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Development of an educational program for healthcare professionals who provide appearance care for patients with cancer: Feasibility study of an e-learning program

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Abstract: This study aimed to evaluate the feasibility and utility of an e-learning training program to improve healthcare professionals' knowledge about providing appearance care to patients with cancer. Healthcare professionals who provide appearance support were invited to participate voluntarily and complete a survey before and after the program. Participation request letters were distributed to 133 individuals, including 75 from four facilities invited via professional connections, and agreed to participate in the study and 58 participated in the National Cancer Center's appearance care training and indicated an interest in participating in the study. The 100 participants (75.2%) included 96 females, with an average age of 40.5 years. The participants reported high levels of satisfaction with the program, where more than 90% responded "satisfied" or "somewhat satisfied" and eager to use the content they learned in the program when they returned to their workplaces. However, the participants identified several barriers to applying their newly acquired knowledge including lack of knowledge (about 80%). Participant knowledge scores about appearance support were significantly higher after program participation. The survey results indicated the high feasibility of the e-learning program through improved knowledge about appearance care and high satisfaction with the program. The program needs further improvements for its practical utility.

***Keywords*:** appearance care, cancer therapy, e-learning, pretest-posttest design

Introduction

Patients undergoing cancer treatment experience a variety of appearance changes, and these appearance changes are among the most painful symptoms of adverse events for patients (*1*). Appearance care was identified as one of the issues to be addressed in the Third Basic Plan for the Promotion of Cancer Control (*2*), as "build a society in which people can live with dignity and peace of mind".

Since 2012, we have been holding training sessions for medical staff at designated cancer care hospitals in order to improve their skills in appearance care, and we are constantly improving the content of these sessions.

In order to obtain basic data regarding the establishment of an appearance care training program, this research group conducted a survey to clarify the actual conditions and issues of appearance care (*3,4*). The results indicated that medical care providers implement various types of appearance care, and that although they feel the need for support, they are not confident in their support.

Furthermore, as requests for training in appearance care, the participants expressed a desire for more training opportunities and locations, such as "more training opportunities" and "training sessions should be held in rural areas", "training should be provided to multiple professions" in order to take on the role in team medicine, and "hope for an e-learning format" that is easy for male medical professionals to learn, since most of the participants in transportation, repetitive learning, and training sessions are women.

This research group has conducted face-to-face

training sessions in the past, but in light of the background of the spread of e-learning training development as a form of learning to improve professional competence, we have been considering the establishment of an e-learning training program to expand learning opportunities.

Prior studies have reported that e-learning provides learning opportunities, convenience and economy, a change to a learner-centered learning style, and high levels of learner motivation and satisfaction (*5-8*) as advantages, although the effectiveness of e-learning has not been fully verified.

The primary objective of this study was to assess the feasibility of an e-learning program developed by the research group to improve the abilities of healthcare professionals who provide appearance care to cancer patients. As a secondary objective, we further examined the participants' satisfaction and perceived usefulness of the program.

The results will be used as the basis for building an e-learning program, and will be used to develop a full-scale national-level training program in the future.

Materials and Methods

Definition of terms

Appearance support: Support from healthcare professionals for patients with changes in appearance (nails, skin disorders, hair loss, *etc*.) associated with cancer treatment.

Research subjects

This study is a feasibility study of an e-learning program on appearance care. The survey period is from September 2019 to December 2019.

The eligibility criteria for the study subjects were as follows: *i*) nurses, physicians, and pharmacists who provide appearance care from the four designated cancer care hospitals; *ii*) participants of the appearance care training organized by the Appearance Center of the National Cancer Center Hospital.

Subject registration

The method of enrolling the subjects was to request the selection of research candidates to each department where nurses, physicians, and pharmacists belonged at the base hospital for cancer treatment. In total, request letters were sent to 50 nurses, 10 physicians, and 20 pharmacists. Request letters were given to 58 nurses participating in the Appearance Support Workshop (leadership training), and they were asked to participate on a voluntary basis. The total number of participants was 133.

The request letter included the URL and two-dimensional bar code for access to the e-learning site linked to the workshop's website, as well as a login ID and password, which were made available to participants who voluntarily agreed to view the site.

Sample size

The number of subjects was assumed to be evaluated by repeated measures for each of the above three selected optional topic groups.

