For the dissatisfaction with EOL care, 'dissatisfaction with physician's treatment of physical symptoms' was the most highly associated with potential psychiatric disorders (OR = 3.44). Unrelieved pain of female cancer patients during their last months of life showed a positive association with psychological morbidity such as sleep disorders in the widowers 4–5 years after bereavement [29]. Additionally, EOL care discussions are associated with less aggressive medical care, such as ventilation and resuscitation and less major depressive disorders in bereaved caregivers [15]. Therefore, satisfactory discussions about physical treatment in EOL care are helpful not only for the patients but also for the caregivers' psychological adjustment. Another factor, 'dissatisfaction with time spent communicating with patients' was significantly associated (OR = 1.55). A recent systematic review of communication with terminally ill patients and their families [30] indicated a lack of quantitative study. Communication skills training for healthcare professionals to improve discussions between patients and caregivers about EOL issues fostering realistic forms of hope is an essential future task for preventive intervention of spousal morbidity after bereavement [30].

We derived several implications for practice and research. In practice, we could obtain the following several indicators for early detection of high-risk spouses prior to the patient's death: 'patients using psychiatric consultation service', 'patients with stomach cancer', 'bereaved with a history of psychiatric disorder', 'dissatisfaction with time spent communicating with patients', and 'dissatisfaction with physician's treatment of physical symptoms'. Along with the early detection of spouses with these risk factors, nurse-assisted [31] or pharmacist-assisted [32] psychiatric referral programs using the 'Distress and Impact Thermometer' might be useful for directly evaluating psychological distress among spouses in EOL practice. In research, we could obtain the following possible strategies for preventive intervention of spousal morbidity after bereavement: assistance for improving 'discussions with physicians about physical treatment in EOL care' and 'discussions between patients and caregivers about EOL issues' would be effective. Development of communication skills training for healthcare professionals to improve these discussions must be considered in future research.

For the study limitations, first, the lack of an exact response rate was a critical methodological limitation. Nevertheless, we believe our estimated sample rate (31%) was adequate because the population of bereaved spouses included those who had died after the patient's death. Second, two sample biases might exist. One was caused by the data collection site, a single cancer center in Japan. However, we do not believe that this institutional bias had a serious effect on the representation of Japanese bereaved spouses of cancer patients because 90% of cancer patients in Japan die in a hospital [19]. In addition, the bereaved with high impaired mental health might have been more motivated to take part in the study. This might have resulted in an inflated number of potential psychiatric disorders. Third, this was a cross-sectional study, and we could not discuss the time course of the prevalence or any causality between impaired mental health and associated factors. In addition, it remains possible that there was a recall bias in answering the question about dissatisfaction with EOL care because it was such a long period for a retrospective report by the bereaved who had lost their partner several years earlier. Fourth, other important factors were not investigated in this study, such as the bereaved spouse's 'style of attachment to the deceased', 'function level among family members', 'perception of the dying process and whether this was traumatic', and 'available social support'. Finally, we have no objective data on EOL care; individuals whose spouses died 7 years ago would likely have had a very different experience in the oncology care setting compared with those whose spouses died more recently.

Conclusions

Nearly half the bereaved spouses showed potential psychiatric disorders even 7 years after bereavement. Patients' psychological distress, bereaved spouses' history of psychiatric disorder, and dissatisfaction with EOL care were indicators of high-risk spouses.

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Conflicts of interest

All authors declare that the answers to the questions on your competing interest form are all 'No' and therefore have nothing to declare.

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Chronic lung disease was found to have a strong association with being underweight. It was one of the chronic wasting diseases with systemic inflammation and protein degradation, and the prevalence was higher in the underweight population with greater disease-specific mortality.[9] Sarcopenia was considered the possible pathophysiological mechanism behind the obesity paradox.

The RAP trigger for nutrition was not a good indicator of underweight or obesity. Most MDS items for nutrition were not found to be good indicators of protein or calorie malnutrition.[10] Other tools with better detection sensitivity and specificity, such as bioelectrical impedance analysis for sarcopenia, should be employed in assessment of nutritional risk for nursing home residents.

There are several limitations of this study. First, BMI was not necessarily correlated with measures of body composition, such as visceral adiposity and sarcopenia. Second, the dynamic change in BMI, RAP triggers, and disease diagnosis could not be fully presented in this cohort study. Weight loss, new RAP triggers, and new disease diagnoses were all considered important risk factors for mortality and morbidity. Third, all participants were male, so the results should not be generalized to women.

In conclusion, being underweight was associated with greater risk of mortality after adjustment for age and comorbidities. Chronic lung disease was significantly associated with being underweight. Other than the intervention program for malnutrition, a multidimensional approach for all associated factors would prevent further adverse health outcomes in the elderly population.

