Universal Health Coverage for Cancer Care in the Era of COVID-19
Challenges and Outlook for Radiotherapy in Japan

Asia Cancer Forum

Contents

Introduction

COVID-19 has significantly transformed not only existing structures of medical care, but also underlying social structures, and in response to this situation, the policy concept of Universal Health Coverage (UHC) has been proposed in various forms around the world as an important issue.

For many years the Asia Cancer Forum, as a Union for International Cancer Control (UICC) member organization, has been engaged in policy proposals and advocacy to find a way forward to resolve issues in order to realize UHC for cancer care. Recently, UICC, as the parent body for member organizations, has set "Equity" as the theme for World Cancer Day for the next three years, from which we could infer that the focus on medical care disparities is growing stronger. "Equity" in cancer care means guaranteeing fair medical care for all people. The goal of this concept is also to recognize the existence of embedded structural inequalities that exist from the starting point, and which cannot be resolved by simply providing equal opportunities. Asia Cancer Forum has been involved in activities to date to realize UHC in Asian countries, and many people may be under the impression that Japan, with its universal health insurance system and demanded equalization of cancer care, is a country far removed from the challenge of UHC for "medical care that leaves no-one behind." However, in fact, in the field of radiotherapy for cancer care in Japan it is difficult to say that sufficient UHC has been realized.

The recent turmoil in the field of cancer care caused by COVID-19 is thought to be a manifestation of the challenges facing existing health care systems, but we must consider the implementation of the next generation of healthcare settings that will improve access to care, and improve quality of care and lower costs within the framework of limited health care resources, with a view to treating patients with advanced stage disease and expected to be increased due to interruptions in diagnostic care caused by the pandemic. It is for this reason that radiotherapy is attracting attention as it does not require inpatient beds or respiratory management equipment, nor does it affect the patient's immune system. However, in comparison to other countries, it is difficult to say that radiotherapy in Japan is being used appropriately in treatment settings.

In the light of this situation, Asia Cancer Forum decided to understand the actual situation for radiotherapy in Japan, as a way to solve the challenge of realizing UHC in cancer treatment. In particular, designated hospitals for cancer treatment, a comprehensive network of which have been established throughout the country, serve as bases for access to medical care. However, the number of facilities that can provide intensity-modulated radiation therapy (IMRT), which is a high-precision radiation therapy, is currently limited to about 50 percent of the total, and the utilization rate of IMRT in radiation therapy overall is about 10 percent, which is extremely low when compared to other countries.

So what and where are the bottlenecks relating to the dissemination of IMRT in Japanese hospitals?

By carefully identifying the impediments to IMRT provision, it could be possible to pinpoint the issues relating to cancer care in Japan, which is said to be equalized but in fact still has large regional disparities, and has not yet achieved true UHC for cancer care. Consideration of the cancer care delivery system with a view to optimizing medical resources will contribute to the realization of UHC for cancer care not only in Japan, but also in other Asian countries, where Japan should take the lead.

Medical personnel, who are the basis for the realization of UHC, are expected to come under considerable pressure in the future in this era of COVID-19. In the field of radiotherapy, a new trend which is adopted data-driven insights is emerging as the workforce model for medical personnel, and information collection is therefore required. In anticipation of a global shortage of human resources, there are various promising systems emerging, such as cloud-based remote systems that provide a flexible work-life balance for medical personnel with reduced on-site personnel requirements, coupled with effective care. With recent advances in radiotherapy technology and software, the use of telemedicine could transform treatment sites in the near future. In the midst of the pandemic, demand for radiotherapy is growing around the world and the time has therefore come to strengthen considerations about support methods for radiotherapy facilities using new solutions.

The structure of radiotherapy in Japan is characterized by the fact that although the number of facilities per patient is the second highest in the world after the United States, the number of external beam radiation devices per facility is unusually low among high-income countries, and it is said that spatial dispersion has already been achieved (Nakamura K, et al. JJCO 2018). For the spread of high-precision radiotherapy to be realized, consolidation is necessary from quality control perspective, and the current situation of dispersed equipment and facilities has been regarded as an issue to be resolved. The consolidation would improve the quality of expert groups and help to create a better medical and research system. However, if equalization could be achieved through telemedicine, this would transform the current situation of dispersed resources into something of potential merit.

As downsizing through the consolidation of hospitals accelerates in the future, discussions about reforming the way physicians work will gain greater traction, and when the upper limit on overtime work is enforced in 2024, hospital reorganizations will make further advances. In this situation, it is also said that the division of roles among hospitals in each medical field, such as cancer and cardiovascular, will become more accentuated, and specialists will beg more concentrated in certain hospitals and high-volume centers for each medical field will be established in regions. In anticipation of such developments, we have now reached the stage of engaging in in-depth discussions on telemedicine.

