Ontario Health
Cancer Care Ontario

Guideline 20-2 Version 2

**A Quality Initiative of the
Program in Evidence-Based Care (PEBC), Ontario Health (Cancer Care Ontario)**

Effective Teaching Strategies and Methods for Cancer Patient Education

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Report Date: April 29th, 2025

Report Citation (Vancouver Style): Papadakos J, Durocher-Allen LD, Devitt D, Krames L, Lawrie K, Pocrnic N, Premji A, Sultana A, Wong S et al. Effective Teaching Strategies and Methods for Patient Education. Toronto (ON): Ontario Health (Cancer Care Ontario); *2025 April 29th*. Program in Evidence-Based Care Guideline No.: 20-2 Version 2.

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Effective Teaching Strategies and Methods for Cancer Patient Education

Section 1: Recommendations

This section is a quick reference guide and provides the guideline recommendations only. For key evidence associated with each recommendation, see Section 2.

GUIDELINE OBJECTIVES

The guideline objective is to make recommendations on the most effective teaching strategies and methods of delivery for patient education in the cancer system.

TARGET POPULATION

Individuals living with or at risk of developing cancer and their care partners who seek services from the cancer system covering the entire continuum of care (prevention, screening, diagnosis, treatment, survivorship, and palliative care).

INTENDED USERS

Intended users of this guideline are members of the healthcare team involved in patient education. This may include patient education specialists and other leaders in healthcare. Intended users may also include physicians, nurse practitioners, nurses, and other allied healthcare professionals with an interest in patient education.

PREAMBLE/BEST PRACTICE STRATEGIES

Thoughtful and intentional patient education is essential in healthcare, especially for individuals living with cancer. Patients with or at risk of developing cancer and their care partners (herein referred to as "learners") often face significant emotional and psychological challenges, making it difficult for them to absorb and retain information. Recognizing that learners may not be at their best during these difficult times makes cancer care a uniquely challenging environment for both teaching and learning. Thus, patient education must be approached with compassion and patience.

The goal of patient education is not simply to deliver information, but to ensure that it is understood, retained, and aligns with the learner's needs, goals, and values. This requires an approach that is deeply learner-centred, considering not only the emotional states but also the unique learning preferences and circumstances of each individual. By considering the learner's perspective, a more personalized and empowering educational experience can be created. In addition, careful consideration should be made among the interprofessional team to coordinate teaching and assign specific teaching goals. For example, decisions should be made between physicians and nurses on what parts of the teaching plan each profession will cover and in what depth. This can serve to ensure the full breadth of education is covered and aligned and can help alleviate role confusion. Strategic overlap of teaching topics is welcome to reinforce learning. Drawing on a rich body of literature from fields such as patient education, health literacy, therapeutic patient education, nursing, and public health, the following strategies highlight best practices for delivering effective, patient-centred education.

1. Building Rapport and Trust

Establishing strong rapport with learners is critical to engagement. Consider their emotional and psychological state, as these factors significantly affect their ability to engage

with the material. Focus on building relationships and trust, as this will enhance learning and create a supportive environment for sharing information.

2. Establishing a Mutual Learning Agenda

Establishing a mutual learning agenda with learners involves actively engaging them in conversations about their education needs and preferences. By collaboratively identifying what they understand, what they want to learn, and how they prefer to receive information, healthcare providers can tailor their approach to be more relevant and effective. This shared process helps build trust, empowers learners to take an active role in their care, and can help ensure that educational content addresses both the clinical and personal aspects of their care.

3. Using Inclusive and Clear Educational Materials

Patient education should adhere to best practices, ensuring the use of plain language, clear design, and inclusive content, as well as the Accessibility for Ontarians with Disabilities Act (AODA) information and communications standards. Consult the Patient Education Materials Assessment Tool (PEMAT) to see patient education best practices. Materials should reflect principles of diversity, equity, accessibility, and anti-racism, as well as consider persons with disabilities, ensuring that all learners feel respected and included.

4. Adapting to Different Learning Styles and Literacy Levels

Patient education must be adaptable to various learning styles and literacy levels. This includes considering differences in health literacy, digital literacy, numeracy, and persons with disabilities. It is essential to deliver content in a way that is accessible and supportive, recognizing that cancer care is very complex, and not all learners process information in the same way.

5. Assessing the Learner's Ability to Absorb Information

Being sensitive to the learner's current ability to absorb and retain information is key. The emotional and physical well-being of patients and their care partners can impact how effectively they can engage with educational material. Regularly assess the learner's understanding and adjust your approach based on their immediate needs, experiences, and emotional state.

6. Recognizing the Fluidity of Learning Styles

Learning styles are not static; they can evolve over time, particularly in the context of illness. It is important to regularly assess and adjust your educational approach to ensure it aligns with the learner's changing needs. For example, a learner may at first prefer one-on-one verbal teaching and over time, they may benefit from accessing recommended websites to obtain more detailed information. This ongoing assessment helps provide more effective and personalized education.

7. Delivering the Right Amount of Information at the Right Time

Tailor the amount and timing of information to the individual learner's preferences. Some learners' may need only enough information to manage the next step in their care, while others may wish to understand every detail upfront. It is important to be flexible and responsive to these preferences to avoid overwhelming the learner.

8. Respecting Individual Differences

Appreciate and accommodate the diversity of learners. This includes considering their backgrounds, cultural differences, and personal preferences. Use inclusive and respectful

language to ensure that every learner feels comfortable and supported in their educational experience.

9. Using Best Practices for Audiovisual Materials
When developing audiovisual materials, follow best practices to ensure clarity and effectiveness. Utilize tools like the PEMAT-A/V to evaluate and enhance the understandability and actionability of these materials. Well-designed audiovisual content can significantly improve the learner's ability to comprehend and retain information.

RECOMMENDATIONS
The following recommendations are based on the expertise and opinions of the Working Group, informed by the currently available evidence. The evidence underpinning these recommendations is complex and not easily summarized; please refer to Section 4 of this report for more details. The recommendations are not meant to provide specific details with respect to the content provided through patient education. These recommendations are meant to provide an overview concerning the efficacy of the teaching strategies and methods of delivery that have been evaluated in the literature.

A) Teaching Strategies

Recommendation 1:
1.1.   *One-on-One Teaching*: One-on-one teaching is an effective strategy for patient education. Using the teach-back method, when appropriate, further enhances this approach. Teach-back helps confirm the learner's understanding of the information presented and can reinforce key points to ensure retention.

1.2.   *Group Teaching*: Group teaching is an effective strategy, although it presents challenges when it comes to confirming individual understanding. In group settings, teach-back may not be appropriate, as it can feel intrusive to individual learners. Instead, other methods of assessment and reinforcement should be used in group teaching environments.

1.3.   *Self-Directed Learning:* Self-directed learning is an effective strategy, either on its own or in conjunction with other teaching methods. For some individuals, this approach may be particularly effective, allowing them to build new knowledge based on their learning style and the ability to process information at their own pace.

1.4.   *Multiple Strategies:* Patient education is most effective when delivered through multiple modalities, tailored to the needs of the learner.

Qualifying Statements for Recommendation 1:
- Support one-on-one teaching with additional resources, such as written materials, to reinforce the learning (see Recommendation #2 below).
- Sensitive topics may not be suitable for group teaching and should be carefully considered before inclusion. Assess whether the topic is appropriate for a group setting. For example, topics like "introduction to chemotherapy" may be relevant to a broad group, while a more tailored discussion, such as "chemotherapy for gynecologic cancers", may be more suitable for a smaller, specialized group. Additionally, consider whether there is an opportunity to personalize the content, such as addressing specific side effects related to certain regimens.

- While some learners may feel comfortable discussing sensitive topics in a group, options should be available for one-on-one teaching for those who prefer a more private setting.
- Self-directed learning is most effective for learners who are self-motivated and capable of independently managing their learning process.
- To enhance the learning experience, engage learners through multiple modalities. The more senses involved in the learning process, the more effective the experience will be. Combining different teaching methods—such as verbal, written, and visual—can help reinforce key concepts and support better retention.
- Identify multiple opportunities to teach and reinforce information throughout the learning process. Leveraging multiple healthcare professionals to deliver key teaching points at different stages can be an effective strategy to reinforce the message and ensure consistency.
- Various teaching methods and materials can be used to deliver patient education effectively. Refer to Recommendation #2 for additional guidance.
- This guideline outlines the best evidence on effective teaching strategies for patient education. Key factors for successful patient education include the learning relationship between the learner and the healthcare team, tailoring interventions to meet the learner's needs, assessing readiness to learn, accommodating diverse learning styles, and understanding the learner's information-seeking behaviors. Although these factors fall outside the scope of this guideline, they are integral to a person-centered approach to education.
- As cancer prevalence increases and it is increasingly viewed as a chronic disease, there is a growing need for guidance on self-management and therapeutic patient education. Incorporating these interventions is essential to support patients in managing their care effectively.

B) Materials and Methods

Recommendation 2

2.1. *Tailored Written Materials:* Providing written materials, especially those tailored to the specific needs of the learner, can be an effective strategy for patient education. Direct provision of these materials by a healthcare professional or a member of the healthcare team increases the likelihood of learner engagement and ensures that the materials are relevant and well-received.

2.2. *Oral Discussions:* Oral discussions are an effective teaching strategy and are most impactful when paired with other modalities. This combination helps reinforce key points and supports better retention of the information shared.

2.3. *Audiovisual Materials*: Audiovisual resources, such as videos and audio recordings, can be valuable tools in patient education. These materials can enhance understanding by providing visual and auditory context that may make complex information more accessible.

2.4. *Technology in Learning:* When used alongside other teaching methods, technology can significantly enhance the learning experience. It is important to apply best practice strategies for user experience and interface design, ensuring that learners can easily access and engage with the content. Web-based learning often requires a higher literacy level compared to print materials thus careful consideration should be given to the learner's needs and technological proficiency.

2.5. *Demonstration:* Demonstrations can reinforce verbal instructions and provide clear, actionable steps. Learners should be provided with accurate visual aids to help them replicate the steps with supervision, ensuring they can eventually perform tasks safely and independently.

2.6. *Traditional Lectures and Webinars*: Both traditional lectures and webinars (synchronous) involve group-based learning where the instructor delivers information, and learners can ask questions. These sessions can also be recorded and made available for self-directed, asynchronous learning, allowing learners to access the content at their convenience.

2.7. *Multiple Modalities:* Using a variety of teaching modalities is recommended to reinforce learning. However, the choice of modalities should be tailored to the specific information being shared to ensure that each method supports the content effectively.

Qualifying Statements for Recommendation 2
- To be effective, written materials—whether physical or web-based—should align with best practice guidelines for clear, accessible communication. This includes using plain language, user-friendly design, and inclusive language that reflects the principles of IDEAA: Inclusion, Diversity, Equity, Accessibility, and Anti-Racism.
- The learning environment should be private, comfortable, and free from distractions to support optimal engagement and focus. Teachers should ensure learners have access to the appropriate technology (e.g., computers, tablets, Internet) to engage with the materials, especially for those who may not have access to such resources at home.
- The effectiveness of patient education is significantly influenced by how information is delivered. Learners are more likely to value the educational material if it is endorsed by a trusted member of their healthcare team. This endorsement can help reinforce the relevance and importance of the information being shared.
- Information shared through different modalities—whether verbal, written, or digital—should be consistent and complementary. For example, the content provided in a group teaching session should align with the same information presented in written materials. Additional information should enhance or build upon what has already been communicated. Inconsistencies between these formats can cause confusion and may lead to uncertainty or inaction. Patient education should focus on the learner's goals and limit the information to what is most relevant and desired, helping to reduce cognitive overload.
- While no specific evidence supports the efficacy of demonstrations (e.g., using anatomical models or diagrams), simulations, or traditional lectures/webinars, these teaching methods can still be valuable in practice. When teaching something the learner has to perform on their own, demonstrations using teach back can be an effective way to ensure they will be able to perform the activity on their own.
- When planning educational delivery, consider accessibility in terms of both the format (in person vs. online) and the timing (synchronous vs. asynchronous). Online learning platforms can significantly increase access for learners who might otherwise face barriers, such as living far from the cancer centre, adverse weather conditions, or logistical issues like transportation costs (e.g., parking fees) and caregiving, school, or employment responsibilities.

Effective Teaching Strategies and Methods for Cancer Patient Education

Section 2: Guideline – Recommendations and Key Evidence

GUIDELINE OBJECTIVES

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GLOSSARY

Learner: Includes patients and caregivers actively engaged in acquiring knowledge, skills, and attitudes necessary to manage their health condition effectively to make decisions and take actions.

Teacher: Member of the clinical team or peers (as appropriately trained) who imparts knowledge skills and attitudes to the learner.

Health literacy: The ability of patients to seek out, understand and apply the information and services to make informed health decisions and take actions for themselves and others.[1]

One-on-one teaching: One-on-one teaching occurs when an individual—whether a member of the clinical team or a volunteer with the appropriate expertise—engages directly with the learner to provide education.

Group teaching: Group teaching involves educating multiple learners simultaneously.

Self-directed learning: Learner actively seeks out information, develops skills, and makes informed decisions about their health care. The learner can take initiative, set goals, identify resources and choose and implement learning strategies.

Demonstrations: In these sessions, a teacher shows learners how to perform a task or procedure (e.g., cleaning a peripherally inserted central catheter line site).

Traditional lectures and webinars: Both traditional lectures and webinars (synchronous) involve group-based learning where the instructor delivers information, and learners can ask questions.

Therapeutic Patient Education: As defined by the World Health Organization: a structured, patient-focused learning process that helps patients with chronic conditions manage their health by using their own resources, with support from carers and families. This process is conducted by trained health professionals, tailored to the patient and their condition, and continues throughout the patients' life [2].

PREAMBLE/BEST PRACTICE STRATEGIES

Thoughtful and intentional patient education is essential in healthcare, especially for individuals living with cancer. Patients with or at risk of developing cancer and their care partners (herein referred to as "learners") often face significant emotional and psychological challenges, making it difficult for them to absorb and retain information. Recognizing that learners may not be at their best during these difficult times makes cancer care a uniquely challenging environment for both teaching and learning. Thus, patient education must be approached with compassion and patience.

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Patient education must be adaptable to various learning styles and literacy levels. This includes considering differences in health literacy, digital literacy, numeracy, and persons with disabilities. It is essential to deliver content in a way that is accessible and supportive, recognizing that cancer care is very complex, and not all learners process information in the same way.

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Learning styles are not static; they can evolve over time, particularly in the context of illness. It is important to regularly assess and adjust your educational approach to ensure it aligns with the learner's changing needs. For example, a learner may at first prefer one-on-one verbal teaching and over time, they may benefit from accessing recommended websites to obtain more detailed information. This ongoing assessment helps provide more effective and personalized education.

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Appreciate and accommodate the diversity of learners. This includes considering their backgrounds, cultural differences, and personal preferences. Use inclusive and respectful language to ensure that every learner feels comfortable and supported in their educational experience.

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When developing audiovisual materials, follow best practices to ensure clarity and effectiveness. Utilize tools like the [PEMAT-A/V](#) to evaluate and enhance the understandability and actionability of these materials. Well-designed audiovisual content can significantly improve the learner's ability to comprehend and retain information.

RECOMMENDATIONS, KEY EVIDENCE, AND JUSTIFICATION

The following recommendations are based on the expertise and opinions of the Working Group, informed by the currently available evidence. The evidence underpinning these recommendations is complex and not easily summarized; please refer to Section 4 of this report for more details. The recommendations are not meant to provide specific details with respect to the content provided through patient education. These recommendations are meant to provide an overview concerning the efficacy of the teaching strategies and methods of delivery that have been evaluated in the literature.

A) Teaching Strategies

Recommendation 1:

1.1. *One-on-One Teaching*: One-on-one teaching is an effective strategy for patient education. Using the teach-back method, when appropriate, further enhances this approach. Teach-back helps confirm the learner's understanding of the information presented and can reinforce key points to ensure retention.

1.2. *Group Teaching*: Group teaching is an effective strategy, although it presents challenges when it comes to confirming individual understanding. In group settings, teach-back may not be appropriate, as it can feel intrusive to individual learners. Instead, other methods of assessment and reinforcement should be used in group teaching environments.

1.3. *Self-Directed Learning:* Self-directed learning is an effective strategy, either on its own or in conjunction with other teaching methods. For some individuals, this approach may be particularly effective, allowing them to build new knowledge based on their learning style and the ability to process information at their own pace.

1.4. *Multiple Strategies:* Patient education is most effective when delivered through multiple modalities, tailored to the needs of the learner.

