

# The Role of Cancer Boards in the Treatment Decisions Regarding Chemotherapy

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## Abstract

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**Objective** The influence of cancer boards with respect to the treatment decisions regarding chemotherapy remains to be elucidated. In the present study, we investigated the cases that presented at our institutional cancer boards, to assess the effect of cancer boards on the treatment decisions regarding chemotherapy.

**Methods** Data from the cancer boards at Yamagata University Hospital, Yamagata, Japan, were collected. Along with data from the clinical records, the details of the discussions and the chosen plan of treatment of the cancer boards were analyzed.

**Results** From February 2010 to February 2014, 1,541 cases were discussed at our cancer boards. Of these, 811 cases (52.6%) involved discussions about chemotherapy. Of those 811 cases, recommendations were made to alter the treatment plans for 189 cases (23.3%). The reasons for discouraging chemotherapy varied; however, 29/45 (64.4%) cases involved discouragement for the following reasons: old age, a comorbid condition, the physical (performance) status, or insufficient evidence to administer chemotherapy. Eighty-six patients were referred to the medical oncology department through the cancer boards.

**Conclusion** Our results showed that cancer boards have a great influence on the treatment decisions regarding chemotherapy and the prompt referral of cases to medical oncologists as necessary. In terms of future research, we will evaluate the effect of cancer boards on the prognosis and outcomes of cases using the institutional cancer registry.

**Key words:** cancer board, chemotherapy, clinical conference, interdisciplinary communication, medical oncology

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## Introduction

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A cancer board (CB) is a multidisciplinary cancer conference to discuss the best treatments for cases, according to the opinions of healthcare professionals from various specialties (physicians, surgeons, medical oncologists, radiation oncologists, diagnostic radiologists, palliative care specialists, pathologists, nurses, and pharmacists) (1, 2). The multidisciplinary approach of the CB has drawn attention in the

field of cancer treatment, because of the growing specialization and complexity of medical practice. In the United Kingdom, more than 80% of treatments for newly diagnosed cancer patients have been discussed in a CB (3). The effect of CBs on the treatment decisions and outcomes has been reported (4-9), along with other additional benefits related to education, learning, or research (10, 11), thus making their value widely recognized.

Medical oncologists act not only as professionals of chemotherapy, but also as coordinators of multidisciplinary can-

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**Table 1. Timetable of the Cancer Board in Yamagata University Hospital.**

Week of the month	Day of the week	Starting time				
		17:00	17:30	18:00	18:30	19:00
First	Tuesday	Lung <sup>†</sup>	Bone, soft tissue	Digestive organs <sup>‡</sup>	Brain <sup>§</sup>	
	Wednesday	Hematology, pediatric	Head and neck <sup>l</sup>	Others		
Second	Tuesday	Lung <sup>†</sup>	Gynecology <sup>¶</sup>	Digestive organs <sup>‡</sup>	Urology <sup>††</sup>	Breast
Third	Tuesday	Lung <sup>†</sup>	Bone, soft tissue	Digestive organs <sup>‡</sup>	Brain <sup>§</sup>	
	Wednesday	Hematology, pediatric	Head and neck <sup>l</sup>	Others		
Fourth	Tuesday	Lung <sup>†</sup>	Gynecology <sup>¶</sup>	Digestive organs <sup>‡</sup>	Urology <sup>††</sup>	

<sup>†</sup> Cancers of the intrathoracic organs are included.

<sup>‡</sup> Separated into a gastrointestinal board and hepatobiliopancreatic board.

<sup>§</sup> Cancers of the central nervous system.

<sup>l</sup> Cancers of the oral cavity are included.

<sup>¶</sup> Cancers of the female genital organs.

<sup>††</sup> Cancers of the urinary tract and male genital organs.

**Table 2. Classification of Determinations at Cancer Boards.**

A	Chemotherapy not discussed <sup>†</sup>
B	Approval of planned chemotherapy
C	Recommendation of unplanned chemotherapy
D	Discouragement of planned chemotherapy
E	Alteration of treatment sequence and/or chemotherapy regimen
F	Other

<sup>†</sup> Regardless of whether chemotherapy was involved or not. Cases in which chemotherapy was not mentioned in the discussion are classified into this category.

cer treatment (12), and their role is widely recognized in Western countries; there are approximately 15,000 medical oncologists in the United States (approximate population: 320 million). In contrast, a total of only 954 medical oncologists were certified by the Japanese Society of Medical Oncology by the year 2014 (approximate population in Japan: 130 million) (13), although their role has started to be recognized over the past decade (14). We believe that medical oncologists play a substantial role as “facilitators” or “conductors” in CBs (10, 11), and with the increase of medical oncologists in Japan, CBs are now becoming common in Japan. CBs are held on a regular basis in designated cancer hospitals and many other hospitals in Japan (15). However, only a limited knowledge exists about the influence of cancer boards with respect to treatment decisions regarding chemotherapy, especially in Asian regions.

