

Development and Evaluation of Video-Based Educational Materials for Nutritional Management of Cancer in Children Among Healthcare Professionals and Caregivers

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Abstract

Background

A good audio-visual educational material for caregivers on nutrition management of pediatric oncology patients can improve treatment effectiveness, recovery rate, and nutritional status of patients. This study aimed to develop and evaluate a series of video-based educational materials for nutritional management of pediatric oncology patients among healthcare professionals and caregivers.

Methods

The development of the video series began with subtopic selection and content refinement based on a printed booklet project previously published by the groups of five experts in dietetics and oncology medicine and five caregivers of pediatric cancer patients. 10 healthcare professionals (medical doctors and dietitians with over 5 years of working experience) and 15 caregivers then evaluated the video series for acceptability and relevance using the Malay version of the Patient Education Materials Assessment Tools for Audio-Visual materials (PEMAT-AV). Sets of understandability and actionability statements were given a score of 0 (disagree) or 1 (agree), and the overall percentage was calculated.

Result

Four main topics were selected from the booklet and adopted into 5 video series ranging from 3 to 8 minutes in length developed in the Malay language entitled (i) Introduction to Cancer and the Treatment, (ii) The Side Effects of Cancer Treatment and Management (Part 1), (iii) The Side Effects of Cancer Treatment and Management (Part 2), (iv) Nutrition Management in Children with Cancer, and (v) You Ask, We Answer. The average understandability and actionability scores rated by the healthcare professionals were 98.6% and 98.7% respectively. Whereas the caregivers' average score for understandability was 99.5% and 99.6% for actionability.

Conclusions

The findings revealed that a high-quality video series was successfully developed and rated as highly understandable and actionable by both healthcare professionals and caregivers. This reflects positive acceptance and relevance of the nutritional management educational videos by both groups who manage and care for pediatric cancer patients.

Trial Registration

Centre for Research and Instrumentation Management, Research Ethics Committee of The National University of Malaysia; Ref. No. UKM/PPI/111/8/JEP-2021-266

Background

About 11,050 children in the United States under the age of 15 are expected to be diagnosed with cancer by 2020 [1]. Despite advances in treatment methods, cancer is still the second highest cause of death among children aged 1–14 years after an accident. The estimated mortality rate among children under 15 years of age due to cancer is 1,190 [2]. Based on the Malaysia National Cancer Registry Report published in 2019, a total of 115,238 new cancer cases were diagnosed for a period of 5 years from 2012 to 2016. 51,505 (44.7%) of the total number of new cases reported cases involving male patients while the cases of female patients were 63,733 cases (55.3%). The stated lifetime risk of cancer is 1 in every 10 men, while for women it is 1 in every 9 women. For childhood cancer in the age category range from 0 to 18 years, there were 3,829 cases reported comprising 2,131 (55.7%) cases involving boys and 1,698 (44.7%) cases involving girls. In total from 2012 to 2016, a total of 82,601 deaths due to medically and non -medically certified cancer were reported by the National Registration Department for the period 2012 to 2016 [3].

Cancer also causes malnutrition especially in pediatric patients who need adequate nutrients for their rapid growth phase. Mouth ulcers, nausea and vomiting, and diarrhea are among the side effects of treatment that interfere with the normal digestive function and absorption of food of the patient. This disorder results in high-risk children suffering from nutrient deficiencies. A study conducted in the pediatric oncology ward of a Malaysian university hospital found that 58.6% of children were malnourished [4]. A large number of more than half the number of patients is a matter of great concern and should be taken seriously. They can also experience weight problems of either being overweight or underweight, depending on the type of cancer and the treatment they are undergoing [5, 6] There is also a risk of death from cachexia if the loss of lean body mass occurs suddenly and is not treated immediately.

The American Cancer Society (2016) defines caregivers as individuals who are always together helping cancer patients [7]. Caregivers manage cancer patients at no cost, they are usually the spouse, family member, or close friend of the cancer patient. Apart from that, some professionals provide paid care for cancer patients. The role of caregivers is somewhat limited as they are not trained to care for and manage cancer patients. Throughout the pediatric cancer treatment process, caregivers are very important individuals in ensuring that the nutritional needs of these children are adequate in addition to relying on the hospital staff. This is because the hospital may not be able to give full focus to a patient. So, caregivers need to manage the nutrition of cancer children in terms of ingredient selection, cooking methods, nutritional requirements, and cancer side effects almost entirely. However, authentic reference material needs to be identified first before the input is used. In educating patients, educational materials play an important role in helping to convey accurate and clear nutritional information to the community [8].