Qualifying Statements for Recommendation 1:
- Support one-on-one teaching with additional resources, such as written materials, to reinforce the learning (see Recommendation #2 below).
- Sensitive topics may not be suitable for group teaching and should be carefully considered before inclusion. Assess whether the topic is appropriate for a group setting. For example, topics like "introduction to chemotherapy" may be relevant to a broad group, while a more tailored discussion, such as "chemotherapy for gynecologic cancers", may be more suitable for a smaller, specialized group. Additionally, consider whether there is an opportunity to personalize the content, such as addressing specific side effects related to certain regimens.
- While some learners may feel comfortable discussing sensitive topics in a group, options should be available for one-on-one teaching for those who prefer a more private setting.
- Self-directed learning is most effective for learners who are self-motivated and capable of independently managing their learning process.
- To enhance the learning experience, engage learners through multiple modalities. The more senses involved in the learning process, the more effective the experience will be. Combining different teaching methods—such as verbal, written, and visual—can help reinforce key concepts and support better retention.
- Identify multiple opportunities to teach and reinforce information throughout the learning process. Leveraging multiple healthcare professionals to deliver key teaching points at different stages can be an effective strategy to reinforce the message and ensure consistency.
- Various teaching methods and materials can be used to deliver patient education effectively. Refer to Recommendation #2 for additional guidance.
- This guideline outlines the best evidence on effective teaching strategies for patient education. Key factors for successful patient education include the learning relationship between the learner and the healthcare team, tailoring interventions to meet the learner's needs, assessing readiness to learn, accommodating diverse learning styles,

and understanding the learner's information-seeking behaviors. Although these factors fall outside the scope of this guideline, they are integral to a person-centered approach to education.

- As cancer prevalence increases and it is increasingly viewed as a chronic disease, there is a growing need for guidance on self-management and therapeutic patient education. Incorporating these interventions is essential to support patients in managing their care effectively.

Key Evidence and Justification for Recommendation 1

Fourteen systematic reviews (four meta-analyses) reported on one-on-one teaching strategies (in-person, online/virtual, or by telephone) aimed at supporting individuals living with cancer [3-16]. The certainty of the evidence was moderate to high. The evidence suggests that one-on-one teaching can positively impact a patient's psychological well-being. Specifically, it may reduce anxiety levels (although the effect is small) and improve short-term psychological health up to three months after the intervention [4,8,10]. One-on-one teaching may also promote adherence to screening behaviours [5-7,14,15], increase knowledge about cancer-related pain [6,11], and help manage psychological symptoms such as anxiety and depression. Long-term benefits include improved quality of life (up to 4-6 months post-intervention), as well as enhanced health-related quality of life at the end-of-life stage[3,6,8,10,12,13,16]. Additionally, one-on-one teaching can support better physical well-being and symptom management [4,6,11,12,16]. The Working Group reached a consensus that the teach-back method should be incorporated into one-on-one teaching strategies, when appropriate, to confirm that the learner understands the information and is able to act on it. Additionally, verbal teaching should be reinforced with written resources (e.g., printed materials, videos) to further support the learning process.

Three systematic reviews (two with meta-analysis) reported on group teaching strategies [8,9,17] and their certainty of evidence was moderate.

Evidence from three systematic reviews, with or without meta-analysis, suggests that group teaching interventions (in person or online/virtual) may offer psychological benefits, particularly in reducing anxiety and depression [7,16]. However, their impact on physical well-being, such as fatigue, may be less pronounced [7]. The Working Group emphasized that careful consideration should be given to the appropriateness of the teaching topic for a group setting. Moreover, the content should be tailored to ensure it is meaningful for individual learners. The Working Group also highlighted that some sensitive topics (e.g., **sexual function and cancer**) may not be suitable for group discussions. While some learners may feel comfortable discussing these topics in a group, options should always be available for one-on-one teaching for those who prefer a more private setting

Although no specific evidence was found on self-directed learning, the Working Group agreed that it can be an effective teaching strategy, either on its own or to complement other methods. Self-directed learning is particularly well-suited for learners who are self-motivated and able to manage their learning independently.

Two systematic reviews (one with meta-analysis) reported on interventions delivered using multiple modalities [8,17] and the certainty of the evidence was moderate. The combination of group and one-on-one teaching strategies found a small effect in reducing anxiety and promoting resilience [8,17]. Based on these findings, the Working Group recommends that patient education be delivered using multiple modalities, with careful consideration of the learner's individual needs. Timing and opportunities to reinforce learning should also be considered. Teaching strategies can be delivered through a variety of materials and methods, as outlined in Recommendation #2 below and Table 4-3 in Section 3.

B) Materials and Methods

Recommendation 2

2.1. *Tailored Written Materials:* Providing written materials, especially those tailored to the specific needs of the learner, can be an effective strategy for patient education. Direct provision of these materials by a healthcare professional or a member of the healthcare team increases the likelihood of learner engagement and ensures that the materials are relevant and well-received.

2.2. *Oral Discussions:* Oral discussions are an effective teaching strategy and are most impactful when paired with other modalities. This combination helps reinforce key points and supports better retention of the information shared.

2.3. *Audiovisual Materials*: Audiovisual resources, such as videos and audio recordings, can be valuable tools in patient education. These materials can enhance understanding by providing visual and auditory context that may make complex information more accessible.

2.4. *Technology in Learning:* When used alongside other teaching methods, technology can significantly enhance the learning experience. It is important to apply best practice strategies for user experience and interface design, ensuring that learners can easily access and engage with the content. Web-based learning often requires a higher literacy level compared to print materials thus careful consideration should be given to the learner's needs and technological proficiency.

2.5. *Demonstration:* Demonstrations can reinforce verbal instructions and provide clear, actionable steps. Learners should be provided with accurate visual aids to help them replicate the steps with supervision, ensuring they can eventually perform tasks safely and independently.

2.6. *Traditional Lectures and Webinars*: Both traditional lectures and webinars (synchronous) involve group-based learning where the instructor delivers information, and learners can ask questions. These sessions can also be recorded and made available for self-directed, asynchronous learning, allowing learners to access the content at their convenience.

2.7. *Multiple Modalities:* Using a variety of teaching modalities is recommended to reinforce learning. However, the choice of modalities should be tailored to the specific information being shared to ensure that each method supports the content effectively.

Qualifying Statements for Recommendation 2

- To be effective, written materials—whether physical or web-based—should align with best practice guidelines for clear, accessible communication. This includes using plain language, user-friendly design, and inclusive language that reflects the principles of IDEAA: Inclusion, Diversity, Equity, Accessibility, and Anti-Racism.
- The learning environment should be private, comfortable, and free from distractions to support optimal engagement and focus. Teachers should ensure learners have access to the appropriate technology (e.g., computers, tablets, Internet) to engage with the materials, especially for those who may not have access to such resources at home.

- The effectiveness of patient education is significantly influenced by how information is delivered. Learners are more likely to value the educational material if it is endorsed by a trusted member of their healthcare team. This endorsement can help reinforce the relevance and importance of the information being shared.
- Information shared through different modalities—whether verbal, written, or digital—should be consistent and complementary. For example, the content provided in a group teaching session should align with the same information presented in written materials. Additional information should enhance or build upon what has already been communicated. Inconsistencies between these formats can cause confusion and may lead to uncertainty or inaction. Patient education should focus on the learner's goals and limit the information to what is most relevant and desired, helping to reduce cognitive overload.
- While no specific evidence supports the efficacy of demonstrations (e.g., using anatomical models or diagrams), simulations, or traditional lectures/webinars, these teaching methods can still be valuable in practice. When teaching something the learner has to perform on their own, demonstrations using teach back can be an effective way to ensure they will be able to perform the activity on their own.
- When planning educational delivery, consider accessibility in terms of both the format (in person vs. online) and the timing (synchronous vs. asynchronous). Online learning platforms can significantly increase access for learners who might otherwise face barriers, such as living far from the cancer centre, adverse weather conditions, or logistical issues like transportation costs (e.g., parking fees) and caregiving, school, or employment responsibilities.

Key Evidence and Justification for Recommendation 2

Five systematic reviews examined the effectiveness of written materials [14,18-21] and the certainty of the evidence was moderate to high. The evidence suggests that written materials, such as pamphlets, mailed letters, or printed resources, can increase cancer knowledge [18,20], encourage compliance with cancer screening [12,18] and promote adherence to genetic evaluations [21].

The Working Group reached a consensus that for written materials, whether physical or web-based, to be effective, they must align with best practice guidelines, which emphasize plain language, clear design, and inclusive language that reflects the principles of IDEAA. Additionally, these materials should be provided directly by a healthcare professional or a member of the healthcare team to ensure greater engagement from the learner.

Two systematic reviews (one with meta-analysis) suggest that verbal discussions can also enhance cancer knowledge [22,23]. The certainty of the evidence was moderate. However, the Working Group recommends that oral discussions be paired with other teaching methods to reinforce the information shared.

Four systematic reviews (one meta-analysis) reported on the use of audio-visual materials, specifically videos, although evidence on podcasts or other recording methods was not found [3,20,24,25]. The certainty of the evidence was moderate to high. Two systematic reviews [24,25] found that audio-visual methods helped patients and survivors gain more knowledge on specific topics, which improved their decision-making processes, communication with healthcare providers, and satisfaction with decision preparation. Additionally, decisional conflict was reduced for those preparing for testing [25]. However, audio-visual methods may be less effective for longer-term symptom reporting (6-8 weeks) and controlling infection rates. Despite this, these methods have shown to be beneficial in improving short-term symptoms (4-6 weeks) and quality of life.

Three systematic reviews (two with meta-analyses) assessed the effectiveness of eLearning, interactive platforms, or mobile apps [18,25,26] and the certainty of the evidence was moderate. These methods were found to be effective in increasing learners' knowledge on specific topics, such as improving bowel preparation before a colonoscopy or enhancing adherence to oral anticancer regimens. Additionally, interactive platforms may reduce physical symptoms [25] and improve learner satisfaction [25]. For example, patients using a Smartphone app were more likely to undergo repeat bowel preparation compared to those in the control group [25]. However, results regarding quality-of-life improvements were mixed, with some studies showing no significant difference compared to usual care [26].

Two systematic reviews examined the effectiveness of electronic materials delivered via email, patient portals, or websites [3,27] and the certainty of the evidence was moderate. The evidence suggests that Internet-based interventions can be effective in improving psychological and physical well-being, such as reducing depression, anxiety, and fatigue, although they may have less impact on symptoms of distress [27]. Results on quality of life were mixed [3,27]

Providing patient education through multiple modalities is recommended, as learners can choose the method that works best for them and engage more fully with the content. Three systematic reviews (one with meta-analysis), explored the use of multiple modalities [3,28,29]. Findings indicate that combining multiple modalities can be effective in improving compliance and adherence [28], psychological well-being (e.g., reducing anxiety, enhancing quality of life), and patient knowledge [3,29]. However, when using multiple modalities, the information presented must be consistent and complementary across methods. Inconsistent or contradictory information can create confusion and prevent action. Teachers should focus on the education goals and limit the amount of information shared to what is most relevant and needed by the learner, minimizing the risk of cognitive overload.

IMPLEMENTATION CONSIDERATIONS

When implementing the recommendations, resource availability should be considered. The clinic or hospital and healthcare team should have the necessary technology available (e.g. computer, tablet) to support learners that do not have access to such technology at home. Additionally, the program's accessibility to learners should be considered, including options for in-person versus online learning, as well as synchronous versus asynchronous. Online learning can provide greater access to education for learners who might otherwise be disadvantaged by factors such as distance to the cancer centre, weather conditions, or other limitations (e.g. finances and caregiving, school or employment responsibilities). Further, it is essential to provide appropriate training for all members of the clinical team and volunteers when implementing these recommendations.

RELATED GUIDELINES

Howell D, Harth T, Brown J, Bennett C, Boyko S, and the Patient Education Program Committee. Self-management education for patients with cancer: evidence summary. Toronto (ON): Cancer Care Ontario; 2016 January 5. Program in Evidence-based Care Evidence Summary No.: 20-3.

FURTHER RESEARCH

As digital technology continues to play an increasing role in healthcare, there is a growing need for research focused on enhancing patient education materials and methods, particularly in the context of cancer care. With the rise of digital health tools, it is essential to address challenges related to health literacy, including low digital health literacy and low health

literacy among learners. Research should focus on understanding the barriers that prevent individuals from accessing, comprehending, and effectively using online health information.

Future studies should explore ways to make digital health tools more accessible, understandable, and user friendly for all learners, including those with limited digital literacy. Investigating how to design platforms and materials that cater to diverse learning styles and technological proficiency will help to make digital health resources are inclusive and beneficial to a broader range of learners, particularly those from underserved or vulnerable populations.

Additionally, there is a need for research into training healthcare providers to be more effective educators. While healthcare professionals are experts in their fields, many face significant barriers to becoming proficient in patient education. Factors such as high clinical workloads, time constraints, and the stress associated with treating patients can impede their ability to focus on teaching. Research should investigate the most effective methods for training and supporting healthcare providers in education, considering these challenges and identifying strategies to overcome them. Additionally, studies should explore how to create a supportive learning environment for both learners and teachers, where educational activities can be integrated seamlessly into care routines without adding undue burden to either party.

GUIDELINE LIMITATIONS

The inclusion criteria for this guideline were limited to systematic reviews with or without meta-analyses, where the inclusion of additional study types may have provided additional information on missing research areas such as demonstrations, traditional lectures or workshops.

Effective Teaching Strategies and Methods for Cancer Patient Education

Section 3: Guideline Methods Overview

This section summarizes the methods used to create the guideline. For the systematic review, see Section 4.

THE PROGRAM IN EVIDENCE-BASED CARE

The Program in Evidence-Based Care (PEBC) is an initiative of the Ontario provincial cancer system, Ontario Health (Cancer Care Ontario). The PEBC mandate is to improve the lives of Ontarians affected by cancer through the development, dissemination, and evaluation of evidence-based products designed to facilitate clinical, planning, and policy decisions about cancer control.

The PEBC supports the work of Guideline Development Groups (GDGs) in the development of various PEBC products. The GDGs are composed of clinicians, other healthcare providers and decision makers, methodologists, and community representatives from across the province.

The PEBC is a provincial initiative of OH (CCO) supported by the Ontario Ministry of Health (OMH). All work produced by the PEBC is editorially independent from the OMH.

JUSTIFICATION FOR GUIDELINE

The original version of this guideline was published in 2009 and was reviewed during the summer of 2020 by a panel of patient education experts with the support from the PEBC. It was determined through this process that an update to the guideline was required due to emerging technologies and advancements (e.g. web-based learning and multimedia tools such as apps, and podcasts). In addition, outdated language to be more inclusive to reflect equity and diversity were identified as an area requiring improvement.

GUIDELINE DEVELOPERS

This guideline was developed by the Effective Teaching Strategies and Methods of Delivery GDG (Appendix 1), which was convened at the request of the Patient Education Program.

The project was led by a small Working Group of the Effective Teaching Strategies and Methods of Delivery guideline GDG, which was responsible for reviewing the evidence base, drafting the guideline recommendations and responding to comments received during the document review process. The Working Group had expertise in patient education, adult education, self-management support, and implementation of education strategies. Other members of the GDG served as the Expert Panel and were responsible for the review and approval of the draft document produced by the Working Group. Conflict of interest declarations for all GDG members are summarized in Appendix 1, and were managed in accordance with the *PEBC Conflict of Interest Policy*.

Two patient/survivor/care partner representatives also participated as active members of the Working Group. They attended and participated in Working Group meetings and teleconferences and provided feedback on draft guideline documents throughout the entire practice guideline development process, communicating the perspective of patients and members of the public.

Two patient/survivor/care partner representatives also participated as Expert Panel members. They participated in the review and approval of the draft document produced by the Working Group.

GUIDELINE DEVELOPMENT METHODS

The PEBC produces evidence-based and evidence-informed guidance documents using the methods of the Practice Guidelines Development Cycle [30,31]. This process includes a systematic review, interpretation of the evidence by the Working Group and draft recommendations, internal review by content and methodology experts and external review by Ontario clinicians and other stakeholders.

The PEBC uses the AGREE II framework [32] as a methodological strategy for guideline development. AGREE II is a 23-item validated tool that is designed to assess the methodological rigour and transparency of guideline development and to improve the completeness and transparency of reporting in practice guidelines.

The currency of each document is ensured through periodic review and evaluation of the scientific literature and, where appropriate, the addition of newer literature to the original evidence-base. This is described in the *PEBC Document Assessment and Review Protocol*. PEBC guideline recommendations are based on evidence of the magnitude of the desirable and undesirable effects of an intervention or accuracy of a test, and consider the certainty of the evidence, the values of key stakeholders (e.g., patients, clinicians, policy makers, etc.), and the potential impact on equity, acceptability and feasibility of implementation. A list of any implementation considerations (e.g., costs, human resources, and unique requirements for special or disadvantaged populations, dissemination issues, etc.) is provided along with the recommendations for information purposes. PEBC guideline development methods are described in more detail in the *PEBC Handbook* and the *PEBC Methods Handbook*.