Since radiotherapy uses image data as input for medical treatment, it is possible to treat patients remotely in the same way as if they were present in the same room, which is a characteristic well-suited to telemedicine. In addition, radiotherapy is performed through a system that mutually integrates doctors, treatment devices, treatment planning systems (TPS), and other equipment, and possesses the

characteristics of an advanced field in which has been quickly established the hybrid machine-human medical treatment being enabled when information science and technology first permeated in the medical field. For this reason, it can also be said that telemedicine in radiotherapy is a touchstone for medical care using new technologies and data such as ICT, which is expected to be established in other fields in the near future, and any challenges arising in telemedicine for radiotherapy are very likely to determine technology requirements and the direction of development in other fields.

Based on this awareness of the issues, by setting the realization of UHC in radiotherapy as our ultimate goal, and with the aim of contributing to this goal, this document sets out a structural understanding of the current situation based on quantitative surveys, and compiles recommendations based on exploratory expert interviews and studies of available literature.

Summary

Radiotherapy is one of the three most important treatments for cancer, but it is also known as one of the biggest challenges for Universal Health Coverage (medical care that leaves no-one behind; UHC) worldwide. In developing countries, there are very few domestic radiotherapy facilities, so it makes difficult to provide appropriate radiotherapy. In Japan, there are 850 radiotherapy facilities and ample medical resources, so at first glance it may seem that any UHC-related challenges would be completely unrelated to Japan under its health insurance system. However, it is in fact the case that many of these treatment facilities are unable to provide intensity-modulated radiation therapy (IMRT), which is a high-precision radiation therapy, even though they are equipped to do so, thus posing a major challenge for UHC. In addition, there is a possibility that a significant number of patients may not be being provided with the radiotherapy they need due to structural factors, resulting in a strange phenomenon where UHC for radiotherapy has yet to be achieved even in Japan, even though there are sufficient treatment facilities. This reality is not widely known beyond the radiotherapy industry itself.

It is in response to this situation that this report aims to clarify the issues that are obstructing the realization of UHC for radiotherapy in Japan, and the structure of the solutions to these issues, by conducting a quantitative survey to gain an understanding about the awareness of experts and then conducting qualitative interviews with experts to extract the issues and solutions facing radiotherapy in Japan today from the perspective of UHC, and to formulate recommendations for realizing UHC for radiotherapy.

The following challenges could be identified: the low penetration rate of IMRT, and a structure that prevents appropriate treatment from being provided due to reasons of hospital management; the possibility of missing patients who are eligible for radiotherapy; the dispersed nature of treatment facilities, and the shortage of radiotherapists. In terms of their solutions, the following were identified: Focus on relaxing the criteria for IMRT-certified facilities in the reimbursement system, and in so doing, enhance telemedicine as a necessary tool to ensure safety and improve the availability and quality of medical personnel; update the institutional design for radiotherapy-related co-medical staff, including the creation of a system that could be an alternative to national certification for medical physicists; create a system to utilize the expertise of radiotherapists in the decision-making process of physicians in other departments; and formulate a design for centralization and equalization of radiotherapy through reimbursement revisions and various other measures.

Based on consideration of the challenges and solutions identified above, this report sets out the following seven recommendations as a means of realizing UHC for radiotherapy in Japan.

1. Review the personnel requirements for physicians in IMRT (intensity-modulated radiation therapy) facility standards.
2. Design a reimbursement system and various other schemes to promote telemedicine.
3. Create a system to utilize the opinions of radiotherapists in the decision-making processes of physicians in other departments, as a means of promoting the use of radiotherapy in the way it should be used.
4. Update the national qualification for medical physicists, or alternatively update the institutional design for radiotherapy-related co-medical staff.
5. Increase the quantity and quality of radiotherapists and specialized radiotherapy planning support staff.
6. Support for the radiotherapy industry by the anti-cancer community.
7. Formulate a grand design for the consolidation and equalization of radiotherapy facilities, aiming for optimal allocation of medical resources.

Challenges obstructing UHC for radiotherapy in Japan and structures of its solutions

We conducted: (1) a quantitative survey, and (2) a qualitative survey, with the aim of clarifying the challenges that are obstructing UHC for radiotherapy in Japan and the structures of solutions. The quantitative survey was in the form of a questionnaire on IMRT facility standards (Conducted October 26 to November 10, 2016, by Japanese Society for Radiation Oncology (JASTRO)), which was then reanalyzed by cluster analysis and regression analysis. A mixed methods approach was taken, in which the quantitative survey was first examined to understand the attitudes of the experts before the qualitative survey was constructed. The qualitative survey was conducted between March and June 2021, using semi-structured interviews with seven experts (six physicians and one medical physicist) working in radiotherapy.

