematic measurement

Source: WHO & OECD. Evaluating quality strategies in Asia-Pacific countries: survey results. 2015.

2. Future directions of measuring PRI

As healthcare system and quality assessment infrastructure vary from country to country, PRI indicator utilization methods are suggested for each group.

Countries ranked high such as Korea and Australia have the infrastructure for quality assessment and measurement. Therefore, adoption of PRI should be a priority task with an establishment of a long-term roadmap. Australian Bureau of Statistics collects patient experience on the national level and on the individual hospitals. In New Zealand, Health Quality & Safety Commission is developing patient experience indicator system with the Ministry of Health. In Japan, Ministry of Health, Labour, and Welfare conducts patient experience every three years. In Singapore, satisfaction survey is conducted every year in public healthcare providers under the supervision of the government. In Malaysia, Institute of Health Management conducts patient experience survey with the Ministry of Health. In Thailand, Healthcare Accreditation Institute started to collect patient experience data.

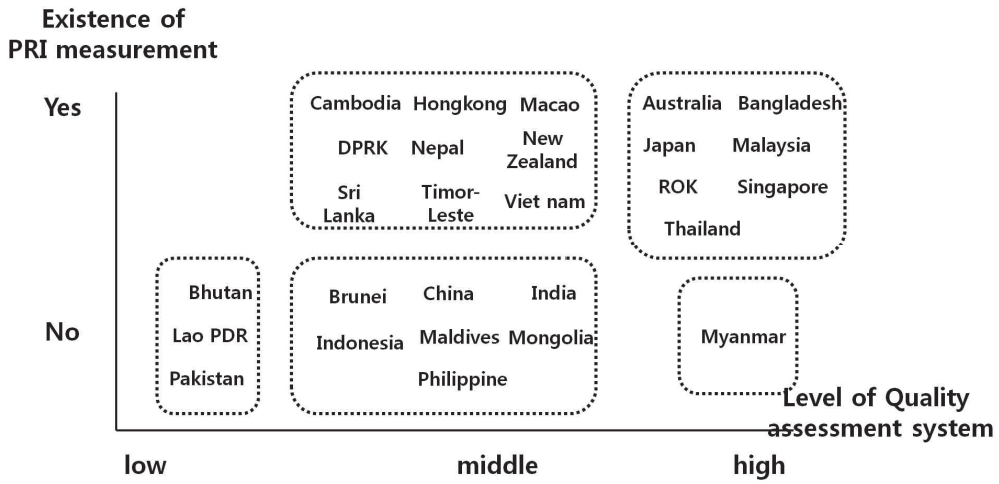

Figure 5. Systemic measurement of PRI at national level

Note. Patient experience survey: "Patient Reported Indicator" and "Healthcare Quality Assessment System" are surveyed and results are produced in 5 groups.

Countries situated in the middle, such as China and India, have some infrastructures in place but lack the PRI measurement system. They would need both infrastructure enhancement and political and technological complementary measures for adoption of PRI. Mid-level countries, excluding Cambodia, Indonesia, Mongolia, Sri-Lanka, East-Timor, and Vietnam, are reporting quality indicators at the national level, and should consider adopting PRI in their quality assessment process by benchmarking best practices in advance countries.

Establishing necessary infrastructure must come before adoption of PRI in Butane, Laos and other countries listed at the bottom.

Ⅴ. Conclusion

1. Patient-centered quality assessment

As patient-centeredness gained significance in healthcare system, it became important to measure how well the system reflected patients' demands. There are two types of measurement. One is patient experience that measures the patient's experience throughout the healthcare service delivery in the perspective of the patient, the other is PRI that measures patient's outcome which includes quality of life, and physical function.

Including Korea, many countries measure patient experience and use the result to improve healthcare system. Patient experience survey is conducted at the national level. Organizations including OECD and Commonwealth Fund survey patient experience internationally and release country comparison data.

PROMs are in use in some countries such as Canada and the Netherlands. But the tool hasn't been developed fully. PROMs are also used to strengthen patient-centered healthcare system, but most importantly, the result is reflected in the patient's care process.

There are prerequisites for the adoption of PROMs, which include development and standardization of tools, information collection system, and health literacy. There are various tools to measure PRO, and they should be used in the context of the culture and characteristics of the country. For comparison of country or region level, it is required to use standardized tools. In national level of outcome measurement, a web system is necessary where patients can register or enter their own data directly. Also, because patients are reporting about their own condition, efforts to enhance health literacy is essential so patients can submit data based on a full understanding of the research.

Internatinally, OECD and ICHOM are conducting research to standardize and utilize PROMs. As a follow up to the 2017 Health Ministerial Meeting, OECD has formed a task force PaRIS initiative to develop and standardize PRI. Most countries, including OECD member countries, have prioritized chronic disease. Since continuity of care and coordination of care are critical in chronic disease management, PROMs can come in handy. Measurement tools, methods, and etc. are being standardized to enable country comparison in the area of breast cancer, hip/knee replacement surgery, and mental illnesses where OECD was already collecting data from. ICHOM is developing standardized indicator sets for specific conditions, and expanding the list gradually.