Several studies have proven the effectiveness of educational materials for the management of pediatric cancer [9, 10]. A recent interventional study conducted among the caregivers of pediatric cancer patients in Malaysia using a printed educational material was reported to be beneficial [11]. While findings from the study revealed that the booklet was effective in increasing the knowledge of the caregivers in the nutritional management of pediatric cancer patients, they also suggested that the booklet should be

adopted into a series of educational videos to tackle anticipated limitations faced by caregivers such as availability of the printed version, the cost of purchasing the booklet and the time commitment required to read it. Hence, this study was conducted to fill in the gaps with the aim to develop and evaluate a video-based educational material for nutritional management of pediatric cancer patients among healthcare professionals and caregivers.

Methods

Study Design

This study consisted of three phases: 1) Selection of subtopic and content refinement, 2) Development of audio-visual educational materials, 3) Evaluation by health professionals and caregivers of pediatric cancer patients for acceptability and relevance. This study was conducted fully online from December 2020 until June 2021 during Movement Control Order in Malaysia due to the Covid-19 pandemic. Ethical approval for this study was obtained from the University's Research Committee (reference: UKM PPI/111/8/JEP-2021-266). All participants provided written informed consent prior to the start of the study.

Phase 1: Selection of subtopic and refinement of content

The development of the audio-visual educational materials in this study was based on the printed educational materials previously developed by Chung et. al (2020) entitled "Oncology Pediatric: Nutritional Management for Caregivers". The 60 pages booklet consists of 7 topics: 1) What is cancer and its treatment, 2) Management of cancer treatment side effects, 3) Managing food-nutrition in children with cancer, 4) Recipe ideas for children during pain, 5) Can children with cancer enjoy outside foods, 6) Food and nutrition-related issues among children with cancer, and 7) Let's play fun activities. The process of subtopic selection and refinement of content involved 5 expert panels (consisting of 2 oncology pediatric specialists, 2 oncology pediatric dietitians, and 1 academic dietitian), and 5 caregivers of pediatric cancer patients. Meetings with expert panels were held three times through an online meeting platform (Google Meet), with each session lasting approximately 1-2 hours discussing the relevance of the content, and suitability of the content, graphics, and specific terms. The process also consists of panels exchanging information based on the present situation of children with cancer. Additionally, feedback and comments were also obtained from caregivers of pediatric cancer patients through drop comments on Google Drive for video improvements.

Phase 2: Development of audio-visual educational materials

Following expert panel consultation, four topics were chosen to be adopted into a series of 5 videos with the following titles: 1) Introduction to cancer and its treatment, 2) The side effects of cancer treatment and how to manage them. 3) Nutrition management in children with cancer, and 4) You ask, we answer. The videos were developed in the Malay language, and each video ranged between 3 and 8 minutes. All of the videos were created using free graphic design and video editing applications available online

utilizing Canva (Canva Pty. Ltd) and Inshot (Inshot Inc.) respectively. Basic terminology and language were used in the videos, as well as appealing and colourful graphics, pictures with subtitles, clear voice recording, and culturally relevant examples.

Phase 3: Evaluation by healthcare professionals and caregivers of paediatric cancer patients

Ten healthcare professionals consisting of 5 medical doctors and 5 dietitians from medical universities and hospitals in Malaysia who are citizens with a minimum of 5 years working experience in the field of medicine and/or nutrition and dietetics were invited to participate in this study. The number of experts evaluating the videos in this study exceeds the recommended number of at least five expert panels suggested by previous studies [12]. Additionally, 5 caregivers aged 18 years old and above who are Malaysian citizens and members of the paediatric cancer support group of the university's hospital were also invited to evaluate the videos. To be eligible to participate in this study, caregivers must also be able to speak and read in the Malay language. These 10 healthcare professionals and 5 caregivers were not involved in the phase I of this study.