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WEIGHT LOSS AND HOMEOSTATIC IMBALANCE OF LEPTIN AND GHRELIN LEVELS IN LEAN OLDER ADULTS

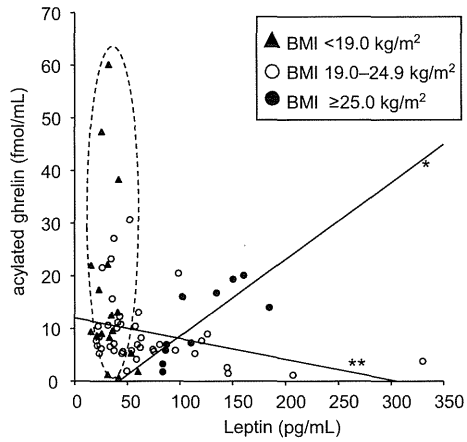
To the Editor: Appetite and food intake decline with age in elderly adults, and their decline results in unintended weight loss, which leads to frailty, morbidity, and mortality.[1] One reason why this anorexic state prevents elderly people from returning to their original weight is impaired regulation of food intake, which makes them likely to be

less hungry and to become rapidly satiated.[2] An imbalance between leptin and ghrelin, two peripheral hormones that signal changes in energy balance to the central nervous system (CNS) and act reciprocally to maintain body weight, may cause predisposition to impaired regulation of food intake.[3]

Sixty-eight elderly adults aged 65 and older (mean age 80.5 ± 5.8 years; female:male ratio 48:20) who were making regular visits to the geriatric outpatient clinic of Kyorin University Hospital were examined. Their diseases were well controlled. Fasting plasma leptin and acylated ghrelin levels were measured using enzyme-linked immunosorbent assay. Because of the potential effects of instrumental activities of daily living (IADLs) on daily energy needs and appetite, they were evaluated by scoring them on the Lawton IADL scale.[4]

The results of a simple regression analysis showed a positive correlation between subjects' plasma leptin levels and their body mass index (BMI; correlation coefficient (r) = 0.54, P<.001), although there was no correlation between their BMI and ghrelin level (r = −0.23, P = .06), age (r = 0.12, P = .31), or sex (r = 0.08, P = .54). After adjustment for age and sex, the results of multiple regression analysis showed significant correlations between BMI and leptin (partial regression coefficient [prc] = 0.29, P = .02), ghrelin (prc = −0.41, P<.001), leptin–ghrelin interaction (prc = 0.41, P<.001), and IADL scores (prc = 0.26, P = .04). When the subjects were stratified into three groups according to BMI (high, ≥25.0 kg/m^2; normal, 19.0–24.9 kg/m^2; and low, <19.0 kg/m^2), there was a significant positive correlation between leptin and ghrelin levels in the high BMI group (r = 0.79, P = .008) and a significant inverse correlation in the normal BMI group (r = −0.33, P = .03), but no significant correlation was not observed between the two peptides in the low BMI group (r = 0.22, P = .39) (Figure 1).

Leptin is a peptide and the product of the *OB* gene, which is expressed primarily in adipocytes, and it signals the CNS about the quantity of stored fat, whereas ghrelin is an acylated peptide produced in the stomach that relays hunger signals to the CNS. Thus, both peptides mutually act to maintain body weight. The results of the present study confirmed the existence of a strong positive correlation between plasma leptin levels and BMI in elderly adults,[5] as well as a tendency for higher ghrelin levels to be associated with lower BMI,[6] although the results provide preliminary evidence that the feedback control of leptin and ghrelin is limited to a small body weight range.



*r=0.79, p=.008 for BMI ≥25.0 kg/m²
**r=–0.33, p=.03 for BMI 19.0–24.9 kg/m²

Figure 1. Relationship between plasma leptin and acylated ghrelin levels of elderly adults attending a geriatrics clinic according to body mass index (BMI). Solid lines represent the statistically significant linear regressions of the data.

In the high BMI group, the relationship between the two peptides shifted to a positive correlation with increasing BMI. Regardless of the potential role of leptin in ghrelin regulation, insulin may be an important peripheral peptide in regulating energy balance in obese people. A previous study found that the plasma ghrelin levels of obese subjects depended on whether they had insulin resistance, because the obese insulin-sensitive subjects in their study had higher ghrelin levels, suggesting that compensatory hyperinsulinemia mediated the relationship between obesity and ghrelin.[7] Attenuated postprandial ghrelin suppression in obese subjects may also contribute to impaired satiety signaling and persistent hunger feelings.[8]

The data obtained data in the current study showed that all three subjects with the highest ghrelin levels were in the low BMI group. This is consistent with previous observations that plasma ghrelin levels increase under conditions associated with negative energy balance, such as body weight loss or anorexia, reflecting the ghrelin compensatory response to undernutrition. However, some individuals in the low BMI group had low ghrelin levels, which may reflect aging[9] or atrophic changes in the gastric mucosa, and their low ghrelin levels may have caused delayed gastric emptying that in turn suppressed food intake. A sedentary lifestyle and psychological and social factors may also underlie anorexia in elderly adults because the results of the current study showed that higher IADL scores were associated with higher BMI.

