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# Effective Teaching Strategies and Methods of Delivery for Patient Education: A Systematic Review and Practice Guideline Recommendations

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**Abstract** The objective of this study was to determine effective teaching strategies and methods of delivery for patient education (PE). A systematic review was conducted and reviews with or without meta-analyses, which examined teaching strategies and methods of delivery for PE, were included. Teaching strategies identified are traditional lectures, discussions, simulated games, computer technology, written material, audiovisual sources, verbal recall, demonstration, and role playing. Methods of delivery focused on how to deliver the teaching strategies. Teaching strategies that increased knowledge, decreased anxiety, and increased satisfaction included computer technology, audio and videotapes, written materials, and demonstrations. Various teaching strategies used in combination were similarly successful. Moreover, structured-, culturally appropriate- and patient-specific teachings were found to be better than ad hoc teaching or generalized teaching. Findings provide guidance for establishing provincial standards for the delivery of PE. Recommendations concerning the efficacy of the teaching strategies and delivery methods are provided.

**Keywords** Patient education · Teaching strategies · Systematic reviews · Meta-analyses · Patient-specific teaching

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## Introduction

Patient education (PE) is any set of planned educational activities, using a combination of methods (teaching, counseling, and behavior modification), that is designed to improve patients' knowledge and health behaviors [1]. Studies have established the informational needs of cancer patients [2–4]. Psycho-educational interventions, such as education, exercise, and psychosocial support, have been demonstrated to improve clinical outcomes in adult patients with a variety of diseases [5, 6]. This guidance document evaluates the effect of various teaching strategies and methods of delivery for PE on patient outcomes. The PE teaching strategies that were targeted were taken from the University Health Network (UHN) Patient Education Task Forum framework [7]. By using this guidance document, healthcare professionals involved in PE including PE specialists, healthcare admin-

istrators, managers, physicians, nurses, and allied healthcare professionals will be better able to use limited resources when designing and delivering PE programs.

## Methods

The guidelines developed by Cancer Care Ontario's Program in Evidence-Based Care (PEBC) use the methods of the Practice Guidelines Development Cycle [8]. The core methodology used to develop the evidentiary base for this guideline was the systematic review. The body of evidence in this review is primarily comprised of systematic review data with and without meta-analyses. That evidence forms the basis of the recommendations developed by the Patient Education Working Group.

### Literature Search Strategy

MEDLINE (1995–May 2009), EMBASE (1995–May 2009), CINAHL (1995–April 2009), and HealthSTAR (1995–May 2009) databases were searched for relevant publications using search terms pertaining to PE, teaching strategies, and methods of delivery. The full search strategy can be found in Appendix 1. Originally, several publication types were targeted; however, when the search was completed, it was apparent that there were enough of the highest levels of evidence (i.e., systematic reviews and meta-analyses) that it was unnecessary to include the individual trials.

### Study Selection Criteria

Articles were included if they were published English-language reports of systematic reviews or meta-analyses that examined teaching strategies and methods of delivery for PE. The search was not limited to PE in oncology. Specific reported outcome measures were not used as part of the selection criteria. It was not expected, a priori, that any cancer clinical outcome data would be located. The comparisons considered were teaching intervention versus standard care (control) and teaching intervention versus another teaching intervention.

### Effect Sizes in Meta-Analysis

In meta-analysis, standard effect size (ES) scores may be calculated for each study. This allows comparison of the results of several studies on a common scale. ESs are interpreted as small (ES=0.20), moderate (ES=0.50), or large (ES=0.80) [9]. It is important to remember, however, that these descriptors are arbitrary conventions and should be considered as such. At the same time, these conventions are considered reasonable [9].

### Internal and External Reviews

This document underwent rigorous internal review including a full data audit and copyediting by staff uninvolved in the development of the document. The report was reviewed and approved by the PEBC Report Approval Panel (RAP) consisting of two members; an expert methodologist and an oncologist with expertise in clinical and methodology issues.

Following RAP approval, this document underwent external review and was sent to several targeted peer reviewers considered to be clinical and/or methodological experts on the topic. Feedback was also obtained through a brief online survey of healthcare professionals who are the intended users of the guideline.