Generally, a sample size of n =12 or more cases per group is recommended for studies to reduce variability and increase precision about the mean and variance (*9*). The acceptance rate was estimated to be about 60%, and the attrition rate about 10%, for a total of at least 75 participants (25 per group).

Development of contents of e-learning materials about appearance care (Table 1)

Based on the literature review (*3,4,10-12*), the items and contents of the educational materials were drafted by the research team (nurses, psychologists, cosmetic specialists, and physicians) and revised based on feedback from cancer survivors (one male and two females in their 30s to 50s).

The process of creating educational materials was as follows: PowerPoint materials were created, narration was recorded and converted to video, and the video was made available to the target audience in a limited public format on YouTube.

The content of the structure included general discussion and care (prevention, care along the course of the disease, care of characteristic symptoms, *etc.*). The course was divided into Step I, which is general-purpose, Step II, which is highly specialized, and Step III, which is related to medical procedures and the use of cosmetic products, respectively. The required "Concept of Appearance Care Step I" was followed by a format in which students must select at least one of "Drug Therapy (Hair Loss) (Skin and Nail Disorders)" and "Radiation Therapy Step I". Other than that, Step II/III and surgical therapy, which can be studied in more detail, were designated as "recommended optional viewing" (Figure 1).

It is recommended that the viewing time for each video in the program be broken down by detailed content, as it is said that an adult can only concentrate on learning for 10-15 minutes (*13*) and can listen to a story while retaining memory for about 20 minutes (*14*). Therefore, the videos in this program were planned to be basically divided into 15-minute increments on each topic. The required items were to be taken first, and after that, the participants were free to choose any of them, and the program could be interrupted at any time and split up during the course period.

The e-learning site was created using Google Sites, with links to the YouTube-converted video and survey questionnaire. The survey form was created in Google

Table 1. Contents of e-learning about appearance care

Training content of Appearance Care [Running time for each step]
Concept of Appearance Care [Step I = 22 min 04 sec; Step II = 24 min 40 sec; Step III = 30 min 19 sec) ●What is appearance care by medical professionals ●Types and processes of major appearance changes associated with cancer treatment ●Steps in appearance care
Drug therapy (hair loss) [Step I: 10 min 04 sec; Step II: 19 min 51 sec, Step III: 9 min 47 sec] ●High risk of hair loss, areas and processes of hair loss ●Psychological characteristics of patients associated with hair loss and their life, work, and relationships
Drug therapy (skin and nail disorders) [Step I: 19 min 27 sec, Step II: 25 min 07 sec, Step III: 14 min 25 sec] ●High risk of skin and nail disorders, process of change ●Characteristics of patients with skin and nail disorders and their life, work, relationships, *etc*. ●Appearance care provided by healthcare professionals for skin and nail disorders
Radiation therapy [Step I: 15 min 43 sec, Step II: 21 min 36 sec] ●Hair loss and skin types associated with radiation, high risk, process of change ●Effects of radiation-induced changes in appearance on life, work, and relationships ●Appearance care by healthcare professionals for radiation-induced hair loss and skin disorders

