IHE Report

The Use and Benefits of Teleoncology

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TELEONCOLOGY: APPLICATIONS AND ASSOCIATED BENEFITS FOR THE ADULT POPULATION

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Foreword

The Use and Benefit of Teleoncology follows an earlier report by Marie-Josée Paquin prepared as part of her participation in the SEARCH Classic program (Paquin, 2006). That report was intended to assist the Alberta Cancer Board in the development of its telehealth initiative.

The Use and Benefit of Teleoncology was developed to facilitate the dissemination of the earlier report to other cancer agencies and organizations and individuals with an interest in the provision of services to adult patients and their families in rural and remote settings. The analysis of findings in the earlier report was extended and some additional material included.

Both works were completed with the assistance of the Institute of Health Economics (IHE) in the addition to support from SEARCH Canada and the Alberta Cancer Board.

SEARCH Canada is a not-for-profit, member-funded organization that helps health organizations create, choose and use research evidence in innovative practice settings to enhance decision-making capacity. SEARCH Classic is a health research and professional development program for community-based health professionals in Alberta.

The Alberta Cancer Board is the provincial health authority responsible for coordinating and providing cancer prevention, research, and care. Facilities operated by the Alberta Cancer board include the Cross Cancer Institute in Edmonton, the Tom Baker Cancer Centre in Calgary and 15 associate and community care centres throughout the province.

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Executive summary

A systematic review and an overview of teleoncology applications were conducted to provide information for cancer agencies and other organizations involved in providing cancer care services to rural and remote communities.

The reviews considered services for the adult population across the cancer continuum (prevention, screening, diagnosis and treatment, psychosocial and supportive care, rehabilitation, and palliative care).

The project aimed to be patient and family centred and did not include appraisal of teleoncology applications used by healthcare providers for administrative or continuing professional development purposes. Applications that use various computer-based technologies were also excluded.

Methods

Computerized literature searches from 1995 to 2005 were performed using bibliographic databases, internet sites of health technology assessment agencies and other relevant organizations, tables of contents of seven electronic journals, and a world wide web search engine. Reference lists of retrieved articles were manually searched.

For the systematic review, we selected comparative quantitative clinical studies, case series with 10 or more subjects, qualitative studies, and economic studies that reported on the benefits achieved for oncology patients and their families.

Quality and reliability of the quantitative studies were evaluated using an approach that considers both study design and study performance. A similar approach was used for qualitative studies, with only study specification and performance being considered. Economic studies were evaluated using the set of criteria of Drummond et al.[2] and satisfaction studies were classified using an approach described in a previous review.

The framework used to present findings of the review included the type of communication technology used (internet or web based, telephone based, or video based) and the six components of the cancer continuum.

For the overview, we used the studies in the systematic review and other material obtained through the literature search, including background articles, to provide a narrative description of current initiatives in the area.

Results

From 269 abstracts identified in the literature search, 54 studies met our inclusion criteria for the systematic review. A further 91 publications were used in preparing the overview.

Clinical studies

There were 42 clinical studies (32 quantitative, eight qualitative, and two that used a mixed methods approach). Studies of psychosocial and supportive care were the most common; there were no studies on rehabilitation of persons with cancer.

Many of the clinical studies recruited patients, families, or caregivers affected by a diagnosis of breast cancer or prostate cancer. There were no studies of persons affected by lung cancer.

Twenty-two studies used telephone-based technology, 17 used the internet or web based technology, and only three reported the use of a video-based technology.

Seventeen studies (40%) were judged to be of high or good quality, with findings that could be accepted with confidence. A further nine (21%) were of fair quality, with limitations that should be considered in any implementation of study findings. The other studies were of poorer quality and of less value for decision makers.

In 18 of 28 better-quality studies, the teleoncology intervention was successful; but in seven studies, success was not achieved and in a further three, the outcome was unclear. Most of the studies that had positive findings showed small effect sizes and few projects had proceeded beyond the stage of feasibility.

Positive findings from higher-quality studies suggested that the use of the telephone based technology was an effective tool for promoting mammography and colposcopy in specific populations, for increasing fruit and vegetable consumption, and for providing an effective alternative to in-person support groups for women with breast cancer.

Overall, the clinical studies provided limited indications of areas in which teleoncology may be a useful approach to providing services for adult cancer patients and their families. One reason for the variation in findings from the studies is the different contexts in which they were performed.

Economic studies

The eight publications that included economic studies (one internet or web based, one telephone based, and six video based) provided some indications of cost advantages through teleoncology in diagnosis and treatment, and in palliative care. Economic information was lacking for cancer prevention, screening, psychosocial and supportive care, and rehabilitation.

Overall, the quality and scope of the economic studies was limited. There was little published evidence to determine whether or not teleoncology is a cost-effective alternative to standard cancer care delivery.

Satisfaction studies

Twenty papers reported information related to patient and family satisfaction (two internet or web based, ten telephone based, and eight video based). In general, patients reported being satisfied with various teleoncology applications, but the significance and generalizability of these findings appears to be limited.

Overview of teleconcology

The general overview provided examples regarding the use of communication technologies across the cancer continuum, suggesting areas for future study.

Conclusions

From the perspective of the Alberta Cancer Board, the literature suggests some useful possibilities for developing new services using internet or web-based, telephone-based, and video-based technologies for cancer patients in rural areas. However, it seems likely that these applications would need validation with suitable local studies.

Table of Contents

List of Figures

List of Tables

1. Introduction

Clinical applications of telemedicine have been on the rise in many areas, including cardiology, dermatology, nephrology, neurology, ophthalmology, orthopedics, otolaryngology, pathology, pediatrics, psychiatry, radiology, rehabilitation, surgery, and supportive care. It is reasonable to believe that a similar growth would have occurred in oncology, but documentation of the evidence related to the benefits of teleoncology for the adult population is lacking.

In the broader area of telemedicine, many reports were published in Canada, with several systematic reviews being undertaken in Alberta by the Institute of Health Economics (IHE),[3] the Alberta Heritage Foundation for Medical Research (AHFMR),[4] and the University of Calgary.[5] These reviews sparked interest for replicating the methods used in these publications to document the evidence that teleoncology is able to assist future planning of services for patients and families living in rural and remote communities.

This report includes two key parts:

- Findings from the assessment of quality of selected clinical, economic, and satisfaction studies and the associated benefits for adult patients and their families affected by a diagnosis of cancer (Sections 6 and 7).
- An overview of teleoncology applications that have been used in Canada and other countries between 1995 and 2005 (Section 9).

2. Context

Cancer research, prevention, and treatment programs in Alberta, Canada are coordinated by the Alberta Cancer Board (ACB). The Board operates 17 cancer treatment facilities across the province, including major centres in Edmonton and Calgary. In 2002, the ACB established a telehealth initiative which, in part, is intended to improve access to health education and cancer services, especially in rural and remote communities.[6] It includes video-based innovations such as the Smoking Cessation Rural Telehealth Initiative, Supportive Care for Bone Marrow Transplant Patients and Donors Program, the Telepsychiatry Pilot Project, and the Virtual Lung Clinic. Results of this review will be used by the ACB to enhance its telehealth initiative.

At the national level, needs for information related to teleoncology were also identified by participants at the 6th National Summit on Community Cancer Control held in June 2004 in Thunder Bay, Ontario.[7] Moreover, participants prioritized telehealth as a potential strategy to improve cancer care services and control in rural and remote communities. The authors of this review plan to share it nationally to contribute to the dissemination of teleoncology knowledge.

3. Questions

The key purpose of this review was to determine the current state of the evidence on teleoncology applications to improve access to care closer to home for rural patients and families affected by a diagnosis of cancer. Aligned with this purpose, the following questions guided the literature search and the selection of relevant materials and studies:

- What types of teleoncology applications have been developed for the delivery of cancer care and services to adult patients and their families?
- What are the benefits of teleoncology as a method of delivery of cancer care and services for adult patients and their families?

4. Definitions and Framework

This report introduces new vocabularies and key terms that are used repeatedly. The following section defines these terms and presents the framework that was developed for collecting and analyzing the data.

4.1: Operational Definitions

Operational definitions for cancer continuum, rural communities, and the different types of studies selected for the assessment of quality and reliability (clinical, economic, and satisfaction studies) are presented in Table 1. In addition, a definition for teleoncology is given, based on that proposed for telepsychiatry by Urness,[8] which was the shortest and simplest definition that applies to the context of this review. The words 'telemedicine' and 'telehealth' are also defined because these terms have often been used interchangeably.

Table 1: Operational definitions

Term	Definition
Cancer continuum	The Canadian Strategy for Cancer Control Priorities for Action[9] and the Alberta Cancer Control Action Plan[10] outline six key components within the cancer continuum: prevention, screening, diagnosis and treatment, psychosocial and supportive care, rehabilitation, and palliative care.
Rural communities	People living on a farm or acreage or in a village or town having a population less than 10,000, or People having their place of residence greater than 35 km from a major urban centre (population > 10 000).11

Table 1: Operational definitions (continued)

Term	Definition
Clinical studies	Studies that focus on the provision of oncology services across the cancer continuum, including disease experience.
Economic studies	Studies that focus on measuring the cost or the economic impact associated with the use of teleoncology.
Satisfaction studies	Studies that focus on measuring the patient and family satisfaction related to the use of teleoncology.
Telehealth	Telehealth refers to the use of information and communication technology to deliver health services, expertise, and information over distance.[5]
Telemedicine	Telemedicine refers to the delivery of healthcare services, where distance is the critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, and for the continuing education of healthcare providers, all in the interest of advancing the health of individuals and their communities.[12]
Teleoncology	Teleoncology uses communication technology for the provision of oncology services to eliminate or reduce geographic barriers for cancer patients and their families (adaptation from Urness 2003[8]).

4.2: Communication Technologies

In a recent State of the Science Report, Jennett et al.[5] suggest four categories for organizing the array of communication technologies: (1) computer based, (2) internet or web based, (3) telephone based, and (4) video based. These categories were chosen for identifying the type of teleoncology applications described in the literature, excluding the computer-based category. Definitions for communication technologies are presented in Table 2.

Table 2: Communication technologies: definitions

Term	Definition
Internet or web-based technology	Technology that provides patients and families with online access to cancer information, consultations, or support. Although a computer is often the tool used for accessing the internet, other devices can also be used for this technology (e.g., mobile telephones).

Table 2: Communication technologies: definitions (continued)

Term	Definition
Telephone-based technology	Telephone-based technology refers to the use of a telephone for individual communications between two people. It also includes the use of a speakerphone when more than two people interact. Teleconference is often used as a synonym for telephone-based technology (adaptation from Doll et al.[13]).
Video-based technology	Technology used for interactive audiovisual communications between patient and provider, patient and family (or support network), or provider and provider that allows timely access to specialist knowledge or enhancement of the plan of care. Remote peripheral devices such as an ophthalmoscope, otoscope, sphygmomanometer, stethoscope, or thermometer can be connected to the technology to assist with patient assessment and examination. Videoconference is often used as a synonym for video-based technology.

4.3: Framework

Aligned with the definitions provided in sections 4.1 and 4.2, the framework presented in Table 3 was used to organize the findings from:

- the assessment of quality of selected clinical, cost, and satisfaction studies (Sections 6 and 7); and
- the overview of teleoncology applications that have been used in Canada and other countries between 1995 and 2005 (Section 9).

Table 3: Teleoncology systematic review framework: communication technologies versus cancer continuum

	Communication technologies		
Cancer continuum	Internet or web based	Telephone based	Video based
Prevention	✓	✓	✓
Screening	✓	✓	✓
Diagnosis and treatment	✓	✓	✓
Psychosocial and supportive care	✓	✓	✓
Rehabilitation	✓	✓	✓
Palliative care	✓	✓	✓

5. Methods

5.1: Literature Identification and Selection

5.1.1: Search strategy

Computerized literature searches from 1995 to 2005 were performed using bibliographic databases, health technology assessment agency and other relevant organization internet sites, and a world wide web search engine. The tables of content of seven telehealth or telemedicine electronic journals accessible via the internet were also searched for relevant materials. A manual search of the reference lists of retrieved articles complemented the search. Multiple keyword sets were used to maximize results from the searches. Limits included English language and humans. The databases, internet sources of information, search terms, and outcomes are presented in Appendix A.