The structure of the challenges and solutions extracted as a result of these surveys is shown in Figure 1 below, and the major challenges issues and its solutions are shown in Table 1.

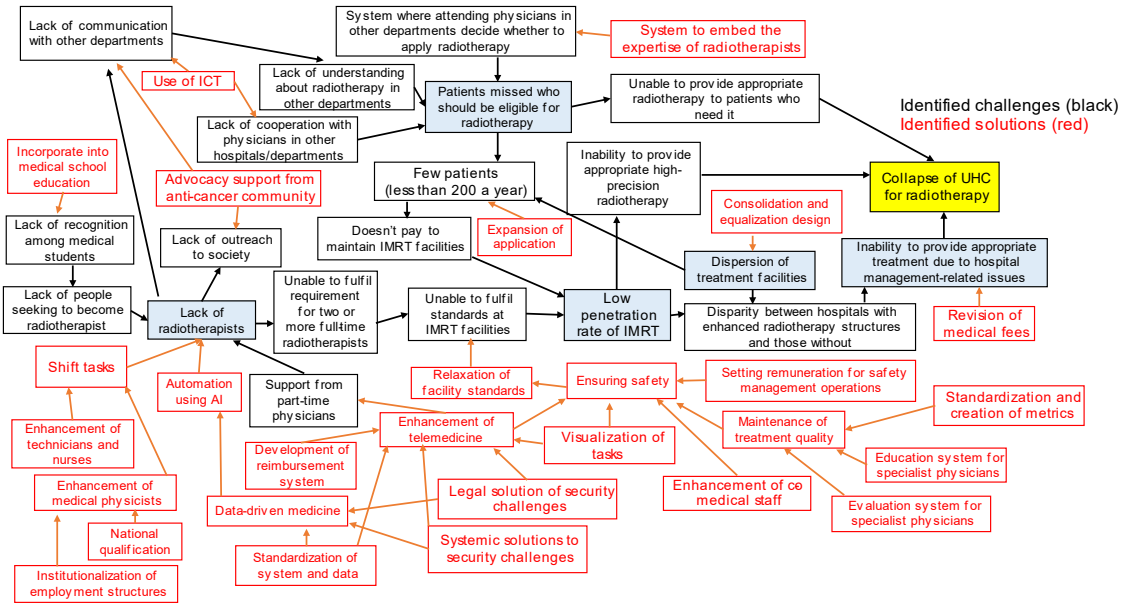

Figure 1. Challenges for radiotherapy in Japan and its solutions

Table 1. Major challenges faced by radiotherapy in Japan and its solutions

Major challenges	・Low dissemination rate of intensity-modulated radiation therapy (IMRT)[1,2] ・Appropriate treatment cannot be provided due to hospital management issues[3] ・Missing patients who require radiotherapy[4] ・Dispersed treatment facilities[5] ・Lack of radiotherapists[6]
Major solutions	・Relaxation of standards for IMRT-certified facilities ・Setting of reimbursement for safety management ・Enhancement of telemedicine ・Solution of issue of data sharing (security, data standards, etc.) ・Visualization and standardization of radiotherapy tasks ・Education and evaluation systems for radiotherapists ・Utilization of big data and AI technologies ・Expansion of IMRT applications ・Update to the institutional design for radiotherapy-related co-medical staff, including the creation of a system that could be an alternative to national certification for medical physicists ・Enhancement of co-medical staff ・Creation of a system to utilize the expertise of radiotherapists in the decision-making process of physicians in other departments ・Consolidation and equalization of design ・Appropriate radiation therapy through revision of medical fees ・Increase the number of radiotherapists

[1] One regulatory bottleneck is the requirement for two full-time physicians specializing in radiotherapy (one of whom must have at least five years of experience in radiotherapy), which is a requirement for IMRT-certified facilities to receive additional reimbursement.
[2] The number of radiotherapy facilities offering IMRT remains low at 395 out of 717 facilities (2017). ("Structural Survey on Radiotherapy Facilities 2017," JASTRO.)
[3] Hypo-fractionation and inpatient radiotherapy are the norm. Under the current reimbursement system, hospitals may not be able to provide treatment to those patients who need it as it would result in a decrease in hospital income.
[4] Patients who should have been eligible for treatment are missed due to two reasons: 1) the medical care delivery system in remote areas, and 2) the structure of the treatment decision-making process. This corroborates the fact that the utilization rate of radiotherapy in Japan is about 30%, far lower than that in other developed countries.
[5] Radiotherapy equipment is available in 850 facilities nationwide and spread out over a wide area. ("Structural Survey on Radiotherapy Facilities 2017," JASTRO.)
[6] A total of 1,328 radiotherapists are registered with the Japanese Society for Radiation Oncology (JASTRO). (https://www.jastro.or.jp/medicalpersonnel/aboutdoctor/cat/ , accessed September 2, 2021.)