## Results

### Literature Search Results

The database searches yielded 23 systematic reviews and meta-analyses [10–32] that met the selection criteria. Because the identified literature was poor with respect to outcomes other than patient knowledge, anxiety, and satisfaction, data for these three outcomes were targeted. Table 1 shows the topic areas covered by each of the included papers. The teaching strategies evaluated are not necessarily mutually exclusive. Therefore, studies were categorized into the teaching strategy that was most applicable.

### Study Design and Quality

The quality of each systematic review was assessed using the AMSTAR tool [33] (see Appendix 2). The systematic reviews and meta-analyses retrieved for this document included studies that reported on a wide array of measures of patient outcomes. Examples include the Spielberger State–Trait Anxiety Inventory, the Patient Satisfaction with Consultation Scale, and investigator-designed knowledge questionnaires. However, the systematic reviews and meta-analyses did not provide details on the actual measures of patient outcomes used in each study and generally only provided information on the standardized ES.

### Outcomes

The PE teaching strategies targeted came from the framework developed by the Patient Education Task Force of the UHN [7] and included traditional lectures, discussions, simulated games, computer technology, written material, audiovisual sources, verbal recall, demonstration,

**Table 1** Evidence included in this report by topic area covered

| | | TEACHING STRATEGIES | | | | | | | | | | | METHODS OF DELIVERY | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GROUPING** | **STUDY, Year [Ref]** | **Traditional Lectures** | **Discussions** | **Simulated Games** | **Computer Technology** | **Written Materials** | **Audiotapes** | **Videotapes** | **Verbal** | **Demonstration** | **Role Playing** | **Other** | **Patient-specific vs. General Information** | **Structured vs. Unstructured Teaching** | **Group vs. Individual Teaching** | **Culturally Specific vs. Not Culturally Specific Information** |
| PATIENT EDUCATION IN ONCOLOGY | Ranmal et al., 2008 [10] | | | | ● | | | | | | | | | | | |
| | van der Meulen et al., 2008 [11] | | | | | ● | ● | | | | | | | | | |
| | Gysels & Higginson, 2007 [12] | | | | ● | | | ● | | | | | | | | |
| | Gaston & Mitchell, 2005 [13] | | | | | ● | ● | | | | | | | | | |
| | McPherson et al. 2001 [14] | | | | ● | ● | ● | | | | | | ● | | | |
| PATIENT EDUCATION IN VARIOUS HEALTH SETTINGS | Bailey et al., 2009 [15] | | | | | | | | | | | | | | | ● |
| | Duke et al., 2009 [16] | | | | | | | | | | | | | | ● | |
| | Meilleur & Littleton-Kearney, 2009 [17] | | | | ● | | | ● | | | | | | | | |
| | Hawthorne et al., 2008 [18] | | | | | | | | | | | | | | | ● |
| | Jeste et al., 2008 [19] | | | | ● | | | ● | | | | | | | | |
| | Khunti et al., 2008 [20] | | | | | | | | | | | | | | | ● |
| | Ryan et al., 2008 [21] | | | | | | | ● | | | | | | | | |
| | Yankova, 2008 [22] | | | | | | | | | | | | | ● | | |
| | Beranova & Sykes, 2007 [23] | | | | ● | | | | | | | | | | | |
| | Bussey-Smith & Rossen, 2007 [24] | | | | ● | | | | | | | | | | | |
| | Whittemore, 2007 [25] | | | | | | | | | | | | | | | ● |
| | Houts et al. 2006 [26] | | | | | | | | | | | ● | | | | |
| | Trevena et al. 2006 [27] | | | | ● | ● | ● | ● | ● | | | ● | | | | |
| | Johnson & Sandford, 2005 [28] | | | | | ● | | | ● | | | | | | | |
| | Santo et al. 2005 [29] | | | | | | ● | | | | | | | | | |
| | Wofford et al. 2004 [30] | | | | ● | | | | | | | | | | | |
| | Chelf et al. 2001 [31] | | | | ● | | ● | ● | | | | | ● | | | |
| | Theis & Johnson, 1995 [32] | ● | ● | | ● | ● | ● | ● | ● | ● | | | | ● | ● | |

vs.= versus.

and role playing. For this review, audiovisual sources were split into audiotapes and videotapes, as each of these two types of strategies has its own body of evidence. The methods of delivery considered were centered on how to deliver the teaching strategies including, but not necessarily limited to, instructor-centered, interactive, individualized learning, and experiential learning. They were also taken from the UHN framework [7]. However, these will be discussed collectively as there was limited evidence found regarding the various methods of delivering PE.