2. Challenges for measuring patient-centeredness care

Korea expanded the measurement range of patient satisfaction and patient experience survey as patient-centered care gained more and more attention. Patient-centeredness assessment in Korea is conducted in specific hospitals (public hospitals, etc.) and domains (emergency care center). In hospital accreditation system, implementation of satisfaction survey is used as one of the accreditation standards. National Health and Nutrition Examination Survey was conducted in 2015 for the first time, but the related questionnaire is deleted since then. Patient Experience Survey on Medical Service, launched in 2017, will continue every year. Patient Experience Survey on Medical Service investigates inpatient and outpatient experience by surveying ordinary household members, but there is no direct link with healthcare policy. Patients' experience was measured for the first time in 2017 by HIRA on patients discharged from general hospitals with 500 beds or more, and the result was disclosed to the public in the unit of individual provider.

PROM indicators are not being surveyed at the national level, but there are

departments and hospitals were they are used independently. Standards for medical institution accreditation includes pain management, and pain management usually involves use of pain measurement tools. However, accreditation standards only look at whether the provider implemented a pain management, not the result of pain assessment score or change of scores. In Korea, some providers use independently developed measurement tools to treat patients. But as it is not a systematic PRO, the utilization of the tools vary upon the level of interest of the physician.

PROMs are necessary in order to reflect patients' needs and demands and to provide better care to patients. It is required to fully understand the measurement, develop and standardize tools with the participation of different stakeholders which include patient and medical circle.

To expand PROMs in Korea, the first priority is to have a good understanding of concept, necessity, and utilization methods of the measurement. PROMs are objectified measurement tools that measure patients' condition to use the result in treatment. It has been measured in clinical field, rather than an entirely new concept. The main objective of PROMs is to assess the overall healthcare system and utilize the result in patient treatment. In Korea, PROMs are collected and used only in limited departments. Thus, further discussion and promotion efforts are needed to expand PROMs use.

PROMs are measured in Korea either by using measurement tools developed in other countries translated into Korean, or tools developed internally by each entity. It is clear that standardization of those tools should take place to allow objective comparison and facilitate benchmarking. Also, the localization process of PROMs developed abroad needs to be standardized to ensure reliability and objectivity of measurement tools.

In Korea, PROMs are used in some Korean healthcare providers and for hospital accreditation, but is not linked to national level system assessment.

Adoption of PROMs should start with domains that need to be assessed for its patient-centeredness rather than efficiency. Such domains include chronic diseases, orthopedics, and rehabilitation. Currently limited use of PROMs in clinical practice, new drug approval and post evaluation, hospital accreditation should expand to connect with national systematic assessment.

Healthcare quality assessment level in Asia-Pacific region varies country by country. Taking into account assessment infrastructure in each country, discussion should take place to learn from advance countries' experience through network of professionals in quality improvement. It is necessary to share best practices from leading countries, and discuss what can be learned and implemented in the domestic assessment infrastructure.

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Appendix

Appendix 1. PROMs abbreviation

abbreviation	full name
AUDIT	Alcohol Use Disorder Identification Test
BAI	Beck Anxiety Inventory
BDI	Beck Depression Inventor
CDI	Children's depression Inventory
CGI	Clinical Global Impression
ECOG	Eastern Cooperative Oncology Group score
EORTC QLQ-C30	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire - Core Questionnaire
EPIC-CP	Expanded Prostate Cancer Index Composite
ESI	Eppendorf Schizophrenia inventory
EQ-5D	EuroQol EQ-5D
FACT-P	Functional Assessment of Cancer Therapy - Prostate
FACT-VCI	Functional assessment of cancer therapy - Vanderbilt Cystectomy Index
FKSI-15	Kidney Symptom Index - 15
HADS	Hospital Anxiety and Depression Scale
ICIQ	International Consultation on Incontinence Questionnaire
IIEF-5	International Index of Erectile Function - 5
IPSS	International Prostate Symptom Score
Korea ARS	Korea Attention Deficit Hyperactivity Disorder
MIBDI	Manitoba Inflammatory Bowel Disease Index
NPRS	Numeric Pain Rating Scale
OABSS	Overactive Bladder Symptom Score
PHQ-9	Patient Health Questionnaire
SCL-90-R	Symptom Checklist-90-Revised
SHIM	Sexual Health Inventory for Men
STAI	State-Trait Anxiety Inventory
VAS	Visual Analogue Scale
Y-BOCS	Yale-Brown Obsessive-Compulsive Scales