The evaluation process was conducted online via emails and WhatsApp where the participants were provided with a link to access a Google Drive folder that contained: i) 5 series of educational videos that need to be evaluated, and ii) google forms of PEMAT-AV (M). An individual evaluation form was provided for each video. This study uses PEMAT-AV (M), the Malay version of the Audio-Visual Patient Educational Material Assessment that has been translated into Bahasa Malaysia by Wong et al. (2018) [13] based on the original English version as an evaluation tool [14]. It comprises 13 statements for understandability and 3 for actionability, and each item on PEMAT scored as either 1 (agree) or 0 (disagree). The total score for understandability and actionability was computed and reported as a percentage. A higher understandability and actionability score imply that the education material is easy to understand and apply. A comment section is also provided to highlight any future improvements that could be made.

Results

Phase 1: Selection of subtopic and refinement of content

Development of audio-visual educational material (video series). The video series is constructed based on the content refinement of the 60 pages booklet Chung et al 2018. From 7 topics overall, only 4 topics were selected to be adopted into video series. An online meeting was held proposing the selected topics to the expert panels. The proposed contents (Table 1) were well-received by the expert panels. All the feedback and comments given during the meeting were noted for the betterment of audio-visual educational materials. Majority of the panels agreed on the use of appropriate font type and size. They also emphasized on the incorporation of realistic pictures and illustration to draw interests and aid in a better understanding towards the information.

Table 1

Selected contents from booklet Oncology Pediatric: Nutritional Management for Caregivers

Content from Booklet Chung et al 2018	Page Number	Selected content (Yes/No)
Topic 1: What is Cancer and The Treatment?	1–3	Yes
Topic 2: Management of Cancer Treatment Side Effects	4–11	Yes
Topic 3: Managing Nutrition in Children with Cancer	12–21	Yes
Topic 4: Recipe Ideas for Children with Cancer	22–42	No
Topic 5: Can Children with Cancer Eat Outside Foods?	43–49	Yes
Topic 6: Nutrition-related Issues among Children with Cancer	50–53	Yes
Topic 7: Let's Play Fun Activities!	54–60	No

Phase 2: Development of audio-visual educational materials

The developed video series has four topics (Table 2) with a total duration of 29 minutes. The average length of the video is 5.8 minutes. Each video has voice-over to facilitate the written information. The use of attractive and appropriate visual aids is being optimized in all the videos. Upon completing the video series, another meeting was held with the same expert panels to review the final contents.

Table 2

Proposed topics and contents for the development pediatric cancer nutrition management videos

Content from Booklet Chung et al 2018	No. of pages	Content for Video	Duration (min)	Total duration (min)
Topic 1: What is Cancer and The Treatment?	3	Video 1: Introduction to Cancer and The Treatment	2.57	29.00
Topic 2: Management of Cancer Treatment Side Effects	8	Video 2: The Side Effects of Cancer Treatment and Management (i) Video 3: The Side Effects of Cancer Treatment and Management (ii)	5.28 7.15	
Topic 3: Managing Nutrition in Children with Cancer	10	Video 4: Nutrition Management in Children with Cancer	6.34	
Topic 5: Can Children with Cancer Eat Outside Foods?	7	Video 5: You Ask, We Answer	7.16	
Topic 6: Nutrition-related Issues among Children with Cancer	4			

Phase 3: Evaluation by healthcare professionals and caregivers of pediatric cancer patients

Acceptance towards the video series among health professionals and caregivers is determined by using PEMAT-AV; in this case, PEMAT-AV(M) is used. A total of 10 health professionals comprising medical doctors (n = 5) and dietitians (n = 5) were selected. Majority of them were Malay (90%) and female (80%). Socio-demographic information of the healthcare professionals is presented in Table 3.

Table 3
 Socio-demographic
 Characteristic of The
 Healthcare Professionals (n =
 10)

Characteristic	n(%)
Gender	
Male	2(20)
Female	8(80)
Ethnicity	
Malay	9(90)
Chinese	1(10)
Profession	
Medical Doctor	5(50)
Dietitian	5(50)
Institution	
Government	10(100)

Table 4
Socio-demographic Characteristic of The
Caregivers (n = 15)

Characteristic	n(%)
Gender	
Male	2(13.33)
Female	13(86.67)
Age	
25–39	6(40.00)
40–59	9(60.00)
Ethnicity	
Malay	15(100.00)
Employment status	
Government	6(40.00)
Private institution	3(20.00)
Self-employed	1(6.67)
Unemployed/housewife	5(33.33)
Education level	
Secondary	4(26.67)
Tertiary	11(73.33)

PEMAT-AV(M) evaluation

The score of PEMAT-AV(M) answered by the healthcare professionals and caregivers is calculated and tabulated. Healthcare professionals' cumulative score for understandability is $98.61 \pm 0.64\%$ meanwhile for actionability is $98.67 \pm 1.82\%$ (Table 5). Video 2, 4 and 5 achieved 100% actionability score.