Further study will be needed to determine whether treating lean elderly adults with ghrelin would increased their food intake, although a comprehensive approach to lifestyle factors is now the best conceivable approach to preventing low body weight and sarcopenia in elderly adults.[10]

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ARE GERIATRIC SYNDROMES ASSOCIATED WITH RELUCTANCE TO INITIATE ORAL ANTICOAGULATION THERAPY IN ELDERLY ADULTS WITH NONVALVULAR ATRIAL FIBRILLATION?

To the Editor: Age is associated with risk of atrial fibrillation (AF) and its consequences, including stroke. In turn, stroke has been associated with mortality, disability, and health-related quality of life.[1] The American Association of Chest Physicians states that anticoagulation therapy (AT) must be initiated in individuals with nonvalvular AF in moderate- and high-risk categories for the development of stroke (according to congestive heart failure, hypertension, aged ≥75, diabetes mellitus, stroke, vascular disease, aged 65–74, sex (CHA_2DS_2VASc) score),[2,3] whereas a variety of major bleeding prediction scores, such as the hypertension, abnormal (renal/liver function), stroke, bleeding tendency, labile international normalized ratio, elderly, drugs (HAS-BLED) have been developed to aid in the decision-making process in relationship to prescribing AT.[4] Nevertheless, recent work has shown that the net clinical benefit favors the initiation of AT over the risk of major bleeding, even in individuals at high risk of bleeding.[5]

Bleeding risk in elderly adults with AF is frequently overestimated, whereas thrombotic risk is underestimated.[1,6] Thus, AT is underused in this context. It is likely that age-related factors such as functional status, falls, and cognitive impairment influence the decision to anticoagulate these individuals, although an association between the presence of geriatric syndromes (GSs) and the reluctance to initiate AT in elderly adults with nonvalvular

Table 1. Multivariate Logistic Regression of the Absence of Oral Anticoagulation Therapy

	Univariate Analyses, n = 137	Model 1, n = 136	Model 2, n = 129	Model 3, n = 128	Model 4, n = 128
Characteristic	Odds Ratio (95% Confidence Interval)				
Age	1.03 (0.97–1.08)	1.02 (0.96–1.08)	—	1.03 (0.96–1.11)	1.04 (0.96–1.12)
Female	0.70 (0.35–1.37)	0.61 (0.29–1.27)	—	0.55 (0.21–1.42)	0.58 (0.22–1.55)
Lives alone	0.67 (0.20–2.22)	0.82 (0.24–2.82)	—	1.03 (0.23–4.65)	0.94 (0.20–4.35)
Education, years	0.96 (0.90–1.02)	0.94 (0.88–1.01)	—	0.95 (0.88–1.48)	0.97 (0.89–1.06)
Hearing impairment	1.66 (0.84–3.27)	—	1.57 (0.66–3.73)	—	—
Visual impairment	2.09 (0.97–4.53)	—	2.45 (0.89–6.78)	2.84 (0.99–8.16)	—
≥3 falls/years	2.37 (1.01–5.53)[a]	—	1.61 (0.53–4.86)	—	—
IADLs disability	0.64 (0.26–1.56)	—	0.81 (0.26–2.56)	—	—
ADLs disability	0.49 (0.25–0.97)[a]	—	1.43 (0.58–3.55)	—	—
Depressive symptoms	5.12 (2.19–11.99)[b]	—	4.59 (1.73–12.12)[a]	4.94 (1.81–13.52)[a]	5.14 (1.84–14.34)[a]
Cognitive impairment	7.97 (3.62–17.53)[b]	—	7.32 (2.98–17.99)[b]	6.79 (2.73–16.87)[b]	6.27 (2.54–15.46)[b]
CHA_2DS_2VASc stroke risk score	1.03 (0.06–16.80)	—	—	—	1.02 (0.04–22.71)
HAS-BLED	2.58 (1.27–5.23)[a]	—	—	—	2.52 (1.03–6.16)[a]

Model 1 included age, sex, living situation, and educational level; Model 2 included hearing impairment, visual impairment, falls, instrumental activities of daily living (IADLs) and activities of daily living (ADLs) disability, depressive symptoms, and cognitive impairment; Model 3 included age, sex, living situation, educational level, visual impairment, depressive symptoms, and cognitive impairment; Model 4 included depressive symptoms and cognitive impairment and was adjusted for age; sex; living situation; educational level; congestive heart failure, hypertension, aged ≥75, diabetes mellitus, stroke, vascular disease, aged 65–74, sex (CHA_2DS_2VASc) stroke risk score; and hypertension, abnormal (renal/liver function), stroke, bleeding tendency, labile international normalized ratio, elderly, drugs (HAS-BLED) major bleeding risk score. Depressive symptoms = Geriatric Depression Scale (GDS) >5; Cognitive impairment = Mini-Mental State Examination (MMSE) ≤ 23.

$P <$ [a].05, [b].001.