Recommendations for realizing UHC for radiotherapy in Japan (where no-one is left behind)

Based on the results of analysis of the challenges obstructing UHC for radiotherapy in Japan and potential solutions, which were clarified based on quantitative and qualitative surveys, we submit the following seven recommendations.

Recommendation 1. Review the personnel requirements for physicians in IMRT (intensity-modulated radiation therapy) facility standards

Although IMRT is widely used as a standard method for high-precision radiotherapy in developed countries, it has been observed that the implementation rate of IMRT in Japan is low, and it makes difficult to say that safe, high-quality, and appropriate radiotherapy is being provided to all patients. Unlike in developing countries where UHC for radiotherapy remains a challenge, the situation in Japan can be characterized by the fact that many of the treatment devices capable of providing IMRT are not actually being used to provide treatment, despite the fact that the devices themselves are sufficiently widespread. A systematic issue is behind this situation, namely that among the IMRT facility standards the personnel requirements for physicians in particular are causing a bottleneck, because they call for two full-time physicians specializing in radiotherapy (one of whom must have at least five years of experience in radiotherapy), or one full-time physician and two part-time physicians, who work more than three days a week and whose working hours exceed 22 hours per week. Due to the structural characteristics of Japan, where the number of radiotherapy facilities and the number of radiotherapists are almost equal, the number of facilities that can meet this standard is limited, resulting in the low rate of IMRT utilization. Therefore, the requirement for the number of physicians (two persons) should be changed so that IMRT can be performed by one full-time physician, and the widespread utilization of IMRT should be enabled as a matter of urgency.

The background to the establishment of the personnel requirements for physicians is that when IMRT was first covered by health insurance in 2008, there was a debate about the need to be cautious in order to ensure safety, in view of the nature of this high-dose irradiation technique. However, since technological advances have enhanced the safety of IMRT, and since many IMRT processes can be carried out by medical physicists and other co-medical staff, the personnel requirements for physicians that were originally set no longer match the current status of the IMRT implementation system, meaning that it would be entirely reasonable to revise these standards.

In recent years, the Japanese Society of Radiation Oncology (JASTRO) and other organizations have been working to revise these standards so that only one full-time radiotherapist and one medical

physicist need to be present, which would better match the current situation regarding the IMRT implementation system. However, the Ministry of Health, Labor, and Welfare (MHLW) has expressed reluctance to revise the standards by reason of the fact that medical physicists are not nationally certified, and revisions have yet to be realized, making it a challenge that needs to be resolved as a matter of urgency.

On the other hand, due to the dispersion of radiotherapy facilities and the chronic shortage of radiotherapists, a certain portion of radiotherapy in Japan is performed by part-time doctors dispatched from university hospitals and other supporting facilities. In addition, due to the characteristic of radiotherapy that all data used for treatment is digitally-based, planning and support for radiotherapy via telemedicine are already in operation in many areas. It is for these reasons that it is considered to be eminently possible to substitute the two part-time physicians stipulated in the current standards with telemedicine.

Therefore, in order to increase the prevalence of IMRT, while placing the highest priority on safety, and to establish the conditions for its implementation under the current medical system in Japan, the existing facility standards should be rewritten to allow IMRT implementation by one full-time physician with at least five years of experience in radiotherapy and one well-trained radiotherapy plan supporter, or one physician specializing in radiotherapy who provides support via means of telemedicine.

Recommendation 2. Design a reimbursement system and various other schemes to promote telemedicine

In radiotherapy, a machine (treatment planning system (TPS)) and a person (physician) work in a hybrid manner to create a treatment plan in advance based on digital data extracted from images of the patient's condition and to determine how much radiation to deliver to which area, and the treatment device automatically delivers the radiation according to the instructions provided. Therefore, due to the nature of radiotherapy, there is little necessity to have a doctor who can make medical decisions at the place where the treatment is being implemented, and it could be said to be a field that is far better suited to telemedicine than other fields.

In Japan, telemedicine in radiotherapy has been implemented on a grass-roots basis for more than 20 years, predominantly in northern Japan, where radiotherapy facilities are scattered across a vast area and support between facilities is provided on a constant basis. In addition to i) remote radiation therapy planning, which can be done at home from a part-time work location using a remote desktop, or similar device via a dedicated line; ii) remote radiation therapy, which includes patient examination, treatment planning and irradiation, while providing instructions to doctors from other departments at

the treatment site via a video conference system, etc., in emergency situations; and iii) remote radiotherapy support, which remotely collates data when radiotherapy is being implemented at hospitals to which the support system has been transferred, as well as a system has been established in some regions that is capable of utilizing the expertise and skills of radiotherapists for treatment beyond spatial constraints, such as for patient referrals, conferences and study group sessions using video conferencing systems. Not only are conditions such that they are suitable for telemedicine, but also their combination with the environmental conditions surrounding radiotherapy in Japan, where treatment facilities are dispersed and support is provided from a core facility, is thought to be the reason why telemedicine has made inroads into radiotherapy earlier than in other fields.