All systematic reviews were checked for overlap with respect to the individual studies used. Any individual study

that appeared in more than one systematic review was discussed only in the context of the most recent article.

Teaching Strategies

*Traditional Lectures* One meta-analysis [32] evaluated the effect of traditional lectures compared to routine care on outcomes related to PE. In this meta-analysis, effect sizes and 95% confidence intervals were calculated for "patient outcomes" in general (i.e., not specifically defined). Based on the pooling of 12 individual studies, the effect size for traditional lectures was 0.48 (95% confidence interval [CI], 0.29–0.67), which is considered to be a moderate effect size as defined by Cohen [9].

*Discussions* One meta-analysis [32] evaluated the effect of discussions compared to routine care on outcomes related to PE. Based on the pooling of 39 individual studies, discussions had a small to moderate effect size of 0.34 (95% CI, 0.25–0.43) for "patient outcomes" in general (i.e., not specifically defined).

*Simulated Games* No data were found for simulated games.

*Computer Technology* Eleven systematic reviews or meta-analyses [10, 12, 14, 17, 19, 23, 24, 27, 30–32] evaluated the effect of computer technology on outcomes related to PE. Bussey-Smith and Rosen [24] evaluated the effectiveness of interactive, computerized asthma PE programs and found that asthma knowledge increased in older children in four of the nine individual studies examined. Beranova and Sykes [23] evaluated computer-based software programs for educating patients with coronary heart disease and found significant improvement in knowledge in those receiving computer-based education even 6 months after the intervention. In addition, patients were more satisfied with computer-based learning than with standard educational methods in three of five individual studies.

Ranmal et al. [10] demonstrated that knowledge level increased immediately after computer-assisted learning in children and adolescents but retention over time was not evaluated. Meiller and Littleton-Kearney [17] evaluated PE in genetic conditions and found that computer interventions resulted in increased knowledge ($p$ values, <0.0001–0.03) and decreased anxiety ($p$ values, <0.005–0.06). The four individual studies that were unique to Jeste et al. [19] were positive with respect to knowledge, but the results on satisfaction were split.

Gysels and Higginson [12] did a meta-analysis of six computer and three videotape studies. Overall, they found that patients receiving personalized information (i.e., based on their own situation) by computer were more satisfied than those receiving general information. Moreover, anxiety was not increased by computer interventions and that it actually decreased in some studies. Theis and Johnson [32] calculated ES for computer interventions compared to routine care for "patient outcomes" in general to be 0.55 (95% CI, 0.22–0.88) based on three studies.

One evaluation of computer interventions concluded that knowledge increased in comparison with audio booklet or written material alone [27]. Of the 21 individual studies that were unique to Wofford et al. [30], nine assessed knowledge; seven of these resulted in increased knowledge. In the one study evaluating anxiety, anxiety was increased in the group receiving general information by computer but not in the group receiving personalized information by computer. An evaluation of computer-assisted learning (CAL) with respect to decision-making programs found that knowledge increased even in pediatric populations. They also found some evidence that CAL resulted in higher patient satisfaction [31].

*Written Material* Six systematic reviews or meta-analyses [11, 13, 14, 27, 28, 32] evaluated the effect of written material on outcomes related to PE. Gaston and Mitchell [13] reported that written material in the form of summary letters written to the patient by the physician or information booklets were effective PE strategies with respect to satisfaction and information recall. However, they noted that writing individual letters to patients increases the workload of busy clinicians. Moreover, written material must be prepared at a reading level suitable for the general population.