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Review Articles

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Establishing a Quality Measurement System for Cancer Care in Japan

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Ensuring the quality of care is a major objective of cancer control policy. The Cancer Control Act 2006 placed responsibility on the Japanese government to maintain the quality of cancer care nationwide. To function as centers providing high-quality care, designated cancer care hospitals (397 hospitals as of April 2012) were instituted nationwide. Although they meet the structural standards, such as the presence of radiation equipment and palliative care teams, it remains unclear whether the designation has led to appropriate provision of care and optimal patient outcomes. A national system to examine the processes and outcomes of cancer care is under development. In 2007 and 2008, the Japanese Association of Clinical Cancer Centers publicly disclosed the 5-year survival of their member facilities with strict data quality standards, including sufficient follow-up of patients' vital status. The network of designated cancer care hospitals will follow this lead to provide a national outcome monitoring system. The processes of care have also been addressed by a government-funded research project. With the collaboration of clinical experts, 206 quality indicators have been developed for five major cancers in Japan (breast, colorectal, liver, lung and stomach) and palliative care. Each indicator described the target patients and standards of care for the patients, the provision of which was considered an aspect of quality. In 2012, the Cancer Registry Chapter of the Association of Prefectural Designated Cancer Care Hospitals instituted quality measurement using these indicators. These activities will soon lead to effective quality monitoring and improvement in Japan.

Key words: cancer – outcomes research – quality control – quality of health care

INTRODUCTION

Cancer Control Activities in Japan

Since 1981, cancer has been the leading cause of death in Japan (1). In 2010, about one-third of Japanese deaths were from cancer, and about half of men and women in Japan experience cancer at some time in their lives (2). Although the age-adjusted mortality is gradually decreasing because of a reduction in risk factors, advances in medical technology which enables early detection and effective treatment, the observed number of incident cancer cases is increasing as a result of rapid aging of the population (2), and poses a great burden on society. The need for high-quality cancer care is even greater.

This increased need led to the enactment of the Cancer Control Act in 2006 (3). The law emphasized three major areas in cancer control, namely the prevention and early detection of cancer, the guarantee of high-quality cancer care nationwide and the promotion of cancer research. The law was uniquely progressive in that it placed responsibility on the Japanese government to undertake concrete actions to ensure the quality of cancer care.

To ensure the quality of care nationwide, effective measurement systems need to be developed. Theoretically, the quality of medical care can be measured at the level of structure, process and outcome (4,5). Structure refers to the resources and environment that produce medical care, such as sufficient medical staff and provision of diagnostic and therapeutic equipment, which are necessary for high-quality care. Process measurement directly examines the care provided, either explicitly with pre-defined criteria for appropriateness or implicitly by means of peer-review by experts (6). Outcome is typically measured using factors associated with care such as survival (commonly a 5-year survival in cancer) and the quality of life (QOL) after treatment. Structure is easily measured and is thus extensively used for regulatory purposes. The government started designating certain hospitals nationwide as cancer care hospitals in 2003, and the criteria for the selection were almost exclusively based on structures, such as the presence of radiation equipment and having a palliative care team.

However, the structure does not guarantee the appropriateness of care processes or desired outcomes. To gain insight on the quality, we need to measure process and outcome. The work of establishing a system to measure processes and outcomes is currently under way. This review presents an overview of the activities to measure processes and outcomes to date and provides some perspectives for the future in Japan. Since outcomes are more intuitive than processes as indicators of the quality, we first present the methods and activities used for the outcome measurement and then discuss actions targeting measuring processes.

OUTCOME MEASUREMENT

Typically, the outcomes of treatment for cancer are measured by a 5-year survival (7,8). As simple as this indicator appears, there are a number of issues that need to be considered in the actual calculations. First, we need to fix the target patients. The easiest way is to target patients who had their tumor resected surgically, but this may miss a substantial proportion of patients, such as those with lung cancer, where more than half the patients are managed medically in the first-course treatment (9). If we are to measure and ensure the overall quality of cancer care provided to patients, a more conceptually appropriate method would be to include all patients treated. Since medically treated patients tend to be more severely ill than surgical patients because of comorbidities or advanced disease, their inclusion would decrease the 5-year survival (10). Whenever we interpret the survival data, we must pay great attention to the range of patients included.

A less apparent, but perhaps more influential factor, is the proportion of follow-up/censoring. To calculate the 5-year survival, we need to know whether patients are alive or dead 5 years after the start of observation (e.g. the time of diagnosis or first treatment). Usually, the survival calculation uses the Kaplan–Meier method (11), in which a patient known to be alive to a certain point, say at 3 years, is counted as a person at risk up to that point and is excluded from the denominator thereafter. The important assumption of this method relies on 'non-informative censoring', which is statistically defined as the condition that 'a patient's loss to follow-up does not provide any information on how long the patient would have survived' (12). However, in the real world where missing patients are more likely to be dead than patients who continue to be followed, the assumption is not valid. A study that compared the survival calculated from hospital statistics found that the rate was higher than the true survival determined from government registration data (10). The level of bias varied depending on the patient population and cancer types, but was as great as 19%. This underscores the importance of a thorough follow-up of the vital status of individual patients in the calculation of survival rates. A low follow-up rate (i.e. a large proportion of censored cases) can result in misleading overestimation of the survival.