Caregivers' understandability and actionability scores, as in cumulative, are $99.49 \pm 0.52\%$ and $99.56 \pm 0.99\%$ respectively (Table 6).

Table 5
The Score of PEMAT-AV (M) among The Healthcare Professionals

Topic Video Series	Overall Score	Mean Overall Score (%) (Mean \pm SD)	Understandability Score (%)		Actionability Score (%)	
			Mean	Total Mean Score (mean \pm SD)	Mean	Total Mean Score (mean \pm SD)
			Video 1: Introduction to Cancer and The Treatment	97.50	98.62 \pm 0.68	97.69
Video 2: The Side Effects of Cancer Treatment and Management (i)	98.75		98.46		100	
Video 3: The Side Effects of Cancer Treatment and Management (ii)	98.75		99.23		96.67	
Video 4: Nutrition Management in Children with Cancer	98.75		98.46		100	
Video 5: You Ask, We Answer	99.34		99.23		100	

Table 6
The Score of PEMAT-AV (M) among Caregivers

Topic Video Series	Overall Score	Mean Overall Score (%) (Mean \pm SD)	Understandability Score (%)		Actionability Score (%)	
			Mean	Total Mean Score (mean \pm SD)	Mean	Total Mean Score (mean \pm SD)
			Video 1: Introduction to Cancer and The Treatment	98.75	99.50 \pm 0.54	98.97
Video 2: The Side Effects of Cancer Treatment and Management (i)	99.58		99.49		100.00	
Video 3: The Side Effects of Cancer Treatment and Management (ii)	100		100.00		100.00	
Video 4: Nutrition Management in Children with Cancer	99.17		98.97		100.00	
Video 5: You Ask, We Answer	100		100.00		100.00	

The video series were noted to be attractive, helpful, and informative. Video 5 is said to be the most relevant by health professionals considering the current COVID-19 outbreak. Due to diversity in educational background and participants' literacy level, the contents were delivered in simple layman terms which made it easy to understand. The narrator verbalized coherently, enhancing the understandability and actionability of the video series. Healthcare professionals and caregivers made specific comments to improve the videos in the open-ended section; regarding the consistency, need for elaboration of terminologies and audio-visual quality (Table 7).

Table 7
Summary of the Comments on the Videos

Characteristic	Healthcare Professionals	Caregivers
Consistency	<ul style="list-style-type: none"> • Highlight and bold the important keywords for every video • Compose a consistent volume of the voice-over 	
Elaboration	<ul style="list-style-type: none"> • Further elaboration on some terminologies such as 'targeted therapy', and 'low-bacteria diet'. • Create a numbered list to improve synchronization between the voice-over and the information 	<ul style="list-style-type: none"> • Include more examples on treatment side effects and food appropriate for children with cancer
Audio-visual quality	<ul style="list-style-type: none"> • Refine the narrative pacing in some parts of the video 	<ul style="list-style-type: none"> • Exert variety in intonation • Supplement with a summary table or take-home message at the end of every video

Discussion

This study has successfully developed a video series on oncology pediatric nutrition management that are relevant among the healthcare professionals and caregivers. The videos were developed to serve as useful practice guidelines for caregivers in managing their children's nutrition. Accompanied with high acceptance from the healthcare professionals, this video series can be used to educate and empower the caregivers with the right knowledge to help their children throughout the cancer treatment, thus reducing the risk of malnutrition and further improve the patient's quality of life.

The content of these videos was developed based on a booklet entitled Oncology Pediatric: Nutritional Management for Caregivers to address the lack of local educational materials of nutritional management for children with cancer and tackle the bad malnutrition among patients [11]. There was a significant improvement of knowledge, attitude and practice among caregivers recorded after reading the booklet. However, the booklet can have limitations such as the buying cost and time taken to finish it. Educational tools in the form of video are proven to be impactful and effective in interventional studies and in some

cases, educational technology was slightly superior to traditional educational methods as information aids. The parents of children diagnosed with cancer preferred video as it allowed them to replay and recall information that they could not have picked up or understood beforehand [10]. Video has higher engagement probability because it combines various types of media, thus preventing distraction by extraneous details.