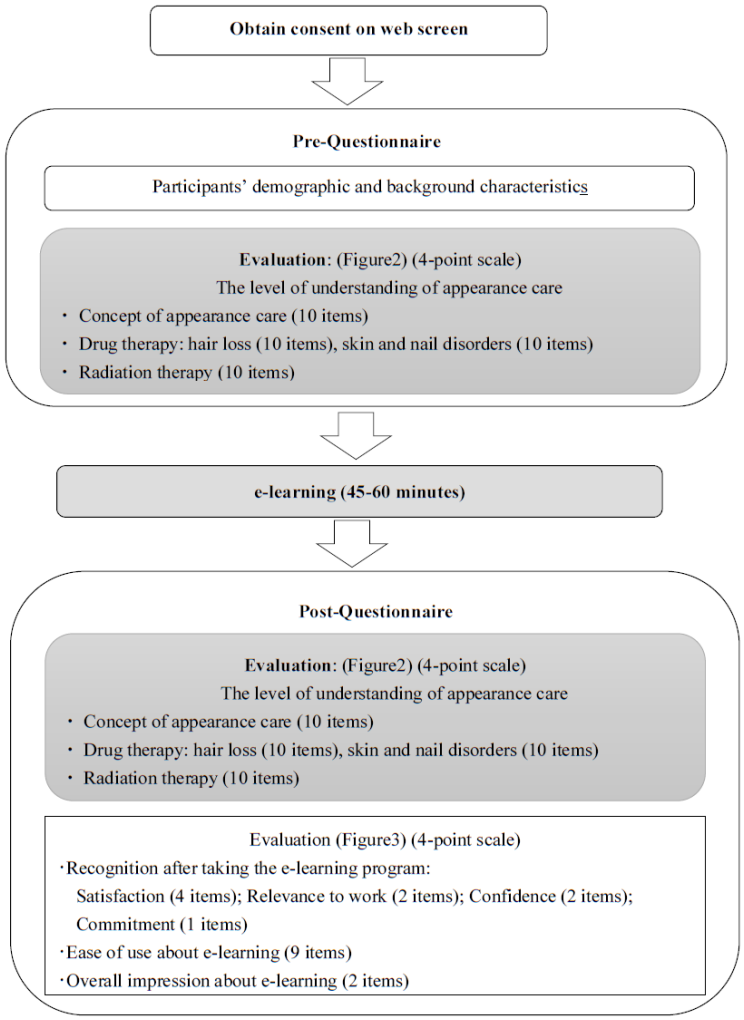

Figure 1. Flowchart of the study process: Items and timing of evaluation regarding the e-learning program for appearance care training

Forms, and the data was saved in Google Spread Sheet and downloaded in Excel format.

Survey questionnaire

The items included in the survey questionnaire were as follows:

(1) Participants' demographic and background characteristics

The participants were asked to respond to the questions regarding gender, age, and *etc.* by filling in the actual numbers or by choosing one of the options.

(2) Evaluation of the feasibility of the e-learning program

The feasibility of the e-learning program was evaluated by the level of participation, the perceived usefulness and satisfaction of e-learning, and increased levels of understanding about appearance care.

i) *Evaluation of e-learning participation*

In order to evaluate the feasibility, satisfaction and usefulness of the e-learning, the research team created an evaluation form for up to the second of the four stages, referring to Kirkpatrick's "4-stage evaluation method for training" (*15,16*).

Level 1: "Reaction" consisted of 4 items of "satisfaction" and 2 items of "relevance to work", with a 4-point scale: 1 for "Disagree", 2 for "Somewhat disagree", 3 for "Somewhat agree", and 4 for "Agree".

The confidence and commitment (willingness to use in clinical practice) questions were 2 items of "confidence" and 1 item of "commitment", and the response format was the same 4-point scale as above.

For commitment, respondents other than "agree" were asked to respond on the same four-point scale as above to the reasons for "lack of sufficient knowledge", "lack of a department to implement what has been learned", "too busy with other work to utilize what has been learned", and "lack of surrounding support to utilize what has been learned.

ii) *Evaluation of the usability of e-learning materials*

The questions, which were developed with reference to the literature (*15*), were 1 item for "likability", 2 items for "reliability", 2 items for "ease of operation", 1 item for "clarity of organization", 2 items for "ease of viewing", and 1 item for "responsiveness". The response format was the same as above, with four-point scale. The "Other" category asked respondents to provide a free-writing response on points that need improvement.

iii) *Evaluation of the levels of understanding about appearance care*

The e-learning program consisted of: concept of appearance care (10 items); drug therapy (hair loss, 10 items; skin and nail disorders, 10 items); radiation therapy (10 items). Each item of the level of understanding ("I can explain about…") was rated on a 4-point scale: 1 for "I cannot", 2 for "I cannot, to some extent", 3 for "I can, to some extent", and 4 for "I can".

(3) Overall impressions

The response format was the same as above, with a four-point scale. The feasibility of the e-learning program was evaluated by the "degree of participation" in the e-learning program, using the number of video views, number of viewers, average viewing time, average viewing rate (viewer retention rate), and number of respondents to the questionnaire.

The evaluation of usefulness included: Level 1 "satisfaction" and "relevance to work" as an evaluation of the e-learning course; Level 2 "learning achievement" and "confidence and commitment" about appearance care; an evaluation of the easy use of the e-learning materials; and overall impressions.