When comparing the survival between hospitals, we must be aware that the patients' baseline characteristics may also be different across hospitals (13). Some hospitals may treat more advanced diseases or patients with more severe comorbidities than other hospitals (9). Risk-adjustment methods using statistical models are frequently used to adjust for the variations in patient populations (14). Although discussion of the statistical techniques is beyond the scope of this review, we feel that the risk adjustment methods are not well enough established in cancer care. The adjustment works best when the statistical models reflect the real world, such as the variables included. Furthermore, it is known that indirect standardizations using the observed or expected ratios of survival rates, which are frequently used in risk adjustment, can result in misleading results especially when comparing patient populations whose case mix varies greatly (14,15).

Public Disclosure of Survival Data

Public reporting of survival data by the Japanese Association of Clinical Cancer Centers (JACCC) is the first organized effort to measure and publicly disclose the 5-year survival rates of the major cancers in Japan (16,17). Member facilities calculated the 5-year survival and posted their data on the JACCC website in 2007 and 2008. The target patients for survival calculation were basically all patients, both surgical and medical, who received primary treatment at the facility. Most importantly, they paid great attention to the

quality of the data. They defined the data quality standards up-front (Table 1) and did not include hospital data which did not meet the standards. In particular, they considered the follow-up rate important because, as mentioned above, the suboptimal follow-up can result in the overestimation of survival rates. Without systematic rules for follow-up, hospitals may not be inclined to rigorously attempt to identify the vital status of patients because the true survival rates obtained from these efforts are lower than the observed (but wrong) survival rates calculated without efforts. The data quality standard therefore demanded that the proportion of censoring be kept at $<10\%$ of patients, otherwise the data were considered too biased, likely to be erroneously high, and were excluded from public disclosure.

Another unique point of the JACCC public disclosures was that they did not use model-based statistical risk adjustment of the survival data. Part of the reason was that the cancer registry data used contained limited information about patient characteristics except age and cancer stage. Therefore, both the stage-stratified survival as well as the overall survival was presented. The overall survival data were presented with the ratio of Stage I/Stage IV patients to concisely represent that the differences in patient population across facilities. This presentation helped to make the public aware that the survival data cannot be simply compared across facilities. These activities were extensively covered by the media and most mentioned the risk of making conclusions on the quality of care based on the survival data because of the differences in patient populations (18).

Recently, increasing numbers of hospitals have individually disclosed the survival data of patients treated in their facilities on their own websites. Table 2 shows the results of an Internet search we conducted using the Google search engine with the key words, 'survival' and 'colorectal cancer' in Japanese in June 2012 while writing this review. It shows a variation in the methods of calculating survival. Many targeted only surgical patients. Less than half of the reports presented the follow-up rate, making the quality of the data questionable. In addition, the differences in the severity of the patients' conditions at admission were uncertain and so these data may not be comparable. Overall, these data were difficult to interpret in the current form. An organized structure for calculation of survival is necessary. One such structure is currently planned in the framework of hospital-based cancer registries operated in all designated cancer care hospitals. However, the way to achieve sufficient follow-up rates remain unresolved.

Table 1. Excerpt from the data quality standards defined by the Japanese Association of Clinical Cancer Centers for public disclosure of cancer survival data

- The start of observation should be set at the date of diagnosis
- The first diagnosed cancer should be considered for survival calculation
- Hospital-based cancer registry should be the data source; a clinician database can be an alternative at the start
- Vital status should be elicited for $>90\%$ of the cases (aim 95%), or survival should not be calculated
- Stage should be elicited for $>60\%$ of the cases (aim 80%), or the survival should not be calculated
- Vital status should be ascertained by referral to local government office data
- Survival should be calculated with Kaplan–Meier estimation
- Relative survival should be used to adjust for death from the other causes

QOL Measures

Although the measurement of hard outcomes such as survival is clear cut, it may miss important aspects of the severity of the patients' conditions. To capture these details in the outcomes of treatment, several QOL measures, both generic and cancer specific, have been developed to date. These measures have been frequently used in clinical trials and technology assessment, but have seldom been regarded as a measure of the quality of care. This is perhaps because the measurement involves questioning patients, and thus is subject to ambiguities in self-reporting and missing data because some patients are unwilling to respond. If some of the quality of care is associated with improvement in QOL that cannot be captured by hard outcomes, we should not hesitate to measure the QOL as the outcome of care.