5.2: Inclusion Criteria

The literature search focused on patient and family care, taking into consideration the following inclusion criteria:

- Teleoncology applications intended for the adult population using internet or web-based, telephone-based, or video-based technology.
- Teleoncology applications across the cancer continuum.

In addition, the following inclusion criteria were applied for the assessment of quality of clinical, economic, or satisfaction studies:

- Clinical studies using quantitative research approaches (randomized controlled trials (RCTs), prospective non-randomized studies, retrospective comparative studies, and non-controlled series with a sample size of ten participants or more) reporting on the ability of teleoncology to provide benefits for patients and families.
- Clinical studies using qualitative approaches regardless of the sample size and reporting benefits for patients and families.
- Clinical studies using mixed methods approaches, with both quantitative and qualitative study components regardless of the sample size and reporting benefits for patients and families.
- Studies that included economic data.
- Studies with a sample size of ten participants or more that measured patient and family satisfaction.
- Scientifically credible studies.

Clinical studies that used qualitative approaches were included, as they provide rich information and perspectives that are not available from other research methodology. The experiences of people living with cancer and using the technology are unique and relevant for informing decision makers about teleoncology. The inclusion of mixed methods approaches, with both quantitative and qualitative inputs, provides the opportunity for a more complete evaluation of a teleoncology application.

5.3: Exclusion Criteria

The following applications and studies were excluded from the review.

- Teleoncology applications:
  - that are intended for children;
  - that use a computer-based technology such as atlas of genetics and cytogenetics, bioinformatics, cancer databases or registries, communications in cancer screening (telecolposcopy, telecolonoscopy, teledermatology, telemammography) or diagnostic pathology (telepathology), computer software, computerized triage in patient assessment, compact discs (CD ROMS), e-commerce, integrated network, radiotherapy planning, robotics, transmission of electronic health records or diagnostic and medical images of all types (e.g., pathology slides, review of the x-rays, computed axial tomography scans, and magnetic resonance imaging);
  - for providing genetic counselling or services;
  - for smoking cessation treatments;
  - for recruiting cancer patients in studies, including clinical trials;
  - for providing education to healthcare professionals; and
  - for conducting administrative meetings.
- Studies that:
  - measure healthcare providers' satisfaction;
  - consider only technical issues or establish technical feasibility of teleoncology with no reported outcomes;
  - focus only on the content evaluation of oncology websites;
  - measure internet use or identify educational needs and technology preferences; and
  - are not scientifically credible.
- Single case reports.

5.4: Selection of Publications

After the initial literature search and abstracts were selected independently by two of the authors (M-JP and DH), any disagreements were resolved by discussion. An in-depth review of selected abstracts was also conducted independently by applying the inclusion and exclusion criteria. Selection of relevant articles was based on information obtained from the abstracts and agreed upon discussion between the authors. When the abstract did not give sufficient information to make a decision regarding relevance, the article was obtained for further review.

5.5: Methods for Assessment of Quality of Clinical Studies

5.5.1: Quantitative studies

Quality of the clinical studies using quantitative approaches was assessed using the methods described in the AHFMR telecardiology systematic review.[4] This method has been tested more than once in reviewing the evidence in telemedicine studies. It includes appraisal of study performance and study design.

For study performance, five areas of interest were considered, as shown in Table 4. When reviewing a clinical study using quantitative approaches, each of these five areas was given a score of 0, 1, or 2, based on the following observations:

0= Relevant information was missing or given in only minimal detail.

1= Reasonable detail was provided, but there were some important limitations.

2= Information was satisfactory, and there were no significant limitations.

Each study therefore had a possible maximum score of 10 for performance.

Table 4: Quantitative approaches: classification of study performance

	Areas of interest	Points considered
1	Patient selection	Methods of randomization/selection. Equivalence of intervention and control groups. Dropouts prior to commencement of intervention.
2	Description/specifications of the interventions	Adequate description for both intervention and control groups.
3	Specification and analysis of study	Sample size, statistical methods used, clear specification of outcome measures.
4	Patient disposal	Length of follow-up; dropouts; compliance failures.
5	Outcomes reported	Fullness and clarity of reporting; missing results, statistical summary. Whether conclusions were consistent with data.

An additional score was allocated to each clinical study according to the study design that had been used. Details are shown in Table 5. Large randomized controlled trials (RCTs; 50 subjects or more in each arm) were given a score of five. Smaller RCTs (fewer than 50 subjects) had a score of three, prospective non-randomized comparative studies a score of two, retrospective comparative studies a score of one, and non-controlled series a score of zero.

Table 5: Quantitative approaches: classification of study design

Study design	Score
Large RCT	5
Small RCT	3
Prospective, non-randomized comparative	2
Retrospective comparative	1
Outcomes reported	0

Quality Scores for Quantitative Approaches

Using criteria defined in Tables 4 and 5, two authors (M-JP and DH) independently assigned scores to each clinical study (see scoresheet in Appendix B). If the authors disagreed on the study design or if individual performance scores differed from each other by more than one, the discrepancies were discussed and resolved by consensus. The performance and design scores were then combined to give an overall score with a maximum value of 15 (e.g., corresponding to a large RCT with no significant limitations). For each study, the mean of the authors' individual scores was reported to the nearest 0.5. This combined score gives an indication of the confidence that decision makers should place in study findings, as illustrated in Table 6.

Table 6: Quantitative approaches: quality scores and implications for decision makers

Overall quality score	Reliability	Implications for decision makers
11.5-15	A	High quality; high degree of confidence in study findings.
9.5-11.0	B	Good quality; some uncertainty regarding the study findings.
7.5-9.0	C	Fair quality; some limitations that should be considered in any implementation of study findings.

Table 6: Quantitative approaches: quality scores and implications for decision makers (continued)

Overall quality score	Reliability	Implications for decision makers
5.5-7.0	D	Fair to poor quality; substantial limitations in the study; findings should be used cautiously.
≤ 5.0	E	Poor quality; study findings have unacceptable uncertainty.

5.5.2: Qualitative studies

An approach to assessing the quality and reliability of qualitative studies was developed with the aim of providing an easily–applicable tool similar to that which had been used for quantitative studies. A set of questions and criteria suggested by Russell and Gregory[14] was used for defining key elements for the qualitative studies shown in Table 7. When reviewing a clinical study that used qualitative approaches, the authors gave each of the six areas of interest a score of 0, 1, or 2, based on the following observations:

0 = Relevant information was missing or given in only minimal detail.

1 = Reasonable detail was provided, but there were some important limitations.

2 = Information was satisfactory; there were no significant limitations.

Each study therefore had a possible maximum score of 12.

Table 7: Qualitative approaches: classification of study performance

	Areas of interest	Points considered
1	Research question/issue	Clear and adequately substantiated. Clear documentation about what is known about the phenomenon of interest.
2	Research design	Appropriate for the research question. Method chosen justified.
3	Sampling	Appropriate for the research question and design. Rationale for the purposeful sample is given.
4	Data collection	Comprehensive (e.g., field observation, interviews, document) and systematic process.
5	Data analysis	Clearly described (e.g., use of verbatim transcripts, documents analysis) and appropriate. Triangulation techniques for validating data and interpretation of analysis.
6	Results	Fullness and clarity of reporting. Results link to the research question.

Quality Scores for Qualitative Approaches

Two authors (M-JP and DH) independently assigned a performance score to each study (see scoresheet in Appendix C). These performance scores translated into quality scores. All discrepancies were discussed between the two authors and resolved by consensus. For each study, the mean of the authors' individual scores was reported to the nearest 0.5. This final score gives an indication of the confidence that decision makers should place in qualitative study findings, as illustrated in Table 8.

Table 8: Qualitative approaches: quality scores and implications for decision makers

Overall quality score	Reliability	Implications for decision makers
9.0-12.0	A	Good quality; reasonable confidence in study findings.
6.0-8.5	B	Fair quality; limitations that should be considered in any decisions.
< 6.0	C	Poor quality; substantial limitations, findings should be used cautiously.

5.5.3: Mixed methods studies

The systematic review also included clinical studies that used mixed methods approaches with both quantitative and qualitative study components. The approach taken for evaluation of these studies was to make separate assessments of quality for the quantitative and qualitative analyses, as outlined in 5.5.1 and 5.5.2, and present both quality scores for consideration.

5.5.4: Economic studies

Quality of economic studies was assessed using the methods described in the AHFMR telecardiology systematic review.[4] Those studies that included cost or economic data were assessed separately to provide an indication of the quality of the economic analysis that had been undertaken. Studies were judged against the criteria for economic analysis given by Drummond et al.[2] as follows:

- Was a well-defined question posed in answerable form?
- Was a comprehensive description of the competing alternative given?
- Was the effectiveness of the programs or services established?
- Were all the important and relevant costs and consequences for each alternative identified?
- Were costs and consequences measured accurately in appropriate physical units?

- Were costs and consequences valued credibly?
- Were costs and consequences adjusted for different timing?
- Was an incremental analysis of costs and consequences of
- alternatives performed?
- Was allowance made for uncertainty in the estimates of costs and consequences?
- Did the presentation and discussion of the study results include all issues of concern to users?

Two authors (M-JP and DH) reviewed the publications that included cost or economic information and reported their appraisal on the scoresheet presented in Appendix D. For those studies where sufficient information was presented to justify classification as a cost study, a score of 1 was given for each criterion that was fulfilled in a satisfactory way, with no significant limitations. A summary score from 0 to 10 was given to each study, with any difference in scores from the authors being resolved by consensus. If the study fulfilled at least five criteria, it was considered to provide at least moderately good information on the economic indications of the teleoncology application.

5.6: Consideration of Measurement of Satisfaction

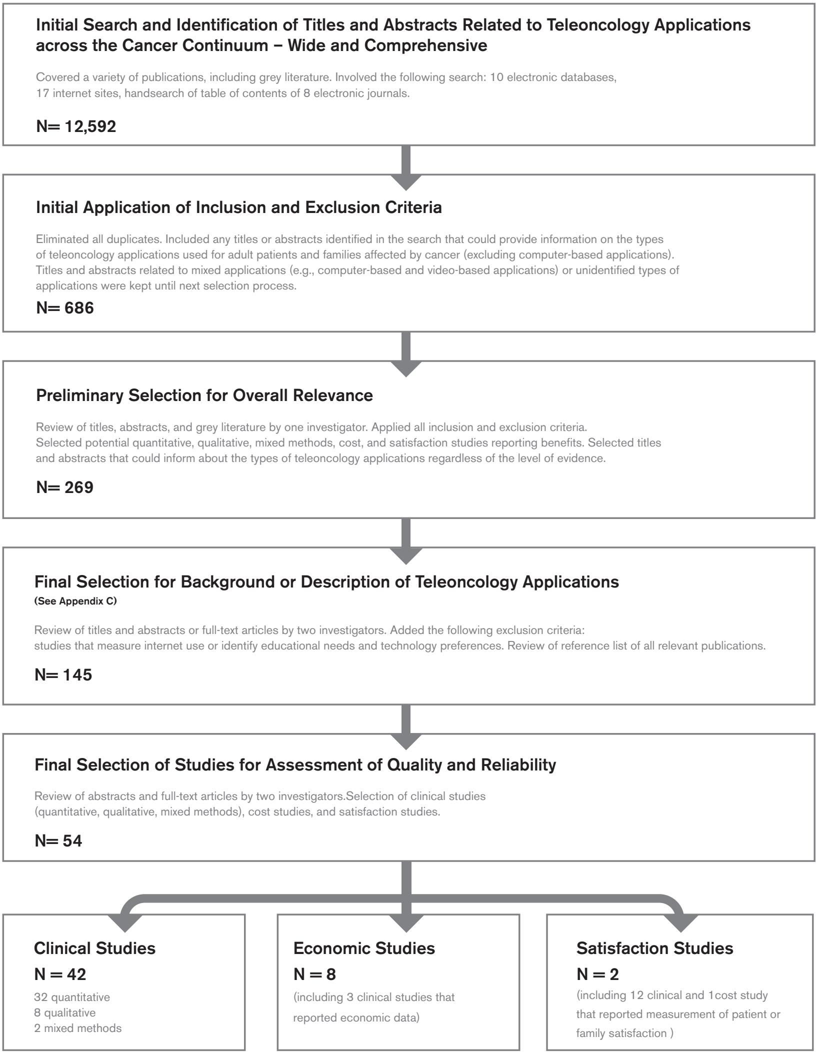
Consideration of measurement of satisfaction was assessed using the approach described in the IHE systematic review of telemedicine.[3] All publications that included some reference to appraisal of patient and family satisfaction with the teleoncology application were considered. Seven levels of assessment were specified:

1. Reference to satisfaction with the service in the text; no details provided.
2. Simple questionnaire approach; no comparison with a non-telemedicine alternative.
3. Questionnaire with implied comparative component.
4. Questionnaire with specific comparison questions.
5. Comparative study with simple outcome measures.
6. Comparative study; satisfaction outcome measures developed further; statistical summary.
7. Randomized study.