The content validity of the questions was checked among the researchers. The "Perceived Comprehension" section consisted of 10 questions for each of the e-learning contents: overview, hair loss, skin/nail disorders, and radiation therapy, and their reliability was checked using Cronbach's alpha coefficient. Alpha coefficients were as high as 0.959 for overview, 0.963 for cancer drug therapy (hair loss), 0.960 for cancer drug therapy (skin nail disorders), 0.954 for radiation therapy, and 0.875 for surgical therapy.

Analysis method

Descriptive statistics were calculated, and pre- and post-course comparisons of perceived understanding of the content were made using the Wilcoxon signed rank sum test for the total score for each of the concepts, drug therapy (hair loss)/(skin and nail disorders), and radiation therapy. The statistical significance level was set at 5%. The main statements were extracted and analyzed based on similarities and differences.

Ethical considerations

This survey was conducted with the approval of the Ethics Review Committee of the National Center for Global Health and Medicine (NCGM-G-003297-00).

The survey was conducted on the web, and responses were voluntary and unsigned. As a way to ensure that individuals could not be identified, a form with an optional ID and password was enclosed with each individual package of the request letter, and respondents were asked to enter their ID and password and respond to the web-based survey. No personally identifiable information was collected as personal attributes.

Results

Participant characteristics

There were 100 participants with a 75.2% response rate, including 71 (71.0%) who selected hair loss (drug therapy), 61 (61.0%) who selected skin and nail disorders (drug therapy), and 57 (57.0%) who selected radiation therapy. They selected at least one of these topics for viewing and evaluation, indicating that there were more than the expected number of participants who selected multiple topics for viewing and evaluation.

Overall participants included 4 males and 80 females with a mean (SD) age of 40.5 (16.7) years. The participants' qualifications as healthcare professionals were 80 nurses, 2 physicians, 2 pharmacists, with 16

unknown qualifications (no response).

Of the nursing staff, 38 were Certified Nurses, including 22 in cancer chemotherapy, 11 in breast cancer, 2 in cancer pain control, 1 each in palliative care, radiation oncology, and wound, ostomy and continence, and 2 were Certified Nurse Specialists. Affiliated departments included 33 in the hospital wards, 22 in the outpatient treatment centers, and 12 in the outpatient medical department (Table 2).

Number of views and viewing time of e-learning programs

The degree of participation was evaluated by the number of times each instructional video was played, the number of people who viewed it, and the number of people who responded to the questionnaire. The number of times each e-learning video was played and viewed by 115 times and 100 persons, respectively, for the compulsory "Introduction" and 120 times and 100 persons for the "Concept of Appearance Care Step I". Of the three optional topics, Step I had 83–95 views and 69–82 viewers, and Step II and III, the recommended optional viewing, had 29–63 views and 27–56 viewers. The average playback rate was generally in the 70% range, although some were in the 60% range, and some were in the 80% range. In all videos, there was no significant decrease in the average playback rate over time.

The level of understanding of e-learning: pre- and post-change (Figure 2)

Table 2. Participants' demographic and background characteristics (n = 100)

	n	(%)	Mean ± SD
Gender*			
Male	4	(4.8)	
Female	80	(95.2)	
Age (years)*			40.5±16.7
Qualifications*			
Nurse	80	(95.2)	
Physician	2	(2.4)	
Pharmacist	2	(2.4)	
Total years of practice experience (years)*			16.7±10.7
Certified Nurse qualification*			
Certified Nurse (Details)	38	(45.2)	
Cancer chemotherapy	22	(26.2)	
Breast cancer	11	(13.1)	
Cancer pain control	2	(2.4)	
Palliative care	1	(1.2)	
Radiation oncology	1	(1.2)	
Wound, Ostomy and Continence	1	(1.2)	
Certified Nurse Specialist			
Oncology Nursing	2	(2.4)	
Department*			
Hospital ward	33	(39.3)	
Outpatient Treatment Center	22	(26.2)	
Outpatient Medical Department	12	(14.3)	
Others	13	(15.5)	

*The valid responses for those variables are smaller (n = 84) due to missing data.