Search for Guidelines

As a first step in developing this guideline, a search for existing guidelines was undertaken to determine whether any guideline could be endorsed. Evidence-based guidelines with systematic reviews that addressed the research question and guidelines only relevant to patient education in an oncology setting were assessed. Guideline older than three years (published before 2021), based on consensus/expert opinion or health professional education (e.g. doctor training) were not included. The following sources were searched for guidelines on February 27th to March 15th 2024 with the search term(s) 'patient education', 'teaching strategy', 'teaching methods', and 'education': ECRI Database, CPAC Database, CMA Infobase, AHRQ (US), NIHR (UK) HTA, CADTH, BC Cancer Agency, Alberta Health Service, cancer guidelines, Saskatchewan Cancer Agency, Cancer Care Manitoba, Cancer Care Nova Scotia, NICE (UK), Scottish Intercollegiate Guidelines Network (UK), American Society of Clinical Oncology, National Health and Medical Research Council, Cancer Council Australia, Geneva Foundation for Medication Education and Research, The Cancer Council Australia, National Cancer Control Initiative (AUS), State Government of Victoria, Australia, Peter MacCallum Cancer Center (Australia), Cancer Research UK, NHS (UK), Guidelines International Network- Guidelines Library, Cancer patient education network, Campbell Collaboration, and Epistemonikos.org. MEDLINE, Embase and Healthstar were searched for guidelines; there were 1,023 hits and none met the inclusion criteria. Cancer Research UK, NHS (UK), Guidelines International Network- Guidelines Library, Cancer patient education network, Campbell Collaboration, and Epistemonikos.org. MEDLINE, Embase and Healthstar were searched for guidelines, there was 1,023 hits and none met the inclusion criteria.

GUIDELINE REVIEW AND APPROVAL
Internal Review
For the guideline document to be approved, 75% of the content experts who comprise the GDG Expert Panel must cast a vote indicating whether they approve the document or not, or abstain from voting for a specified reason, and of those that vote, 75% must approve the document. In addition, the PEBC Report Approval Panel (RAP), a three-person panel with methodology expertise, must unanimously approve the document. The Expert Panel and RAP members may specify that approval is conditional, and that changes to the document are required. If substantial changes are subsequently made to the recommendations during external review, then the revised draft must be resubmitted for approval by RAP and the GDG Expert Panel.

External Review
Feedback on the approved draft guideline is obtained from content experts and the target users through two processes. Through the Targeted Peer Review, several individuals with content expertise are identified by the GDG and asked to review and provide feedback on the guideline document. Through Professional Consultation, relevant care providers and other potential users of the guideline are contacted and asked to provide feedback on the guideline recommendations through a brief online survey.

DISSEMINATION AND IMPLEMENTATION
The guideline will be published on the OH (CCO) website and may be submitted for publication to a peer-reviewed journal. The Professional Consultation of the External Review is intended to facilitate the dissemination of the guideline to Ontario practitioners. Section 1 of this guideline is a summary document to support the implementation of the guideline in practice. OH (CCO)-PEBC guidelines are routinely included in several international guideline databases including the CPAC Cancer Guidelines Database, the CMA/Joule CPG Infobase database, NICE Evidence Search (UK), and the Guidelines International Network (GIN) Library.

Effective Teaching Strategies and Methods for Cancer Patient Education

Section 4: Systematic Review

INTRODUCTION

Patient education plays a pivotal role in empowering individuals with the knowledge and skills needed to make informed decisions about their health and navigate the complexities of care. Effective teaching strategies not only help individuals retain and apply vital information about their risk of developing cancer, their diagnosis and treatment plans, but also alleviate anxiety, improve adherence to their treatment plan, and enhance meaningful engagement in their care[1]. As defined by Lorig *[33]*, "*patient education is a planned, systematic, sequential, and logical process of teaching and learning provided to patients and clients in all clinical settings*". In the context of cancer care, where the treatment landscape is multifaceted and evolving, and is clouded with often difficult emotional experiences, effective patient education becomes even more crucial.

Health literacy, the ability to access, understand, and apply health information, is a critical factor influencing the success of patient education efforts. Unfortunately, low health literacy remains a significant challenge both in Canada and globally, affecting an estimated 60-88% of adults in some populations [34]. Patients with low health literacy are at increased risk for misunderstandings about their diagnosis, treatment options, and self-care instructions, which can lead to poor health outcomes, nonadherence to treatment, and higher healthcare costs. Moreover, in today's digital age, advancements in digital technology have drastically changed the ways in which patient education can be delivered. However, the rise of digital media has introduced new challenges. Low digital health literacy, often co-occurring with low general health literacy, poses a barrier to accessing and understanding online health information, further exacerbating health disparities. Therefore, healthcare professionals must not only select teaching strategies and methods that cater to diverse literacy levels but also ensure that digital tools are accessible, understandable, and usable by all learners.

The original evidence-based guideline on Effective Teaching Strategies and Methods of Delivery for Patient education was developed in 2009 by OH (CCO) PEBC and GDG of Patient Education [35] (Appendix 2). Since then, much has changed in both the landscape of cancer care and the tools available for patient education. The increasing reliance on digital technologies for health communication necessitates a re-evaluation of the existing guideline to ensure current best practices in the integration of technology, as well as strategies to improve both health and digital health literacy. As such, the GDG of Patient Education developed this evidentiary base to inform recommendations as part of a clinical practice guideline. Based on the objectives of this guideline (Section 2), the Working Group derived the research question below. This systematic review has been registered on the PROSPERO website (International prospective register of systematic reviews) with the following registration number CRD42024549925.

RESEARCH QUESTION:

What are the most effective teaching strategies and methods of delivery for patient education to support the individual living with or at risk of developing cancer and their care

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[1] The term patient is used in this guideline but includes individuals affected by the patient's diagnosis including family, friends and care partners

partner in knowledge, physical and psychological well-being, satisfaction, experience, and self-efficacy?

METHODS
Literature Search Strategy
The scientific and clinical literature was systematically searched for publications pertaining to patient education, teaching strategies and methods of delivery. MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, PsycINFO, CINAHL, Prospero, and Epistemonikos.org databases were search from January 1, 2018, to June 30, 2024, for relevant guidelines, systematic reviews and meta-analyses. The full search strategy can be found in Appendix 3.

Study Selection Criteria and Process
Articles were selected for inclusion in this systematic review if they were published English-language reports involving human participants that were systematic reviews or meta-analyses that examined teaching strategies and methods of delivery for patient education. Articles were included if they met the following criteria: addressed at least one research questions with similar inclusion/exclusion criteria, relevant to patient education in an oncology session, and had a moderate/high overall rating assessed with the AMSTAR 2 tool. Reviews published before 2018 and focused on education content or improving knowledge among healthcare providers and health professional students were excluded. Letters, editorials, notes, case reports, commentaries, comparative trials, non-randomized trials, randomized controlled trials (RCTs), and non-systematic reviewers were not included in this systematic review.

Identified articles from each database were imported into EndNote (version 21, a reference management software developed by Clarivate https:/www.endnote.com). After removing duplicates, a review of the titles and abstracts was conducted by LDA in collaboration with JP. Studies that warranted full-text review were imported in Covidence, on online systematic review screening platform (COVIDENCE 2024. Veritas Health Innovation. Available from http:/www.covidence.org) and were independently reviewed by LDA and JP. During the full-text review, reference lists were screened to identify relevant articles for inclusion. At each stage, discrepancies between reviewers were resolved through discussion.

Data Extraction and Quality Assessment
All included studies underwent data extraction by LDA, with all extracted data and information audited subsequently by an independent auditor. Ratios, including hazard ratios, were expressed with a ratio of <1.0 indicating the outcome was better in the intervention group compared to the control group.

The AMSTAR 2 was used to determine the overall confidence in the results of the systematic review and meta-analysis [36]. The AMSTAR 2 helps to identify critical weaknesses in a systematic review and meta-analysis that reduces one's confidence in their findings. Low or critically low articles have one or more critical flaw with and without non-critical weaknesses and reduces the overall confidence in the systematic review to provide an accurate and comprehensive summary of available studies. Moderate or High ratings had no or more than one non-critical weakness but no critical flaws and provide an accurate/comprehensive summary of the available studies [36].

Synthesizing the Evidence
The evidence used in this guidance document was drawn from systematic reviews, with or without meta-analysis, and did not support data pooling using meta-analytic techniques due

to considerable heterogeneity in terms of interventions used, types of participants, outcomes measured, and tools used.

RESULTS
Search for Systematic Reviews

The literature search, after removal of duplicates, resulted in a yield of 3762 documents. After title and abstract screening, 101 articles underwent full-text review, and 47 systematic reviews and meta-analyses were excluded. Reasons for exclusion included: not focused on patient education (n=15), the effect of education was not in isolation (n=12), oncology setting was not in isolation (n=6), patient population was younger than 18 years of age (n=5), full text was unavailable (n=2), no outcomes of interest (n=2), was a scoping review (n =2), not a systematic review (n=2), or conference abstract (n=1). Nolan et al [37] was nested in Hirschey et al [24], Belcher et al [38] was nested in Waseem et al [26], and Martinez-Miranda et al [39] was nested in Martinez-Miranda et al [10] because each set reported on the same data. As a result, there were 54 references reporting on 51 studies that met the inclusion criteria in this review. A PRISMA flow diagram of the complete search is available in Appendix 4.

Study Design and Quality

The remaining 51 systematic reviews with or without meta-analyses underwent AMSTAR 2 assessment to determine the overall confidence in the results of the systematic reviews [3-29,40-66]. As per protocol, only systematic reviews having a moderate/high overall rating as assessed with the AMSTAR 2 tool were included. Appendix 5 shows how each of the 51 systematic reviews and meta-analyses scored on each of the 16 AMSTAR 2 items. In many of the studies, the review authors did not explain their selection of the study designs for inclusion in the review, provide a list of excluded studies and justify the exclusions, nor report on the sources of funding for the studies included in the review. Many of the studies with a low overall rating did not use a satisfactory technique for assessing risk of bias in either randomized trials or non-randomized studies, and if a meta-analysis was conducted, did not account for risk of bias in individual studies interpreting/discussing the results of the review or a satisfactory explanation for and discussion of, any heterogeneity observed in the results of the review. In the end, 24 had low overall rating and were excluded from further data extraction, and 27 had moderate-to-high overall rating. Table 4.1 shows the topic area covered by each of the included papers. The categories were not necessarily mutually exclusive; therefore, studies were categorized into one that was most applicable.

Table 4.1. Topic area covered by each of the included papers.

Study, Year (Ref)	Teaching Strategies				Materials & Methods									
	One-on-one	Group	Self-Directed Learning	Multiple Modalities	Written materials (e.g. pamphlets)	Verbal discussions	Demonstrations (models)/Role playing	Simulation	Audio-visual (e.g. videos, podcasts)	Traditional lecture/Webinar	E-learning, interactive platforms, Apps	Electronic materials delivered by email/patient portal or websites	Workshop	Multiple Modality
Ahuja et al. 2022 [18]					X						X			X
Bartolo et al. 2019 [3]	X								X			X		X
Champarnaud et al. 2020 [22]						X								
Choi et al. 2021 [4]	X					X								
Dougherty et al. 2018 [5]	X													
Edwards et al. 2019 [6]	X													
Elston Lafata et al. 2023 [7]	X													
Hirschey et al. 2020 [24]	X								X					
HuangLongcoy et al. 2023 [28]					X				X					X
Huynh et al. 2022 [8]	X	X		X										
Karakus et al. 2024 [9]	X	X												
Kim et al. 2021 [23]						X								
Li et al. 2021 [21]						X			X					
Li et al. 2022 [25]											X			
Martinez-Miranda et al. 2023 [10]	X													
Oldenmenger et al. 2018 [11]	X													
Ream et al. 2020 [12]	X													
Sara et al. 2024 [13]	X													
Schliemann et al. 2019 [14]	X													
Sihvola et al. 2023 [17]		X		X										
Steves et al. 2021 [29]									X		X			
Teo et al. 2019 [19]					X									
Vieira et al. 2024 [20]	X				X	X								
Wang et al. 2020 [27]												X		
Waseem et al. 2022 [26]											X			
Washington et al. 2024 [15]	X													
Zhang et al. 2024 [16]	X													

Outcomes

Research Question: What are the most effective teaching strategies and methods of delivery for patient education to support the patient living with cancer in knowledge, physical and psychological well-being, satisfaction, experience, and self-efficacy?

A. Teaching Strategies

The characteristics and outcomes of the included eight systematic reviews [3,4,7,11-14,17] and seven systematic reviews with meta-analyses [5,6,8-10,15,16] described various teaching strategies are reported in Table 4-2. The teaching strategies can be in person, online/virtual or by telephone.

One-on-one strategies

Fourteen systematic reviews (4 meta-analysis), reported on one-on-one teaching strategies (in-person, online/virtual, or by telephone) aimed at supporting individuals living with cancer [3-16]. The certainty of the evidence was moderate to high. Evidence suggests that these strategies, whether delivered in person, online/virtual, or by telephone, could improve psychological well-being by reducing anxiety and improving short-term quality of life. A meta-analysis by Huynh et al [8] evaluated the effects of nurse-led educational interventions in anxiety management in cancer patients. By pooling data from 12 studies, they found a small effect but significant reduction in anxiety levels. Choi et al [4] conducted a systematic review on teach-back methods among cancer patients, reporting improvements in post-intervention happiness (1 study), psychological distress (1 study), and patient self-efficacy (2 studies). Martinez-Miranda et al found a moderate effect in favour of improving patients' quality of life at three months after the intervention; however, this effect was not significant over the long term (4-6 months after the intervention) [10].

There is evidence suggesting that one-on-one teaching strategies can improve compliance/adherence in screening behaviour and increase knowledge about cancer-related pain. A meta-analysis of 19 studies (6 with high risk of bias) found patient education increased screening rates and that more favourable results were observed with personal telephone calls or mailings followed by a telephone call after a visit [5]. Additionally, in a systematic review and meta-analysis of six studies comparing health education intervention with usual care, participants who received the health education intervention were twice as likely to report participating in screening behaviour (odds ratio [OR], 2.43; 95% confidence interval [CI], 1.49 to 3.97) [15]. More specifically, a study in that systematic review found that participants were more likely to be screened if they received both patient navigation and education rather than patient education alone.

In another systematic review investigating best communication strategies to support adherence to oral anticancer medication for the treatment of active cancer found that programs that in-person encounters seemed perform better in comparison to telephone and/or text communications [7]. In their systematic review, Schliemann et al found a study that found greater uptake in Papanicolaou tests in the intervention groups invited by telephone in comparison to a mailed registered letter or a text message [14]. In an RCT study, participants were more likely to attend gastric and colorectal cancer screening after a telephone call alone or combined telephone call with mail information in comparison to the control group [14]. Further, a meta-analysis (e studies) found that cancer knowledge increased post telephone or telephone/face to face intervention versus usual care [6]. With regard to cancer-related pain, a systematic review found 15 of 22 studies showed a significant difference in pain knowledge in face-to-face sessions and fewer pain barriers in comparison to the control [11]. Fourteen of these studies provided additional face-to-face sessions and/or follow-up telephone calls.

There is also evidence suggesting that one-on-one interventions help manage psychological well-being, including symptoms of anxiety and depression, and improve long-term quality of life (4-6 months post intervention), as well as health-related quality of life at end of life. Huynh et al conducted a systematic review and meta-analysis evaluating the effectiveness of nurse-led educational interventions in managing anxiety in cancer survivors [8]. They found that one-on-one interventions had a small effect on reducing anxiety. However, when additional materials (booklets, manuals, cassettes, etc) were provided, with or without Internet (WeChat) or telephone support with the face-to-face communication, the effect on reducing anxiety was moderate [8].

Further, Zhang et al identified death education interventions and found a significant decrease in anxiety and depression in favour of face-to-face interventions compared to the control [16]. Similarly, Martinez-Miranda et al [10] found that in-person meetings had a modest effect on long-term quality of life (4-6 months after intervention) for breast cancer survivors, but not on short-term quality of life (3 months post-intervention). Telephone intervention versus usual care showed no difference in short-term (3 months post intervention; 1 study) or long-term (4-6 months post intervention; 2 studies) quality of life [10].

Sara et al [13] aimed to identify psychological and educational survivorship interventions focusing on health-related quality of life outcomes in men. Four of eight studies involved in-person sessions in an outpatient setting with a supplementary education booklet on managing side effects; two of these studies showed a statistically significant improvement in health-related quality of life. Bartolo et al found a small effect size on telepsychology approaches compared to usual care or attention control group, with improvements in global distress outcomes, fewer depression symptoms over time, and increase in overall quality of life [3].

Another systematic review found that two studies reported a significant increase in quality of life following educational intervention delivered by telephone or face to face/telephone [6]. Ream et al conducted a systematic review to assess the effectiveness of telephone-delivered interventions for reducing symptoms associated with cancer and its treatment. They found 10 studies that delivered the intervention solely by telephone and 16 that used a combination of telephone calls with other materials (such as printed or digital). Compared to the usual care, telephone interventions, with or without additional support, helped reduced the feelings of anxiety and depression [12].

There is evidence suggesting one-on-one patient education can help manage physical well-being and symptom management. Vieira et al [20] found that theoretical-practical teaching-learning programs for the care of Central Venous Access Device (CVAD) in adult patients were effective in reducing infection rates compared to those receiving usual care or standard guidelines. Similarly, care partners/family members who received theoretical-practical teaching-learning program for CVAD care in pediatric cancer patients also experienced lower infection rates before the intervention was performed [20].