Table 2. Disclosure of individual hospitals in their own websites

Hospital	Patients	Follow-up rate	Stage stratification	Treatment period
1	Surgical, all treated	99.1%	Yes	2005/1–2009/1
2	Surgically treated	NP	No	1993–2008/12
3	Surgically treated	NP	No	2005–06
4	Surgically treated	100.0%	Yes	1993–2002
5	Surgically treated	NP	Yes	2007
6	Surgically treated	NP	Yes	1994/1–2000/12
7	Surgically/ endoscopically removed	NP	Yes	1970/8–1984/1
8	All treated	NP	Yes	NP
9	Surgically treated	NP	Yes	2004/1–2008/12
10	Surgically treated	NP	Yes	Last 10 years
11	Surgically treated	100.0%	Yes	1991–2003
12	Registered to HBCR	96.7%	Yes	2002/6–2003
13	Surgically treated	96.3%	Yes	1993/1–2007/6
14	Surgically treated	NP	Yes	1993/1–2001/12

HBCR, hospital-based cancer registry; NP, not presented.

PROCESS MEASUREMENTS

From a quality improvement perspective, the 5-year survival has several limitations in the context of a quality monitoring system. The two most important limitations are the uncertainty about the factors contributing to the outcomes, and the time between care provision and outcome measurement (19). The former means that if there is suboptimal survival, we need to look for what needs improvement. The causes can be medical care, surgical procedures or even factors other than the quality of care, perhaps not under the control of doctors and hospitals (20). The latter means that, by definition, the 5-year survival needs 5 years before being calculated. During the 5 years, staff or even standards can change. To overcome these limitations, the measurement of processes can be used. Since process measurement deals with the processes of care, these can be assessed in a timely manner and the measurements themselves can identify problems that need to be addressed. Although the process measures have their own limitations, as described later, they can offset the pitfalls of the outcome measures.

Processes of care can be assessed in an implicit way, through peer-review by clinical experts, or in an explicit way using a set of criteria, typically defined by clinical experts (6). The implicit methods have much greater flexibility than the explicit methods because the care can be examined according to the reviewers' expertise. However, the results can be unreliable without a structural guide for the review (21), and requires extensive involvement of experts, which is sometimes difficult to obtain because of their demanding schedule. In the method using explicit criteria, once the criteria are developed, data collection for the implementation can be done by non-experts and has greater reliability (22). It may not be an easy task to set the explicit criteria, but is probably a more realistic option than to have experts available for the review. Typically, explicit criteria define the standards of care with a description of target patients and the care processes that such patients should receive (6,19,23–25). The proportion of target patients who actually receive the care specified is considered to represent the quality of care in that aspect. Therefore, such criteria are often called quality indicators (QIs, more specifically, process-of-care QIs, because outcome or structure can represent quality, too), and the proportion calculated are called quality scores. These QIs have some similarity with the recommendations in clinical practice guidelines in describing the standards of care, but the quality criteria must be more clearly defined for evaluation purposes. For example, one frequently used criterion, 'post-surgical chemotherapy for Stage III colon cancer patients' (26,27) defines the target patient as colon cancer patients who had surgical removal of the tumor and were pathological Stage III, and the care processes as chemotherapy within a certain time frame after surgery. Since each QI covers only an aspect of care for the specified patients, many QIs are needed to comprehensively examine the quality of care (6,24,25).

Development of QIs

A Japanese government-funded research project started developing QIs to measure the quality of care for breast, colorectal, liver, lung and stomach cancer and palliative care in late 2006 (28). Defining the process-of-care QI is a challenge. Ideally, QIs should: (1) be based on firm evidence and professional consensus to improve outcomes; (2) be able to be implemented on some data sources that exist already, preferably in an electronic format and (3) be expected to have room for improvement in community practice (25,26). To enable the development of QIs integrating these conditions, we followed the commonly used methods in the development of QIs adapted from the RAND-University of California, Los Angeles Appropriateness method (29,30). This method is extensively used to develop QIs (25,31–33), and the quality measured by criteria formulated with this method has been shown to have concurrent validity, according to a survey of practicing physicians (34), and predictive validity for survival after care (35). This method involved the preparation of candidate QIs and a summary of supporting evidence, followed by examination by a group of experts to determine whether these QIs had validity and feasibility. The candidate QIs were assembled from already existing QIs mainly from other countries (26,27,36,37) and/or the recommendations of clinical practice guidelines developed by Japanese professional societies (38–42). We treated the QIs from other countries as candidates rather than accepting them as they were because the standards of care can be different in Japan, such as the controversy regarding the necessity of extensive lymph node dissection for advanced gastric cancer. Extensive dissection can be considered as standard in Japan (43,44), while there appears to be disagreement expressed from surgeons in other countries (45).

Each of the candidate QIs was evaluated through the modified Delphi processes by a panel of nationally recognized clinical experts (28,46). The panel included surgeons, medical oncologists, endoscopists, radiologists and pathologists, depending on the specialty involved in the care of each cancer type. The number of panelists ranged from 9 to 11. The panel members were mailed a rating sheet listing the candidate QIs alongside a scale of 1–9 with the summary of evidence that supported each QI. The members rated the validity of each QI (a high number indicated high validity) and returned the sheet to the project office. Then, a face-to-face meeting was held to discuss each QI. Members were provided with the distribution of their first ratings without disclosing who assigned which ratings. If they felt that the QIs needed some modification or improvement, they were allowed to do this as a group. They then assigned the second ratings. QIs rated as 7 or higher by more than half of the panelists and 3 or less by two or fewer panelists in the second ratings were accepted. These processes produced 206 QIs in total. These covered a broad range of care for five cancers from diagnostic evaluation to treatment and follow-up. The whole set of QIs are

published on the project website (28). Examples of the QIs are listed in Table 3.