Comparisons were made for those who responded to the pre- and post-surveys in each e-learning content. 68 (68.0%) responded to the overview, 71 (71.0%) responded to the drug therapy (hair loss), 61 (61.0%) responded to the drug therapy (skin and nail disorders), and 57 (57.0%) responded to the radiation therapy.

(1) Concept of appearance care

Sixty-eight respondents responded to both the pre- and post-answers; the median (interquartile range) pre/post for the total of 10 questions was 26 (21–31)/34.5 (29–38.75) points, higher for the post-answers ($p < 0.001$).

(2) Drug therapy (hair loss)

Seventy-one respondents answered both pre- and post-question; the median (interquartile range) pre/post for the 10-question total was 29 (22–35)/38 (32–40) points higher for the post ($p < 0.001$).

(3) Drug therapy (skin and nail disorders)

Sixty-one respondents answered both pre and post. The median (interquartile range) pre/post for the total of 10 questions was 27 (21–31)/40 (33–40) points, higher for the post ($p < 0.001$).

(4) Radiation therapy

Fifty-seven respondents answered both pre and post. The median (interquartile range) pre/post for the total of 10 questions was 25 (21–30)/36 (30.5–39) points, with the post being higher ($p < 0.001$).

E-learning satisfaction, relevance to work, confidence, and commitment rating (Figure 3)

(1) Satisfaction with the program and relevance to work

The majority responded positively to both satisfaction and relevance to work, with more than 70% responding positively to both.

(2) Relevance to work, confidence, and commitment

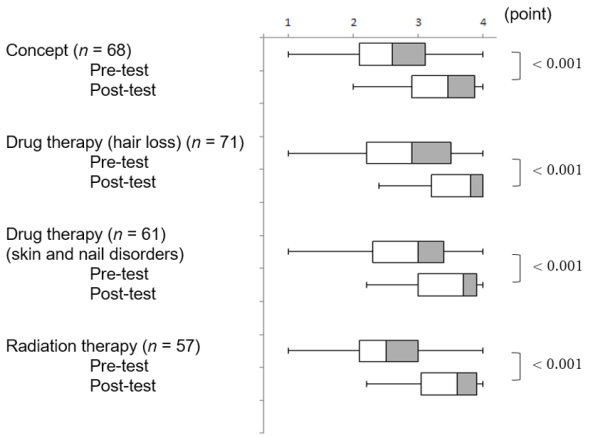

Figure 2. The level of understanding of appearance care: pre- and post- change. Each item ("I can explain about…") was rated on a 4-point scale: 1 for "I cannot", 2 for "I cannot, to some extent", 3 for "I can, to some extent", and 4 for "I can".