A systematic review on educational interventions for managing cancer-related pain found that 31% (8 of 26) of the studies reported a significant reduction in pain intensity with one-on-one in-person methods, using various measures of pain intensity [11]. A meta-analysis of four RCTs showed a small benefit of pharmacist-delivered education, either by telephone or in-person, in reducing cancer pain compared to usual care [6]. Ream et al. found that telephone interventions, with or without additional support, reduced feelings fatigue more effectively than usual care [12]. Additionally, Choi et al [4] found one study that observed positive changes in symptom experience with one-on-one teach back methods. However, Karakus et al found in a subgroup analysis of six studies that psychoeducational interventions, whether individual or web-based, were not effective in improving chronic cancer-related fatigue [9].

Table 4.2. Teaching Strategies

Author/year	Aim of study	Databases search	Total # of included studies/participants	Outcomes
One on One- can be in person, online/virtual or by telephone				
Bartolo et al 2019 [3] Systematic review Newly diagnosed to survival Patient Focus	To provide a comprehensive review of psycho-educational interventions using telecommunication technologies developed for adult cancer patients, assessing their effectiveness in reducing emotional distress and improving QoL	PubMed, Scopus, Web of Science (Science and Social Science Citation Index), ProQuest, Psychology & Behavioral Sciences Collection (through EBSCOhost) and Cochrane Central Register of Controlled Trials (CENTRAL) 2007-May 2017	8 studies (6 RCT, 1 non-RCT, 1 pretest-post-test no control group) N=1016 patients (active phase (N=778) and survivors (N=238) 5 breast and 3 multiple cancers	3/8 were telephonically delivered. Psycho-educational telephone sessions ranged from two calls to eight calls. **Psychological well-being: Distress & Depression:** a) telepsychology approaches demonstrated improved global distress outcomes, compared to the usual care or attention control groups, and promoted the reduction of depression symptoms over time. However, these effects were typically not robust, having a small effect size. Only one study based on telephonic delivery of psycho-education in the survival period showed a medium effect on depression b) significant increase of overall QoL from baseline to follow-up as a result of the interventions conducted by telephone c) Telephonically delivered psycho-education in the survival phase seems to have a medium effect size also in this domain, although this finding is limited by the small sample size in this study.
Choi et al 2021 [4] Systematic Review Treatment Patient Focus	This study aimed to systematically review published research on the use of the teach-back method among cancer patients and provide basic data for developing effective nursing interventions	RISS, KISS, DBpia; NDSL, KCIm CINAHL, EMBASE, PubMed, and PsycInfo January 1, 2011, and September 30, 2020	5 studies (1 RCT, 4 NRT) N=NR 4 breast, 1 gastrointestinal	The teach-back interventions consisted of mostly self-management (4 studies), and one study included health literacy promotion. The intervention types were as follows: only teach-back (3 studies), teach-back with relaxation therapy (1 study), and teach-back with shared decision making (1 study). **Psychological well-being:** One study noted a significant post-intervention improvement in happiness and psychological distress. **Physical well-being:** One study observed significant effects on symptom experience **Patient self-efficacy:** Two studies observed significant effects on self-efficacy
Dougherty et al 2018 [5] Systematic Review and Meta-Analyses Screening Patient Focus	The purpose of this review and meta-analysis is to systematically evaluate interventions designed to increase CRC screening rates in US settings	PubMed, CINAHL, and the Cochrane Library, ClinicalTrials.gov database January 1, 1996, to August 31, 2017	73 RCT studies 366,766 patients Colorectal	**Patient knowledge- Compliance/Adherence** 19 studies, including 6 with high risk of bias, compared an intervention with patient education as the focal point (excluding extensive co-interventions, e.g., navigation and FBT outreach) with usual care, and overall were associated with increased screening rates (RR, 1.20; 95% CI, 1.06-1.36; RD 4%; 95% CI, 1%-6%). Subgroup analyses were notable for favourable results of interventions that included personal telephone calls or mailings with telephone calls after a visit with screening test distribution, but were nonsignificant for pooled effects of decision aids or tailored interventions.

Author/year	Aim of study	Databases search	Total # of included studies/participants	Outcomes
Edwards et al 2019 [6] Systematic Review and Meta-Analyses Treatment Patient Focus	To assess the benefit of pharmacist-delivered educational interventions for patients with cancer pain	EMBASE, MEDLINE, CINAHL, PsycINFO, ASSIA, Web of Science and CENTRAL Inception until January 2018	4 RCT studies N=944 Cancer type NR	**Physical Well-Being: Symptom Management** All four studies showed a reduction in pain scores in the intervention group compared with the control (usual care). The Chen study was not included in the meta-analysis as the measurement of pain was not comparable with the other three studies although pain was statistically significantly reduced in the intervention group in all pain sites measured Meta-Analysis results: Overall, the changes in pain intensity were reduced by an extra 0.76 in the intervention group versus the control group. This was significant at the 5% level, and the overall 95% CI suggests the change in pain intensity was reduced by an extra 0.69–0.82 points (on a 0–10 scale) in the intervention versus the control. The $I^2=0\%$ suggest the studies are not heterogeneous, and this is supported by the forest plot that shows studies found fairly consistent results. **Patient Knowledge:** 2/4 studies looked at patient knowledge of cancer pain before and following the intervention. Both studies found that knowledge increased post intervention in both groups although this was significantly higher in the intervention group at baseline for both studies. **Patient Satisfaction & Experience:** 2/4 studies measured some aspect of patient satisfaction. Chen asked a simple question at the end of the study and in Powers it was unclear how it was assessed other than by an observer at the end of the study. Both seen a slight increase in patient satisfaction in the intervention group compared to the control. **Psychological Well-Being QoL:** 2/4 studies measured QoL: one study used the validated EORTC QLQ C30 and found a significant increase in QoL in the intervention group post intervention. The other study did not go into any detail about how QoL was measured and whether a validated tool was used but also found a significant increase in QoL.
Elston Lafata et al 2023 [7] Systematic Review Treatment Patient Focus	To identify types of medication counseling/ patient-clinician communication strategies that have been tested among community-dwelling adult patients to support adherence to oral anticancer meds for the treatment of active cancer.	Medline/PubMed, EMBASE, PsycINFO, and CINAHL Inception-March 13, 2020	24 studies (5 RCTs, 19 NRTs) N=NR 9 solid tumours only, 5 hematological malignancies only (all CML) 8 either a solid or hematological malignancy	Only five programmes were delivered via only in-person encounters **Patient knowledge - Patient adherence:** Programmes that included at least some face-to-face contact seemed to perform better than those relying on telephone and/or text communications alone.

Author/year	Aim of study	Databases search	Total # of included studies/participants	Outcomes
Huynh et al 2022 [8] Systematic Review & Meta Analysis Mix of new diagnosed, scheduled/undergoing treatment or completed treatment Patient Focus	Aimed toward evaluating the effectiveness of nurse-led educational interventions in anxiety management in cancer survivors.	Embase, PubMed, CINAHL Complete, the Cochrane Central Register of Controlled Trials (CENTRAL), and ERIC 2000 to March 2021	42 studies (all RCTs) N=6333 16 studies were either breast, ovarian or gynecological, 4 were prostate, 22 mixed	**Psychological well-being: Anxiety** (N=12 studies in meta-analysis) (negative values indicate that the intervention led to a greater reduction in anxiety) Individual: (N=1562), ES = -33 (95% CI -0.48, -0.17), 49% heterogeneity Subgroup analysis: **Face-to Face**: 5 studies (N=947), ES=-0.14 (95% CI -0.27, -0.01), 0% heterogeneity **Face-to-Face and materials** (booklets, manuals, cassettes, etc.): 5 studies (N=397), ES=-0.38 (95% CI -0.67,-0.09), 46% heterogeneity **Face-to-Face and telephone**: 4 studies (N=649), ES=-0.33 (95% CI -0.62, -0.04), 65% heterogeneity **Face-to-Face, materials, the Internet (WeChat)**: 2 studies (N=426), ES=-0.25 (95% CI -0.70, 0.20), 82% heterogeneity
Karakus et al 2024 [9] Systematic Review and Meta-Analysis Cancer Continuum-NR Patient Focus	To synthesize the effect of a psychoeducational intervention that is specific to CRF and includes CRF management.	Cochrane Library, CINAHL, Web of Science, PubMed, MEDLINE, Scopus, Springer Link, Science Direct, TR Index Turkish National Databases, Turkish Thesis Center of the Council of Higher Education and the ProQuest Dissertations & Theses Database Inception to February 2023	10 studies (all RCTs) N=1369) Cancer type NR	**Physical well-being - fatigue:** Subgroup analysis (N=6 studies) showed that the type of psychoeducational intervention such as group or individual intervention had not been effective on improving CRF (p=0.083) nor web-based intervention or face-to face intervention or digital intervention such as telephone had not been effective (p=0.290). In addition, this analysis indicated that no difference between group and individual psychoeducational interventions (x^2=1.65, df=1, p=0.198) and no difference between face to face and telephone or web-based interventions (x^2= 2.77, df=1, p=0.096).
Martinez-Miranda et al 2023 [10] Systematic Review and Network Meta-Analysis Survival Patient Focus	To assess the comparative effect of patient education modalities (online, telephonic, mixed, in-person meetings) on the improvement of quality of life in breast cancer survivors.	Other: Systematic Review and Network Meta-Analysis Web of Science, PubMed, CINAHL, SCOPUS, the Cochrane Plus Library, PEDro, Dialnet and Clinicaltrials.gov Inception to Dec 2020	14 RCT studies 1482 women in the meta-analysis Breast cancer	**Psychological well-being - quality of life (short term; at 3 months post intervention):** Two different pairwise meta-analyses, including 11 of the studies in them - significant differences in favour of patient education (overall; SMD=0.32; 95% CI [0.09, 0.56], p=0.008) and online modality (SMD=0.28; 95% CI [0.06, 0.50], p=0.01), but not in-person meetings (SMD=0.19; 95% CI [-0.05, 0.44] p =0.11), telephone (SMD -0.02; 95% CI [-0.34, 0.30], p=0.92) or mixed program (SMD=0.63; 95% CI [-0.24, 1.50] p=0.15). **Psychological well-being - quality of life (long term 4-6 months post intervention):** At longer term, significant differences in favour of the application of patient education in overall (SMD=0.55; 95% CI [0.09, 1.01], p=0.02), and in-person meetings modality (SMD=0.55; 95% CI [0.26, 0.84], p=0.0002), but not mixed program (SMD=1.04; 95% CI [-0.17, 2.24], p=0.09), telephone (SMD=0.24; 95% CI [-0.62, 1.10], p=0.59) or online modality (SMD=0.15; 95% CI [-0.14, 0.43], p=0.31).

Author/year	Aim of study	Databases search	Total # of included studies/participants	Outcomes
Oldenmenger et al 2018 [11] Systematic Review Treatment Mix of Patient and Patient/Family Care partner Focus	Aim of this systematic review is to investigate the effectiveness of educational interventions in patients with cancer-related pain on all these relevant	Medline (OVID) and CINAHL January 1st, 1995, and May 8th, 2017	29 articles on 26 RCT studies N=4735 Cancer Type NR	**Physical well-being - symptom management - pain intensity:** 8 of the 26 studies (31%) reported a statistically significant difference in pain intensity in favour of the intervention group. However, these studies measured pain intensity in different ways; average pain intensity (six studies), worst pain intensity (four studies), current pain intensity (three studies), and least pain intensity (two studies). These eight studies included 19% of all included patients. In six of these eight studies, the intervention existed of a face-to-face session (nurse-led in five studies), followed by repeated face-to-face sessions (n=4) or follow-up phone calls (n=2). **Patient knowledge - Knowledge about cancer-related pain/pain barriers:** Twenty-two studies (85%) reported on pain knowledge and/or pain barriers. Fifteen studies (68%) showed a significant difference in pain knowledge or barriers (increased knowledge or less barriers. In all these studies, the intervention existed of a face-to-face session (nurse-led in 11 studies), followed by repeated face-to-face sessions and/or follow-up phone calls in 14 studies. Twelve studies provided written and/or videotaped information.
Ream et al 2020 [12] Systematic Review Across the cancer continuum Patient Focus	To assess the effectiveness of telephone-delivered interventions for reducing symptoms associated with cancer and its treatment. To determine which symptoms are most responsive to telephone interventions. To determine whether certain configurations and duration/frequency of intervention calls mediate observed cancer symptom outcome effects.	The Cochrane Central Register of Controlled Trials; MEDLINE via OVID; Embase via OVID; (CINAHL) via Athens; British Nursing Index; and PsycINFO Inception to January 2019	32 studies (31 RCTs; 1 repeated-measure experimental design) N=6250 9 breast, 11 either breast, colorectal, lung or prostate	Ten studies delivered interventions solely by telephone, and 16 studies combined telephone calls with other materials (printed or digital). Most compared a telephone with usual care alone or usual care with additional support. Eight studies compared 2 telephone interventions against each other; some also compared these with usual care. **Psychological Well-being - Anxiety:** Telephone interventions with or without additional support vs control intervention Effects measure (using change score) - N=277 (5 studies) SMD -5.1 (95% CI -6.1 to -4.1) for breast cancer to SMD -0.3 (95% CI -0.3 to 0.9) for prostate cancer (certainty of the evidence very low) **Psychological Well-being - Depression:** Telephone interventions with or without additional support vs control intervention Effects measure (using change score) N=1059 (9 studies) SMD -2.2 (95% CI -2.7 to -1.7) for colorectal cancer to SMD 0.3 (95% CI 0.04 to 0.5) for mixed cancers (certainty of the evidence very low) **Physical Well-being - fatigue:** Telephone interventions with or without additional support vs control intervention Effects measure (using change score) N=895 (6 studies)

Author/year	Aim of study	Databases search	Total # of included studies/participants	Outcomes
				SMD -0.9 (95% CI -1.5 to -0.3) for breast cancer to SMD 0.0 (95% CI -0.2 to 0.2) for mixed cancers
Sara et al 2024 [13] Systematic Reivew Cancer Continuum	To identify psychological and educational survivorship interventions targeting health-related QoL outcomes in men on ADT.	Systematic Review Web of Science, Cochrane, EBSCO Host, PubMed, SCOPUS Inception (1984) to 28 January 2023.	8 RCT studies N=656 Prostate cancer	Four involved in-person sessions in outpatient settings. All included an information booklet. Two had psycho-educational content (i.e. assessment of needs, personalized intervention, multi-disciplinary approach), 2 did not (i.e. individually based, nurse led). **Psychological well-being - health related quality of life:** - Only two studies demonstrated statistically significant improvements using a specific health-related QoL measure.[33][37] One was a nurse-led educational intervention [37] which supports the evidence in the literature that nurse-led interventions lead to significant improvements in health-related QoL. The other was a multidisciplinary educational intervention with psychoeducational components. Both interventions were delivered in the individual setting and included supplementary educational materials and specific information on the management of ADT side effects.
Schliemann et al 2019 [14] Systematic Review Screening Patient Focus	To identify whether mass and small media interventions improve knowledge and attitudes about cancer, cancer screening rates, and early detection of cancer in Asia.	Medline, EMBASE, CINAHL, Web of Science, Cochrane Library, and Google Scholar Inception to September 2017	22 studies (reported across 24 papers; 11 RCTS (in 13 papers) and 11 quasi-experimental) N=NR 11 breast, 7 cervical, 3 colorectal, 2 oral	Other small media communication channels were telephone calls and text messages (Short Message System). The RCTs included between one and four intervention groups (IGs), either comparing different channels of communication to a control group (CG) or comparing different types of messages delivered through the same channel of communication. **Patient knowledge - compliance/adherence:** - Repeated text message screening invitation combined with information about mammograms was as effective as receiving a screening invitation through text message alone. - One study reported a significantly greater uptake of Papanicolaou tests in the IG invited by telephone compared with a mailed letter, a registered letter, or a text message (50.9%, 23.9%, 23.0%, and 32.93%, respectively; p<0.05). - RCT participants who received a telephone call alone or a call combined with mailed information were significantly more likely to attend gastric and colorectal cancer screenings compared with the respective CGs (gastric cancer: telephone, 31.7% vs. 17.9%, p=0.01; telephone plus post, 40.5% vs. 17.9%, p<0.01; Colorectal cancer: telephone, 24.3% v 13.5%, p<0.01; telephone plus post, 27.8% v 13.5%, p<0.01).