The need for telemedicine in radiotherapy is expected to increase in the future due to a variety of factors, including the evolution of ICT technology and gathering national momentum for promotion of telemedicine, reforms to the way physicians work, the chronic shortage of radiotherapists, and travel constraints due to the COVID-19 pandemic. However, many issues remain unresolved if telemedicine is to be made effective and sustainable.

The first challenge is that telemedicine is not institutionalized for use except in emergencies. Since there are no regulations on reimbursement when telemedicine is conducted, it is usually brought in to the facilities receiving support or conducted by doctors on a volunteer basis. Another problem is that there is no provision for labor management. By positioning these telemedicine services in the system and establishing regulations on remuneration, the supporting facilities would be able to actively provide telemedicine without financial detriment to themselves. In such a case, designing appropriate incentives would enable new medical physicists and other co-medical staff to be hired for telemedicine as remuneration through the national health system could be duly expected, which would have a positive impact on the enhancement of radiotherapy.

The second challenge is that of medical safety. When performing radiotherapy remotely via telemedicine, there is comparatively less patient information available than when performing conventional radiotherapy, as doctors are unable to use their sense of touch and smell to examine patients as the examination is performed via a video conferencing system. Therefore, it is essential to ensure close cooperation with physicians and nursing staff who meet patients face-to-face at treatment sites, and to have a full complement of co-medical staff, including diagnostic radiographers and medical physicists. In addition to these and the already existing radiotherapy via telemedicine for emergencies, guidelines for telemedicine radiotherapy under normal circumstances need to be developed so that telemedicine can be performed safely under a system that works to prevents medical accidents.

The third challenge concerns security-related issues when engaging in telemedicine. Much of the medical information about patients is of a personal or sensitive nature, and handling this information through the means of telemedicine raises many challenges for the medical field. Most of the medical

information about patients is of a personal or sensitive nature and is subject to laws and ordinances on personal information protection. Each facility has its own interpretation of laws and ordinances and sets its own operational guidelines for telemedicine, but the degree of strictness differs among facilities, resulting in a situation in which telemedicine cannot be used in the strictest facilities, while in facilities that have looser restrictions the physicians are constantly concerned about violating the law. Security-related issues should be resolved from both institutional and systemic perspectives to eliminate the danger of violating the law while also ensuring that telemedicine remains usable as an option. In terms of institutional structures, it is essential to establish common guidelines. In terms of systems, vendors need to take the lead in developing systems so that technologies can be developed to enable data sharing in a way that does not violate personal information. In such cases, it would be desirable to formulate a common standard among vendors, because inter-facility telemedicine would be difficult or impossible if standards varied from facility to facility. Solving security issues will not only improve convenience in clinical settings, but it is also expected to lead to the creation of a data-sharing environment with a view to the utilization of AI technology and big data, on which research and development is currently being advanced globally. This would enable telemedicine to function not only as an on-the-spot "extension of the eye," using videoconferencing systems and remote desktops, but also as an "extension of the brain" for radiotherapists and other personnel, and an "extension of the collective knowledge of a community of experts."

The fourth challenge is that of harmful effects due to the lack of standardization of the radiotherapy systems themselves. Although it is to be expected that telemedicine would be able to transcend spatial constraints to link supporting and institutions nationwide, the reality is that in many cases this is not possible. This is due to differences in "style" among physicians from different medical departments of universities, and differences in the equipment being used. The issue has therefore been observed that even if it is technically possible to transcend prefectural borders, differences in the radiotherapy systems of each medical office mean that it is practically impossible to go beyond prefectural borders. In order to solve these issues and enable high quality radiotherapy to be performed via telemedicine without spatial constraints, it is first necessary to visualize and standardize each step of radiotherapy and to establish quality standards. When engaging in such an endeavor, what would be preferable is not to simply unify all procedures and methods, but rather to create a framework that describes which method was selected for each step, referring to the international standards ISO and IEC, and to record the different "styles" in a traceable format and using a common language. It is hoped that the IAEA, ICRP, or UICC will take the lead in developing such standards as international standards.

The fifth challenge is the absence of standards, in a situation in which different telemedicine systems are running separately across the country, as these systems have emerged from the continuous grassroots practice in the medical field. In order to promote efficient and sustainable telemedicine for radiotherapy, a survey of the current situation should be conducted, the future of telemedicine in

radiotherapy in Japan should be discussed, and a system should be developed based on a grand design.