Appendix 2. Patient experience measurement

○ 7 Domains, 24 items

Domains	Indicators	Scale
Nurse Service	Q1. Did nurses treat you with courtesy and respect? Q2 .Did nurses listen carefully to you? Q3. Did nurses explain things in a way you could understand? Q4. How often did you get help as soon as you wanted it?	4 scores (Never, Sometimes, Usually, Always)
Doctor Service	Q5. Did doctors treat you with courtesy and respect? Q6. Did doctors listen carefully to you? Q7. How often did doctors talk with you about your condition or treatments? Q8. Did you get information about doctor's scheduled rounds?	4 scores
Medication & treatment process	Q9. Beforehand, did a member of staff explain the reason of medications/test/surgery? Q10.Beforehand, did a member of staff explain the risks of adverse events of medications/test/surgery? Q11.Do you think the hospital staff take proper action to control your pain? Q12.Do you feel you got enough emotional support from hospital staff? Q13.Did you get information about treatment plans after discharge?	4 scores
Hospital environment	Q14.how clean was the hospital room or ward? Q15.how safe was the hospital?	4 scores
Patient's rights	Q16.Did you feel you were treated fairly compared to other patients? Q17.Did you feel comfortable to complain when you want? Q18.Were you involved in decisions about your care and treatment? Q19.Were you given enough privacy when being examined or treated?	4 scores
Overall assessment	Using any number from 0 to 10, Q20.How would you rate your overall experience? Q21.Will you recommend to your family or friends?	11 scores (0~10score)
Personal characteristics	Q22.Were you hospitalized through emergency department? Q23.How is your health in general now? Q24.What is your educational background?	Adjustment variable

Appendix 3. Evaluating quality strategies in Asia-Pacific countries

No.	Domains	Questions
1.1	Overview of quality of care policies	Policies or documents for quality of care
		Organizations responsible for quality of care
1.2	Legal framework for quality of care	Legal and regulatory framework for quality of care
1.3	Professional certification/licensing and re-certification	Policies for mandatory CME/CPD and re-certification
1.4	Accreditation and other external quality assessment mechanisms	Existence of accreditation
		Existence of national standards for hospitals
		Type of accreditation
		Scoring systems
		ISO certification programme
1.5	Medical devices, blood products and pharmaceuticals	Technology assessment for medical devices
		Standards on safe blood use
		Technology assessment studies on drugs
		Pharmacovigilance systems
1.6	National audit studies and performance reports	National audit studies
1.7	Practice guidelines	Clinical practice guidelines
		Development area
		Disseminating mechanisms of CPGs
		Financial incentives to encourage compliance of CPGs
		Studies to assess compliance with guidelines
1.8	Quality indicators	Existence of quality indicators at national level
		Existence of consistency assuring mechanisms amongst the level of systems
		Quality of care feedback mechanisms for providers

No.	Domains	Questions
1.9	The ability of patients to influence quality and policies on measuring patient experiences	Systematic measurement of patient experiences
		Patient organizations
1.10	Public reporting on quality of care	Existence of public report on quality of care
		Existence of regular national reports on quality of care
		Influence of regular reports on quality of care
1.11	Financial incentives	Pay for performance
1.12	Patient safety and medical malpractice	Existence of national patient safety programme
		Adverse event reporting or medical malpractice addressing system
		Adverse event reporting or medical malpractice addressing system
1.13	Infection control policies	Existence of quality indicators and performance measures relating to infection control
		Existence of policies to prevent spread of infection
2.1	Data set at national level	
2.2	Custodian at national level	
2.3	Estimated proportion of service/population coverage	
2.4	Sources of data used to create the dataset	
2.5	Standards or guidelines for collecting the data	Standards or guidelines for data collection
2.6	Adherence to a global health data standard	Global health data standard
2.7	Records for patients	Data containing records for patients
2.8	Unique patient identification number	Data containing unique patient identification number
2.9	Unique patient identifier generated or used exclusively by the facility	Unique identifier used by the facility
2.10	ID system to link the data	Link to another data set
2.11	Data used to regularly report on health-care quality	Regularly report on health-care quality

No.	Domains	Questions
2.12	Indicators used to regularly monitor health-care quality	Examples of indicators on health-care quality
2.13	Difficulties in regular monitoring of health-care quality	Legal or policy barriers to the collection or analysis of data
		Concerns with the quality of the data that limits the usefulness
		Lack of resources or technical capacity for data collection, analysis and use
		Other challenges
2.14	Comparison with the past five years	much easier
		easier
		neither easier nor harder
		harder
		much harder
2.15	Expectation over the next five years	very likely
		likely
		Unsure
		unlikely
		very unlikely
3.1	SAVE LIVES: Clean Your Hands	
3.2	WHO Surgical Safety Checklist and Manual	
3.3	WHO Patient Safety Curriculum Guide	
3.4	The adaptation and promotion of QA/QI trainings	
3.5	Conceptual framework for the International Classification for Patient Safety	
3.6	Other Initiatives and Activities	