Written information in the form of new patient information packages or booklets improved patient knowledge and reduced confusion especially if it was provided to the patient prior to the first clinic appointment rather than at the first appointment [14]. The use of tailored print material resulted in better information recall than did general print materials, and evidence-based leaflets increased knowledge compared to no leaflet [27]. Johnson and Sandford [28], in their systematic review of two trials, found that knowledge significantly improved when written materials were combined with verbal health information in comparison to verbal information only. Satisfaction was high overall but not statistically different between intervention and controls in one trial and higher in the intervention group compared to controls in the other trial ($p<0.0001$).

Theis and Johnson [32] determined that the ES for written material compared to routine care for "patient outcomes" in general, based on 22 studies, was 0.43 (95% CI, 0.33–0.53), which is a small to moderate ES.

*Audiotapes* Seven systematic reviews or meta-analyses [11, 13, 14, 27, 29, 31, 32] evaluated the effect of audiotapes on outcomes related to PE. Santo et al. [29] exclusively evaluated the use of audiotapes in PE. They found that most studies of audiotapes of patient consultations resulted in increased patient knowledge, at least within the short term. The addition of an audiotape recording of a patient consultation to written recommendations also increased patient knowledge. Moreover, audiotapes of general information might result in decreased recall, possibly because these tapes overwhelmed patients with too much information. These authors also report that audiotapes decreased anxiety in three studies, made no difference in three studies, and increased anxiety in one study. With respect to satisfaction, patients reported appreciation of the audiotapes, especially when the information was tailored to their specific situation [29].

Theis and Johnson [32] determined that the effect size for audiotapes, compared to routine care, was 0.58 (95% CI, 0.31–0.85) for "patient outcomes" in general, based on the pooling of five studies; a moderate ES.

*Videotapes* Seven systematic reviews or meta-analyses [12, 17, 19, 21, 27, 31, 32] evaluated the effect of videotapes on outcomes related to PE. Meilleur and Littleton-Kearnery [17] evaluated two studies of video interventions. In the one study that evaluated knowledge, knowledge was increased in the intervention group ($p$=0.000) compared to controls. Anxiety was not significantly different between the groups in both of the studies whereas satisfaction was significantly higher in the video intervention group in both studies ($p<$ 0.05 and $p$=0.000).

Jeste et al. [19] included 22 studies of video PE interventions. Of these, 13 reported increased knowledge for the intervention group and nine reported negative results. Video interventions were also associated with greater satisfaction in general.

Ryan et al. [21] found that audiovisual interventions did not significantly increase knowledge consistently. Of the four studies evaluated, two found no significant differences in knowledge, one reported increased knowledge but did not test it statistically, and one reported no significant differences between groups in knowledge immediately after the intervention but did report significantly better knowledge retention in the intervention group 2 to 4 weeks following the intervention.

Gysels and Higginson [12] performed a meta-analysis that included six computer and three videotape studies. Overall, they found that, with respect to knowledge, videotape was better than the same information given verbally, but the combination of videotape and verbal discussion was no better than videotape alone. Other systematic reviews also reported that videotapes increased patient knowledge [27, 31].

Videotape interventions had no effect on anxiety [12, 27]. Theis and Johnson [32] calculated ES for videotape interventions compared to routine care for "patient outcomes" in general (i.e., not specifically defined) to be 0.41 (95% CI, 0.29–0.53) based on 23 studies, which is a small to moderate ES.

*Verbal* Three systematic reviews or meta-analyses [27, 28, 32] evaluated the effect of verbal information on outcomes related to PE. Johnson and Sandford [28] found that the combination of written and verbal information was significantly better than verbal information alone with respect to knowledge. However, this was based on two studies only. Theis and Johnson [32] found verbal teaching to be the least effective strategy among all the strategies they looked at and recommended that it should not be used alone. Based on 30 studies, they report a small effect size for "patient outcomes" in general (i.e., not specifically defined) of 0.28 (95%CI, 0.19–0.37) for verbal teaching compared to routine care.

*Demonstration* One meta-analysis [32] evaluated the effect of demonstrations on outcomes related to PE. Based on the pooling of nine individual studies, demonstrations had a large ES of 0.79 (95% CI, 0.55–1.03) for "patient outcomes" in general (i.e., not specifically defined) compared to routine care.