As described above, in order to efficiently and sustainably promote telemedicine in radiotherapy, which is expected to become of increasing necessity in the future, it is imperative to review the medical fee regulations and design incentives for non-emergency cases, create guidelines for medical safety and enhance the number of co-medical staff, as well as to solve security issues, and formulate an institutional design capable of standardizing radiotherapy systems. These should be based on an understanding of the current status of telemedicine in radiotherapy in Japan and a discussion of what form it should take in the future.

Recommendation 3. Create a system to utilize the opinions of radiotherapists in the decision-making processes of physicians in other departments, as a means of promoting the use of radiotherapy in the way it should be used

In cancer care as it is currently structured, the decision to apply radiotherapy is made by the attending physician of the primary department, and the expertise of the radiotherapist is not always sought or utilized in this process, leading to an issue whereby "patients who would normally be eligible for radiotherapy could be being missed." This point may be a corroborating factor for the low implementation rate of radiotherapy for cancer patients in Japan.

For example, when a core medical institution such as a university hospital expands its support to medical institutions in remote areas, it is known that the number of patients supported and the number of patients referred to the main hospital increase significantly, suggesting the possibility that radiotherapy may not have been provided to patients who should normally have expected to receive it. In addition, it has been pointed out that in hospitals without radiotherapy facilities or without full-time radiotherapists, there may be a culture of using only the two major treatments, surgery and chemotherapy, due to a lack of understanding of radiotherapy by doctors in the main department and a lack of communication and cooperation in general. The possibility that radiotherapy, which is one of the three pillars of modern cancer treatment, may not have been provided from the beginning in local medical setting, which are backed up by some of the following observations: painkillers are prescribed instead of palliative radiotherapy; patients are referred to the radiology department for palliative radiotherapy long after the appropriate timing has passed; the option of breast-conserving surgery was not presented from the outset for breast cancer patients; chemotherapy alone is used even in cases where chemoradiotherapy is available; and even when radiotherapy is available instead of surgery, the option is not presented. This failure to utilize radiotherapists' knowledge in determining cancer treatment policies suggests the possibility that appropriate radiotherapy may not be being provided to patients.

Cancer boards are already in place as a mechanism to utilize the knowledge of specialists from other departments, including radiotherapists, upstream in the decision-making process. However, while this function well works at larger university hospitals, most hospitals in rural areas are providing cancer treatment under a radiotherapy system that consists of a single full-time doctor, part-time doctors, or referrals to other hospitals, meaning that it is difficult for radiotherapists to participate in cancer boards. What is more, there are cases where the further subdivided specialties of radiotherapists are not necessarily a match for the cases handled by the hospital's internal cancer board, resulting in one-sided treatment based on what are referred to as "recipes." Many hospitals do not have the structures in place that would function to utilize the knowledge of radiotherapy specialists in determining whether or not to apply radiotherapy.

If the cancer type is one for which radiotherapy is listed as a standard treatment in the medical guidelines that the attending physician of the primary department refers to when deciding on a treatment plan, the knowledge of the radiotherapist can be incorporated. However, certain cancer types and highly individualized cases for which the latest radiotherapy findings are not reflected in the guidelines are not being addressed. Furthermore, even though radiotherapy is said to be one of the three major types of treatment for cancer, the percentage of radiotherapists involved in the development of medical guidelines remains very low.

In order to increase the number of radiotherapy patients by preventing people from missing out on the application of radiotherapy, and also to improve the cure rate and quality of life, constrain adverse events, and optimize medical costs by providing appropriate treatment, there is an urgent need to create a system that utilizes the expert opinions of radiotherapists in the decision-making processes of physicians in other departments. In doing so, it is desirable to construct a platform for communication across treatment facilities and medical regions utilizing ICT, which can be implemented even in hospitals where there is no functioning cancer board.

It would also be desirable for radiotherapists, as a group of specialists, to regularly update the radiotherapy knowledge of physicians engaged in cancer treatment in other departments, by always ensuring that the Japanese Society of Radiation Oncology (JASTRO) holds joint seminars at the annual and academic meetings of other cancer societies.

Recommendation 4. Update the national qualification for medical physicists, or alternatively update the institutional design for radiotherapy-related co-medical staff

A medical physicist is a specialist in medical physics, who is responsible for checking treatment plans in radiotherapy, planning treatment plans for high-precision radiotherapy, and engaging in verification and quality control work, as well as research and development of new technologies.