Based on the discussion with expert panels during phase 1, only five topics were chosen from the total seven topics of the booklet. The video's topic was aligned with parents who stated that they wanted more information on understanding the disease, side effects and extra content on practical or day-to-day management of their children's cancer [10]. The panel experts agreed that the videos should be seven minutes at most to spark interest, maintain focus and attention and not be time-consuming [12]. The terms used were suitable for laymen while maintaining the real health context as plain language, a patient-centered approach for clear communication, is preferred by all health literacy levels [15].

The video series was evaluated by the healthcare professionals consisting of doctors and dietitians who have above five years of experience in their respective field and caregivers. PEMAT-A/V is used to evaluate the videos developed to ensure the relevance and acceptance of the videos among healthcare professionals and caregivers. It was a systematically developed questionnaire that consists of two domains which are understandability and actionability. A PEMAT score of above 70% is considered understandable or actionable while below 70% is considered poorly understandable or actionable. Overall, higher score means higher understandability and actionability of the videos developed.

To summarize, the video series of oncology pediatric nutrition management scored a mean of 98.62% with understandability of 98.61% and actionability of 98.67% among the healthcare professionals. The caregivers' mean score is 99.50% with understandability of 99.49% and actionability of 99.56%. Both groups have high scores that indicates the videos are understandable and actionable. These mean that healthcare professionals and caregivers can process, explain the key messages and identify what they can do with information presented, despite the diverse background and varying health literacy. The healthcare professionals have slightly lower scores probably due to their expertise made them more particular towards the content and details than caregivers. In the open-ended question, they also provide more comments and suggestions on how to improve the videos.

This study recorded a higher average score of the videos than the previous study on booklet that only scored average of 67.85% when evaluated using Tools to Evaluate Material Used in Patient Education (TEMPtEd) on caregivers [11]. This proves that the video series has higher acceptance among the cancer patients' caregivers. In comparison with studies that evaluate audiovisual educational materials on diabetes in Korea, the average PEMAT score is 58.5% (moderate) with understandability of 49.5% and actionability of 31.4% (low), despite 58.8% of the materials were developed by nongovernment organizations like this study. Those materials did not state their clear purposes, target audience and offer features such as replay, pause or magnify the screen unlike the videos this study developed [16].

The current study is the first in Malaysia to develop and evaluate videos on oncology pediatric nutrition management for caregivers. This video series has gone through many processes from the development of booklet from scratch by the previous study to finally, the finalized content of the videos after rounds of discussion with expert panels. The feedback received by the healthcare professionals and caregivers in this study will also surely contribute to the video's improvement. In future studies, videos can cover on real life experience of the caregivers in managing the patients' nutrition as it can help the videos to be more relatable and practical.

Conclusions

A video series entitled oncology pediatric nutrition management for caregivers that contained five short videos was successfully developed and evaluated by the healthcare professionals and caregivers in this study. The videos are well-accepted and relevant by the healthcare professionals and caregivers as proven by the high score of PEMAT understandability and actionability.

Abbreviations

PEMAT-AV: Patient Education Materials Assessment Tools for Audio-Visual

PEMAT-AV(M): Patient Education Materials Assessment Tools for Audio-Visual Malay

UKM: Universiti Kebangsaan Malaysia

TEMPtEd: Tools to Evaluate Material Used in Patient Education

Declarations

Ethics Approval and Consent to Participate

All methods were performed in accordance with the relevant guidelines and regulations. Ethics approval was gained from Centre for Research and Instrumentation Management, Research Ethics Committee of The National University of Malaysia; Ref. No. UKM/PPI/111/8/JEP-2021-266. Informed consent was obtained from all participants prior to commencement of the study.

Consent for Publication

Consent for publication was obtained from each individual person and their parent or legal guardian.

Availability of data and materials

The datasets obtained from this study are available from the corresponding author on request.

Competing Interests

The authors declare that they have no competing interests.

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Not applicable.