*Role Playing* No data were found for role playing.

*Other Types of Teaching Strategies* Information was found about types of teaching strategies other than those included in the UHN framework. Houts et al. [26] reviewed the role of pictures in improving health communication. They reported that five of six studies found that illustrated materials resulted in greater patient comprehension than did non-illustrated material. This was especially true for those with low literacy skills. The sixth study found no difference between illustrated and non-illustrated materials with respect to comprehension (94% versus 97% accuracy). Because accuracy was so high in both groups in this particular study, the authors felt that there was a ceiling effect at play in this situation. With respect to recall, three of five studies found higher recall with illustrated text compared to text alone in both young and older participants. One study found no effect on recall, and one study reported that younger participants benefitted from the addition of illustrations, but older participants were ham-

pered by the illustrations. These authors concluded that pictures should be used to illustrate key points, should be accompanied by text using simple language, and should not contain distracting details [26].

van der Meulen et al. [11] reported on one randomized controlled trial (RCT) that evaluated the use of question prompt sheets and found that they improved recall but only if the physician was proactive in addressing the questions that the patient asked. Trevena et al. [27] reported on two RCTs that made use of question prompt sheets and found that there was an increase in knowledge if the prompt sheets were used in conjunction with a leaflet.

Another option for patient educators is to make use of multiple teaching strategies. Based on ten studies, Theis and Johnson [32] reported that 67% of patients who received PE using multiple teaching strategies had better outcomes than did patients receiving standard care (ES, 0.440; 95% CI, 0.287–0.593), which is a small to moderate effect.

## Methods of Delivery

There was not as much information available about methods of delivery in PE as there was regarding teaching strategies. Nine systematic reviews/meta-analyses did have information regarding methods of delivery [14–16, 18, 20, 22, 25, 31, 32]. McPherson et al. [14] reported that seven of the 10 studies they evaluated provided patient-specific information rather than general information. Overall, such targeted interventions increased knowledge, decreased anxiety, and increased satisfaction. Chelf et al. [31] reported that, following an "instructional session", patients undergoing chemotherapy remembered more information about the drugs they were taking and the potential side effects of those drugs. They also noted that orientation programs in general increased cancer patients' knowledge and decreased anxiety.

Duke et al. [16] reported on three studies that evaluated individual education for patients with type 2 diabetes. In one study, knowledge significantly improved at 6 months post-intervention for those receiving individual education compared to usual care. The other two studies compared individual to group education. One study demonstrated that both groups had improvements in knowledge compared to baseline, but there was no significant difference between individual and group education groups. In the third study, there was a significant improvement in knowledge in the group education arm over the individual education arm 6 months post-intervention but the difference disappeared by 12 months post-intervention. Duke et al. [16] also reported on the clinical outcome of glycemic control. They reported short-term non-significant improvements at 6 to 9 months post-intervention in hemoglobin-A1c ($HBA_{1c}$) in those receiving individual education compared to usual care. Group education resulted in significant ($p=0.0007$) improvements in $HBA_{1c}$ at 6 to 9 months post-intervention compared to individual education but no differences at 12–18 months post-intervention. Theis and Johnson [32] report ES for various methods of delivery. Small ES was reported for group (ES, 0.269; 95% CI, 0.195–0.343; 13 studies) and individualized (ES, 0.240; 95% CI, 0.039–0.441; 5 studies) teaching for "patient outcomes" in general (i.e., not specifically defined). This means that 60.6% of patients receiving group teaching and 59.5% of patients receiving individualized teaching had better outcomes than did those receiving routine care.

Yankova [22] evaluated whether or not structured teaching increased patient knowledge about patient-controlled analgesia. Structured teaching resulted in significant increases in knowledge in comparison to ad hoc instruction ($p<0.05$ in all four individual studies). Theis and Johnson [32] reported moderate ES for structured teaching (ES, 0.539; 95% CI, 0.465–0.613; 37 studies), independent study (ES, .521; 95% CI, 0.251–0.791; 5 studies), and for multi-methods (ES, 0.440; 95% CI, 0.287–0.593; 10 studies) for "patient outcomes" in general. No specific outcome was articulated. This means that 70.5% of patients receiving structured teaching, 69.8% of patients who did independent study, and 66.9% of patients who received PE from a variety of methods had better outcomes than those receiving routine care [32].