Medical physicists play a central role in IMRT and are critical co-medical staffs in the increasingly sophisticated field of radiotherapy. In Japan, the first professional certification for medical physicists was introduced in 1987 for people in science and engineering backgrounds to work in medical physics. Subsequently, and in response to the increasing sophistication of work due to advances in radiological equipment and technology, and the increasing incidence of medical accidents, since 2002, diagnostic radiographers who meet certain requirements have also been able to obtain certification. Today there are a total of approximately 1,300 persons with certification, including medical physicists with a background in science and engineering, and medical physicists with a qualification as a diagnostic radiographer.[7] Despite of the fact that these medical physicists are expert who are the essential for modern radiotherapy, the fact that there is no nationally approved qualification creates many challenges for them in the medical field.

Since medical physicists with science and engineering backgrounds are not nationally certified, there is no employment system for them, and they are often not treated as medical professionals, as witnessed by the practice of university hospitals hiring them as instructors, in contrast to public hospitals hiring them as clerical workers. There is also no salary scale for medical physicists and wages remain low. (In recent years, although some cancer hospitals have established employment systems for medical physicists, these remain limited.) Medical physicists also face problems in terms of their career path.

On the other hand, medical physicists with a background as diagnostic radiographers are employed on the basis of their nationally recognized qualification as diagnostic radiographers, making it difficult for them to work exclusively as medical physicists, and raising the issue that they have to engage in diagnostic radiography work concurrently in order to progress along their career path as diagnostic radiographers.

National certification of medical physicists has often been attempted based on requests from the radiotherapy community. However, there is a historical background where the work of medical physicists has been supported in many clinical settings by the tireless actions of diagnostic radiographers, which is compounded by an identity conflict arising from where lines are drawn in defining the work of diagnostic radiographers and medical physicists in a rapidly evolving technological environment. These factors have exacerbated the complexity of the situation and caused some degree of resistance, with the result that national certification has yet to be realized.

It is necessary to ensure that the abovementioned challenges, arising from inconsistency between the job functions required of co-medical staff in radiotherapy today and the national qualifications system in Japan as it currently stands, are resolved in a manner that considers the needs and requirements of all stakeholders. In order to do so, diagnostic radiographers and medical physicists

[7] https://www.jbmp.org/outline/greetings/ (Accessed on September 2, 2021)

should collaborate to conduct a survey of the functions and roles required for both jobs, update the qualification system through careful coordination, and consider establishing a professional system for radiotherapy planning supporters that could serve as an alternative to a national qualification for medical physicists.

Recommendation 5. Increase the quantity and quality of radiotherapists and specialized radiotherapy planning support staff

In Japan a total of 1,328 radiotherapists are registered with the Japanese Society for Radiation Oncology (JASTRO), a very small figure compared to physicians in other fields, meaning that the field of radiotherapy is chronically understaffed. The reasons for this shortage include the fact that although it is said to be one of the three major treatments for cancer, radiotherapy has a low application rate and is not well known; also there is no system in place in medical education to actively encourage medical students to become radiotherapists; and it is also difficult for children of medical practitioners to choose this career path since it is difficult to start their own business. These and other characteristics of the field mean that very few medical students aspire to become radiotherapists. Recently, there have been concerns that advances in AI technology will threaten the profession and cause technological unemployment, making it even more difficult to hope for any increase in the number of radiotherapists under current circumstances. Therefore, it is necessary to increase the number of radiotherapists in the mid- to long-term by: increasing the relative importance and weighting given to radiotherapy in medical school education to raise its visibility; clarifying career paths for radiotherapists and establishing role models; and designing incentives for people to become radiotherapists.

In order to maintain and improve the quality of radiotherapists, it is necessary to conduct quality control of the professional group by developing an educational system. Currently it is the case that some advanced radiotherapy techniques require training to perform them properly, but there is no such system in place for IMRT. It is therefore important from the perspective of maintaining safety of IMRT while relaxing facility standards and requirements for JASTRO to mandate a similar type of training course for IMRT as for other radiotherapy types. In addition, it would be desirable to develop a system in which IMRT radiotherapy treatment plans are submitted, and then evaluated by specialists in a manner similar to the video review of surgery conducted by surgical societies, with specialists then being classified according to their skills, and the radiotherapy they are permitted to provide being controlled in this way.

There is also a significant shortage of medical physicists. In recent years, graduate schools have developed educational courses to provide specialized training, but the total number of medical physicists is still only about 1,300, far short of the number of medical physicists required for each

therapeutic device as stipulated by the American Society for Radiation Oncology (ASTRO). This is due to the absence of any employment or salary systems and a lack of clarity regarding career paths arising from the fact described in recommendation 4 above, that there is no recognized national qualification for medical physicists.

In order to achieve UHC in radiotherapy, more human resources are needed in the medical field to boost the adaption rate of radiotherapy and high-precision radiotherapy, including IMRT, to a higher level than at present. In particular, given that employing one medical physicist makes it possible to provide IMRT to 100 patients annually, an urgent and pressing challenge is to increase the number of medical physicists. As noted in recommendation 4 above, it is necessary to consider establishing a professional system for radiotherapy planning supporters that could serve as an alternative to a national qualification for medical physicists and to clarify the career path trajectory for medical physicists.