6. Results

6.1: Retrieved Articles

The algorithm presented in Figure 1 provides details of the process used for the selection of publications retained for this report. This process resulted in the identification of 145 articles, 54 of which were used for the systematic review. The remaining 91 articles, and those used in the systematic review, were considered in preparing the overview presented in Section 9 (See details in Appendix D).



Initial Search and Identification of Titles and Abstracts Related to Teleoncology Applications across the Cancer Continuum – Wide and Comprehensive

Covered a variety of publications, including grey literature. Involved the following search: 10 electronic databases, 17 internet sites, handsearch of table of contents of 8 electronic journals.

N= 12,592

Initial Application of Inclusion and Exclusion Criteria

Eliminated all duplicates. Included any titles or abstracts identified in the search that could provide information on the types of teleoncology applications used for adult patients and families affected by cancer (excluding computer-based applications). Titles and abstracts related to mixed applications (e.g., computer-based and video-based applications) or unidentified types of applications were kept until next selection process.

N= 686

Preliminary Selection for Overall Relevance

Review of titles, abstracts, and grey literature by one investigator. Applied all inclusion and exclusion criteria. Selected potential quantitative, qualitative, mixed methods, cost, and satisfaction studies reporting benefits. Selected titles and abstracts that could inform about the types of teleoncology applications regardless of the level of evidence.

N= 269

Final Selection for Background or Description of Teleoncology Applications
(See Appendix C)

Review of titles and abstracts or full-text articles by two investigators. Added the following exclusion criteria: studies that measure internet use or identify educational needs and technology preferences. Review of reference list of all relevant publications.

N= 145

Final Selection of Studies for Assessment of Quality and Reliability

Review of abstracts and full-text articles by two investigators.Selection of clinical studies (quantitative, qualitative, mixed methods), cost studies, and satisfaction studies.

N= 54

Clinical Studies
N = 42
32 quantitative
8 qualitative
2 mixed methods

Economic Studies
N = 8
(including 3 clinical studies that reported economic data)

Satisfaction Studies
N = 2
(including 12 clinical and 1cost study that reported measurement of patient or family satisfaction)

6.2: Clinical Studies

Table 9 shows the number of reviewed clinical studies by cancer continuum classification. Studies of psychosocial and supportive care were the most common; there were no studies on rehabilitation of persons with cancer. Most of the studies were conducted in the United States (N = 34). Others originated from Canada (N = 2), Denmark (N = 1), Finland (N = 2), Spain (N = 1), and the United Kingdom (N = 2).

Table 9: Clinical studies by cancer continuum classification

Cancer continuum	Number of studies
Prevention	2
Screening	3
Diagnosis and treatment	8
Psychosocial and supportive care	26
Rehabilitation	0
Palliative care	3
Total	42

As shown in Table 10, many of the 42 clinical studies recruited patients, families, or caregivers affected by a diagnosis of breast cancer or prostate cancer. It was notable that there were no studies of persons affected by lung cancer.

Table 10: Tumour groups covered in the selected studies

	Cancer Continuum				
Tumor Group	Prevention	Screening	Diagnosis and treatment	Psychosocial and supportive	Palliative
Breast	1	2		16	
Prostate		1		3	
Gynecology			2		
Gastrointestinal			1		
Hematology			1		
Skin				1	
Not specified	1		3	3	3

*Four studies considered more than one tumour group

Telephone-based technology has been the most researched area of communication technology (N = 22), followed by the internet or web-based technology (N = 17). Very few clinical studies reported the use of a video-based technology (N = 3). Table 11 provides numerical information for each communication technology category in relation to the study design. Further details of each clinical study, including quality scores and reliability, are given in Appendix D.

Table 11: Clinical studies by area of communication technology and study design

	Communication technology		
Study design	Internet or web based	Telephone based	Video based
Quantitative/large RCT	2	7	0
Quantitative/small RCT	2	4	0
Quantitative/prospective	3	1	2
Quantitative/retrospective	0	1	0
Quantitative/non-controlled	4	6	0
Qualitative/phenomenology	3	0	0
Qualitative/ethnography	1	0	0
Qualitative/case studies	1	1	1
Qualitative/grounded theory	0	1	0
Mixed methods	1	1	0
Total	17	22	3

RCT: randomized controlled trial

Although clinical studies were retrieved for all three areas of communication technology, similar findings were not available for all key elements of the cancer continuum (see Table12).

Table 12: Clinical studies reporting the use of communication technologies for the provision of care and services across the cancer continuum

	Communication technology		
Cancer continuum	Internet or web based	Telephone based	Video based
Prevention	0	2	0
Screening	1	2	0

Table 12: Clinical studies reporting the use of communication technologies for the provision of care and services across the cancer continuum (continued)

	Communication technology		
Cancer continuum	**Internet or web based**	**Telephone based**	**Video based**
Diagnosis and treatment	2	3	3
Psychosocial and supportive care	13	13	0
Rehabilitation	0	0	0
Palliative care	1	2	0
Total	17	22	3

The following sections examine all clinical studies more closely, using the Teleoncology Systematic Review Framework: Communication Technologies versus Cancer Continuum presented in Table 3 of Section 4.3.

6.2.1 Internet or web-based technology

Seventeen clinical studies reported the use of internet or web-based technology. Key findings are as follows:

Prevention

No clinical studies were found reporting the use of internet or web-based technology for cancer prevention.

Screening

A high-quality large RCT compared the clinical effectiveness of an internet-based decision aid with a video for educating men about issues relevant to prostate-specific antigen screening. The authors reported no benefits from using the internet as opposed to a video. They note "simply providing access to an internet-based decision aid is not as effective as showing a video in the clinic."[15]

Diagnosis and Treatment

Basch et al.[16] provided indications that cancer patients with prior experience of using the internet are capable of reporting symptoms experienced during chemotherapy using a web-based interface. The study had some limitations such as sample size, demographics, and validation of tools (quality: fair). A poor-quality retrospective case review found that internet-based consultations between specialists at a centre of excellence and referring doctors might facilitate timely access to specialist knowledge.[17]

Psychosocial and Supportive Care

There is evidence from **good** quality studies that:

- Access to internet health information may have a direct relationship with patients' confidence to ask questions of a physician and ability to make decisions related to cancer care.[18] Such internet access would allow patients to check covertly the tests, treatment, and advice they receive from health professionals.[19]
- A web-based support group might be helpful in reducing depression, perceived stress, and cancer-related trauma.[20]
- Online communities seemed rich in storing medical information and knowledge about breast cancer and might provide psychological benefits to participants,[21] but no clear benefits were reported from a self-guided internet coping group.[22]

There is evidence from studies of **fair** quality that:

- Personal storytelling on the internet could breach the social isolation experienced as a consequence of breast cancer.[23]
- Electronic support groups may hold promise for serving women diagnosed with breast cancer living in rural communities.[24]
- Women and men have different conceptions and ways of enacting supportive communication online.[25]
- No coping benefits were obtained from internet health information use among breast cancer patients.[26]

Methodologically **poor** studies indicated that:

- Internet usage (access to information and online support) has the potential to provide patients with a sense of empowerment and greater control of their disease.[27]
- A higher number of depressed patients were participating in an internet support group compared with a face-to-face group.[28]
- Participation in a self-directed bulletin board might improve psychosocial quality of life for women with breast cancer.[29]

Finally, findings from a clinical study that used a mixed methods approach suggested that electronic support groups should consider cultural diversity.[30] This work included good-quality qualitative evidence and fair-to-poor quantitative material.

Rehabilitation

No clinical studies were found reporting the use of internet or web-based technology for cancer rehabilitation.

Palliative Care

In a high-quality American study conducted by McDonald et al.,[31] home care nurses were sent e-mail reminders about clinical pain management recommendations. The results indicated that the intervention had a limited impact on nurse-documented practices; however, patients reported reduced pain intensity. The effect sizes were small and there was no significant difference between the groups on one pain measurement scale.

6.2.2 : Telephone-based technology

Twenty-two clinical studies reported the use of telephone-based technology. Key findings are as follows:

Prevention

High-quality findings suggested the following:

- Cancer control interventions delivered over the telephone can increase fruit and vegetable consumption[32]; however, diet interventions to promote reduced fat and increased vegetable intakes are not associated with weight loss in women with breast cancer.[33]

Screening

In a large RCT, Crane at al.[34] targeted lower income and older women. The authors demonstrated that a mass telephone outcall intervention promoting mammography screening did not have an impact on mammography counselling at 6-month follow-up. In contrast, Davis et al.[35] targeted women from a health maintenance organization. They found that a multi-component phone call consisting of a reminder, counselling, and scheduling of the mammogram appointment was the most effective method of stimulating mammography counselling. Both studies included high-quality evidence

Diagnosis and Treatment

A high-quality large RCT indicated that telephone counselling may be an effective strategy for enhancing initial and long-term adherence to a follow-up cervical diagnostic procedure in a traditionally underserved population.[36]

An exploratory study of using a telephone-based system to monitor post chemotherapy symptoms found that cancer patients are capable of reporting symptoms using the technology.[37] Another quantitative study of patients at a cancer clinic found that around-the-clock direct access for patients to a personal oncologist via telephone might decrease the average number of emergency hospital visits.[38] Both studies were of fair to poor quality.

Psychosocial and Supportive Care

Two high-quality studies gave contrary findings. Samarel et al.[39] obtained an indication that telephone support might provide an effective alternative to in-person support groups for women with breast cancer. In contrast, Braden et al.[40] found there were no clear benefits from using a telephone contact approach for a self help intervention, again for women with breast cancer. A further high quality study found that two brief therapies intended to help women cope with breast cancer may be ineffective.[41]

There was good evidence that a psycho-educational, telephone-delivered intervention directed at helping men with prostate carcinoma might provide benefits such as learning new cognitive and behavioural skills.[42]

There were indications from studies of **fair** quality that:

- The telephone might be an effective method to deliver psychosocial interventions to meet the needs of breast cancer patients.[43]
- Information provided through cancer helplines may have a role on callers' coping strategies[44] and positive health actions.[45]
- The use of audioconferencing might be beneficial for the provision of information and support to women with breast cancer who are living in rural and remote communities.[46]

Within the classification of **fair**-to-**poor**-quality studies, findings were as follows:

- There were no clear benefits from interpersonal psychotherapy for breast cancer patients and their partners during oncology treatment.[47]
- The telephone might be relevant in providing social support interventions to patients diagnosed with melanoma.[48]
- There were no clear benefits from telephone-administered cognitive-behavioural therapy in patients with breast cancer.[49]

Methodologically **poor** quality studies indicated that:

- Therapeutic factors emerged in a therapy group even when breast cancer participants were not face to face during sessions.[50]
- There were no clear benefits from telephone social support in combination with education in improving men's adaptation to prostate cancer in the year following diagnosis.[51]

Rehabilitation

No clinical studies were found reporting the use of telephone-based technology for cancer rehabilitation.