Author/year	Aim of study	Databases search	Total # of included studies/participants	Outcomes
Washington et al. 2024 [15] Systematic Review and Meta-Analysis Screening Patient Focus	To systematically review health education and awareness interventions targeting cervical cancer prevention and detection efforts directed toward women living in rural communities.	Systematic Review and Meta-Analyses EBSCO, JSTOR, Medline, PsychINFO, Psychology and Behavioral Sciences Collection, PubMed, and Cochrane Library 2000 to January 2023	11 studies (2 arm cluster, 2 quasi-experimental, 6 RCT, 2 group randomized) N=9720 Cervical cancer prevention	**Patient knowledge -compliance/adherence:** - One study found that the women who received both patient navigation and education were more likely to be screened than those participants who only received the education intervention (OR: 6.16, 95% CI: 5.22 to 7.27). - Findings suggest that educational interventions are effective in encouraging cervical cancer screening and prevention behaviour. When paired with patient navigation services or lay health advisors, educational interventions are even more effective in promoting cervical cancer screening and prevention behaviour.
Zhang et al 2024 [16] Systematic Review and Meta-Analyses End of life Patient Focus	The objectives of the current systematic review and meta-analysis were to: (1) systematically identify and summarize the characteristics of death education delivered in current studies and (2) evaluate its effects on cancer patients	PubMed, Web of Science, Embase, CINAHL, CENTRAL, PsycINFO, China, National Knowledge Infrastructure, China Wan Fang Database, and China Science and Technology Journal Database Inception to April 2022	22 studies (11 RCTs, 11 clinical controlled trials) N=2374 4 livers, 1 breast, 2 lung, 1 gastric, 1 head and neck, 13 multiple cancers	Most of the interventions were administrated in a face-to-face setting (n=21). **Psychological well-being - anxiety:** The total pooled results demonstrated that there were significant differences in favor of death education, as compared with controls for anxiety [SMD=-2.17, 95% CI (-2.47, -1.86), p<0.01] **Psychological well-being - depression:** The total effect showed a statistically significant effect of death education on depression [SMD=-2.24, 95% CI (-2.71, -1.77), p<0.01] **Psychological well-being - quality of life:** In the subgroup of education focused on cognition of life and death (N=4), the pooled results showed significant differences between the intervention and control groups [(SMD=1.18, 95% CI (0.67, 1.68) It was observed that most facilitators of death education were healthcare professionals who had experience in oncology, most commonly nurses as they have close contact with patients and may even accompany them through this last journey of life. Of the study group, most had at least 5 years of oncology experience and excellent communication skills. They also received training related to life and death to qualify for providing death education
Group *can be in person, online/virtual*				
Huynh et al 2022 [8] Systematic Review & Meta Analysis	See above for details in the one-on-one teaching strategies.			**Psychological well-being: Anxiety** (N=6 studies in meta-analysis) (negative values indicate that the intervention led to a greater reduction in anxiety) Group: (N=913), ES=-0.14 (95% CI -0.31, 0.02), 26% heterogeneity

Author/year	Aim of study	Databases search	Total # of included studies/participants	Outcomes
Karakus et al 2024 [9] Systematic Review and Meta-Analysis	See above for details in the one-on-one teaching strategies.			Subgroup analysis showed that the type of psychoeducational intervention such as group (n=4) had not been effective on improving CRF (p=0.083). In addition, this analysis indicated that no difference between group and individual psychoeducational interventions (x^2=1.65, df=1, p=0.198)
Sihvola et al. 2023 [17] Systematic Review Treatment/Finished Treatment Patient Focus	To explore the essential elements of patient education methods for promoting resilience among adult cancer patients.	Systematic Review The PubMed, Scopus, CINAHL and PsycInfo databases January 2010 to April 2021	9 studies (6 RCTs, 2 quasi-experimental,1 longitudinal) N=NR 5 breast, 1 colorectal, 1 colorectal/gastric, 2 general cancers	**Psychological well-being - Anxiety and depression:** 3 studies mentioned that interventions reduced anxiety and depression scores
Multiple Modalities				
Huynh et al 2022 [8] Systematic Review & Meta Analysis	See above for details in the one-on-one teaching strategies.			interventions delivered in a combination of group and individual (n=7). Negative values indicate that the intervention led to a greater reduction in the outcome. **Psychological well-being: Anxiety** Subgroup analysis - Meta-analysis (N=2 studies): N=461), ES=-0.21 (95% CI -0.44, 0.02), 29% heterogeneity
Sihvola et al. 2023 [17] Systematic Review	See above for details in the one-on-one teaching strategies.			Of the included studies, seven of nine reported that the intervention was beneficial to promoting resilience.

Abbreviations: ADT, Androgen deprivation therapy; CABSI, Catheter-Associated Bloodstream Infection; CI, Confidence interval; CINAHL, Cumulative Index of Nursing and Allied Health; CML, Chronic myelogenous leukemia; CRF, Cancer-related fatigue; DBpia, Database Periodical Information Academic; df, Degrees of freedom; EMBASE, Excerpta Medica Database; ES, Effect Size; EORTC QLQ European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire; RKCI, Korea Citation Index; KISS, Korean Studies Information Service System; NDSL, National Discovery for Science Library; NR, Not reported; NRT, Non-randomized controlled trial; OR, Odds ratio; QoL, Quality of life; RCT, Randomized controlled trial; RD, Risk difference; RISS, Research Information Sharing Service; RR, Relative risk; SMD. Standardized mean difference

Group strategies

Three systematic reviews (two with meta-analysis) reported on group teaching strategies [8,9,17] and the certainty of evidence was moderate. A meta-analysis of six studies found that group nurse-led interventions had a small effect on decreasing anxiety levels. Another systematic review found that group interventions in three studies helped reduce the feelings of anxiety and depression [17]. However, a subgroup analysis indicated that group interventions were not effective in improving cancer chronic-related fatigue [9]. Overall, the evidence suggests that group interventions may reduce anxiety and depression [9,17] but may be less effective on physical well-being symptoms like fatigue [9].

Directed Self-learning strategies

The literature review found no studies meeting our inclusion criteria.

Multiple modalities strategies

Two systematic reviews (one with meta-analysis) reported on interventions delivered using multiple modalities [8,17] and the certainty of the evidence was moderate. A meta-analysis of two studies found that combined one-on-one and group nurse-led interventions had a small effect on reducing patient anxiety levels [8]. Sihvola et al found that seven studies reported these interventions were beneficial to promoting resilience [17]. The evidence suggests that using both group and one-on-one teaching strategies could help reduce anxiety and promote resilience.

B. Materials and Methods

The characteristics and outcomes of the 10 systematic reviews [4,7,14,18-22,24,29] and six systematic reviews with meta-analyses [3,23,25-28] are reported in Table 4-3.

Written materials

Five systematic reviews examined the effectiveness of written materials [14,18-21] and the certainty of the evidence was moderate to high. A systematic review by Ahuja et al [18], when looking at RCT data, found that when individuals were given patient information leaflets about oral cancer, there were greater improvements in knowledge scores compared to those who did not receive it. When looking at studies conducted in high-risk groups or smokers, there was also higher oral cancer knowledge scores when receiving patient information leaflets and one on one versus the control group [18]. No differences were found in knowledge scores between the leaflet group and one-on-one plus leaflet instruction group. Similarly, when looking at non-RCT studies, there were significant increases in mean oral cancer awareness scores after reading a written information. One study found a 28% increase in mean oral cancer knowledge scores from baseline to one year later after reading a leaflet compared to those not reading a leaflet [18]. In another systematic review, it was observed that in the absence of practical skills training, patients' infection rates were decreased only when printed materials were provided [20]. There is some evidence to suggest that providing written materials has potential to increase individuals' cancer knowledge.

In a systematic review by Schliemann et al, small media interventions (e.g., mailed letters or materials) were effective at improving screening behaviour, especially among cervical cancer screening [14]. There were mixed results for breast, colorectal and gastric cancer screening. Two studies in this systematic review did find that tailored letter reminders were significantly more effective than non-tailored. Another study found higher screening uptake when a mailed screening invitation and information was followed by a telephone call reminder compared to the control. In another systematic review, five studies found that screening

Table 4.3. Materials and Methods

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
Written Materials				
Ahuja et al 2022 [18] Systematic Review Prevention Patient Focus	To evaluate the effectiveness of interventions designed to improve oral cancer knowledge among the general population or high-risk groups based on RCTs and NR/QE studies	PubMed, PsycINFO, CINAHL, Cochrane Library, and Web of Science. January 1989 and October 2019.	27 studies (8 RCTs and 19 NR/QE studies N=NR Cancer type: NR	**Patient Knowledge- RCT studies: Written info vs no written:** Most of the RCTs where participants received a Patient information leaflet (PIL) reported greater improvement in knowledge scores among the intervention group when compared to participants who did not receive it **Patient Knowledge- RCT studies: Written info vs written info + one on one vs control (none):** In studies conducted among high-risk groups or smokers, as compared to the control group, higher oral cancer knowledge scores were reported among the participants in the leaflet group and one-to-one plus leaflet instruction group; however, the knowledge scores did not differ statistically between the leaflet group and one-to-one plus leaflet instruction group. **Patient Knowledge- NR/QE studies:** One pretest post-test study reported a significant increase in mean oral cancer awareness scores two weeks after reading a brochure (6.7; 95% CI: 6.4, 6.9) than before reading it (5.3; 95% CI: 4.8, 5.8) ($p < 0.05$) (Table 2). Similarly, there was a 28% increase in mean oral cancer knowledge scores among participants from baseline (70.4 ± 10.0 vs. 71.1 ± 10.1; t=0.48, p=0.63) to one-year follow-up after reading a leaflet than those without reading it (88.7 ± 8.4 vs. 71 ± 47.8; t=15.05, p<0.001)
Li et al 2021[21] Systematic Review Screening and Preventative Patient Focus	To identify, characterize and summarize patient-targeted interventions on improving the uptake of colorectal cancer genetic evaluation for at-risk individuals and enhancing their informed decision making	PubMed, CINAHL, Web of Science, Embase, PsycINFO, and Cochrane library Inception to March 25, 2020	8 studies (4 RCT and 4 quasi-experimental) N=NR Colorectal	**Patient knowledge - adherence:** One study provided patients with a brochure containing genetic information and invited them to undergo genetic counselling and testing. The control group in this study underwent a doctor-centred educational intervention. The results showed that direct patient education and doctor-centred education intervention were both effective for genetic referral. There were no significant differences regarding the rates of patients who received counselling (42% vs. 51%, respectively) or who chose DNA testing between the two groups (32% vs. 37%, respectively)
Schliemann et al 2019 [14] Systematic Review Screening Patient Focus	To identify whether mass and small media interventions improve knowledge and attitudes about cancer, cancer screening rates, and early detection of cancer in Asia.	Medline, EMBASE, CINAHL, Web of Science, Cochrane Library, and Google Scholar Inception to September 2017	22 studies (reported across 24 papers; 11 RCTS (in 13 papers) and 11 quasi-experimental) N=NR	**Patient knowledge - Compliance/adherence:** Findings from RCTs were mixed for breast (n=4 [medium quality]) and colorectal cancer screening (n=3 [medium quality]) and positive for cervical cancer screening (n=3 [medium to high quality]). Only one RCT looked at gastric cancer screening. 2 studies reported that a tailored letter about free breast cancer screening was significantly more effective than a non-tailored reminder (odds ratio, 4.02 [95% CI, 2.67 to 6.06]; p<0.001).

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
			11 breast, 7 cervical, 3 colorectal, 2 oral	A mailed screening invitation and information followed by a telephone reminder yielded a significantly higher test uptake compared with no intervention (opportunistic screening; odds ratio, 2.44 [95% CI, 1.29 to 4.62]) in one study
Teo et al 2019 [19] Systematic Review Screening Patient Focus	To evaluate the effectiveness of cancer screening pamphlets as a standalone intervention.	Ovid MEDLINE, Embase, The Cochrane Library, PsycInfo, CINAHL, ClinicalTrials.gov; UK Clinical Trials Gateway; EU Clinical Trials Register; International Clinical Trials Registry Platform (ICTRP); and Australian Clinical Trials Jan 2000 - May 2019	9 RCT studies N=NR 5 colorectal, 3 prostate, 1 lung	**Patient knowledge - compliance/adherence:** Five studies reported that pamphlets significantly increased screening uptake (p<0.05). Of these, two studies showed a large increase in uptake (>20%) and three studies showed a moderate increase (10–20%). The remaining four studies reported that the pamphlets did not have a significant effect on uptake. There is some evidence that pamphlets increase uptake for colorectal cancer screening when used in primary care. As for prostate cancer and lung cancer screening, we found very few studies, so generalisability is limited.
Vieira et al 2024[20] Systematic Review Treatment Mix of patients and care partners of pediatric patients	To evaluate the effectiveness of teaching-learning programs for cancer patients and/or their care partners or family in preventing and controlling infections associated with long-term central venous access devices	CINAHL, Cochrane Library, EMBASE, LILACS, and MEDLINE via PubMed portal, Scopus, and Web of Science; Google Scholar Inception to June 2023	7 studies (2 RCTs, 2 non-RCTs, 3 quasi-experimental) N=NR Cancer Type= NR	**Patient knowledge - problem solving or compliance/adherence:** Among the exclusively theoretical teaching-learning programs, where practical skills training for patients and/or their care partners or family are absent, effectiveness in reducing the rates of CABSI was observed only when printed materials were provided to the participants.
Verbal Discussion				
Champarnaud et al 2020[22] Systematic Review Treatment Patient Focus	A systematic review designed to search for evidence of the effectiveness of therapeutic patient education interventions in older adults with cancer on physical and mental health	Medline, Cochrane Library, Web of Science and PsycINFO 1990 and July 2016	14 studies (6 RCTS, 3 quasi-experimental, 1 prospective, 1 cohort, 2 pilot studies and 1 feasibility study) N=NR Diverse Types	Only one study geared their educational intervention to the specific learning capabilities of older adults (average age of 80). However, it was a pilot test and only included 21 patients. Its aim was preventive health care of older adults with respect to cancer. **Patient knowledge- knowledge** Significant increase in cancer knowledge on the post-test in the intervention group (t (11)=-2.53, p<0.05)

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
Kim et al 2021[23] Systematic Review and Meta-Analyses Treatment Patient Focus	Estimate the effects of preoperative education intervention on various postoperative outcomes and to investigate the influence of moderators on the relationship between preoperative education and outcomes for patients undergoing cancer-related surgery	Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, and CINAHL Inception to Oct 2019	10 studies were eligible for the meta-analysis (5 RCTs, 5 non-RCT) N=1563 in quantitative synthesis Diverse Types	**Patient knowledge- knowledge** In the random-effects moderator analyses by method of education, using the verbal education (2 studies; 147 participants; SMD=1.08; 95% CI, 0.48–1.68) or written audio-visual education (3 studies; 381 participants; SMD=0.73; 95% CI, 0.01–1.45) yielded greater effects compared with audiovisual education (2 studies; 383 participants; SMD=0.16; 95% CI, −0.04 to 0.36) and written education (3 studies; 652 participants; SMD=0.1; 95% CI, −0.06 to 0.25). The results of our meta-analysis suggest that the conventional verbal format and combined written-visual format would both be useful in helping patient's education, and the duration of the education varied greatly from 15 to 90 minutes
Audiovisual				
Bartolo et al 2019 [3] Systematic review Newly diagnosed to survival Patient Focus	To provide a comprehensive review of psycho-educational interventions using telecommunication technologies developed for adult cancer patients, assessing their effectiveness in reducing emotional distress and improving QoL	PubMed, Scopus, Web of Science (Science and Social Science Citation Index), ProQuest, Psychology & Behavioral Sciences Collection (through EBSCOhost) and Cochrane Central Register of Controlled Trials (CENTRAL) 2007-May 2017	8 studies (6 RCT, 1 non-RCT, 1 pretest-post-test, no control group) N=1016 patients (active phase (N=778) and survivors (N=238) 5 breast and 3 multiple cancers	One study offered brief psychoeducation to cancer patients arriving at chemotherapy through a movie clip utilizing a tablet PC. **Psychological well-being- Distress:** It was not possible to estimate the effect size, participants undergoing chemotherapy that received a single session of brief psychoeducation reported more improvements over 3 weeks than did the attention control group regarding nonspecific distress symptoms and depression symptoms
Hirschey et al 2020 [24] Systematic Review Survivors completed/undergoing/awaiting treatment Patient Focus	To systematically review evidence on the composition and utility of health education videos among adult URM survivors.	Web of Science, Embase, PubMed, Cochrane, PsycInfo, and CINAHL databases Inception to Oct 2018	8 studies N=352 A variety of cancer diagnosis; two included only breast cancer survivors	**Patient knowledge- knowledge** Armed with knowledge, survivors reported being more likely to engage in the decision-making process, being more likely to communicate with healthcare providers about their health given their feelings of comprehension. Studies comparing groups, African Americans had less knowledge about common cancer concerns than non-Hispanic Whites; yet there was no statistical difference in knowledge post watching the video [34]. Thus, African Americans may benefit from videos more than non-Hispanic Whites. **Physical well-being - Symptom management:** Patients who watched videos about communicating pain with physicians, had physicians who more accurately reported their pain at three to four weeks post-intervention, compared to control arm participants for whom physicians underestimated pain (p<0.05). However, these effects were not sustained at six to seven weeks post-intervention. **Psychological well-being- QoL**