In order to address these gaps in the literature, we assessed the effect of CBs on the treatment decisions regarding chemotherapy by investigating cases of CBs during which chemotherapy was discussed, at Yamagata University Hospital.

## Materials and Methods

### Cancer boards at Yamagata University Hospital

Yamagata University Hospital is a designated cancer care

hospital in Yamagata Prefecture, located about 300 km north of Tokyo, Japan. Approximately 1,200 newly diagnosed cancer patients are treated at the hospital every year. Details of our hospital and the CBs are described elsewhere (2, 16). In brief, CBs are held every Tuesday and biweekly on Wednesdays (separated into 13 boards according to the type of cancer), and focus on the best treatment for each case. The timetable for the boards is shown in Table 1. Medical oncologists, radiation oncologists, diagnostic radiologists, palliative care specialists, physicians and surgeons from each specialty, and any other personnel who ought to participate in the discussion (e.g. pathologists, nurses, pharmacists, and medical students) attended the CB, to form a multidisciplinary cancer conference.

### Data collection and analysis

We collected data from CBs and clinical records to analyze the details of the discussions and the chosen plan of treatment. We counted the number of cases discussed at CBs; thus, the same patient could be counted more than once, according to the number of times the case was presented at the CB. However, the number of patients was counted, not cases, when assessing the number of patients who were referred to the medical oncologist in addition to the CB.

The details of the discussions and the chosen plan of treatment were classified into six categories (A to F). Ta-

**Table 3. Number of Cases Discussed at Each Cancer Board and the Determination.**

Board	Classification of the determination at each cancer board <sup>†</sup>						Total
	A	B	C	D	E	F	
Brain <sup>‡</sup>	82 (5.3)	75 (4.9)	5 (0.3)	2 (0.1)	2 (0.1)	4 (0.3)	170 (11.0)
Bone, soft tissue	45 (2.9)	15 (1.0)	4 (0.3)	4 (0.3)	1 (0.1)	3 (0.2)	72 (4.7)
Breast	2 (0.1)	7 (0.5)	1 (0.1)	1 (0.1)	2 (0.1)	0 (0.0)	13 (0.8)
Gastrointestinal	37 (2.4)	71 (4.6)	21 (1.4)	4 (0.3)	7 (0.5)	7 (0.5)	147 (9.5)
Gynecology <sup>§</sup>	30 (1.9)	45 (2.9)	4 (0.3)	2 (0.1)	6 (0.4)	10 (0.6)	97 (6.3)
Head and neck <sup>  </sup>	81 (5.3)	44 (2.9)	5 (0.3)	7 (0.5)	4 (0.3)	7 (0.5)	148 (9.6)
Hematology	74 (4.8)	166 (10.8)	4 (0.3)	1 (0.1)	0 (0.0)	0 (0.0)	245 (15.9)
Hepatobiliarypancreatic	39 (2.5)	11 (0.7)	1 (0.1)	2 (0.1)	1 (0.1)	2 (0.1)	56 (3.6)
Lung <sup>¶</sup>	111 (7.2)	134 (8.7)	14 (0.9)	18 (1.2)	15 (1.0)	4 (0.3)	296 (19.2)
Others	18 (1.2)	5 (0.3)	3 (0.2)	0 (0.0)	0 (0.0)	2 (0.1)	27 (1.8)
Pediatric	15 (1.0)	10 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	25 (1.6)
Urology <sup>††</sup>	191 (12.4)	39 (2.5)	4 (0.3)	4 (0.3)	4 (0.3)	2 (0.1)	244 (15.8)
Subtotal <sup>‡‡</sup>	-	-	-	189 (12.3)			-
Total	730 (47.4)	622 (40.4)	66 (4.3)	45 (2.9)	40 (2.6)	38 (2.5)	1,541 (100)

<sup>†</sup> Data are shown as *n* (%). A: Chemotherapy not discussed; B: Approval of planned chemotherapy; C: Recommendation of unplanned chemotherapy; D: Discouragement of planned chemotherapy; E: Alteration of treatment sequence and/or chemotherapy regimen; F: Other.

<sup>‡</sup> Cancers of the central nervous system.

<sup>§</sup> Cancers of the female genital organs.

<sup>||</sup> Cancers of the oral cavity are included.

<sup>¶</sup> Cancers of the intrathoracic organs are included.

<sup>††</sup> Cancers of the urinary tract and male genital organs.