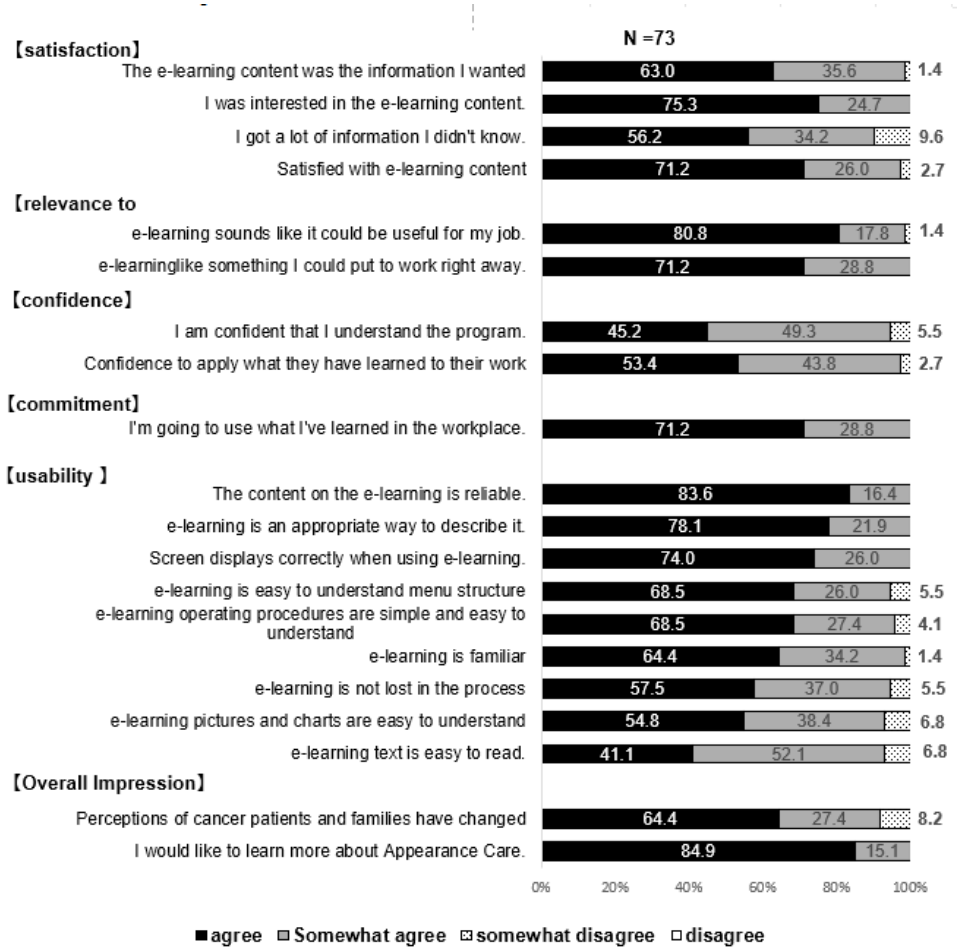

Figure 3. Evaluation on satisfaction and utility of the e-learning appearance care (*n* = 73)

About half of the respondents answered positively for confidence, and the majority answered positively for commitment. 21 respondents answered other than "Yes" for the use of the knowledge in the workplace, 13 (76.5%) for "Insufficient knowledge," 8 (47.0%) for "Too busy with other duties to use what I have learned," and 8 (47.0%) for "Lack of support from others to use what I have learned. 8 respondents (47.0%) answered that they "do not have enough knowledge," and 8 respondents (47.0%) answered that they "do not have the support from others to use what I have learned".

Evaluation of the usability of e-learning materials, overall evaluation

About 84% of the respondents answered "Yes" to the question "The content in this program is reliable".

The free comments were diverse, including: easy to understand overall, requests for improvement of the screen (font size, font style) and narration (speed, sound clutter), requests for distribution of materials, and limited Wi-fi data traffic as a viewing environment. Some of the comments included: "I would like to know more specific care", "It is easy to understand as it is linked to the number of pages in major books", "It was useful as I am often asked questions in clinical practice", and "Some contents were not helpful as they are different from the care methods used at my institution".

Discussion

This survey was conducted as a prospective observational study among healthcare professionals already practicing in this field in order to evaluate the feasibility, satisfaction and usefulness of the e-learning program that was constructed based on the results of the previously conducted training sessions and research findings. This e-learning program was evaluated as feasible because the survey results indicated the participants' increased knowledge, enhanced perception related to their clinical relevance, and high level of satisfaction after taking the e-learning program. However, since the majority of respondents were nurses, the results of the analysis need to be interpreted in light of this when generalizing the results.

The number of participants was 100, and the response rate was high at 75.2%. The survey was conducted after confirming the number of participants with the permission of department managers, and it is assumed that many of them were interested in this field.

The following section discusses the results of the survey in terms of participation, satisfaction,

comprehension, and ease of use.

Number of views and viewing time of e-learning programs

The number of viewers of the e-learning videos indicated that all 100 participants viewed the required "Introduction" and "Concept of Appearance Care Step I" videos. The number of views was slightly higher than the number of viewers, indicating that some participants viewed the videos more than once, and the number of viewers was slightly higher than the number of survey respondents, indicating that some participants viewed videos other than those on the selected topics that required responses in the survey.

The average playback rate was around 70% and showed almost no decline over time, indicating that around 70% of the participants watched the material almost to the end once they started watching it. Although we had initially expected at least 25 participants for each selected theme, the number of participants for some themes far exceeded that number. Since this was an e-learning program on appearance, it can be assumed that viewers had a wide range of interests in participating in the course.

In this study, since Google Sites and YouTube were combined as a simple e-learning system, only the number of times the videos were viewed, the number of viewers, and the average playback rate were tabulated. In the future, by introducing a dedicated e-learning system (learning management system), it will be possible to grasp and evaluate individual viewing and learning situations and reflect on them in instructional planning.