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
				Cross studies, interventions had differing effects on QoL outcomes, in which one intervention had no effect on QoL, and in another, participants expressed beliefs that the intervention could improve QoL.
Li et al 2021[21] Systematic Review	See above for details in verbal information			**Patient Knowledge and Patient Self-efficacy:** One study evaluated the effectiveness of educational intervention on informed decisions regarding MSI testing. Participants who received the education plus the CD-ROM modules reported that their knowledge on the MSI and IHC tests increased significantly, their satisfaction regarding their preparation to decide about testing and decisional self-efficacy were greater, and their decisional conflict was lower.
Vieira et al 2024[20] Systematic Review	See above for details in written information			**Patient knowledge - problem solving or compliance/adherence:** When only audiovisual materials were presented to the participants, there was no effectiveness in reducing the CABSI rates compared to the usual care and/or standard guidelines provided by the healthcare team.
e-learning, interactive platform, Apps				
Ahuja et al 2022 [18] Systematic Review	See above for details in written information			In one RCT, study and control groups received identical oral cancer education messages (text, pictures, and videos in a standardized format); however, the method for delivering these messages differed between groups WhatsApp vs PowerPoint presentation) **Patient Knowledge- RCT study:** A significant increase in oral cancer knowledge scores in the WhatsApp group as compared to the PowerPoint presentation group after one month
Li et al 2022 [25] Systematic Review and Meta-Analysis Patient Focus	To evaluate the effect of Smartphone education on the bowel preparation quality of patients undergoing colonoscopy	PubMed, Web of Science, the Cochrane Library, and Embase Inception to August 31, 2021	12 RCT studies 4165 (2060 intervention/2105 control) Cancer type NR	**Patient knowledge - compliance:** Conventional education methods (verbal, written or web-based ed video) vs Smartphone app or social media apps or audiovisual instruction by Smartphone + control methods The heterogeneity test showed that there was significant heterogeneity (I^2=88%, p<0.01). The pooled RR of the rate of adequate bowel preparation was 1.15 (95% CI: 1.07–1.23,p<0.01). Meta-analysis showed that the rate of adequate bowel preparation in the Smartphone group was significantly higher than that in the control group Subgroup analysis results suggest that the bowel preparation quality of the patients in the Smartphone group was significantly higher than that of the patients in the control group. Suggesting that Smartphone education can significantly improve the bowel preparation quality of patients undergoing colonoscopy **Patient's satisfaction & experience:** The number of patients who were willing to repeat bowel preparation in the Smartphone group was significantly higher than that in the control group (p<0.05). More patients in the Smartphone group were willing to

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
				undergo repeat bowel preparation.
				Patient's physical well-being: After Smartphone education, the incidence of nausea/vomiting and abdominal distension during bowel preparation among the patients were significantly lower than those in patients in the control group ($p<0.01$, $p<0.05$, respectively, Fig. S4a, b), but there was no significant difference in the incidence of abdominal pain between the two groups ($p=0.10$, Fig. S4c). The incidence of nausea/vomiting and abdominal distension in the Smartphone group was significantly lower than that in the control group, but there was no significant difference in the incidence of abdominal pain between the two groups The detection rates of adenoma and advanced adenoma in the Smartphone group were significantly higher than those in the control group, and there was no significant difference in the detection rate of polyps between the two groups
Waseem et al 2022 [26] Systematic Review and Meta-Analyses Treatment Patient Focus	Compared the efficacy of interventions to usual care on adherence to oral anticancer regimens.	Embase, PubMed, and CINAHL database January 2000 and May 2021	49 studies 50,379 patients Diverse cancers	Technological interventions varied, encompassing webpages, applications, text messaging, voicemails, and emails. Interactive technology entailed patients inputting a response using technology that was then addressed by a primary healthcare worker, whereas noninteractive technology provided automated reminders alone. **Patient knowledge- Compliance/Adherence:** Technology may improve adherence rates versus to usual care (MD=8.23%, 95% CI [2.9, 13.55], very low certainty of evidence). It should be noted that this improvement was seen when technology was accompanied by additional primary healthcare follow-up. **Patient Well-being- QoL:** QoL may improve in patients receiving technological interventions in comparison to usual care; Two RCTs reported there may be little to no effect (SMD=1.44, 95% CI [1.15, 1.74], very low certainty of evidence). Conversely, a cohort study showed that patients receiving a technology intervention may have higher quality of life when compared to those receiving usual care (MD=0.13 points, 95% CI [-0.07, 0.2], MID=0.061, very low certainty of evidence)
Electronic materials delivered by email, patient portal, or on websites				

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
Bartolo et al 2019 [3] Systematic review	See above for details in audio-visual information			3/8 utilized an educational website or e-mail as the only resource **Psychological well-being- QoL:** -significant increase of overall QoL from baseline to follow-up because of the interventions conducted by email -web-based interventions reported a small effect on the QoL dimensional scores regarding emotional, physical and cognitive functioning.
Wang et al 2020[27] Systematic Review and Meta-Analyses Treatment Patient Focus	To systematically review evidence regarding the benefits of Internet-based psycho-educational interventions among cancer patients.	Medline, Embase, CINAHL, PsycINFO, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL), Proquest Digital Dissertations, Foreign Medical Retrieval System, China National Knowledge Infrastructure, VIP Journal Integration Platform, China Wanfang Database, and Taiwanese Airiti Library. Inception - March 2019	7 RCT studies N=1220 3 breast, 1 glioma, 2 several types and 1 unclear	Internet-based psycho-educational interventions: Interventions were diverse in terms of the instrument, duration, frequency, setting, and facilitator. The tools used for Internet-based psycho-educational interventions included websites (n=5), tablet personal computers (PCs) (n=1), and e-mail (n=1) **Psychological well-being - distress:** The pooled data of the four studies showed no significant difference in improvement between the intervention and control groups (SMD –1.03, 95% confidence interval (CI) (–2.63, 0.57), p=0.21) **Psychological well-being - depression:** Meta-analysis showed a significant difference in improvement between the intervention and control groups (SMD –0.58, 95% CI (–1.12, –0.03), p=0.04) **Psychological well-being - quality of life**: Two studies including 185 participants that provided sufficient data were combined in the meta-analysis [39, 40]. The result showed no significant difference in improvement between the intervention and control groups (MD 1.10, 95% CI (–4.42, 6.63), p=0.70) **Psychological well-being - Anxiety:** One study showed a significant effect on anxiety using HADS (U=69.0; p=0.006) **Physical well-being - fatigue:** Two studies assessed the effect of Internet-based psycho-educational interventions on fatigue [42, 46]. The pooled data included 427 participants and showed a significant difference in improvement between the intervention and control groups (MD –9.83, 95% CI (–14.63, –5.03), p<0.01)
Multiple Methods				

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
Bartolo et al 2019 [3] Systematic review	See above for details in audio-visual information			Only one used multiple delivery resources combining the usual face-to-face care with psycho-educational videos and telephone counseling sessions **Psychological WB- distress and QoL:** Data suggested that the addition of psycho-education videos or telephone counseling or both to the usual care of patients in an early stage of the disease did not change distress levels from post-surgery to ongoing recovery and improved overall QoL over time, although between-group differences were not found
Huang Longcoy et al. 2023 [28] Systematic Review and Meta-Analyses Screening Patient Focus	To identify RCTs of educational interventions for Asian American women aimed at increasing breast cancer screening and to estimate the effects of the interventions	Web of Science, MEDLINE, PubMed, and Cochrane Library January 2010 through December 2020	7 RCT studies N=1157 Chinese American women and 1129 Korean American women Breast Cancer Prevention	**Patient knowledge - adherence:** Significant increases in the receipt of mammography at follow-up were observed mainly in the interventions that included more than one intervention strategy. **Patient knowledge - adherence:** Significant increases in the receipt of mammography at follow-up were observed mainly in the interventions that included more than one intervention strategy. All studies evaluated the efficacy of an intervention by comparing an experimental group with a control group that received a printed brochure or standard educational information. The RR of the pooled estimate was 2.01 (95% CI [1.38, 2.93]), indicating that, in general, the educational interventions were effective at increasing mammography receipt among Asian American women Interventions included: individually tailored screening brochure, community health worker–led group training in health literacy, and telephone counseling and navigation assistance; culturally targeted video and participated in a group discussion and couples discussion activity; individually tailored text messages and logistical and navigation assistance via a mobile application; culturally targeted educational program including group teaching and individual counseling (logistical and navigation assistance); culturally targeted video and another group received a linguistically appropriate nontargeted video; individually tailored telephone counseling The findings of this review support the incorporation of multiple intervention strategies to address various barriers, which may result in a better effect on mammography screening uptake

Author/year	Aim of study	Study design	Total # of included studies/participants	Outcomes
Steves et al 2021 [29] Systematic Review Treatment Patient Focus	To determine whether adequate research evidence exists to support utilizing multimedia technology in the preoperative education of adult cancer patients	Medline, CINAHL, Web of Science, and PsycINFO databases 2010 through September 24, 2020	9 studies (4 RCTs, 5 quasi-experimental (3 did not have a control group)) N=NR breast (n=3), cutaneous (n=2), esophageal (n=2), prostate (n=1), and colorectal (n=1).	Videos were the most common type of multimedia used among the studies. The use of video combined with written materials and narrative instruction occurred in seven studies. Some studies failed to describe the narrative component clearly. **Psychological well-being - anxiety:** Of the nine studies, four studies showed a significant reduction in anxiety with MPPE, but only two of these studies had a control group. While these results may suggest that the MPPE interventions were as effective as standard education in reducing anxiety, the lack of baseline measurements in two studies does not rule out another causative element leading to these findings, such as inherent differences between the control and intervention groups. **Patient knowledge - knowledge:** Knowledge improved in both intervention and control groups, with only one study showing a significant difference between intervention and control groups. MPPE was popular with the participants among all studies, but only one study showed a significant difference favouring the inclusion of multimedia. **Patient knowledge - compliance:** The reporting of patient compliance did not convey a beneficial effect from MPPE in one study

Abbreviations: CABSI, Catheter-Associated Bloodstream Infection; CI, Confidence interval; CINAHL, Cumulative Index of Nursing and Allied Health; HADS, Hospital Anxiety and Depression Score; MD, Mean difference; MPPE, Multimedia preoperative patient education; NR, Not repoNR/QE, Non-randomized/quasi-experimental; PIL, Patient information leaflet; QoL, Quality of life; RCTs, Randomized controlled trials; RR, Relative risk; SMD, Standardized mean difference

uptake was significantly increased with pamphlets; two showed a significant increase and three found a modest increase, while four studies reported no effect [19]. Most studies focused on colorectal cancer, whereas fewer prostate and lung cancer screening studies were found; thus, generalizability among the various cancers is limited. In their systematic review, Li et al [21] described a study where patients either received a genetic information brochure and an invitation to genetic counselling or a doctor-centred education intervention to improve the uptake of colorectal cancer genetic evaluation for at-risk individuals. They detected no significant difference between the groups; thus, receiving a brochure in lay language and an invitation to generic counseling could be an effective means to improving adherence to colorectal cancer genetic evaluations. In summary, there is evidence to suggest that written materials could encourage compliance/adherence in colorectal and cervical cancer screening [14,19] and genetic evaluation [21] and may be more effective when tailored and in lay-language (vs. non-tailored) and followed with a telephone call reminder.

Verbal discussion

Two systematic reviews (one with meta-analysis) suggest that verbal discussions can also enhance cancer knowledge [22,23]. The certainty of the evidence was moderate. In their meta-analysis, Kim et al [23] looked at preoperative education interventions on postoperative outcomes and found overall that preoperative education had a modest effect on postoperative outcomes such as patient knowledge. When looking specifically at education methods, it was found that using verbal education had a greater effect on patient knowledge than audiovisual and written education. Champarnaud et al [22] aimed to find evidence on the effectiveness of educational interventions for older patients (over 65 years of age). There was one study that did a modified cancer education program on nutrition geared toward the geriatric population and was led by a nurse educator versus a conventional cancer education program (control). There was a significant increase in cancer knowledge on the post-test in the intervention group. In summary, there is evidence to suggest that verbal discussions could help increase patients' knowledge.

Demonstrations (models) or role playing

The literature review found no studies meeting our inclusion criteria.

Simulations

The literature review found no studies meeting our inclusion criteria.

Audiovisual (e.g., videos, podcasts, recordings)

Four systematic reviews (one meta-analysis) reported on the use of audiovisual materials, specifically videos, although evidence on podcasts or other recording methods was not found [3,20,24,25]. The certainty of the evidence was moderate to high. Two systematic reviews [24,25] found that the use of audiovisual aids helped learners gain more knowledge on a particular topic, which in turn helped with the decision-making process [24], made patients more likely to communicate with healthcare providers [24], and increased satisfaction in preparation on decisions on testing and lower decisional conflict [21]. Similarly, when patients watched videos about communicating their pain to physicians, they had physicians more accurately report their pain three to four weeks post-interventions versus the control arm (no video) and physicians underestimating their pain [24]. These effects, however, did not last after six to seven weeks post-intervention. Another systematic review found that when audio-visual material was presented, it did not aid in controlling for infection rates associated with long-term central venous access devices in comparison to usual care/standard guidelines provided [20]. In terms of psychological well-being, one study found that patients undergoing

chemotherapy who watched a brief psychoeducational movie clip in a single session reported greater improvements in nonspecific distress and depression symptoms compared to the control group [3]. In another systematic review, there were mixed results where one intervention found an effect for quality of life, while another that found that the intervention could improve quality of life [24]. In summary, there is evidence to suggest audio-visual methods could help improve patients' knowledge on a particular topic and some evidence to suggest that it may be helpful in communicating their symptoms (short term,4-6 weeks) and quality of life but may be less effective for reporting their symptoms in the longer term (6-8 weeks) and controlling infection rates.

Traditional lectures/ webinars
The literature review found no studies meeting our inclusion criteria.

eLearning, interactive platforms, apps
Three systematic reviews (two with meta-analyses) assessed the effectiveness of eLearning, interactive platforms, or mobile apps [18,25,26] and the certainty of the evidence was moderate. In a systematic review evaluating the effect of Smartphone education on bowel preparation quality among individuals undergoing colonoscopy, the Li et al [25] meta-analysis found that adequate bowel preparation knowledge in the Smartphone group was significantly higher than the control group. Of note, there was significant heterogeneity found among the studies. Further, in another systematic review and meta-analysis comparing the efficacy of technological interventions, a moderate effect found that technology may improve patients' adherence rates to oral anticancer regimens, especially when accompanied by additional healthcare professional follow-up [26]. However, the authors note that the evidence is very low certainty. Ahuja et al described an RCT that compared identical educational messages in a standardized format, but the method of delivering these messages were either WhatsApp group or PowerPoint presentation [18]. There were higher oral cancer knowledge scores in the WhatsApp group. In summary, there is evidence to suggest that eLearning, interactive platforms, and mobile apps may be an effective way to help increase an individual knowledge on a particular topic, such as improving bowel preparation quality before a colonoscopy or adherence to oral anticancer regimens.

These methods of delivering patient education may also decrease the incidences of individuals physical symptoms. Li et al described that in the Smartphone education group the rates of nausea/vomiting and abdominal distension during bowl preparation were significantly less than the control group, but with no difference in abdominal pain [25]. Further, these methods increased individuals' satisfaction and experience. For example, patients in the Smartphone group were more willing to undergo repeat bowel preparation in comparison to the control group [25]. There are mixed results as to whether technological interventions may improve quality of life in comparison to usual care[26].

Electronic materials delivered by email, patient portal or on websites
Two systematic reviews examined the effectiveness of electronic materials delivered via email, patient portals, or websites [3,27] and the certainty of the evidence was moderate. In comparison to usual care, the evidence suggests that Internet-based interventions could be effective in improving individuals' psychological and physical well-being, such as depression, anxiety, and fatigue, but not for symptoms of distress [27]. There was mixed result on the effectiveness for quality of life; in the Wang et al meta-analysis there were no significant improvement between the intervention and control [27], whereas Bortolo et al found a significant increase in quality of life with interventions conducted by email and small effect with web-based interventions [3].

Multiple modalities

Three systematic reviews (one with meta-analysis) described multiple modalities used [3,28,29]. The evidence suggest that the combination of multiple modalities may be an effective option to facilitate compliance/adherence [28]. A significant increase in the receipt of mammography at follow-up was seen when more than one intervention strategy was included [28]. However, in one study, the use of multimedia preoperative patient education (MPPE), which mostly consisted of video combined with written materials and/or narrative instructions, found that patients were equally compliant with MPPE and traditional preoperative education [29]. There was some evidence found to support the use of multiple modalities on psychological well-being and patient knowledge. Steves et al found four studies that described a reduction in anxiety with the use of MPPE [29]; however, only two had a control group, which limited the ability to rule out another causation. MPPE was shown to be a popular choice among participants in all studies; however, there was only one study that showed a significant patient knowledge difference favouring the inclusion of MPPE. Bortolo et al found that additional videos and/or telephone to usual face-to-face-care did not affect distress levels of individuals post-surgery or but did improve quality of life over time [3].