Four systematic reviews or meta-analyses [15, 18, 20, 25] evaluated the effect of culturally appropriate PE for minority groups on outcomes related to PE. Bailey et al. [15] looked at the effect on knowledge of culturally specific PE for child and adult asthmatics from minority groups. Based on two pediatric studies, they reported that knowledge scores were significantly better in children (mean difference, 3.30; 95% CI, 1.07–5.53) and parents (mean difference, 1.90; 95% CI, –0.04–3.84) receiving culturally specific education. Khunti et al. [20] reported on the effect of culturally appropriate PE for migrant South Asians with type 2 diabetes. Three of five studies reported improvements in knowledge in the group receiving culturally specific education, and two reported no difference between intervention and controls. Whittemore [25] evaluated culturally appropriate PE in Hispanic adults with type 2 diabetes. Diabetes knowledge was significantly increased for those receiving culturally appropriate education compared to those who did not. Khunti et al. [20] and Whittemore [25] also reported on the clinical outcome of glycemic control. Whittemore [25] reported that seven of

eight studies that measured $HBA_{1c}$ demonstrated improved glycemic control in those receiving culturally appropriate PE whereas Khunti et al. [20] reported variable results, with a few studies demonstrating improvements in $HBA_{1c}$ but only in the short term (up to 3 months).

## Discussion

Although each teaching strategy for which evidence was available was effective to some degree (i.e., better than controls), clearly some methods were more effective than others. Most studies of PE, especially those in cancer, measure behavioral and/or psychosocial outcomes and not clinical outcomes (e.g., survival, response, and recurrence).

Two articles in the evidentiary base are meta-analyses that estimated overall ES [12, 32]. These analyses are only appropriate and meaningful when the studies included in the meta-analysis are homogenous in such areas as the population groups studied or research questions addressed. The studies included in these meta-analyses show no obvious heterogeneity that would call the results into question. Moreover, both analyses reported on and attempted to deal with statistical heterogeneity. In one paper [32], if heterogeneity was detected, outlier studies were removed until homogeneity was achieved; weighted effect sizes were calculated based on the number of studies remaining after homogeneity was reached. Gysels and Higginson [12] used a random effects model when heterogeneity was encountered.

With respect to specific teaching strategies, verbal teaching [28, 32] and discussions [32] were found to be the least effective teaching strategies. In fact, Theis and Johnson [32] recommend that verbal teaching be used in combination with other teaching strategies and not as a stand-alone teaching method.

The use of computer technology was found to be an effective teaching strategy, positively affecting patient knowledge, anxiety, and satisfaction [10, 12, 17, 19, 23, 24, 27, 30–32]. Audiotapes, videotapes, written materials, and lectures were all found to be more effective teaching strategies than were verbal teaching and discussions [32]. All of these strategies had a positive effect on patient knowledge, anxiety, and patient satisfaction [12, 13, 17, 19, 27–29, 31]. However, written materials must be prepared at a reading level suitable for the general population [13]. In Canada, it has been demonstrated that health literacy varies from community to community [34]; therefore, written materials might need to be reviewed to ensure that they can be understood by the individual community the PE program serves. Demonstrations had the highest ES of any of the teaching strategies evaluated and should be considered in appropriate situations. Houts et al. [26] demonstrated that the addition of illustrations to written text is an effective teaching strategy when compared with written material lacking illustrations. This was especially true for those with low literacy skills. The use of multiple teaching strategies is also a viable option. Theis and Johnson [32] found that almost 67% of patients who received PE using several different strategies had better outcomes than those who received routine care.

All of the teaching strategies evaluated are used to provide effective PE. However, the learning needs of each patient must be taken into account and cannot be applied in the same way to every patient. These strategies will only be as effective as their audience's access to the necessary tools to use them, whether that tool is intangible such as literacy or tangible such as having access to an audiotape player. As a result, there is no "one size fits all" solution for the strategies needed to educate patients.