<sup>‡‡</sup> Subtotal of cases for which the plan for chemotherapy was altered. Details within each board are as follows: brain 13/170 (7.6%), bone and soft tissue 12/72 (16.7%), breast 4/13 (30.8%), gastrointestinal 39/147 (26.5%), gynecology 22/97 (22.7%), head and neck 23/148 (15.5%), hematology 5/245 (2.0%), hepatobiliarypancreatic 6/56 (10.7%), lung 51/296 (17.2%), others 5/27 (18.5%), pediatric 0/25 (0%), and urology 14/244 (5.7%).

ble 2 shows the classifications for each type of determination. We classified the cases as Category F, or “Other,” when more detailed examination was needed, more detailed survey of publications was needed, or the treatment choice was to be made by the patient.

A difference in the proportions of the categories of determination for cases introduced to medical oncologists versus those who were not were compared using Pearson’s Chi-square test with Yate’s continuity correction, Post-hoc McNemar’s Chi-square test with continuity correction, and the Bonferroni-Holm adjustment for multiple comparisons. Fisher’s exact test was performed instead, when any of the categories’ expected values were below 5. A *p* value <0.05 was considered to be statistically significant. Statistical analyses were performed using the R software Version 3.0.2 (R Foundation for Statistical Computing, Vienna, Austria).

## Results

From February 2010 to February 2014, 1,541 cases were discussed at CBs. Overall, 7,489 patients were registered in the institutional cancer registry during the same period; thus, approximately 20.6% (1,541/7,489) of the cases at our hospital were discussed at the CB. The number of cases discussed at each board and the determinations are shown in Table 3. Among 811 cases [811/1,541 (52.6%)] that involved discussions concerning chemotherapy, treatment alterations were recommended for 189 patients (23.3%). The lung board had the largest number of cases (*n*=296), followed by hematology (*n*=245), and urology (*n*=244). In terms of cases in which chemotherapy was involved, the

lung board also had the largest number (*n*=185), followed by hematology (*n*=171), and gastrointestinal (*n*=110).

Alteration of the chemotherapy plan was observed in 189/1,541 (12.3%) of all cases, and 189/811 (23.3%) of cases in which chemotherapy was involved (Table 3). Alteration of the planned treatment showed the largest proportion in the “other” category [5/10 (55.6%)], followed by bone and soft tissue [12/27 (44.4%)], breast [4/11 (36.4%)], gastrointestinal [39/110 (35.5%)], and hepatobiliarypancreatic [6/17 (35.3%)]. An excessively small proportion compared to other boards was seen for the hematology board [cases with altered chemotherapy plans: 5/171 (2.9%)] and pediatric board [0/10 (0.0%)]. Treatment regarding chemotherapy was not planned (e.g., neo-adjuvant or adjuvant chemotherapy) in most cases that were classified as Category C (63/66); however, in three cases, a decision was made not to administer chemotherapy. The reasons for discouraging chemotherapy varied; however, 29/45 (64.4%) cases were classified as Category D for the following reasons: old age, comorbid condition, physical (performance) status, or insufficient evidence to administer chemotherapy.

Overall, 93 patients were treated in the medical oncology department, and 86 patients were referred through the CBs (Table 4). Category A included cases in which chemotherapy was administered, but they were not mentioned in the discussion at CBs; 13 patients were classified in this category. Of these, seven cases were presented only to discuss radiotherapy, and chemoradiotherapy was performed in the clinical oncology department. The other six cases were referred to the medical oncologist as outpatients afterwards, without chemotherapy being discussed at the CB, in order to

**Table 4. Number of Patients Discussed at Cancer Boards who were Treated in the Medical Oncology Department.**

Category <sup>†</sup>	2009	2010	2011	2012	2013 <sup>‡</sup>	Total
A	2	3	2	1	5	13 (14.0)
B	3	13	10	16	11	53 (57.0)
C	0	4	3	1	2	10 (10.8)
D	0	0	0	1	1	2 (2.2)
E	0	0	3	3	1	7 (7.5)
F	2	3	1	1	1	8 (8.6)
Total	7	23	19	23	21	93 (100)

Data are shown as n (%).

<sup>†</sup> Classification of the determination at cancer boards. A: Chemotherapy not discussed; B: Approval of planned chemotherapy; C: Recommendation of unplanned chemotherapy; D: Discouragement of planned chemotherapy; E: Alteration of treatment sequence and/or chemotherapy regimen; F: Other.

<sup>‡</sup> Category A includes one case from 2014.

provide information about chemotherapy to the patient according to their request. Seven patients were referred to the medical oncologist before being presented at the CB, and thus were excluded from the number referred through the CBs.