DISCUSSION

Effective and intentional patient education is critical in cancer care, as it empowers patients and their care partners with the knowledge and skills needed to make informed decisions and manage the complexities of their care. Given that cancer care is an emotionally and psychologically challenging experience, learners are often not in the best state to learn. This makes the teaching and learning environment particularly difficult. Healthcare professionals must approach patient education with forethought, compassion, and patience, while selecting teaching strategies and methods that accommodate various literacy levels. The goal is not just to deliver information, but to ensure that it is understood and retained by the learner.

The evidence presented in this document is based on systematic reviews and meta-analyses that evaluated different teaching strategies and methods for cancer patient education. One-on-one teaching emerged as an effective strategy and according to the Working Group, should be combined with the teach-back method to confirm understanding. This approach can help to ensure that the learner's learning needs are addressed, and comprehension is achieved. Evidence supports its effectiveness in improving psychological well-being, reducing anxiety, and enhancing cancer-related knowledge. The Working Group emphasizes the importance of supporting verbal teaching with additional modalities to reinforce learning.

Group teaching is also recognized as effective, especially for its psychological benefits, such as reducing anxiety and depression. However, it may be less effective in addressing physical symptoms like fatigue. The Working Group advises caution when introducing sensitive topics in group settings, recommending alternative one-on-one options for those who need it. Although there is no specific evidence on self-directed learning in cancer education, the Working Group reached a consensus that it can be an effective teaching strategy. Self-directed learning is particularly suited for individuals who are self-motivated and prefer to engage with materials at their own pace, aligning with their learning styles.

The use of multiple teaching modalities is recommended to address the diverse learning needs of patients. Combining one-on-one and group teaching strategies, along with other methods, can enhance learning outcomes. Additionally, the timing and frequency of teaching opportunities should be carefully considered to maximize their effectiveness.

Tailored written materials, such as pamphlets or other printed resources, are effective in increasing patient engagement and knowledge. These materials should follow best practice

guidelines for plain language, clear design, and inclusive language. When provided directly by a healthcare professional, written materials have a greater impact and are more likely to be engaged with. Verbal discussions are another effective teaching strategy. However, these should be paired with other modalities (e.g., written materials, audio-visual tools) to reinforce the information shared. This combination of methods helps improve patient knowledge and engagement. Audio-visual materials, such as videos, are effective tools for conveying information and supporting decision-making processes. Evidence from four systematic reviews indicates that audio-visual tools help learners gain a better understanding of specific topics, improve communication with healthcare providers, and reduce decisional conflict [3,20,21,24].

eLearning platforms, mobile apps, and other technology-based tools can enhance learning when used alongside traditional teaching methods. These tools can improve patient knowledge, adherence to treatment regimens, and overall satisfaction with the learning experience. However, careful attention must be paid to the user experience and accessibility to ensure they are usable by all learners, regardless of digital literacy.

Providing education through multiple modalities allows learners to choose the method that best suits their needs, leading to greater engagement. However, the information provided across different modalities must be consistent and complementary to avoid confusion or cognitive overload.

Limitations of the current health literature

There are several limitations to the systematic reviews and meta-analyses used in this guideline. First, the tools used to measure outcomes varied among studies, and many of these tools were not always validated or clearly defined. This makes it challenging to compare outcomes across studies. Second, the studies included in the systematic reviews varied widely in terms of methodology and intervention details, and the teaching strategies evaluated were not always mutually exclusive. As a result, studies were categorized based on the strategy that was most applicable. Finally, the details of the interventions were often unclear, and including all the specific details in this document would not be practical. Despite these limitations, there is enough consistency in the findings to support generalizable recommendations for effective teaching strategies.

Limitation of this systematic review

A limitation of this systematic review is it did not include original studies, which may have restricted the depth of analysis. Additionally, the review was limited to publications in English, potentially excluding relevant studies published in other languages.

Conclusion

This guideline offers a comprehensive framework of teaching strategies and methods for cancer patient education, emphasizing the importance of multi-modal approaches to meet the diverse needs of patients and their care partners. Thoughtful, intentional education—delivered with compassion and patience—is essential to supporting patients through the challenges of cancer care. By using a variety of teaching strategies and methods, we can better empower patients to manage their health and make informed decisions.

Effective Teaching Strategies and Methods for Cancer Patient Education

Section 5: Internal and External Review

INTERNAL REVIEW

The guideline was evaluated by the GDG Expert Panel and the PEBC Report Approval Panel (RAP) ([Appendix 1](#)). Two patient/survivor/care partner representatives were Expert Panel members. They took part in the review and approval of the draft document produced by the Working Group. The results of these evaluations and the Working Group's responses are described below.

Expert Panel Review and Approval

Of the nine members of the GDG Expert Panel, seven members voted and two abstained, for a total of 75% response in February/March 2025. Of those who voted, seven approved the document (100%). The main comments from the Expert Panel and the Working Group's responses are summarized in Table 5-1.

Table 5-1. Summary of the Working Group's responses to comments from the Expert Panel.

Comments	Responses
1. Could there be more discussion on providing trauma-informed education?	Thank you for your suggestion, however, this was out of scope of the guideline objectives.
2. While the guideline outlines teaching strategies for all cancer patients and acknowledges different learning styles through multiple modalities, should there be more direction on which strategies are most effective in specific scenarios?	Thank you for your feedback. We have added information under Recommendation 2 qualifying statement.
3. Add some content about the shift in patient education from provider generated to a partnership model with patients, where both learn and benefit.	Thank you for your suggestion. We have looked through the guideline and have added some details to reinforce the partnership between learners and teachers.
4. What a thorough and helpful resource.	Thank you so much!

RAP Review and Approval

Three RAP members reviewed this document in February 2025. The RAP approved the document. The main comments from the RAP and the Working Group's responses are summarized in Table 5-2.

Table 5-2. Summary of the Working Group's responses to comments from RAP.

Comments	Responses
1. Very well done on a comprehensive document. Provides an excellent foundation or medical educators in creating new materials.	Thank you!
2. The document is generally very well written and easy to follow. Several minor corrections suggested.	Thank you, we have made those minor grammatical corrections.

3. Overall, this is a comprehensive, thoughtful, and well-presented guideline. Please add more detail on the method of translating evidence into recommendations.	Thank you. We have added more details in the methods section on how the evidence was translated into recommendations.

EXTERNAL REVIEW
External Review by Ontario Clinicians and Other Experts

Targeted Peer Review

Two targeted peer reviewers from Ontario who are considered to be clinical and/or methodological experts on the topic were identified by the Working Group. Both agreed to be the reviewers (Appendix 1) and both responses were received. Results of the feedback survey are summarized in Table 5-3. The main comments from targeted peer reviewers and the Working Group's responses are summarized in Table 5-4.

Table 5-3. Responses to nine items on the targeted peer reviewer questionnaire.

Question	Reviewer Ratings (N=2)				
	Lowest Quality (1)	(2)	(3)	(4)	Highest Quality (5)
1. Rate the guideline development methods.				1	1
2. Rate the guideline presentation.					2
3. Rate the guideline recommendations.					2
4. Rate the completeness of reporting.					2
5. Does this document provide sufficient information to inform your decisions? If not, what areas are missing?				1	1
6. Rate the overall quality of the guideline report.					2
	Strongly Disagree (1)	(2)	Neutral (3)	(4)	Strongly Agree (5)
7. I would make use of this guideline in my professional decisions.					2
8. I would recommend this guideline for use in practice.					2
9. What are the barriers or enablers to the implementation of this guideline report?	Enablers: Easy to navigate, very easy read and understandability Barriers: Training and education, this guideline could be a mandated tool to review yearly				

Table 5-4. Summary of the Working Group's responses to comments from targeted peer reviewers.

Comments	Responses
1. The guideline presentation is easy to navigate. Wondering if a simple summary table	Thank you for your comment. Upon completion of the document, Section 1 will be a summary version

with key points of the recommendations would also benefit the reader.	of the document displaying the Recommendations and Qualifying Statements.
2. There are benefits of virtual platforms as outlined in the guideline, but for some patients who are less health literate for example, telephone may not be the best platform to use. Any guidance or recommendations on who is appropriate for in person vs. virtual.	There is no specific guidance for which method is appropriate, as it should be tailored to individual learner preferences.
3. The guideline mentions the need for the right information at the right time. One struggle clinically is when is the right time and who should be providing the information- oncologists of course but within radiation oncology, there are nurses who deliver education and symptom management. There can sometimes be role confusion and concerns re: scope of practice.	Thank you, we have added the following sentences to the Preamble/best practice strategies: "In addition, careful consideration should be made among the interprofessional team to coordinate teaching and assign specific teaching goals. For example, decisions should be made between physicians and nurses on what parts of the teaching plan each profession will cover and in what depth. This can serve to ensure the full breadth of teaching materials is covered and aligned and help alleviate role confusion. Overlap of teaching topics is welcome to reinforce learning."
The recommendations are appropriate for the general population and inclusive i.e. IDEAA. Although it is generalized about teaching strategies and learning styles, it is important to consider those with disabilities (e.g. blindness, deaf, autism) that can have challenges.	Thank you, we have added more information for persons with disabilities under the preamble/best practice strategies.
Consider adding specific case examples, if possible, the bullet points on "building rapport and to recognizing the fluidity of learning styles".	Thank you, we have added the following to that section: For example, a learner may at first prefer one-on-one verbal teaching and over time, this need may change to include the addition of recommended websites for more detailed information.

Professional Consultation

Feedback was obtained through a brief online survey of healthcare professionals and other stakeholders who are the intended users of the guideline. Three hundred eighty-seven contacts from the PEBC database with an interest in primary care, supportive care, nursing and psychosocial, as well as Ontario cancer leads, and oncology nursing leads were contacted by email. Forty-nine (13%) responses were received and 12 stated that they did not have interest in this area or were unavailable to review this guideline at the time. The results of the feedback survey from 37 people are summarized in Table 5-5. The main comments from the consultation and the Working Group's responses are summarized in Table 5-6.

Table 5-5. Responses to four items on the professional consultation survey.

	N= 37 (13%)				
General Questions: Overall Guideline Assessment	Lowest Quality (1)	(2)	(3)	(4)	Highest Quality (5)
1. Rate the overall quality of the guideline report.			3	17	17
	Strongly Disagree (1)	(2)	(3)	(4)	Strongly Agree (5)

			1	4	12	19
2. I would make use of this guideline in my professional decisions.			1	4	12	19
3. I would recommend this guideline for use in practice.				5	11	21
4. What are the barriers or enablers to the implementation of this guideline report?		Enablers: Strategies outlined are already in use, create an easy-to-use cue card or summary version to promote use, evidence is very strong, adequate training, sufficient resources, very thorough guideline, appropriate use of technology (virtual meetings, shared online platforms) may prove beneficial, accessibility and clarity. Barriers: Lack of staffing, no centralized resource for creating patient education materials, time constraints, very detailed and complex document; lack of resources, lack of time, funding for anything to do with cancer patient education is lacking, lack of review and updating of written information available to provide cancer patients, many clinics have removed paper pamphlets since the pandemic, language barriers,				

Table 5-6. Summary of the Working Group's responses to comments from professional consultants.

Comments	Responses
1. This document makes no references to patient decision aids or decision coaching.	Thank you for your suggestion, however this was out of scope of the guideline objectives.
2. There was no reference to physical disabilities such as vision impairment or less obvious ones like autism or attention-deficit/hyperactivity disorder. Is it worth referencing Accessibility for Ontarians with Disabilities Act (AODA) standards for communications to shore up that content?	Thank you, we have added more information for persons with disabilities under the preamble/best practice strategies and information on AODA standards.
3. Under "Implementation considerations" on p. 9 of the guideline it is stated that "The clinic or hospital and healthcare team should have the necessary technology available (e.g. computer, tablet, DVD player) to support learners that do not have access to such technology at home." The reference to DVD player is somewhat outdated.	Thank you for your comment, we have removed DVD player from the example.
4. On page 2, under intended user, consider Nurse Practitioner in addition to Physician, as primary health provider, e.g., physician or nurse practitioner.	Thank you for your feedback, we have added nurse practitioner to the intended user.

5.	On page 2, Learner - why are decisions and behaviours missing from the list?	Thank you, we have modified to include this in the definition.
6.	On page 3, using Inclusive and Clear Educational Materials - please add PEMAT here too.	Thank you for your suggestion, we have added PEMAT to "Inclusive and Clear educational materials.
7.	Maybe also a definition of health literacy as it is mentioned in further research.	Thank you for your suggestion, we have added a definition.

CONCLUSION

The final guideline recommendations contained in Section 2 and summarized in Section 1 reflect the integration of feedback obtained through the external review processes with the document as drafted by the GDG Working Group and approved by the GDG Expert Panel and the PEBC RAP.

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Appendix 1: Affiliations and Conflict of Interest Declarations

GUIDELINE DEVELOPMENT GROUP		
WORKING GROUP		
Name	**Affiliation**	**Declarations of interest**
Debbie Devitt	Patient Experience Lead, Durham Regional Cancer Centre Patient Education Lead, Central East Regional Cancer Program	None declared
Lisa Durocher	Health Research Methodologist, Program in Evidence-based Care	None declared
Lester Krames	Patient and Family Advisor, Cancer Care Ontario Professor Emeritus	None declared
Karen Lawrie	Manager, Education Intervention Development, Cancer Education Program, Princess Margaret Cancer Centre	None declared
Janet Papadakos	Director, Cancer Education Research & Evaluation and the Cancer Health Literacy Research Centre, Princess Margaret Cancer Centre; Scientist, The Institute for Education Research, University Health; Assistant Professor, Institute for Health Policy, Management & Evaluation, University of Toronto Network	None declared
Naomi Pocrnic	Regional Patient Education Lead, London Health Science Centre	None declared
Aalima Premji	Patient Education Specialist, Odette Cancer Centre, Sunnybrook Health Sciences Centre	None declared
Adrienne Sultana	Patient and Family Advisory Council Member, Cancer Care Ontario	None declared
Susanna Wong	Quality Lead, Hudson Regional Cancer Program, Royal Victoria Regional Health Centre	None declared
EXPERT PANEL		
Name	**Affiliation**	**Declarations of interest**
Tamara Harth	Program Head of Patient and Family Education, Sunnybrook Health Sciences Centre	Has received financial or material support of $500 or more in a single year as a University of Toronto lecturer
Becky Holden	Patient Representative	None declared
Melody Keyvani	Patient Representative	None declared

	Public Health Nurse	
Kerri Loney	Clinical Manager, Shirley & Jim Fielding Northeast Cancer Centre of Health Sciences North	Employed by the Shirley & Jim Fielding Northeast Cancer Centre, which is funded by Ontario Health
Phyllis Mancini	Patient Education Specialist, Health Communications, University Health Network	None declared
Sarah Mushtaq	Director, Equity, Inclusion, Diversity, and Anti-Racism, Windsor Regional Hospital	Has received $500 or more in a single year in a consulting capacity for Municipalities
Tina Papadakos	Director, Knowledge Translation, Cancer Education and Co-Director, Cancer Self-Management Research Centre, Princess Margaret Cancer Centre	None declared
Christine Peters	Interim Manager, Grand River Hospital	Employed previously as a regional oncology lead, and currently an interim manager Had managerial responsibility in cancer program that has received $5,000 or more in a single year from Apo-Biologix
Sarah Vanderhelm	Patient and Family Educator, Kingston Health Sciences Centre	None declared
Shannon White	Coordinator, Indigenous Projects & Patient Education, Windsor Regional Hospital	None declared

REPORT APPROVAL PANEL		
Name	**Affiliation**	**Declarations of interest**
Bill Evans	Oncosynthesis Consulting Inc.	Has a relevant business entity within the last five years as OH(CCO) Clinical Lead Smoking Cessation.
Michelle Ghert	Juravinski Cancer Centre	None declared
Jonathan Sussman	Juravinski Cancer Centre	None declared

TARGETED PEER REVIEW		
Name	**Affiliation**	**Declarations of interest**
Jennifer Croke	Radiation Oncologist, Department of Radiation Oncology, Princess Margaret Cancer Centre	Received $500 or more in a single year to act in a consulting capacity as a speaker for Merck Canada.
Nazlin Jivraj	Clinical Nurse Specialist, Princess Margaret Cancer Cancer Centre	None declared.