Moreover, given that radiotherapy is rapidly becoming increasingly sophisticated in recent years due to advances in treatment devices, ICT technologies, AI and big data, etc., it is important to have an education system in place for medical physicists after they are certified. It would be desirable to develop highly capable medical physicist personnel through such means as residency programs and remote medical physicist education using VR technology.

Recommendation 6. Support for the radiotherapy industry by the anti-cancer community

The fact that radiotherapy in Japan is facing major challenges from the perspective of UHC is a serious issue that needs to be more broadly known about and addressed as a matter of urgency, but the reality is that these major challenges are not widely known beyond the radiotherapy community. In the background to this lack of awareness, there are structural issues in terms of communication and outreach abilities. For example, the number of radiotherapists is very small compared to specialists in other fields, meaning that they are all very busy and therefore lack the time and means to communicate effectively, and also, unlike chemotherapy, where technological developments are dynamically disseminated to a wide audience through the sales and marketing capabilities of pharmaceutical companies, there are few promotional activities by companies in the radiotherapy equipment industry. To compensate for this situation, the anti-cancer community needs to give special support to the radiation therapy industry.

Through training, development of educational materials, publicity, and various events the anti-cancer community should promote awareness and understanding of radiotherapy among physicians in other departments and co-medical staff, a wide range of industry groups involved in cancer care, government officials, hospital administrators, local decision-makers, the media, and the general public as potential patients.

In addition, the anti-cancer community should call for a significant increase in the number of radiotherapists involved in the formulation of cancer treatment guidelines, leading to the development of a structure that would enable physicians from other departments involved in cancer treatment to enhance their understanding of radiotherapy.

Furthermore, the anti-cancer community should call for increased weighting to be given to the handling of radiotherapy in medical school education, and encourage the training of physicians with a thorough understanding of radiotherapy, taking into account the changes that have occurred in radiotherapy in a clinical setting due to technological advances.

Efforts should also be made to set specific numerical targets, for example, "Providing radiotherapy to 50% of all cancer patients by 2030 (provisional target)." Then, based on cooperation with the Japan National Committee for UICC (UICC-Japan), it would be advisable to heighten momentum towards the provision of appropriate radiotherapy to more patients by conducting UHC-related campaigns that involve a broad-range of human resources involved in cancer care, in addition to radiotherapists.

Recommendation 7. Formulate a grand design for the consolidation and equalization of radiotherapy facilities, aiming for optimal allocation of medical resources

It is practically impossible to provide highly specialized high-precision radiotherapy at all treatment facilities, due to the cost of purchasing and maintaining the treatment equipment and human resources required for such high-precision radiotherapy, and also in view of the break-even point depending on the number of patients. An urgent challenge is therefore to devise a mechanism to achieve the consolidation of advanced medical care, while maintaining the equalization of cancer care as stipulated in the Japanese government's Basic Plan to Promote Cancer Control Programs.

Due to the nature of radiotherapy, which requires a series of visits to the hospital over the course of several days to several weeks, there are concerns that visits may place pressure on the lives of patients and their families who provide transportation, and may trigger job difficulties or people having to leave their jobs. Reducing the burden of hospital visits is therefore one of the keys to ensuring that equalization is not compromised by consolidation. For example, a potential model could be one where patients who do not require high-precision radiotherapy are treated in local facilities, and those patients who do require high-precision treatment are referred across medical areas to consolidated facilities that provide advanced radiotherapy services. Under such a model, treatment would be performed while ameliorating the burden of hospital visits by using hypofractionation, which reduces the need for hospitalization and the number of times irradiation is required. However, under the current reimbursement system, the implementation of long-term inpatient radiotherapy and hypofractionation would result in a significant drop in hospital income, and therefore, a revision of the system is needed

to encourage the use of these procedures.

As described above, in order to achieve consolidation and equalization, it is necessary to conceive a grand design of how radiotherapy should be positioned and utilized in regional medical care, and detailed and comprehensive measures based on such a concept are therefore required. Providing patients with high-quality radiotherapy, which has become more segmentalized and sophisticated in line with developments in medical science, will be impossible under the current conditions, whereby treatment is provided by dispersed treatment facilities, supported by core facilities in each region, which also are experiencing their own difficulties. It is necessary, therefore, to establish a treatment delivery system in terms of both hardware and software, and devise a grand design that will serve as the basis for such a system. To this end discussions must be held with the participation of a wide range of stakeholders and experts, focused on identifying the ideal form for regional medical care and healthcare governance in local communities.

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