Palliative Care

There is good evidence that supportive telephone call intervention is a relevant alternative and additional form of family support for grieving family members as compared with group support. About 100 family members of patients who died in an oncology ward in Finland received a supportive phone call from a nurse who took care of their loved one while on the ward.[52] The most commonly reoccurring theme of the phone call concerned family members' grief and mourning.

In addition, in a mixed methods study with good qualitative evidence, family members reported that the telephone call gave them a feeling of conclusion to the care that the patients had received. Although 88% of family members described their telephone support experience as being positive, the authors noted: "It remains unclear whether the supportive intervention had an impact on the survivor after the death of a family member".[53]

6.2.3: Video-based technology

Only three clinical studies were identified within this category. Quality rating varies from fair to poor (see Appendix D). They all used the video-based technology for the diagnosis of cancer and related treatments. No clear benefits were obtained from use of telenursing technology on patients discharged with new ostomies related to a cancer diagnosis;[54] a qualitative study found that many patients view consultations with an oncologist using a video-based application as an adjunct to regular face-to-face consultations rather than as a substitute, with convenience of access the principal advantage[55]; and similar management decisions on chemotherapy were taken for patients having teleconsultations as for those seen face to face.[56]

6.2.4: Summary of clinical studies quality

Quality scores for the quantitative clinical studies are shown in Table 13, with judgments on the implications for decision making. The majority of the studies were judged to be useful for decision making and the proportion of high-quality (category A) studies was higher than in other reviews of the telemedicine literature.[3.4]

Scores for qualitative studies, most of good or fair quality, are given in Table.[14] Nine of these studies were concerned with psychosocial and supportive care, and one of the category C investigations was concerned with treatment.

Table 13: Quality scores for quantitative clinical studies

		Number of studies				
Quality score	Implications for decision making	Prevention	Screening	Diagnosis and treatment	Psychosocial and supportive care	Palliative care
11.5-15	A. High quality; high confidence in study findings	3		3	3	1
9.5-11.0	B. Good quality; some uncertainty				4	
7.5-9.0	C. Fair quality; some limitations to consider			1	5[a]	
5.5-7.0	D. Fair to poor quality; substantial limitations			3	6[b]	
≤ 5.0	E. Poor quality; unacceptable uncertainty			2	3	

[a] One study had a lower-quality component (non-comparative data)

[b] Two studies had mixed methodology that also included qualitative analysis

Table 14: Quality and reliability scores for qualitative clinical studies

Overall quality score	Reliability	Implications for decision makers	Number of studies
9-12	A	Good quality; reasonable confidence in study findings	4[a]
6.0-8.5	B	Fair quality; limitations that should be considered in any decisions	4[a]
< 6.0	C	Poor quality; substantial limitations; findings should be used cautiously	2

[a] One study from each group had mixed methodology that also included quantitative analysis

6.3: Economic Studies

Eight publications included economic information. Seven used some form of cost analysis and one included measures of cost-effectiveness. Their classification using the **Teleoncology Systematic Review Framework: Communication Technologies versus Cancer Continuum** is shown in Table 15. Although there is a distribution in all areas of communication technologies–internet or web based (N = 1), telephone based (N = 1), and video based (N = 6)–economic information was lacking for cancer prevention, screening, psychosocial and supportive care, and rehabilitation.

Table 15: Classification of economic studies: communication technologies versus cancer continuum

	Communication technologies		
Cancer continuum	Internet or web based	Telephone based	Video based
Prevention	0	0	0
Screening	0	0	0
Diagnosis and treatment	0	0	5
Psychosocial and supportive care	0	1	0
Rehabilitation	0	0	0
Palliative care	1	0	1

The quality of some economic studies was limited and only two of them met 5 or more of the 10 criteria for economic analysis given by Drummond et al.[2] In the following list, scores for the studies are given in parentheses.

The most useful study results were as follows:

- In western Sweden, costs may be saved by carrying out multidisciplinary team meetings by means of videoconferencing instead of face to face meetings (6/10).[57]
- In the United States, a video-based visit for patients requiring hospice care is much less expensive than a traditional, in-person visit.[58] However, work is needed to compare the clinical and social components of the two approaches (4/10).
- In a US study of two-nurse targeted, e-mail-based interventions in home care, costs of two types of intervention were the same as those of usual care. One e mail intervention gave reductions in pain at its worst and in risk of hospitalization ($96 and $466 per 10% reduction). With the other intervention, there was a reduction in pain on average ($37 per 10% reduction) (6/10).[31]

- In the United States, costs of a teleoncology service had decreased by one-half over the 5 years after the start of the program[59] and by two-thirds after 10 years (4/10).[60]

Weaker evidence was provided of:

- Cost savings through use of teleoncology for post-operative consultations (2/10).[61]
- Cost savings for home care compared with hospital care (3/10).[62]
- Similar costs for ostomy support from teleoncology and standard care (3/10).[54]
- Operating costs of a call centre service (2/10).[38]

In summary, there is little published evidence to determine whether or not teleoncology is a cost-effective alternative to standard cancer care delivery. This fact has also been observed for telemedicine "at large".[63,64] The reviewed studies provided some indications of cost advantages through teleoncology in specific situations.

6.4: Satisfaction Studies

Twenty papers reported information related to patient or family satisfaction (see Appendix D for further details on the authors and objectives of the publications). They were reviewed using the classification on approaches to satisfaction measurement noted in Section 5.6.

Reference to satisfaction with the service in the text

One study included essentially passing reference to satisfaction with the telephone interventions provided.[52] The IHE report[3] suggested that such anecdotal findings might have provided reassurance for investigators but are of little value for any independent appraisal of the study. Within the context of this qualitative study, the references to satisfaction in the text reflect the family's care experience and are useful feedback for the staff.

Simple questionnaire approach; no comparison with non-telemedicine alternative

There were nine studies in this category. Eight of them involved the use of a telephone based technology. Overall, participants positively evaluated their telephone support experiences. Not having face-to-face contact was viewed as a limitation rather than a dislike.[65]

Questionnaire with implied comparative component

This approach was used in five studies for evaluating satisfaction related to videoconferencing. Overall, there was general reassurance that the videoconference services were comparable with the alternative.

These services included telehospice, that is, use of videoconferencing units in homes of palliative patients,[66] and teleconsultation.[55,56,61,67]

Comparative study with simple outcome measures

Only one study was reported in this category. It included materials that indicated general support for the use of videoconference for ostomy care, with similar levels of satisfaction with the non-teleoncology home care alternative.[54]

Comparative study; satisfaction outcome measures developed further; statistical summary

Satisfaction measures in the study by Allen and Hayes[68] provided assurance that the interactive videoconferencing method for accessing oncologists was acceptable to rural cancer patients, at least on an occasional basis. Similar findings, with telemedicine presentation at a multidisciplinary tumour meeting among patients with head and neck cancer, emerged from a more recent satisfaction study.[69]

Randomized study

Only one study used a randomized approach to measure satisfaction. When comparing internet and video to facilitate patient education for men considering the prostate-specific antigen test, no between-groups differences in participants' rating of convenience or satisfaction were found on follow-up exposure to decision aid.[15]

The classification of satisfaction studies using the **Teleoncology Systematic Review Framework: Communication Technologies versus Cancer Continuum** is shown in Table 16. Although there is a distribution in all areas of communication technologies–internet or web based (N = 2), telephone based (N = 10), and video based (N = 8)–measurement of satisfaction is lacking for cancer prevention and rehabilitation. In general, patients reported being satisfied with various teleoncology applications, but the significance and generalizability of these findings appears to be limited.

Table 16: Classification of satisfaction studies: communication technologies versus cancer continuum

Cancer continuum	Communication technologies		
	Internet or web based	Telephone based	Video based
Prevention	0	0	0
Screening	1	0	0
Diagnosis and treatment	1	1	7

Table 16: Classification of satisfaction studies: communication technologies versus cancer continuum (continued)

Cancer continuum	Communication technologies		
	Internet or web based	Telephone based	Video based
Psychosocial and supportive care	0	8	0
Rehabilitation	0	0	0
Palliative care	0	1	1

7. Benefits for Patients and Their Families by Cancer Continuum Category

In this section, the reviewed clinical studies are grouped by their place in the cancer care continuum with information on the themes that they addressed, the communication technology used, their quality, and whether they demonstrated that use of teleoncology had been successful. Success was taken to be a clear indication from a study that use of a teleoncology approach had produced improvement in management or outcomes.

7.1: Prevention Studies

The two prevention studies were of high quality. Their education interventions related to diet modification gave contrasting results, telephone intervention being successful in one study but not the other.

Table 17: Outcomes of prevention studies

Study	Tumour group	Theme	Communication technology	Study quality	Teleoncology successful?	Comments
Marcus et al.[32] Quantitative	Not specified	Diet modification	Telephone based	High	Yes	Fruit and vegetable consumption increased
Rock et al.[33] Quantitative	Breast	Diet modification	Telephone based	High	No	No weight loss achieved

7.2: Screening Studies

The three studies on cancer screening were of high quality. There were contrasting results for the two studies on participation in breast cancer screening, one reporting a successful telephone-based intervention and the other no clear benefits. Use of the internet did not offer comparative benefits for informing patient decisions on prostate-specific antigen screening.

Table 18: Outcomes of screening studies

Study	Tumour group	Theme	Communication technology	Study quality	Teleoncology successful?	Comments
Davis et al.[35] Quantitative	Breast	Participation in screening	Telephone based	High	Yes	More women in telephone group went for mammography
Crane et al.[34] Quantitative	Breast	Participation in screening	Telephone based	High	No	No clear benefits
Frosch et al.[15] Quantitative	Prostate	Patient decisions on prostate-specific antigen (PSA) screening	Internet Based	High	No	No benefits from internet compared with watching video

7.3: Diagnosis and Treatment Studies

The level of evidence was relatively limited in this group, with two studies being rated as high or fair and the others of poorer quality. In seven studies, use of teleoncology was successful, although in one of these there were some concerns about the approach used. In the other study, it was unclear whether teleoncology had been successful.

Table 19: Outcomes of diagnosis and treatment studies

Study	Tumour type	Theme	Communication technology	Quality	Teleoncology successful?	Comments
Miller et al.[36] Quantitative	Gynecology (cervical)	Adherence to diagnostic follow-up	Telephone based	High	Yes	Enhanced initial and long-term adherence to a follow-up cervical diagnostic procedure
Basch et al.[16] Quantitative	Gynecology	Self-reporting of toxicity symptoms during chemotherapy	Internet based	Fair	Yes	Capability of patient reporting symptoms; implications for closer management
Weinerman et al.[56] Quantitative	Gastrointestinal	Acceptance of teleconsultation	Video based	Fair to poor	Yes	Patient acceptance; similar decisions on chemotherapy as face-to-face group
Mair et al.[55] Qualitative	Hematology	Opinions on teleconsultation	Video based	Poor	Yes	Participants valued improved access to specialist services, but had clear views as to the limitations of such a service
Mooney et al.[37] Quantitative	Not specified	Monitoring chemotherapy symptoms	Telephone based	Fair to poor	Yes	Patients capable of reporting symptoms
Ferrer-Roca and Subirana[38] Quantitative	Not specified	Use of hospital services	Telephone based	Fair to poor	Yes	Reduced hospital emergency visits; no difference in non-emergency visits
Kedar et al.[17] Quantitative	Not specified	Access to specialist advice	Internet based	Poor	Yes	Shorter consults; change to chemotherapeutic regimen in majority
Bohnenkamp et al.[54] Quantitative	Mixed (bladder + colorectal)	Patient social readjustment	Video based	Poor	Unclear	Fewer ostomy pouches used; no cost advantages; more consults for teleoncology group

7.4: Psychosocial and Supportive Care Studies

In this largest group of studies, most of good or fair quality, benefits from teleoncology were shown in just over half. Four high or good quality studies showed either no benefit from teleoncology, or benefits were uncertain (see Table 20).