Appendix 2: Guideline Document History

GUIDELINE VERSION	SYSTEMATIC REVIEW		PUBLICATIONS	NOTES and KEY CHANGES
	Search Dates	Data		
Original December 10th, 2009	1995 to May 2009	Full Report	Web publication	N.A.
Original Reviewed August 21st, 2020	2009 to May 2019	Document Assessment and Review	Updated web publication.	2009 recommendations REQUIRE UPDATING
Version 2	2018 to June 2024	Full Report	Web publication	

Appendix 3: Literature Search Strategy

Medline, embase, healthstar, psyc info

1. (meta-analy: or metaanaly: or meta analy: or systematic review: or systematic overview:).mp. or ((exp "review"/ or exp "review literature as topic"/ or review.pt. or (review: or overview:).tw.) and (systematic: or selection criteria or data extraction or quality assessment or methodologic: quality or (study adj selection) or Cochrane or Medline or Embase or PubMed or Med-line or Pub-med or psychlit or psychinfo or psycinfo or cinhal or cinahl or science citation index or scisearch or cancerlit or hand search: or hand-search: or manual search: or reference list: or bibliograph: or pooled analys: or statistical pooling or mathematical pooling or statistical summar: or mathematical summar: or quantitative synthes?s).tw.)
2. exp practice guideline/ or exp guideline/ or guideline.pt or consensus development conference/ or practice guideline$.tw. or (guideline: or recommend: or consensus or standards).ti,kw.
3. 1 or 2
4. (comment or news or newspaper article or historical article or editorial or note or letter or short survey).pt.
5. (exp animals/ or exp animal experiment/) not (humans/ or exp human/)
6. 4 or 5
7. 3 not 6
8. Patient Education.mp. or exp Patient Education as Topic/ or exp Client Education/ or patient education/ or written materials.mp. or education/ or verbal discussion.mp or role playing/ or role playing.mp or patient simulation/ or interactive learning.mp or audiovisual.mp or e-learning/ or elearning.mp. or traditional lecture.mp. or patient teaching.mp.
9. Teaching/ or Teaching Materials/ or exp Team Teaching Method/ or exp Teaching Methods/ or Teaching.mp. or exp Teaching Strategies/ or teaching.tw or teaching material$.tw or team teaching method.tw or teaching method$.tw
10. Cancer patient/ or cancer patient.mp. or cancer:.mp. or neoplasm/ or malignant neoplasm/
11. 8 or 9
12. 11 and 10
13. 7 and 12
14. (2018: or 2019: or 2020: or 2021: or 2022: or 2023: or 2024:).ed.
15. (2018: or 2019: or 2020: or 2021: or 2022: or 2023: or 2024:).dd.
16. 14 or 15
17. 13 and 16
18. Remove duplicates from 17
19. Limit 18 to English language
20. Limit 19 to humans

Cinahl search
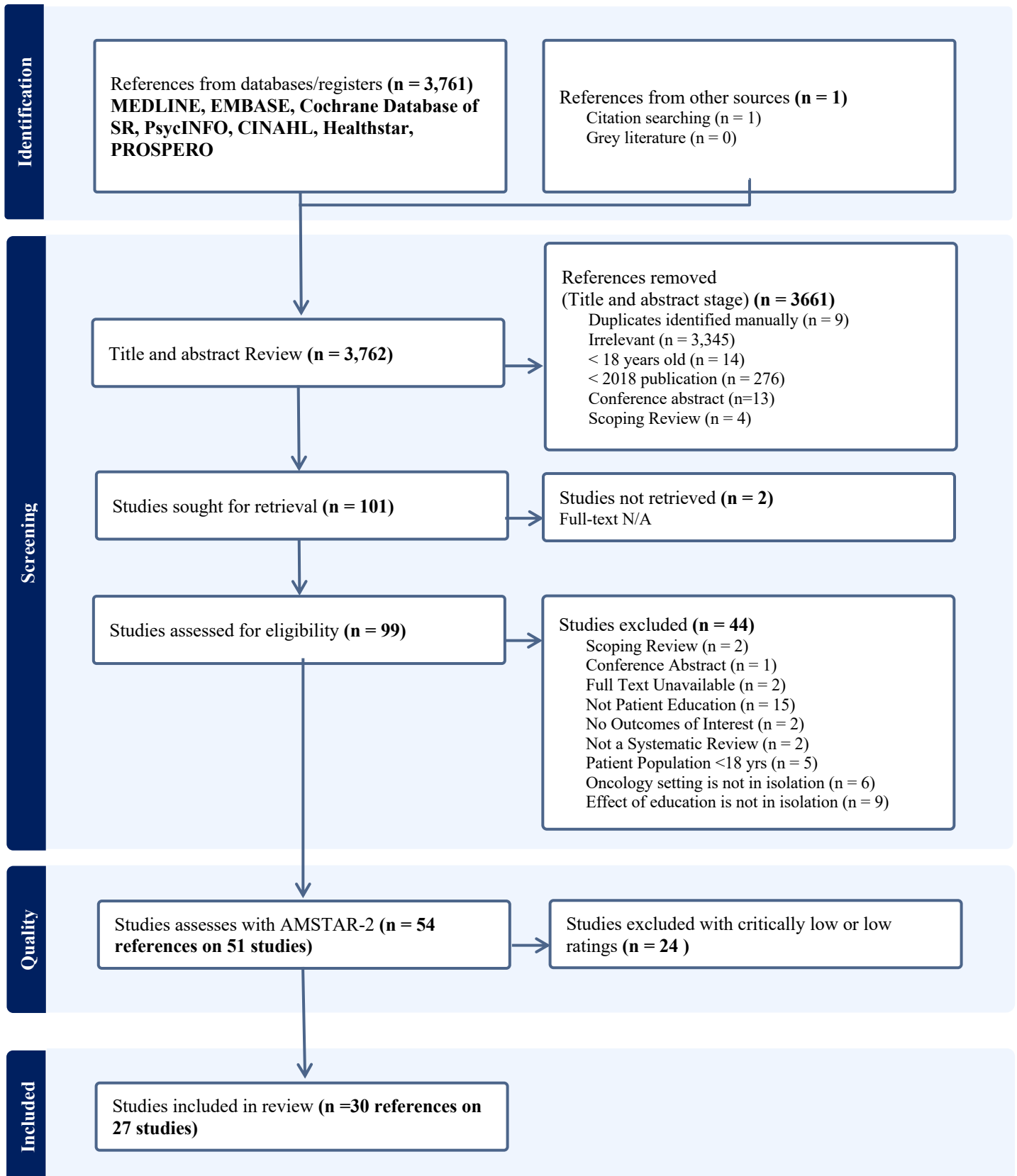(patient education or patient teaching)
AND
(meta-analysis or systematic review or literature review or guidelines or practice guideline or clinical practice guideline)
AND
January 2018 to May 2024, English only

Appendix 4: PRISMA diagram

Appendix 5: Amstar Ratings

Study ID	1. Did the research questions and inclusion criteria for the review include the components of PICO?	2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?	3. Did the review authors explain their selection of the study designs for inclusion in the review?	4. Did the review authors use a comprehensive literature search strategy?	5. Did the review authors perform study selection in duplicate?	6. Did the review authors perform data extraction in duplicate?	7. Did the review authors provide a list of excluded studies and justify the exclusions?	8. Did the review authors describe the included studies in adequate detail?	9a. (RCTs) Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	9b. (NRSI) Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	10. Did the review authors report on the sources of funding for the studies included in the review?	11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?	12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	13. Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?	14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	Overall Certainty in the Evidence
Agide 2018 [67]	no	yes	yes	yes	yes	no	no	partial yes	partial yes	partial yes	no	N/A	N/A	no	no	N/A	yes	Low
Ahuja 2022[18]	yes	partial yes	yes	yes	yes	no		yes	yes	yes	no	N/A	N/A	yes	yes	N/A	yes	Moderate
AlDaken 2018[41]	no	partial yes	yes	partial yes	yes	yes	no	yes	no	no	no	N/A	N/A	no	no	N/A	yes	Low
Bartolo 2019[3]	yes	yes	no	yes	yes	yes	no	yes	yes	only RCTs	no	N/A	N/A	yes	yes	N/A	yes	Moderate
Bashirian 2020 [42]	yes	partial yes	yes	partial yes	yes	yes	no	yes	yes	only RCTs	no	yes	yes	yes	yes	yes	yes	Moderate
Champarnaud 2020[22]	yes	no	yes	partial yes	yes	yes	no	yes	partial yes	partial yes	no	N/A	N/A	yes	yes	N/A	yes	Moderate
Choi 2021[4]	yes	partial yes	no	partial yes	yes	yes	no	partial yes	partial yes	partial yes	no	N/A	N/A	yes	yes	N/A	yes	Moderate
Christiansen 2023 [43]	yes	yes	no	partial yes	yes	yes	yes	yes	no	no	no	N/A	N/A	no	yes	N/A	yes	Low
Dougherty 2018[5]	yes	partial yes	yes	yes	yes	yes	no	partial yes	yes	only RCTs	no	yes	yes	yes	yes	yes	yes	Moderate
Edwards 2019[6]	yes	no	no	partial yes	yes	yes	no	yes	yes	only RCTs	no	yes	yes	yes	yes	no	yes	Moderate
ElstonLafata 2023[7]	yes	yes	no	partial yes	yes	yes	partial yes	partial yes	yes	yes	no	N/A	N/A	yes	no	N/A	yes	Moderate
Gliwska 2024 [44]	no	no	no	partial yes	no	no	no	partial yes	no	no	no	N/A	N/A	no	no	no	yes	Low
Gonzalez-Martin 2023[45]	yes	yes	no	partial yes	yes	no	partial yes	yes	partial yes	partial yes	no	yes	yes	no	yes	yes	yes	Low
Grilo 2023[46]	yes	yes	no	partial yes	yes	yes	no	yes	no	no	no	N/A	N/A	no	yes	N/A	yes	Low
Gu 2024[47]	yes	yes	no	partial yes	yes	yes	no	no	no	no	no	yes	no	no	no	no	yes	Low
Guo 2020[48]	no	no	no	yes	yes	yes	no	partial yes	partial yes	only RCTs	no	yes	no	no	yes	yes	yes	Low
Hirschey 2020 [24]	yes	partial yes	yes	partial yes	yes	yes	no	partial yes	partial yes	partial yes	no	N/A	N/A	yes	no	N/A	yes	Moderate
Hou 2018[49]	yes	no	no	partial yes	yes	no	no	yes	no	no	no	N/A	N/A	no	no	N/A	yes	Low
HuangLongcoy 2023[28]	yes	partial yes	no	partial yes	yes	yes	no	yes	partial yes	only RCTs	no	yes	yes	yes	yes	yes	yes	Moderate
Huynh 2022[8]	yes	no	yes	partial yes	yes	yes	no	yes	yes	only RCTs	no	yes	yes	no	yes	yes	yes	Moderate
Indah 2024[50]	no	no	yes	partial yes	yes	yes	no	partial yes	only NRSI	no	no	N/A	N/A	no	no	N/A	yes	Low
Kang 2024[51]	yes	yes	no	partial yes	yes	yes	no	yes	yes	only RCTs	no	yes	no	yes	yes	no	yes	Low
Karakus 2024 [9]	yes	yes	no	partial yes	yes	yes	no	yes	yes	only RCTs	no	yes	yes	yes	yes	yes	yes	Moderate
Kim 2021 [23]	yes	partial yes	no	partial yes	yes	yes	no	yes	yes	yes	no	yes	yes	no	yes	yes	yes	Moderate
Li 2021 [21]	yes	partial yes	no	partial yes	yes	yes	no	yes	yes	yes	no	N/A	N/A	yes	yes	N/A	yes	Moderate

Study ID	1. Did the research questions and inclusion criteria for the review include the components of PICO?	2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?	3. Did the review authors explain their selection of the study designs for inclusion in the review?	4. Did the review authors use a comprehensive literature search strategy?	5. Did the review authors perform study selection in duplicate?	6. Did the review authors perform data extraction in duplicate?	7. Did the review authors provide a list of excluded studies and justify the exclusions?	8. Did the review authors describe the included studies in adequate detail?	9a. (RCTs) Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	9b. (NRSI) Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	10. Did the review authors report on the sources of funding for the studies included in the review?	11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?	12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	13. Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?	14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	16. Did the review authors report any potential sources of conflict of interest, including any funding they received for the review?	Overall Certainty in the Evidence
Li 2022 [25]	yes	partial yes	no	partial yes	yes	yes	no	yes	yes	only RCTs	no	yes	yes	yes	yes	yes	yes	Moderate
Low 2024 [52]	yes	yes	yes	partial yes	yes	no	no	yes	yes	only RCTs	no	yes	yes	yes	yes	yes	yes	Low
Luque 2019 [53]	yes	no	no	partial yes	yes	yes	no	yes	no	no	no	no	no	no	yes	yes	no	Low
Makadzange 2022 [54]	yes	no	no	partial yes	yes	yes	partial yes	partial yes	partial yes		no	N/A	N/A	no	no	N/A	yes	Low
Malale 2020 [55]	yes	partial yes	no	yes	yes	yes	yes	yes	yes	yes	no	N/A	N/A	no	yes	no	N/A	Low
Martinez-Miranda 2023 [10]	yes	yes	yes	yes	yes	yes	yes	yes	yes	only RCTs	no	yes	yes	yes	yes	yes	yes	High
Mojica 2018 [56]	no	partial yes	no	partial yes	yes	no	no	partial yes	partial yes	partial yes	no	N/A	N/A	no	no	N/A	yes	Low
NaseriBooriAbadi 2018 [57]	no	no	no	partial yes	yes	no	no	partial yes	no	no	no	N/A	N/A	no	no	N/A	yes	Low
Noman 2020 [58]	yes	yes	no	partial yes	no	yes	no	yes	partial yes	partial yes	no	N/A	N/A	no	yes	N/A	yes	Low
Oldenmenger 2018 [11]	yes	no	yes	partial yes	yes	yes	no	yes	partial yes	only RCTs	no	N/A	N/A	yes	yes	N/A	yes	Moderate
Perdomo 2023 [59]	yes	yes	no	partial yes	yes	yes	no	yes	partial yes	partial yes	no	N/A	N/A	no	no	N/A	yes	Low
Ream 2020 [12]	yes	yes	no	yes	yes	yes	yes	yes	yes	only RCTs	no	N/A	N/A	yes	yes	N/A	yes	High
Rieger 2018 [60]	no	no	no	partial yes	yes	yes	no	partial yes	partial yes	partial yes	no	N/A	N/A	no	no	N/A	yes	Low
Rogers 2020 [61]	no	yes	no	partial yes	yes	yes	no	yes	yes	yes	no	yes	no	yes	yes	yes	yes	Low
Romli 2022 [62]	yes	yes	no	partial yes	yes	yes	no	partial yes	partial yes	partial yes	no	yes	no	no	yes	yes	yes	Low
Saei Ghare Naz 2018 [63]	yes	no	no	partial yes	yes	yes	no	partial yes	partial yes	partial yes	no	N/A	N/A	no	no	N/A	yes	Low
Sak-Dankosky 2022 [64]	yes	partial yes	yes	partial yes	no	no	no	partial yes	partial yes	partial yes	no	N/A	N/A	no	yes	N/A	yes	Low
Sara 2024 [13]	yes	yes	no	partial yes	yes	yes	no	yes	yes	only RCTs	no	N/A	N/A	no	yes	N/A	yes	Moderate
Schliemann 2019 [14]	yes	yes	yes	yes	yes	yes	no	yes	partial yes	partial yes	no	N/A	N/A	yes	yes	N/A	yes	Moderate
Sihvola 2023 [17]	yes	partial yes	no	yes	yes	yes	no	partial yes	partial yes	partial yes	no	N/A	N/A	no	yes	N/A	yes	Moderate
Steves 2021 [29]	yes	partial yes	yes	partial yes	no	yes	no	partial yes	partial yes	partial yes	no	N/A	N/A	no	yes	N/A	yes	Moderate
Teo 2019 [19]	yes	no	yes	yes	yes	yes	no	yes	partial yes	only RCTs	no	N/A	N/A	yes	no	N/A	yes	Moderate
Vieira 2024 [20]	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	N/A	N/A	yes	yes	N/A	yes	High
VanDijck 2016 [65]	yes	partial yes	no	partial yes	yes	yes	no	partial yes	partial yes	only RCTs	no	N/A	N/A	no	no	N/A	yes	Low
Wang 2020 [27]	yes	yes	no	partial yes	yes	yes	no	yes	yes	only RCTs	no	yes	no	yes	yes	no	yes	Low

Study ID	1. Did the research questions and inclusion criteria for the review include the components of PICO?	2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?	3. Did the review authors explain their selection of the study designs for inclusion in the review?	4. Did the review authors use a comprehensive literature search strategy?	5. Did the review authors perform study selection in duplicate?	6. Did the review authors perform data extraction in duplicate?	7. Did the review authors provide a list of excluded studies and justify the exclusions?	8. Did the review authors describe the included studies in adequate detail?	9a. (RCTs) Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	9b. (NRSI) Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?	10. Did the review authors report on the sources of funding for the studies included in the review?	11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?	12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	13. Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?	14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	16. Did the review authors report any potential sources of conflict of interest, including any funding they received for	Overall Certainty in the Evidence
Waseem 2022[26]	yes	partial yes	no	partial yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	Moderate
Washington 2024[15]	yes	partial yes	no	partial yes	yes	yes	no	yes	yes	partial yes	no	yes	yes	yes	no	no	yes	Moderate
Zhang 2024[16]	yes	yes	no	partial yes	yes	yes	no	partial yes	partial yes	only RCTs		yes	yes	no	yes	no	yes	Moderate
Zhao 2021[66]	no	partial yes	no	partial yes	no	yes	no	no	partial yes	only RCTs	no	yes	no	no	yes	yes	yes	Low

Abbreviations: N/A, Not available; NRSI, Non-randomized study intervention; PICO, Population, Intervention, Comparison, and Outcomes; RCT, Randomized controlled trial