Authors' Contributions

Conceptualization, N.H.R, methodology, N.H.R., M.H.M., N.R.R. and N.Q.Z.; formal analysis, M.H.M., N.R.R. and N.Q.Z writing—original draft preparation, N.H.R., M.H.M., N.R.R. and N.Q.Z.; writing—review and editing, N.H.R., M.H.M., N.R.R. and N.Q.Z.; supervision, N.H.R. and H.A. All authors have read and approved the manuscript.

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References

1. National Cancer Institute. Childhood Cancer. 2020. <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/childhood-cancer>. Accessed 18 November 2020.
2. American Cancer Society. Key statistics for childhood cancers. 2020. <https://www.cancer.org/cancer/cancer-in-children/key-statistics.html>
3. Azizah A, Hashimah B, Nirmal K, Siti Zubaidah A, Puteri N, Nabihah A, et al. Malaysia National cancer registry report 2012–2016. 2019.
4. Yusoff NAM, Zaid ZA, Sham R, Jamaluddin R, Shahar S, Jamal AR. Kajian Rintis Penilaian Status Pemakanan di Kalangan Pesakit Onkologi Pediatrik di Hospital Universiti Kebangsaan Malaysia. *Jurnal Sains Kesihatan Malaysia*. 2007;5(1).
5. Co-Reyes E, Li R, Huh W, Chandra J. Malnutrition and obesity in pediatric oncology patients: causes, consequences, and interventions. *J Pediatric blood cancer*. 2012;59(7):1160–7.

doi:10.1002/pbc.24272

6. Mosby TT, Barr RD, Pencharz PB. Nutritional assessment of children with cancer. *Journal of pediatric oncology nursing*. 2009;26(4):186–97.
7. American Cancer Society. What Is a Cancer Caregiver? 2016. <https://www.cancer.org/treatment/caregivers/what-a-caregiver-does/who-and-what-are-caregivers.html>. Accessed 31 November 2020.
8. Talib RA, Raqi RA. Penerimaan masyarakat terhadap bahan pendidikan pemakanan bercetak. *Malaysian Journal of Nutrition*. 2001;7(1 & 2):51–60.
9. Murphy D, Kashal P, Quinn G, Sawczyn K, Termuhlen A. Development of a Spanish language fertility educational brochure for pediatric oncology families. *Journal of pediatric adolescent gynecology*. 2014;27(4):202–9.
10. Rodgers CC, Laing CM, Herring RA, Tena N, Leonardelli A, Hockenberry M, et al. Understanding effective delivery of patient and family education in pediatric oncology: A systematic review from the Children's Oncology Group. *Journal of Pediatric Oncology Nursing*. 2016;33(6):432–46. doi:10.1177/1043454216659449
11. Chung J, Zamada NA, Baharun NAN, Sulaiman S, Razalli NH, Alias H. Effectiveness of printed educational material on nutrition management among paediatric oncology caregivers. *Jurnal Sains Kesihatan Malaysia*. 2020;18(1). doi:10.17576/jskm-2020-1801-01
12. Jamil NA, Chau SH, Razak NIA, Kamar IIS, Mohd-Said S, Rani H, et al. Development and evaluation of an integrated diabetes-periodontitis nutrition and health education module. *BMC medical education*. 2021;21(1):1–9. doi:10.1186/s12909-021-02721-9
13. Wong ST, Saddki N, Arifin WN. Understandability and Actionability of Printable and Audio-Visual Patient Education Materials produced by the Ministry of Health Malaysia. October 2018; Kuala Lumpur, Malaysia.
14. Shoemaker SJ, Wolf MS, Brach C. Development of the Patient Education Materials Assessment Tool (PEMAT): a new measure of understandability and actionability for print and audiovisual patient information. *Patient education counseling*. 2014;96(3):395–403. doi: 10.1016/j.jpec.2014.05.027
15. Papadakos J, Giannopoulos E, McBain S, Forbes L, Jain P, Samoil D, et al. Quality assessment of cancer patient education materials: the current state of systemic therapy patient education in fourteen cancer centres across Ontario, Canada. *Supportive Care in Cancer*. 2021;29(7):3513–9. doi:10.1007/s00520-020-05859-2
16. Kang SJ, Lee MS. Assessing of the audiovisual patient educational materials on diabetes care with PEMAT. *Public Health Nursing*. 2019;36(3):379–87. doi:10.1111/phn.12577