Table 20: Summary of psychosocial and supportive care studies

	Benefits from teleoncology		
Study quality	**Yes**	**Unclear**	**No**
High	1	1	1
Good (3 x qualitative)	5	1	1
Fair (3 x qualitative)	6	1	1
Fair to poor	1	1	1
Poor (1 x qualitative)	2	3	
Total	**15**	**7**	**4**

Details of the psychosocial and supportive care studies were presented in Section 6.2. The information is summarized in Table 21. Sixteen of the 26 studies involved women with breast cancer. These 16 studies are listed first in Table 21. Benefits were shown in half (eight studies), whereas there were no benefits documented for five studies and outcomes were unclear for three studies.

Table 21: Outcomes of diagnosis and treatment studies

Study	Tumour type	Theme
Samarel et al.[39] Quantitative	Breast	Patient information and support
Rodgers and Chen[21] Qualitative	Breast	Psychosocial benefits
Winzelberg et al.[20] Quantitative	Breast	Psychological benefits
Badger et al.[43] Quantitative	Breast	Symptom management
Lieberman et al.[24] Quantitative	Breast	Patient coping and quality of life
Høybye et al.[23] Qualitative	Breast	Patient coping
Solberg et al.[46] Qualitative	Breast	Patient support
Lieberman and Goldstein[29] Quantitative	Breast	Psychosocial well-being
Braden et al.[40] Quantitative	Breast	Psychological adjustment, confidence in cancer knowledge
Sangdren and McCaul[41] 2003 Quantitative	Breast	Patient coping
Owen et al.[94] Quantitative	Breast	Quality-of-life outcomes
Fogel et al.[85] Quantitative	Breast	Patient coping
Sangdren et al.[49] Quantitative	Breast	Patient coping
Donnelly et al.[47] Quantitative	Breast	Support, distress
McTavish et al.[30] Mixed	Breast	Coping, patient support

Communication technology	Quality	Teleoncology successful?	Comments
Telephone based	High	Yes	Telephone may be an option for service delivery
Internet based	Good	Yes	May provide psychosocial benefits
Internet based	Good	Yes	Possible decrease in depression, stress, cancer-related trauma
Telephone based	Fair	Yes	Decrease in depression and stress
Internet based	Fair	Yes	Women can benefit from participation in electronic support groups
Internet based	Fair	Yes	Internet support groups can breach social isolation
Telephone based	Fair	Yes	Telephone, audioconference may be beneficial for support of rural and remote communities
Internet based	Poor	Yes	Participation in bulletin board improved psychosocial well-being
Telephone based	High	No	No clear benefits
Telephone based	High	No	difference in quality of life or mood from standard care
Internet based	Good	No	No effects seen at 12-week follow-up
Internet based	Fair	No	No benefits
Telephone based	Fair to poor	No	Modest improvement only
Telephone based	Fair to poor	Unclear	No clear benefits through change in distress scores
Internet based	Quality: good Quantity: fair to poor	Unclear	Women of colour used support system less than and in different fashion to Caucasian women

Table 21: Outcomes of diagnosis and treatment studies (continued)

Study	Tumour type	Theme
Heiney et al.[50] Quantitative	Breast	Patient support
Mishel et al.[42] Quantitative	Prostate	Patient coping, support
Broom[27] Qualitative	Prostate	Coping, decision making
Scura et al.[51] Quantitative	Prostate	Patient information, support
Reid Rudy et al.[48] Quantitative	Skin	Patient support
Ziebland et al.[76] Qualitative	Mixed (prostate, testicular, breast, cervical, bowel)	Patient information, support
Sullivan[25] Qualitative	Mixed (ovarian, prostate)	Patient support
Klemm and Hardie[28] Quantitative	Mixed (prostate versus other cancer diagnosis)	Relationship of levels of depression among groups using internet
Fleisher et al.[18] Quantitative	Not specified	Patient coping, decision making
Ward et al.[45] Quantitative	Not specified	Information for patients
Broadstock and Borland[44] Quantitative	Not specified	Coping

Communication technology	Quality	Teleoncology successful?	Comments
Telephone based	Poor	Unclear	”Therapeutic factors emerged” during study
Telephone based	Good	Yes	Improvement at 4 months, decrease at 7 months
Internet based	Poor	Yes	Potential for empowerment, control of decisions
Telephone based	Poor	Unclear	No significant difference in outcomes
Telephone-based	Fair to poor	Yes	Possibly relevant for providing social support interventions
Internet based	Good	Yes	Patients able to check treatment, tests, advice from health professionals
Internet based	Fair	Yes	Both groups empowered by their participation in the online support group
Internet based	Poor	Unclear	Patients in internet support groups were more depressed than face-to-face group
Internet based	Good	Yes	Access to information improved ability to ask questions, make decisions
Telephone-based	Fair	Yes	Large proportion reported benefit
Telephone-based	Fair	Unclear	Frequent association of information received with patients’ coping strategies

7.5: Palliative Care Studies

The first two of the palliative care studies were concerned with support for grieving family members after the death of cancer patients. Both provided good evidence of success of a telephone intervention. The level of evidence in the mixed study was lower for quantitative measures of the grief reaction. The other study, on pain management, was of high quality. It is not clear from the results obtained whether this teleoncology approach was successful.

Table 22: Outcomes of palliative care studies

Study	Tumour type	Theme	Communication technology	Quality	Teleoncology successful?	Comments
Kaunonen et al.[52] Qualitative	Not specified	Family support	Telephone	Good	Yes	Lessening of grief for families
Kaunonen et al.[53] Mixed	Not specified	Family support	Telephone	Quality: Good Quantity: Fair to poor	Yes	Perceptions of families mostly positive
McDonald et al.[31] Quantitative	Not specified	Pain management	Internet based	High	Unclear	E-mail reminders might play a role in improving pain management, though effect sizes were small and not significant on one pain scale

7.6: Overall Findings on Benefits from Teleoncology

The overall indications of benefits from teleoncology are summarized in Table 23. In a majority of the reviewed studies, the teleoncology intervention was shown to produce benefits for patients, their families, or both. However, in a large minority of studies, teleoncology either produced no benefits, as compared with an alternative approach, or the evidence of benefits was uncertain.

In the largest group of papers, on psychosocial and supportive care, 12 of the 15 "positive" studies were of good or fair quality, providing useful indications of the potential value of teleoncology in this area. However, four studies which were of high or good quality were equivocal or negative with regard to benefits from psychosocial interventions.

Seven of the eight studies on diagnosis and treatment provided evidence of benefit, but only two studies were of high or fair quality, with the remainder having substantial limitations.

Studies in the remaining categories–prevention, screening, and palliative care–were of high or good quality, but gave varying indications as to whether teleoncology had been successful.

Table 23: Overall indications of benefits from teleoncology

	Benefits from teleoncology		
Type of intervention	**Yes**	**Unclear**	**No**
Prevention	1		1
Screening	1		2
Diagnosis and treatment	7	1	
Psychosocial and supportive care	15	6	5
Palliative	2	1	
Total	**26**	**8**	**8**

8. Summary of Study Findings and Discussions

8.1: Study Design

Both quantitative and qualitative approaches were useful for assessing the quality and reliability of teleoncology studies. Use of mixed methods approaches, with both quantitative and qualitative inputs, provides the opportunity for a more complete evaluation of a teleoncology application. Mixed methods results may be more informative than single method studies, given the nature of the goal at hand supporting patients and their families living with cancer in varied circumstances and locations.

8.2: Communication Technologies

Telephone-based technology has been the most researched area of communication technology in this group of studies, followed by internet or web-based technology. Both areas provided high to good quality evidence and benefits to patients and families.

Although the telephone is the most ancient communication technology and may not be seen to be as innovative as the internet or videoconference, the value of its use should not be underestimated in terms of its ability to provide cancer information and support to patients and families. With cancer prevalence being higher in elderly populations, telephone interventions can be extremely relevant to patients and families living in rural and remote areas with restricted access to technology or with limited knowledge regarding the use of internet.

Only three clinical studies reported use of video-based technology and they tended to demonstrate benefits related to access to oncology services. Although such benefits could not be reported with a high degree of confidence, it is important to outline cost benefits when using this type of technology in palliative populations.[58] Satisfaction studies also reported positive outcomes for the use of the technology for the delivery of oncology services to rural communities.

Although few clinical studies reported the use of video-based technology (7%), six of the cost studies (75%) focused on measuring the cost benefits of videoconferencing.

8.3: Tumour Group Populations

It is interesting to note that most of the clinical studies recruited participants affected by breast or prostate cancer. Canadian statistics reveal that breast cancer is the highest incidence cancer among the female population and prostate cancer is the highest incidence cancer in the male population.[70] However, lung cancer is the cancer with the highest incidence and mortality in the general population,[70,71] which merits the question of why no studies about that particular tumour group could be located for the current review.

8.4: Cancer Continuum (Clinical Studies)

No clinical studies were found reporting use of communication technologies for cancer rehabilitation.

A limited number of clinical studies related to cancer prevention, screening, and palliative care.

Studies related to cancer diagnosis and treatment were also limited. Exclusion of computer-based technology from the review may explain why such information appears to be lacking.

A high proportion of clinical studies were available in the area of psychosocial and supportive care.

The clinical studies provided limited indications of areas where use of teleoncology may be a useful approach to providing services for adult cancer patients and their families. However, it seems likely that in most cases, follow-up with local studies would be needed to establish the worth of these interventions in particular healthcare settings. One reason for the variation in findings from the studies is the different contexts in which they were performed. Also, a number of studies were preliminary in nature, with limited numbers of subjects or short follow-up after the intervention. In some cases, it is possible that longer, more powerful studies would have provided clearer indications of benefit.

8.5: Economic Studies

Most of the economic studies related to video-based applications. They provided some indication of cost advantages in diagnosis and treatment, and in palliative care, but the overall quality and scope of the economic studies was limited. There was little published evidence to determine whether or not teleoncology is a cost-effective alternative to standard cancer care delivery.

8.6: Satisfaction Studies

Twenty papers reported information related to patient and family satisfaction. In general, patients reported being satisfied with various teleoncology applications, but the significance and generalizability of these findings appears to be limited.

9. Teleoncology Applications: Literature Overview

This section presents an overview of the types of teleoncology applications found in the literature. It includes the 54 studies selected for the systematic review and 91 other relevant publications, such as systematic reviews or background articles related to the topic. The material included here reflects the views of the authors of the publications. The validity of these publications has not been evaluated here. The Teleoncology Systematic Review Framework: Communication Technologies versus Cancer Continuum was used for organizing the information.

9.1: Internet or Web-Based Technology

9.1.1: Prevention

The Institute of Oncology, Sremska Kamenica, Yugoslavia, has developed a website that describes various programs for early detection of cancer. It includes a 'breast self-test' and other programs for early detection of female genital organ, colon, lung, skin, and prostate cancers.[72] Colon and female genital organ cancer prevention programs were added as of May 1, 2005. Another web portal includes personal breast cancer risk assessment, information about prevention, information about early detection, and other components.[73]

9.1.2: Screening

Internet-based applications can be used for patient education about various screening tests and programs available. As an example, a slide show about the prostate-specific antigen test, available on the internet, was presented to a group of men scheduled for a physical examination in the hospital.[15]

9.1.3: Diagnosis and treatment

Goldsmith et al.[74] interviewed patients, nurses, and physicians and reported that all counterparts would be interested in using internet-based tools for reporting and managing cancer-related symptoms if such tools were demonstrated to be effective. Basch et al.[16] used a web-based patient reporting system to monitor symptoms in patients undergoing chemotherapy. Over 80% of patients reported symptoms using the online system and 75% of patients logged in at least once from home. The patient-centred online reporting of severe toxicity helped prompt seven clinical interventions.