In addition, we compared differences in the proportions between the categories of determination for cases introduced to medical oncologists and those that were not, using the Chi-square test. The proportions significantly differed between the groups ( $p < 0.001$ ). The difference in the proportions was still significant between the groups even after excluding Category A ( $p = 0.01$ ), for which chemotherapy was less frequent. A post-hoc analysis showed that the proportions significantly differed in Categories C to F (all adjusted  $p$  values  $< 0.003$ ).

## Discussion

This study reported the current status of CB in our hospital, and investigated the influence of CBs on the treatment decisions regarding chemotherapy specifically. The results of our study showed that CBs have an influence on the treatment decisions regarding chemotherapy. We also demonstrated that CBs have an effect on the chemotherapy decisions regardless of the cancer type, since we were able to compare the CBs of the same quality across different cancers. The different pattern seen for hematology and pediatric boards was due to the lack of cases that required discussion about chemotherapy in these two groups, because there is wide consensus on the standard treatments and protocols for these types of cancer.

For most cases that presented at our CBs, only issues deemed critical by the presenter were discussed. Thus, cases were sometimes classified as Category A (Table 3, 4), even when chemotherapy was planned. As a result, the treatment plan might have been altered for some cases if they had been discussed at the CB.

In an overview reported by Croke et al., the treatment plans were altered by CBs for about 10% of all gynecological cancer cases, and for about 20% of all gastrointestinal cancer cases (3). In addition, van Hagen et al. reported that

about 30% of the cases presented at CBs resulted in an alteration of treatment (4). Given that these studies do not specify the details of such alterations, our results showing the alteration of the chemotherapy plan in 12.3% of all cases, 22.7% of gynecological, and 26.5% of gastrointestinal cancer cases thus appear to be consistent with previous studies. The gastrointestinal board showed the highest rate, which could be explained by the potential for several treatment alternatives, including surgery, radiotherapy, and chemotherapy, especially in esophageal cancers. The small rates observed for the hematology and pediatric boards arise because of the wide consensus on the standard treatments and protocols for these types of cancer, as already described above.

The implementation of the determination at CB is often an issue. Several reports have shown that treatments recommended at CB are not implemented when palliative treatments seem ideal because of complications, or when patients do not wish to receive the treatments recommended by CB (3, 17, 18). These cases belong to Categories D, E, or F (Table 2, 3), thus suggesting that these problems have been adequately discussed at our CBs. This supports the quality of our CBs.

Our group previously showed that CBs have a great influence on radiotherapy treatment decisions, which we have now been corroborated for chemotherapy (2, 16). Nevertheless, one limitation associated with this study is that we have not yet evaluated the effect of CB on prognosis. Kesson et al. reported an association between an improvement in survival for cases and having been discussed at CB (6). Therefore, we are planning to compare the survival rates between cases presented at CB and those that are not. Moreover, as our group previously reported (2), it is difficult to discuss all cases at our institution as more than a thousand cases are newly diagnosed annually; thus, only a portion of the cases at our institution are presented at CBs. This could be one reason why only 13 cases were presented at the breast board. Cases that are suited to standard therapy are rarely presented, and the treatment plans might have been altered for such cases as well, if they had been discussed at CB. The number of cases at gastrointestinal boards also

seemed to be small compared to other boards. This could be explained by the fact that there is a gastrointestinal clinical conference in addition to the CB, in which clinical oncologists, but not radiation oncologists or palliative care specialists, also attend. Since the gastrointestinal board is held only once a week and time is limited, cases that are unlikely to undergo radiotherapy or need specialized palliative care are discussed at this conference. In addition, we could not include any other factors that might have affected the determination of the treatment plan; for example, age, tumor stage, and treatment received.

Looking at the details of the cases that were referred to the medical oncologist, cases that belonged to Categories C, E, and F tended to be introduced more often (Table 3, 4). This indicates that such cases are likely to be introduced to the medical oncologist when unplanned chemotherapy is recommended at the CBs; this is a meaningful finding in Japan since medical oncology is an emerging specialty and these cases have long been treated in their respective organ-oriented departments. These cases can also be considered ones for which management is difficult, or there is reluctance to administer chemotherapy on the part of the doctor in charge, based on the patients' condition. CBs prompt these cases to be introduced to the medical oncologist, who fulfills the important role of giving advice with respect to treatment decisions.

In conclusion, this study showed that CBs have a great influence on decisions regarding chemotherapy, and prompt necessary referrals of cases to the medical oncologist. These findings were consistent for most cancer types. In terms of future research, we will evaluate the effect of CBs on the prognosis in the near future, using the institutional cancer registry.

**The authors state that they have no Conflict of Interest (COI).**

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