With respect to methods of delivery, targeted interventions that provide patient-specific information have been found to increase patient knowledge, decrease anxiety, and increase satisfaction [14]. In addition, structured teaching has been shown to be much more effective than unstructured ad hoc teaching [22, 32]. Culturally appropriate PE has also been found to increase patient knowledge [15, 20, 25].

There are several limitations to this systematic review. The reporting of the systematic reviews and of the individual studies that comprise them is imprecise where the specific outcomes chosen are concerned. This is because the tools to measure a given outcome (e.g., knowledge) vary not only between diseases but also within a given disease. Moreover, these tools are not always validated. Related to this is the fact that "outcomes" are not always clearly articulated, making it impossible to determine the exact outcome that was measured. A second limitation is that the individual studies that make up any given systematic review or meta-analysis vary considerably. A third limitation is that the teaching strategies evaluated are not necessarily mutually exclusive, and, as a result, studies were categorized into the teaching strategy that was most applicable. A fourth limitation of this systematic review is the fact that the details of the various interventions are unclear. The data do not necessarily provide this information and more importantly, it would not be pragmatic to report all the details in a document of this nature. Finally, while the reporting of ES is acceptable, absolute differences would provide much more compelling data regarding the impact of a given teaching strategy.

**Table 2** Recommendations for teaching strategies and methods of delivery for patient education

Teaching strategies

- Computers can be an effective PE teaching strategy especially when patients are given information specific to their own situation rather than general information.
- Audiotapes of patient consultations can be effective for patient recall of verbal education.
- Videotapes (or more modern formats such as CDs and DVDs) can be an effective teaching strategy in delivering PE.
- The provision of written materials, and, especially, tailored print materials, can also be an effective PE teaching strategy. All written information should be prepared at a reading level appropriate for the general population. New patient information packages provided to patients prior to their first clinic visit are very useful to them.
- Verbal instruction should only be used in conjunction with another teaching method.
- Demonstrations, if appropriate for the situation, can be a very effective teaching strategy.
- The use of multiple teaching strategies is a good option for PE.
- Use visual aids appropriately. Pictures and illustrations are useful for enhancing printed materials especially in those with low literacy skills. The illustrations should be non-ambiguous and should be accompanied by text written in simple language.

Methods of delivery

- Patient-specific information (i.e., information specific to the individual's actual clinical situation) should be provided to patients rather than general information about their cancer.
- PE should be structured. An ad hoc random question and answer format session is not sufficient.
- PE should involve multiple teaching strategies.
- PE for minority groups should be culturally sensitive.

However, absolute differences were not reported in any meaningful way. Furthermore, there is considerable variation in ES, which makes interpretation tricky. Despite these limitations, there is enough consistency in the findings of the systematic reviews and meta-analyses used in this guidance document, across different diseases, upon which overall generalizable recommendations can be made.

PE is a vital component of heath care. This report discusses several teaching strategies for the delivery of PE that were effective in increasing knowledge, decreasing anxiety, and increasing satisfaction and that included computer technology, audio and videotapes, written materials, and demonstrations. Various teaching strategies used in combination were similarly successful; for example, including illustrations enhanced patient understanding of written materials. In addition, structured teaching, culturally appropriate teaching, and teaching targeted to a patient's individual situation were found to be better than ad hoc teaching or teaching that only provides general information to a patient.

## Recommendations

The following recommendations (Table 2) are informed by the available evidence. They are not meant to provide specific details with respect to the content provided through PE. They are meant to provide an overview concerning the efficaciousness of the teaching strategies and methods of delivery that have been evaluated in the literature. These findings provide guidance for future discussions on establishing standards for PE delivery.

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**Conflict of Interest** The authors declare that they have no conflict of interest.