E-mail exchanges between patients and healthcare providers are another example of the use of the technology.[75] Although patients have expressed high interest in using e-mails to communicate with their physicians, only 10% in the United States have done so. Physicians have not incorporated that medium into their everyday practice because many concerns exist. Physicians are worried about increased time commitment as well as the possibility of inappropriate use.

9.1.4: Psychosocial and supportive care

Ziebland and colleagues[19,76] provide qualitative results on how internet use affects patients' experience of cancer. Internet use is common among cancer patients at all stages of disease, among men and women, and among all ages. Patients reported using the internet to find support, to find out about experiences of other patients, to interpret their symptoms, to find second opinions, to find information about tests and treatments, to understand consultations, to formulate questions for their physicians, and for many other information-seeking and support reasons.

Eysenbach[77] distinguished four broad areas of application on how cancer patients are using the internet. The first application fosters communication and therefore includes e-mail and instant messaging. The second pillar is focused on content and therefore encompasses the area of health-related information seeking using the world wide web. The third application is centred on community and includes services such as bulletin boards, mailing lists, newsgroups, chat rooms, and interactive portals. The fourth aspect of internet use can be defined as e-commerce and involves selling and buying health-related products and services on the internet. The two most commonly described pillars with respect to teleoncology are content information seeking and community. They are described in more detail below.

Communication

As Sharp[78] describes, the common applications include internet discussion groups and e-mail support lists, which are also called listservs, as well as chat rooms, which use real-time communication, in which messages are exchanged between users at the same time. E-mail support and discussion lists for breast cancer,[23,79,80] medullary thyroid carcinoma,[81] metastatic cancer,[82] ovarian cancer,[25,83] and prostate cancer[25] have been described in the literature.

Content Information Seeking

A recent publication stated that cancer is one of the top two diseases about which American people seek information on the internet, and patients who share a diagnosis or treatment would be among the most active healthcare users joining a support group on the internet.[84] Moreover, from a recent meta-analysis conducted by Eysenbach[77] in the developed world, about 39% of people living with cancer are using the internet. Fogel et al.[85] found that

41.5% (N = 188) of breast cancer patients used the internet as a source of information. Within this sample, Caucasian patients with higher income or education were more likely to use the internet for breast health issues.

Patients reported that they felt empowered by the information available on the internet and even though they found conflicting information about treatments, they did not find it overwhelming or confusing.[18] Moreover, many study participants (20%) switched categories from indirect user or non-user into direct user between the initial contact regarding the study and a 6-week follow-up phone call.[18] In addition, patients who were given an opportunity to attend a learning session with a librarian on how to find and evaluate information on the internet reported feeling more confident, more satisfied, and empowered by the learning session and by being able to assess needed information after receiving training.[86] In contrast, Fogel[26] did not find that internet health information use was associated with psychological coping in breast cancer patients.

However, internet use for health information was associated with greater social support for women with breast cancer.[87] In addition, minority groups seem to benefit more, because internet use for health information increased the perception of social support.

Community

A variety of internet-based resources such as bulletin boards,[21,29,88] interactive patient portals,[89,90] patient education sites,[91] and virtual support groups[20,22,24,27, 28,72,75,92-95] have been extensively described in the literature.

One of the most studied patient portals developed primarily for women with breast cancer is the CHESS Portal (Comprehensive Health Enhancement Support System).[89,96] The portal includes ten different services such as electronic library, the possibility of sharing a personal story, decision aid for choosing the best treatment options, and the possibility of leaving confidential messages and receiving confidential answers from medical experts. The most popular part of the CHESS Portal is the discussion group, which was used less frequently by women of colour than by Caucasian women.[30] It was found that women of colour benefited more from using the portal, as they used it in a more instrumental way, primarily focusing on cancer issues. In addition, low-income women tend to use the CHESS portal more often than do their counterparts with a higher socio-economic status, and their use of CHESS has been associated with improved quality of life and greater participation with a healthcare system.[97]

Another patient-friendly and easy-to-operate portal has been developed to help patients navigate through their experience of cancer.[90] The portal enables patients to find information about different resources and treatments available, as well as to log on to a personalized page to record their symptoms and reactions to treatment or to submit journal entries, which can be shared with friends and family members. The long-term expected effects of the portal include a decreased number of phone calls to a cancer centre, a decreased number of missed appointments, and a decreased number of admissions and length of stay, as well as a decrease in the overall cost of care as patients more closely monitor their symptoms and care at home.[90]

Other Internet-Based Applications

One other application of internet-based technology is the use of an online videoconferencing platform, which can be used for consultations between multidisciplinary teams of professionals for training, diagnosing, treatment planning, and team building. One example of such an application is an internet Tumour Board.[98]

Online patient consultations such as Partners Online Specialty Consultations are also reported in the literature.[17] Partners Online Specialty Consultations is offered to patients around the world for a fee, which can be submitted by credit card. The description for this specific consultation service reads as follows:

- Patients can self refer and request from their primary physician to input information about their condition onto the website.
- In the next step, a team of specialists discusses the case and posts recommendations on the website.
- The primary physician is notified via email that the consultation has been completed and the information is available on the website.

Finally, Sorrentino et al.[91] report a practical web-based application: the use of the internet to deliver patient education materials such as medication teaching sheets and symptom management tips. This method of patient education has several benefits such as easy access to materials needed, decreased costs, no storage space requirement, a real-time opportunity to update the information, and unlimited supply.

9.1.5: Rehabilitation

A rehabilitation program that offers a set of exercises for patients with breast mastectomy is part of the Institute of Oncology (Sremska Kamenica, Yugoslavia) website, which is designed for patients. Exercises are defined individually for each patient from the information in their chart. Patients can access the website with exercises developed specifically for them by using patient personal identification. Patients can also print off the pictures and descriptions of recommended exercises.[72]

9.1.6: Palliative care

The Collaborative Consultative Model (CCM) has been developed by a palliative care nurse practitioner in the United States and a practicing palliative care physician in Canada.[99] The nurse practitioner collected information regarding the patient's condition and forwarded it to the physician on a standardized communication form via e-mail. From the information on the form, the physician was able to provide expert clinical recommendations via e-mail to improve patient care. On the basis of the success of the collaboration, the CCM form was envisioned to be uploaded onto the website for worldwide access. The formation of a panel of palliative specialists was also envisioned to be available for providing consultations.

Many positive aspects of the internet have been documented, such as increased social support, greater knowledge and understanding of the treatment process, and reduced demand on healthcare professionals to educate patients face to face. However, disadvantages include issues related to personality conflicts among support group members and distribution of non-evidence-based information.[100] The primary use of the internet by patients in the future has been predicted to be as follows:[84]

- Disease-specific health information.
- Directories of providers.
- Health plan eligibility and benefits information.
- Report card ratings of health plans and providers.
- Patient support group “chat” rooms.
- Online health advice and counselling.
- Personal health risk assessment.
- Ordering books on health-related topics, medical equipment, prescription drug refills, over-the-counter remedies, and alternative medicines.
- Searching medical literature for the latest medical advances.
- Participation in clinical studies for pharmaceuticals.
- Developing a personal electronic medical record.
- Self-scheduling doctor's or other healthcare provider's appointments.

9.2: Telephone-based Technology

McBride and Rimer[101] classify various telephone-based interventions into several categories. Depending on how the calls are initiated, the interventions can be reactive (for example, various helpline services) or proactive (various outcall interventions). Telephone-based interventions also vary on the basis of the service provider. The service can be provided by health professionals, lay staff, or volunteers. Finally, the telephone based intervention can serve as a main intervention, but can also be part of a larger multi-component intervention.

9.2.1: Prevention

Several initiatives advocating for increased fruit and vegetable consumption have been integrated into other psychosocial and supportive services, which are described below.

9.2.2: Screening

Brief telephone counselling increased adherence to the Pap smear appointment as compared with a simple telephone confirmation in low income ethnic minority women.[36]

9.2.3: Diagnosis and treatment

Mooney at al.[37] used a telephone-based patient reporting system to monitor symptoms in patients undergoing chemotherapy. Twenty-seven patients used the telephone reporting system daily during a single cycle of chemotherapy and reported on seven common chemotherapy-related symptoms. Based on pre-set criteria for severity, fax alerts were generated to notify the physician about the patient report. Most patients participating in the study reported symptoms severe enough to generate a fax alert. Patients were able and willing to use the telephone reporting system. Patients reported that the telephone reporting system was easy to use and they were highly satisfied with it. Future initiatives should include strategies to increase adherence to symptom reporting use, such as automatic call reminder if the patient does not call to report symptoms by a certain time during the day. Because it is difficult to follow-up patients with paper-and-pencil based questionnaires as they return home, Bielli et al.[102] administered a 10-item questionnaire to assess cancer patients' quality of life via mobile phones. Fifty-eight percent of patients agreed to use the mobile phone to fill out the questionnaire. Those who refused were older, less educated, and less familiar with communications technology.

A study by Twomey[103] analyzed telephone contacts with a cancer nurse specialist. The majority of the calls received were concerning psychological support, followed by symptom management and then treatment. The nurse specialist received calls mainly from patients, then from relatives and healthcare professionals. This exploratory study demonstrated that a cancer nurse specialist spends a lot of time providing patient consultations over the phone.

9.2.4: Psychosocial and supportive care

Psychosocial telephone interventions include individual support, peer support, and group support for the delivery of psychotherapy and counselling services. Alter at al.[104] described individual interpersonal telephone counselling for patients receiving chemotherapy for colorectal cancer. Individual telephone therapy for women with breast cancer,[40,41,43,49] for men with prostate cancer,[42,105] for cancer patients and their partners,[43,47] and for caregivers of cancer patients[106,107] was also documented.

Peer social support telephone-based intervention for melanoma patients,[48] early stage breast cancer patients,[39] and prostate cancer patients[51] has been evaluated. Telephone-based diet and nutrition counselling to prevent recurrence of breast cancer[33,108] or to increase fruit and vegetable consumption among Cancer Information Service callers[32,109] and among Cancer Helpline callers[110] has also been described.

Telephone group therapy for women with breast cancer[39,50] and secondary breast cancer[65] has also been used. Colón[111] described a telephone support group for cancer patients, which was in operation for 5 years. The group consisted of 12 members who all get connected with a social worker once a week for a 1-hour meeting. The members were required to commit to the group. They were also encouraged to verbalize their emotional concerns. All members were isolated from resources either because they were living out of town or because they were too immobile or too ill to travel and access other resources.

The use of telephone-based technologies for cancer patients has also been extensively described by the Canadian authors Doll, Stephen, and Poon[13] in their report on improving access to psychosocial and supportive care. In their various publications, Church, Curran, and Solberg[46,112-114] provide a Canadian example of the use of the technology for group support in the rural context of Newfoundland and Labrador.

In addition, support interventions include various information and patient education lines.[44,115,116] One example, the Cancer Information Service offered by the National Cancer Institute, is a telephone information line where information specialists are extensively trained to respond to phone inquiries about cancer prevention, treatment options, clinical trials, early detection, and survivorship.[117] The client survey conducted on a random sample of calls indicated that respondents had a high degree of satisfaction with this service (95%), reported an increase in knowledge (92%), felt reassured after the call (69%), and indicated that information obtained helped them with coping (73%). The Cancer Information and Counseling Line has been offered nationwide since 1981.[116] This line also provides information and resources related to cancer. It uses a brief, integrative telephone counselling model to meet the psychosocial needs of its callers, who might be cancer patients or their caregivers.