Consideration on Implementation

For the research project, we used the primary source of information for QI implementation as patient medical records to minimize the restriction in the area for measurement. Since the designated cancer care hospitals are required to have cancer registrars to operate the hospital-based cancer registry, we expected that they would take on the task of record abstraction. We piloted the implementation of the QIs in cooperation with cancer registrars. In 2009–10, we conducted the pilot project in 18 hospitals nationwide to implement the QIs for stomach, colorectal, breast and lung cancers. We reviewed all newly treated cases in the participating facilities. The results found reasonable care in some areas and room for improvement in other areas (47–49).

Moreover, from the pilot studies, we found several challenges to be overcome in the establishment of a nationwide system. First, the task of medical record abstraction took up a large amount of time of the abstractors. The abstraction of one patient's data could take 40 min to an hour. As of 2012, it is a requirement for the designated cancer care hospitals to hire at least one trained cancer registrar to manage the hospital-based cancer registry. If we are to measure the quality as part of the routine work of the registrars, we need more staff.

Secondly, the documentation is sometimes insufficient. It is particularly troublesome when information to determine the eligibility of patients for a QI is missing. For example, performance status was frequently missing thus diminishing our ability to determine the indication for chemotherapy. Furthermore, some findings were documented in order to support the treatment choice. For example, the level of pain may be documented only when the patient receives analgesic medications. If this happens, the proportion of patients whose pain was addressed and treated will be overestimated. On the other hand, lack of documentation can, of course, lead to poor quality scores. If the indicated care was performed but not documented, it will not be captured in the quality data, and thus, considered the same as not provided in the quality measures. The quality of documentation can substantially influence the measured quality. In a different perspective, however, the quality of documentation is certainly part of quality. Miscommunication between health providers is a major contributor of medical errors (50). Appropriate documentation enables information sharing among the team of health professionals, preventing errors and enhancing smooth collaboration. Documentation does not need to be over-emphasized, but should not be overlooked.

Another rare but interesting problem we found was that some records were written totally in English, not Japanese. Although English is a mandatory subject in the Japanese education system, we cannot expect that all medical record abstractors understand the documentation written in English. In such cases, medical record abstraction needs help from doctors or those who have proficiency in English. From the quality of care perspective, we do not know whether such documentation practices represent better or worse quality. It may represent the documenting physician's ability to collect state-of-the-art medical information not only in Japanese but also in English, but it may weaken the level of information sharing among the local health-care team. This may need to be addressed by discussion with the clinical experts in the process of setting the standards for quality.

Table 3. Examples of QIs

Denominators (target patients)	Numerators (care processes recommended)
Gastric cancer patients with cT1N1–3 or cT2-4aN0-4 disease	D2 or greater gastrectomy was performed as the initial treatment, or if not, the reason was stated in the medical record
Patients with colorectal cancer who underwent surgical resection and diagnosed pathologically with Stage III disease	Standard adjuvant chemotherapy is performed within 8 weeks after surgery or reason for no chemotherapy is documented
Colorectal cancer patients who underwent surgery	Surgical risks (including the nature of complications, their incidence and mortality) were explained, and stated in the medical record
Patients with Stage I to II breast cancer of 3 cm or less in diameter	Breast-conserving surgery was performed or the option was explained and documented
Patients <75 years old, who were PS0-1, diagnosed with Stages III–IV non-small-cell lung cancer, and received chemotherapy	Two-agent combination chemotherapy including a platinum drug was performed, and if not, the basis for not doing so was stated in the medical record
Patients with hepatocellular carcinoma and liver damage class A, having 3 or less tumors of 3 cm or smaller in diameter	Surgical resection or percutaneous local ablation therapy was performed
Patients started on opioid therapy on an outpatient basis	Effectiveness, adverse reactions and compliance are checked by physician, pharmacist or nurse and documented in the medical records

Consideration on Process–outcome Link

Theoretically, the process quality must be linked to outcomes. As the aim of medical care is to improve outcomes, the processes that do not improve the outcomes do not become the standard for high-quality care. Process-of-care QIs developed in prior studies were often examined for their link with improved outcomes. Some showed a positive relationship (35,51) and others did not (52). A study that compared the survival curves between those who received post-surgical drug therapy conforming to the St. Gallen recommendation and those who did not showed that the former had a better survival (51). In contrast, many

of the well-established QIs for chronic heart disease were not associated with the 60–90-day mortality after discharge (52).