Evaluation of the e-learning program (satisfaction and comprehension)

In terms of evaluation of the program content, the usefulness of the program was indicated by high scores for "satisfaction", "degree of participation", and "relevance to work" at "Level 1" and "confidence" at "Level 2", as well as high recognition of "commitment" in "willingness to use what was learned in the workplace".

As a training evaluation, Kirkpatrick has added a new content that is important for "Level 1", which is interest, and for "Level 2", which is knowledge, skills, and attitude change, as well as confidence and commitment, *i.e.*, "whether the trainee is confident/willing to utilize the training content" (*14,16*). The new content has been added to the current version of the training evaluation. This indicates that the importance of these factors is not only knowledge and skills, but also confidence and commitment, which are meaningless unless the trainee has the confidence and commitment and can appropriately utilize them in clinical practice. The high level of confidence, commitment, *etc.* in this study, including confidence and willingness to utilize the program in clinical practice, is a valuable finding that demonstrates the high usefulness of the clinical application of this program.

On the other hand, about 80% of the respondents answered that they "do not have sufficient knowledge", and about 50% answered that they "are too busy with other duties to use what they have learned" and "lack support from others to use what they have learned", indicating the need to acquire reliable knowledge, work environment, and support from others to apply what they have learned in the workplace. In the future, it is necessary to develop more practical programs that include not only the acquisition of knowledge, but also its application and dissemination in the workplace.

Ten questions were set for each of the following areas of understanding of the program: overview, hair loss, skin/nail disorders, and radiation therapy. However, the fact that the participants in this study were medical professionals involved in this field at a designated cancer care hospital for cancer treatment and the high participation rate in this program suggest that they were a group with a high level of interest in this field from the beginning.

Evaluation of the usability of e-learning materials

Many respondents answered "strongly agree" to the item "The content in this program is reliable". Considering the convenience for trainees and the possibility of continuing training during an infectious disease pandemic, the usefulness of e-learning, which can be conducted remotely, is expected to further increase in the future. While a small number of respondents stated that the course was easy to understand, there were also various opinions regarding improvements to the presentation of the text and the sound. The materials need to be revised based on these opinions.

Regarding the communication environment of the participants, there were opinions regarding the communication capacity of Wi-Fi. In addition, according to the results of our survey of designated cancer care hospital (*3*), it was reported that there were some who wanted to learn about support for appearance care but were not comfortable with e-learning, so we believe that consideration should be given to simplifying the operation method.

The viewing time for each video material ranged from 10 to 22 minutes. In previous studies (*13,14*), it was estimated that it takes 10 to 15 minutes to concentrate on learning and 20 minutes to listen to a story while retaining memory. Although this study employed a split program, some e-learning contents were of somewhat longer duration. In particular, although not included in the current evaluation items, Step II resulted in a wide range of video viewing time settings, from 6 to 30 minutes. Although the program can be interrupted at any time and can be divided into separate courses during the course period, we believe that there is room for further

consideration regarding time settings.

Conclusions

The results of this feasibility study indicated the following, including the level of understanding about appearance care, satisfaction and usefulness of the e-learning training program that was developed by this research group in order to improve the competence of healthcare professionals who support cancer patients' appearance: *i*) The number of times participants replayed the e-learning program and the response rate to pre- and post-questionnaire surveys were high, indicating the high feasibility of the program. Further refinement of content and methods is needed in the future; *ii*) The scores for satisfaction with the training content, relevance to work, confidence, and intention to use the training in clinical practice were all high, indicating its usefulness in clinical practice; *iii)* While many participants responded with positive comments about the ease of use of e-learning, several participants had diverse opinions about the contents and methods of the program. It is necessary to develop a more practical program that includes not only the acquisition of knowledge, but also the application and dissemination of knowledge in the workplace; and *iv*) The mean comprehension scores after viewing were significantly higher than before viewing for all of the concepts, hair loss, skin/nail disorders, and radiation injury, indicating that knowledge was gained through program viewing.

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Conflict of Interest: Chikako Shimizu has received research grants from Eli Lilly, honoraria from Astra Zeneca, Pfizer, Chugai, Taiho, and Daiichi-Sankyo. The remaining authors have no conflicts of interest to disclose.

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