Another service named COPELINE offers techniques to help caregivers with problem solving.[89] The Cancer Response System, offered by the American Cancer Society, allows patients to ask questions about cancer, community resources, and local programs as well as to order publications on cancer-related topics. A similar service is also offered by The Candlelighters Childhood Foundation.[117]

9.2.5: Rehabilitation

No information was found to describe the use of a telephone-based technology for cancer rehabilitation.

9.2.6: Palliative care

Daily telephone calls and 24-hour-a-day phone availability to help problem solve and provide advice for caregivers at home decreased the frequency of home visits, hospitalizations, and infections, as well as increased caregivers' and patients' confidence.[118]

Overall, telephone-based technologies are mainly used in the area of psychosocial and supportive care, which also includes various helplines that provide information related to cancer prevention, manifestations of the disease, and treatment.

9.3: Video-Based Technology

Similar to the communications technologies listed earlier, videoconferencing presents an opportunity to improve service delivery to isolated populations. In addition, Urness[8] outlines the fact that the use of videoconferencing can reduce exposure to communicable diseases. This observation alone can be a positive health outcome for immunocompromised cancer patients.

9.3.1: Prevention and screening

No information was found related to the use of a video-based technology for cancer prevention and screening.

9.3.2: Diagnosis and treatment

Bohnenkamp et al.[54] describe the benefits of combining traditional homecare visits with telenursing for supporting recently discharged patients with ostomies. The cost of telenursing visits was less than traditional homecare visits, but telenursing visits could occur more often and, therefore, the overall cost of both types of visits was comparable.

Overall, videoconferencing technology has been extensively used for consultations between multidisciplinary teams of professionals for training, diagnosing, treatment planning, and team building. Examples include the following:

- An international tumour board, consisting of professionals from various disciplines (medical oncology, radiation oncology, surgery, pathology, social work), has been created to improve counselling cancer care for patients in several locations in the United States and Israel.[119]
- A multidisciplinary team was created for case reviews and treatment planning between various cancer centres in Wales.[120]
- Gynecological oncology rounds were held in Scotland.[121]
- Regional multidisciplinary genitourinary tumour boards in Ontario were created to connect cancer centres, academic hospitals, and referring urologists.[122]
- A comprehensive multidisciplinary telemedical cancer centre was created within the Veterans Affairs healthcare system, covering the northwestern part of the United States and Alaska.[123]
- Twelve district hospitals connected with the London Chest Hospital to consult with a multidisciplinary team, especially thoracic surgeons, to benefit lung cancer patients by promptly assessing the need for surgery.[124]
- Six district hospitals connected with the Liverpool Hospital in Sydney to collaborate as a multidisciplinary team and discuss treatment options for breast cancer patients.[125] The project compared videoconferencing meetings with face-to-face meetings. Overall, the attendance at videoconferencing meetings was slightly higher; however, the respondents preferred face-to-face meetings.
- Tele-Oncology Rounds Ontario (TORO) was created for remote community surgeons.[126]
- Region 10 of the Veterans Affairs healthcare system had multidisciplinary breast tumour rounds.[98]
- Consultations occurred within Jefferson Cancer Network between Thomas Jefferson University Hospital in Philadelphia and seven community hospitals.[127]
- Multidisciplinary cancer meetings were held between Royal Adelaide Hospital in South Australia and Royal Darwin Hospital in Northern Territory.[38]
- Multidisciplinary team (MDT) meetings were held in Sahlgrenska University Hospital in Sweden. Usually all patients with a tumour in the area of the head and neck were invited to attend the meetings in person when their case was being presented.[128]

- The Teleoncology Interdisciplinary Council in Sremska Kamenica, Yugoslavia, used PACS (Picture Archiving and Communication Systems) for storing and forwarding of all kinds of medical images and EPR (Electronic Patient Record) to provide multidisciplinary expert opinion to other health institutions.[72]
- Ad hoc consultations regarding a patient's diagnosis and treatment planning were also used.[72,129]

Some common findings about MDT meetings via videoconference have been reported: videoconference MDT meetings tend to be more formal, more case focused, and less interactive than regular MDT meetings; attendance at videoconference meetings is higher than at regular meetings; more time is required to prepare for videoconference MDT meetings; and high-quality technical support for transmitting radiology and pathology images is of paramount importance.[125,130-132] In addition, enhanced videoconferencing equipment like the Telesynergy system is recommended to be used for MDT meetings.[133,134] The Telesynergy system is capable of transmitting high-quality video from various sources, as well as diagnostic-quality radiology and pathology images. The unit also includes remotely operated microscopes and video cameras, which allow for detail examination of specimens by a remote operator. The system can also transmit traditional x-ray images and paper documents.[133]

The benefit of MDTs seems obvious for satellite sites, as the access to specialty care and expertise is increased; however, as London et al.[127] point out, the tertiary cancer centres can also benefit by gaining access to a larger pool of patients for clinical research studies.

Another use of videoconferencing technology is the established virtual cancer care clinics for patients, where patients from remote locations are seen by multidisciplinary team specialists, often from the tertiary care centres, for diagnosis, treatment planning, and follow-up visits.[135] These clinics include the following:

- The Telemedical Cancer Centre encompassing all tumour sites and involving multidisciplinary teams of professionals in the tertiary and satellite centres has been created to improve cancer care for veterans in Alaska, Washington, Oregon, and Idaho.[123]
- Teleoncology clinics have been offered in Kansas since 1992.[55,135-137] Usually consultations for 4 to 6 patients are provided weekly. The physical examinations are performed by using a nurse or physician as proxy examiner, and an electronic stethoscope transmits breath and cardiac sounds over the network.
- Teleoncology clinics linking a large cancer centre in Edinburgh, Scotland, with a district regional hospital complemented existing on-site services and provided specialist consultation to non-surgical patients.[67]

- Sixteen post-surgical patients in Hospital Rothschild (Paris, France) attended a teleconsultation with a medical oncologist regarding their post-surgical chemotherapy regimen. Eighty percent of the patients were satisfied with teleconsultation in general.[61]
- Multidisciplinary team meetings were held in Sahlgrenska University Hospital in Sweden, where all patients with a tumour in the area of the head and neck are invited to attend when their cases are presented.[57]
- Initial and follow-up consultations are held by a medical oncologist from the BC Cancer Agency, Vancouver Island Centre, for cancer patients from Nanaimo Regional General Hospital.[56,138]

9.3.3: Psychosocial and supportive care

Cluver et al.[139] conducted psychotherapy on ten terminally ill cancer patients undergoing active medical treatment with diagnoses of adjustment disorder and major depression. Patients received six sessions of cognitive counselling therapy. The sessions alternated between face-to-face sessions and low bandwidth videophone sessions. Patients reported the same levels of satisfaction for face-to-face and videophone sessions. In another study, dignity therapy was delivered via videophones to eight patients with life expectancy of less than 6 months enrolled in a hospice or a palliative care program.[140] Overall, this pilot project was deemed a success based on patient satisfaction feedback and staff reports.

9.3.4: Rehabilitation

Speech rehabilitation sessions were arranged by videoconference between a speech language pathologist and a patient who had undergone a total laryngectomy.[141] The patient resided in a remote community and because of loss of speech was unable to communicate over the phone or travel by himself for long distances. After weekly sessions with the speech language pathologist, the patient and his wife connected with a social worker for psycho-educational support and counselling. On many occasions the patient's family members and local health professionals joined the videoconference to learn more about how to provide the patient with care and support.

9.3.5: Palliative care

In addition to traditional videoconferencing, videophones and portable videoconferencing units have been used in home to deliver palliative home care services to patients. This "telehospice service" allows more cancer patients to receive palliative care at home. The National Cancer Institute of Milan's home care program supplied patients and their families with portable videoconferencing units to increase patients' access to medical assistance; improve communication between team members, patients, and family members; and, in the long term, reduce physicians' expenses for house calls and reduce demand for hospital and emergency admissions.[142] Similar portable videoconferencing units were used to establish a telehospice service in Kansas.[58,143] Videoconferencing units were installed in the homes of three nurses who received after-hours calls, as well as in the residences of six patients. Nurses performed video assessments to determine whether an in-person visit was warranted. The results of the pilot study, which indicated a general satisfaction of the telehospice service by patients and caregivers, allowed for integration of telehospice units into the standard hospice service. Almost 200 patients participated in the pilot telehospice project in Michigan, where patients also reported a high degree of satisfaction with this service and even reported a certain degree of frustration that it was not used more often.[66]

Positive predictors of telehospice use include time and travel savings, ability to supplement services, and ability to connect with loved ones who cannot be physically present during the dying process. Inversely, negative predictors are related to culture variation among sites or agencies, lack of managerial involvement, and individual caregivers' personalities.[144]

Few authors documented the effect of the videophone on the care of palliative patients, but samples that focused on cancer populations were not necessary and the methodology did not lead to significant conclusions. Coyle et al.[118] provided a terminally ill patient with a recurring brain tumour and extensive hearing loss with a home videophone to enhance his clinical care, foster communication (he could read lip movements), and decrease his isolation.

Overall, current published information highlights the fact that video-based technology enables patients to see their oncologist more regularly. Patients are also given the opportunity to speak with a social worker, a psychologist, a speech therapist, or a dietician to answer their queries, which are part of their ongoing cancer care. Videoconferencing technology also allows liaison between large urban specialized medical centres and smaller rural regional health centres to exchange information, share expertise, and recruit patients for clinical trials.

9.4: Summary of Findings and Discussion

In summary, the literature was rich in providing examples regarding the use of communication technologies across the cancer continuum, with gaps in the area of cancer prevention, screening, and rehabilitation, as highlighted in Table 24.

Reasons for these findings may be the lack of sustainable funding or the lack of time and resources for publishing.[145] Other impediments to the development of telemedicine applications include the lack of resolution as to how physicians should be reimbursed for services they provide using telemedicine and issues relating to licensing of medical staff and other operators.[146]

Table 24: Teleoncology innovations found in the literature: communication technologies versus cancer continuum

	Communication technologies		
Cancer continuum	Internet or web based	Telephone based	Video based
Prevention	✓	✓	–
Screening	✓	✓	–
Diagnosis and treatment	✓	✓	✓
Psychosocial and supportive care	✓	✓	✓
Rehabilitation	✓	–	✓
Palliative	✓	✓	✓

10. Conclusion

Although oncology is an area that seems able to benefit from the application of communications technology, the scope and quality of the evidence that demonstrates benefits from teleoncology for adult patients and families affected by a diagnosis of cancer are limited.

The overall number of publications identified for the period 1995 to 2005 that were relevant to oncology services for adult patients and their carers was small. As indicated in Figure 1, only 145 relevant publications were found. These papers provided an overview of potentially useful teleoncology applications, but only 54 met all selection criteria and provided potentially valid evidence on the outcomes of teleoncology.

Forty-two of the 54 papers that provided information on outcomes described clinical studies. Nineteen of these (45%) were judged to be of high or good quality, with findings that could be accepted with confidence. A further nine papers (21%) were considered to be of fair quality, with limitations that should be considered in any implementation of study findings. The remainder of the papers were of poorer quality and of less value for decision makers.

In most of the better-quality studies (18 of 28), the teleoncology intervention was successful, but in seven studies, success was not achieved and in a further three, the outcome was unclear. Most of the studies that had positive findings showed only small effect sizes and few projects had proceeded beyond the stage of feasibility. Strongest evidence of effectiveness came from six studies on psychosocial applications; two on palliative care; and one each on prevention, screening, and diagnosis and treatment.

The studies indicated that experience with teleoncology applications was varied, with much depending on the context in which the services were provided. It will be important for any implementation of promising teleoncology applications in Alberta to take account of the overall healthcare context in the province. For the purposes of this study, a limitation of the reviewed literature was that it did not include findings and recommendations that were specific to services for rural and remote communities.