However, we need to make distinction between the theoretical and observed link. It is reasonable to examine the process–outcome link in the real data, but several problems exist to overemphasize the process–outcome link observed, or the proposal to rank QIs based on the link to the outcomes. First, the outcomes targeted to be improved with the process vary across the QIs. For example, the QI that recommends prophylactic anti-emetic use along with high-risk chemotherapy aims to improve the QOL during chemotherapy, and the QI that recommends giving sufficient explanation to patients about their treatment focuses on patient centeredness. These QIs cannot be compared with QIs for care that improves survival. Furthermore, some care aims to improve short-term outcomes while some improves long-term outcomes (53). Secondly, diagnostic processes improve outcomes through enabling appropriate treatment, which is a more indirect effect on outcomes than the treatment processes. It may lead to the diagnostic processes showing a weaker link to the treatment processes. However, it does not mean that diagnosis is less important than treatment. Thirdly, even if we do not find a relationship between the process of care and outcomes in an observational study, the reasons could be anything other than the true effect of care processes, such as the sample size, and confounders other than the quality. In particular, when the care process proved to be effective in randomized controlled studies, a lack of relationship in the examination of process–outcome, which probably takes an observational design, does not necessarily refute the efficacy of care.

With all these limitations in mind, however, we agree that it is worth examining the process–outcome link. If appropriately interpreted, the results will enrich discussion by the experts in the revision or development of the QIs in future.

Limitations of Process Measurement

Compared with the outcomes, processes have their own limitations, too. First, the quality of care can be measured only in the area where standards exist and are contained in the QIs. Innovative approaches to advance medical care or excellent surgical skills for which no standard exists cannot be measured. Such aspects of care are expected to be captured in the outcomes measurement. Secondly, the content of processes needs expert knowledge and the relative importance of each can sometimes be uncertain. It leads to uncertainty in creating a valid summary score integrating multiple QIs. Finally, the criteria can change along with advances in medical knowledge. A prior study showed that half of clinical practice guidelines are out of date in 5.8 years (54). Process of care QIs need periodic updates, and once the QI changes, we cannot trace trends in quality. Outcome measures are more stable in this sense. For quality measurements to be useful and reliable, a correct balance of processes and outcomes is necessary.

Current Activities for the Process Quality Monitoring System

In December 2011, the Association of Prefectural Designated Cancer Care Hospitals started the Cancer Registry Chapter, which sponsors the QI activities. These activities are intended to use hospital-based cancer registry data linked with health insurance claims. The hospital-based cancer registries contain patient characteristics and tumor characteristics, including cancer type, histopathology and TNM stage, and the health insurance claims data contain the medical services provided in the facility. The hospital-based cancer registries can be used to create a list of eligible patients because these data are routinely submitted to the National Cancer Center every year. The greatest advantage of these data sets is that they are all electronically available.

A possible limitation in the use of these electronic data is that we cannot capture the care provided in other facilities. For example, as mentioned above, a QI states that Stage III colorectal cancer should receive chemotherapy after surgery. If patients were referred to another hospital after surgery and received chemotherapy in the other hospital, this chemotherapy cannot be captured in the claims data of the original facility. Such collaboration in care between hospitals is now encouraged for the efficient use of resources. We will need to examine the extent that this referral practice influences the quality measurement in the course of our quality measurement activities.

Another limitation is that we cannot take into account the reasons for care inconsistent with the standards recommended in the QI. The recommended care may not be provided because of patient preference or patient physical conditions such as age and comorbidities. The electronic data does not include information on such clinical judgment. From the report on the Quality and Outcomes Framework in the UK, these exceptions existed in ~5% of cases (55). This figure may be different in cancer care and will also differ across the types of care and patient populations. A separate study will need to address the level of exceptions.

Given the two limitations, caution will be needed in considering the results as 'quality of care'. One additional step will be necessary to ascertain the care provision in other facilities and reasons for exceptional treatment. Nonetheless, identifying the cases who failed to receive the recommended care and examining the reasons will be part of the quality improvement processes. The benefit can become even greater if the reasons for exceptions are shared widely and the ideal care for such cases is discussed. It will reveal areas where controversy and variation exist for future clinical research, which should advance the knowledge of patient management. After all, this may be the most practical way of constructing an ongoing monitoring system of quality of cancer care in Japan.

CONCLUSIONS

We presented an overview of current activities for measuring the quality of care in Japan. In the era of population aging and rising health-care costs, ensuring the quality of care is of greater importance ever before. The quality measurement is not a simple task. There are a myriad of considerations in preparing, using and interpreting the measurements. Nevertheless, to ensure and improve the quality of care, we must start by measuring. Although the perfect measurement of quality is difficult, measurement does not need to be perfect to enable improvement. We simply need the data to act on. A key to improvement is not to blame someone for the problems found or simply to compete against each other, but for every player to work collaboratively to solve the problems. Whether we should make the results public may be a concern among those measured, but it is a secondary issue. The research findings to date show patients do not frequently use the quality measurement for their chosen hospital (56,57), but transparency is a value in itself unless it causes unintended consequences, such as health providers gaming with the measurement (58). We should continue efforts to measure the quality, discuss improvements in both measurement and care and research the answer to questions arising during the processes.

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Conflict of interest statement

None declared.

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