## Appendix 1. MEDLINE, EMBASE, HealthSTAR, and CINAHL Search Strategy (all databases were searched at once)

1. Patient education.mp
2. Patient education/mt
3. Teaching/mt
4. Or/1–3
5. Clinical trials/or clinical trials, phase ii/or clinical trials, phase iii/or clinical trials, phase iv/or controlled clinical trials/or randomized controlled trials
6. Meta-analysis
7. "review literature"
8. Clinical trial.pt
9. Clinical trial, phase ii.pt
10. Clinical trial, phase iii.pt
11. Clinical trial, phase iv.pt
12. Meta-anaysis.pt
13. Randomized controlled trial.pt
14. Controlled clinical trial.pt
15. Guideline.pt
16. Randomized.mp
17. Or/5–16
18. 4 and 17
19. Limit 18 to English
20. Limit 19 to human [limit not valid in: CINAHL; records were retained]
21. Remove duplicates from 20

## Appendix 2

**Table 3** Evaluation of included publications using AMSTAR

| | Studies of patient education in oncology | | | | | Studies of patient education in various health disciplines | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Ranmal et al., 2008 [10] | van der Meulen et al., 2008 [11] | Gysels and Higginson, 2007 [12] | Gaston and Mitchell, 2005 [13] | McPherson et al. 2001 [14] | Bailey et al., 2009 [15] | Duke et al., 2009 [16] | Meilleur and Littelon-Kearney, 2009 [17] | Hawthorne et al., 2008 [18] | Jeste et al., 2008 [19] | Khunti et al., 2008 [20] |
| 1. Was an "a priori" design provided? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 2. Was there duplicate study selection and data extraction? | Y | Y | N | Y | N | Y | Y | N | Y | N | Y |
| 3. Was a comprehensive literature search performed? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 4. Was the status of publication [i.e., gray literature] used as an inclusion criterion? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 5. Was a list of studies (included and excluded) provided? | Y | N | N | N | N | Y | Y | N | Y | N | N |
| 6. Were the characteristics of the included studies provided? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 7. Was the scientific quality of the included studies assessed and documented? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 8. Was the scientific quality of the included studies used appropriately in formulating conclusions? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 9. Were the methods used to combine the findings of the studies appropriate? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 10. Was the likelihood of publication bias assessed? | N | N | N | N | N | N | N | N | N | N | N |
| 11. Was the conflict of interest stated? | Y | N | N | N | N | Y | Y | N | Y | N | Y |
| Total AMSTAR points | 10 | 8 | 7 | 8 | 7 | 10 | 10 | 7 | 10 | 7 | 9 |

| | Studies of patient education in various health disciplines | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Ryan et al., 2008 [21] | Yankova, 2008 [22] | Beranova and Sykes, 2007 [23] | Bussey-Smith and Rossen, 2007 [24] | Whittemore, 2007 [25] | Houts et al. 2006 [26] | Trevena et al. 2006 [27] | Johnson and Sandford, 2005 [28] | Santo et al. 2005 [29] | Wofford et al. 2004 [30] | Chelf et al. 2001 [31] | Theis and Johnson, 1995 [32] |
| 1. Was an "a priori" design provided? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 2. Was there duplicate study selection and data extraction? | Y | N | Y | Y | N | N | Y | Y | N | Y | Y | Y |
| 3. Was a comprehensive literature search performed? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 4. Was the status of publication [i.e., gray literature] used as an inclusion criterion? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 5. Was a list of studies (included and excluded) provided? | Y | N | N | N | N | N | N | Y | N | N | N | N |
| 6. Were the characteristics of the included studies provided? | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | N |
| 7. Was the scientific quality of the included studies assessed and documented? | Y | Y | Y | Y | Y | N | Y | Y | N | Y | N | Y |
| 8. Was the scientific quality of the included studies used appropriately in formulating conclusions? | Y | Y | Y | Y | Y | N | Y | Y | N | Y | N | Y |
| 9. Were the methods used to combine the findings of the studies appropriate? | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| 10. Was the likelihood of publication bias assessed? | N | N | N | N | N | N | N | N | N | N | N | N |
| 11. Was the conflict of interest stated? | Y | N | N | Y | N | N | N | N | N | N | N | N |
| Total AMSTAR points | 10 | 7 | 8 | 9 | 7 | 4 | 8 | 9 | 5 | 8 | 6 | 7 |

*N* no, *Y* yes

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