From the perspective of the Alberta Cancer Board, the literature suggests some useful possibilities for developing new services using internet or web-based, telephone-based, and video-based technologies for cancer patients in rural areas, but it seems likely that these applications would need validation with suitable local studies.

Appendix A: Literature Search Strategy[i]

This literature search was conducted by MJP as part of her learning experience with SEARCH Canada. MJP developed her own search terms and search strategies. Electronic databases that were not accessible to MJP were searched by LH using a specific search strategy, as noted in the table.

Database/source[ii]	Search terms[iii]	Outcomes
Databases		
Agence d'évaluation des technologies et des modes d'intervention en santé (AETMIS) http://www.aetmis.gouv. qc.ca	Cancer Telemedicine	No publications related to teleoncology
Agency for Healthcare Research and Quality (AHRQ) http://www.ahrq.gov (1990 to 1999)	Technology assessment	No publications related to teleoncology
Alberta Heritage Foundation for Medical Research (AHFMR), Health Technology Assessment Unit http://www.ahfmr.ab.ca/hta	Cancer	No publications specific to teleoncology
BIOSIS Previews (1997 to 2006)	1. (teleradiology or telepathology or tele-pathology or teledermatology or ehealth or e-health or emedicine or e-medicine or telecare or tele-care or telehomecare or tele-homecare or telehome-care or telenursing or tele-nursing or teleconsult* or tele-consult* or telecommunication* or tele-communication*) 2. (teleradiology or telepathology or tele-pathology or teledermatology or ehealth or e-health or emedicine or e-medicine or telecare or tele-care or telehomecare or tele-homecare or telehome-care or telenursing or tele-nursing or teleconsult* or tele-consult* or telecommunication* or tele-communication*) 3. (television or internet or intranet or video-assisted or digital hospital* or video telecommunication* or videotelecommunication* or telemonitor* or tele-monitor* or satellite communication* or web*)	2318 references

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[i] The literature search was conducted between 15 November 2005 and 15 January 2006. The following limits were included for all databases: English, Human, 1995-2005. When the time limit was different, the information is indicated in parentheses.

Database/source[ii]	Search terms[iii]	Outcomes
Databases (continued)		
	4. (tele-oncology or teleoncology or e-oncology) 5. (neoplasms or cancer or oncology*) 6. #3 OR #2 OR #1 7. #5 OR #4 8. #7 AND #6	
British Columbia Office of Health Technology Assessment (BCOHTA) http://www/chspr.ubc.ca	Cancer	No publications related to teleoncology
Canadian Coordinating Office for Health Technology Assessment: CCOHTA https://www.ccohta.ca/entry_e.html	Cancer Internet AND cancer Remote consultation AND cancer Telemedicine AND cancer Telemedicine AND neoplasm Telemedicine AND oncology Teleoncology	No publications related to teleoncology
Centre for Health Economics and Policy Analysis (CHEPA), McMaster University http://www/chepa.org	Cancer Telemedicine	No publications related to teleoncology
Centre for Health Economics Research and Evaluation http://www.chere.uts.edu.au/index. html	Cancer	No publications related to teleoncology
Centre for Reviews and Dissemination, University of York: CRD All databases: DARE, NHS EED, and HTA http://www.york.ac.uk/inst/crd/crddatabases.htm	Internet AND cancer Telemedicine AND cancer Telemedicine AND neoplasm Telemedicine AND oncology Teleoncology	94 references
The Cochrane Library	Teleoncology OR tele-oncology Telemedicine OR remote consultation AND oncology	Nine publications
The Cochrane Library Health Technology Assessment Database	Cancer	No publications related to teleoncology

Database/source[ii]	Search terms[iii]	Outcomes
Databases (continued)		
Cumulative Index Nursing and Allied Health Literature: CINAHL (Ovid)	eHealth OR e-health AND oncology eMedicine OR e-medicine AND oncology Internet AND cancer Online AND cancer Online AND cancer AND support group Remote AND (monitoring OR consultation) AND oncology Rural areas OR rural health OR rural health centers OR rural health nursing OR rural health personnel or rural health services AND cancer Rural areas OR rural health OR rural health centers OR rural health nursing OR rural health personnel or rural health services AND oncology Satellite communications AND oncology Telecare OR telehealth OR telehomecare OR tele-homecare OR telenursing AND cancer Telecare OR telehealth OR telehomecare OR tele-homecare OR Telenursing AND oncology Teleconference AND (medicine OR medical OR health) AND oncology Teleconference AND oncology Telecommunications AND oncology Teleconsultation AND oncology Teleeducation OR tele-education AND cancer Teleeducation OR tele-education AND oncology Telehomecare OR tele-homecare AND Oncology Telemedicine OR remote consultation AND Oncology Telematic AND oncology Teleoncology OR tele-oncology Telephone support AND cancer Teleprevention AND oncology Telesupport AND oncology videoconference AND oncology	765 references

Database/source[ii]	Search terms[iii]	Outcomes
Databases (continued)		
EMBASE	1. exp CANCER DIAGNOSIS/ or exp CANCER RADIOTHERAPY/ or exp CANCER ADJUVANT THERAPY/ or exp CANCER PATIENT/ or exp CANCER PALLIATIVE THERAPY/ or exp CANCER/ or exp cancer center/ (200178) 2. (television or internet or intranet or video-assisted or digital hospital? or video telecommunication? or videotelecommunication? or telemonitor? or tele-monitor# or satellite communication?).mp. (25728) 3. exp telemedicine/ (5307) 4. exp neoplasms/ or cancer.mp. or oncolog#.mp. (1038839) 5. (tele-oncology or teleoncology or e-oncology).mp. (8) 6. (teleradiology or telepathology or tele-pathology or Teledermatology or ehealth or e-health or emedicine or e-medicine or telecare or tele-care or telehomecare or tele-homecare or telehome-care or telenursing or tele-nursing or teleconsult# or tele-consult# or telecommunication? or tele-communication? or teleeducation or tele-education or tele-matic? or telematic? or telesupport or tele-support or teleprevention or tele-prevention or remote consult# or telesurgery or tele-surgery or virtual reality or videophone? or video-phone? or telehospice or tele-hospice or telepalliative or tele-palliative or telepsychiatry or tele-psychiatry or telepsychology or tele-psychology or hotline? or helpline? or healthline? or triage or telepharmac? or tele-pharmac? or tele-nurs# or telenurs# or tele-rehabilitation or telerehabilitation or telemental or tele-mental or web or tele-center? or tele-centre? or telecentre? or telecenter? or tele-visit? or televisit?).mp. (20686) 7. ((1 or 4) and (2 or 3 or 6)) or 5 (3762)	2885 references
Google Scholar	Telemedicine AND oncology Teleoncology Videoconference AND oncology	1358 hits
Health Data Management http://www.healthdata management. com	Oncology Telehealth Telemedicine Teleoncology	174 hits – mainly related to electronic medical record

Database/source[ii]	Search terms[iii]	Outcomes
Databases (continued)		
Health Management Technology http://www.healthmgttech.com	Telemedicine AND oncology Teleoncology	190 hits – mainly related to computer-based applications
Journal of the American Informatics Association 1995 to Jan 2005 (table of contents available online) http://www.jamia.org	Teleoncology	Two references
INSPEC (1997 to 2005)	Cancer and Internet Cancer and (telemedicine or telehealth or Internet or tele-health or tele-medicine)	238 references
Institute for Clinical Evaluative Sciences http://www.ices.on.ca	Cancer	No publications related to teleoncology
Institute of Health Economics http://ihe.ab.ca	Cancer	No publications related to teleoncology
Journal of Medical Internet Research 1999 to 2005 all issues and supplements www.jmir.org	Teleoncology	21 references
Journal of Telemedicine and Telecare 1996 to 2005 (table of contents available online) http://www.rsmempress.co.uk/jtt. htm	Teleoncology	66 references
Journal of the American Medical Informatics Association 1995 to Jan 2005 (table of contents available online) http://www.jamia.org	Teleoncology	Two references
National Cancer Institute (NCI) – US National Institutes of Health http://www.cancer.gov	Telehealth Telemedicine	29 hits

Database/source[ii]	Search terms[iii]	Outcomes
Databases (continued)		
National Guideline Clearinghouse	Telemedicine AND oncology Teleoncology	No publications related to teleoncology
Oncology net guide Jan 2002 to Oct 2005 (table of contents available online) http://www.oncology netguide. com	Teleoncology	No publications specific to teleoncology that met the inclusion and exclusion criteria
PsycInfo (1997 to 2006)	1. (teleradiology or telepathology or telepathology or teledermatology or ehealth or e-health or emedicine or e-medicine or telecare or tele-care or telehomecare or tele-homecare or telehome-care or telenursing or tele-nursing or teleconsult# or tele-consult# or telecommunication? or tele-communication? or teleeducation or tele-education or tele-matic? or telematic? or telesupport or tele-support or teleprevention or tele-prevention or remote consult# or telesurgery or tele-surgery or virtual reality or videophone? or video-phone? or telehospice or tele-hospice or telepalliative or tele-palliative or telepsychiatry or tele-psychiatry or telepsychology or tele-psychology or hotline? or helpline? or healthline? or triage or telepharmac? or tele-pharmac? or tele-nurs# or telenurs# or tele-rehabilitation or telerehabilitation or telemental or tele-mental or tele-centre? or tele-center? or telecenter? or telecentre or televisit? or tele-visit?).mp. or exp telemedicine/ (3266) 2. (television or internet or intranet or video-assisted or digital hospital? or video telecommunication? or videotelecommunication? or telemonitor? or tele-monitor# or satellite communication? or web#).mp. (12081) 3. (tele-oncology or teleoncology or e-oncology).mp. (1) 4. exp neoplasms/ or cancer.mp. or oncolog#. mp. (15229) 5. ((1 or 2) and 4) or 3 (170)	152 references

Database/source[ii]	Search terms[iii]	Outcomes
Databases (continued)		
Sciru	Teleoncology	90 hits
Technology Assessment Unit of the McGill University Health Centre http://www/mcgill.ca/tau/	Cancer	No publications related to teleoncology
Telemedicine Information Exchange http://tie.telemed.org/biblio/	Teleoncology	28 references
Telemedicine Journal and E-health (March 1999 to October 2005) http://wwww.liebert pub.com/ TMJ/	Teleoncology	Four references
Telemedicine Today 1995 to 2002 (table of contents available online) http://www2.telemed today.com	Teleoncology	No publications specific to teleoncology that meet the inclusion and exclusion criteria
PubMed	eHealth OR e-health AND oncology eMedicine OR e-medicine AND oncology Internet AND cancer Online AND cancer Online health AND oncology Remote AND (monitoring OR consultation) AND oncology Teleconsultation AND oncology Telediagnosis AND oncology Teleducation OR tele-education AND oncology Telehealth AND oncology Telehomecare OR tele-homecare Telehomecare OR tele-homecare AND oncology Telehospice Telemedicine OR remote consultation AND oncology Telenursing Teleoncology OR tele-oncology Telepathology AND oncology Telepharmacy Teleprevention Teleradiatherapy Telerehabilitation Telescreening Telesurgery AND oncology Videoconference AND oncology	2096 references

Database/source[ii]	Search terms[iii]	Outcomes
Databases (continued)		
Web of Science: Citation Index and Social Sciences Citation Index (1997 to 2006)	Same as BIOSIS Previews	2071 references

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[ii] The databases suggested in the AHFMR telecardiology systematic review[4] provided initial guidance for the search strategy. The AHFMR publication Health technology assessment on the net: A guide to Internet sources of information and an article published by Allen and March[135] provided additional guidance for searching the reliable and relevant internet sites and electronic journals.

[iii] MeSH terms of PubMed and search terms used by Jennett et al.[5] in the State of the science report were the primary strategies used to increase comprehensiveness and reduce the ambituity of the search.

Appendix B: Scoresheets for Study Appraisal

Scoresheet for Quantitative Studies

Date: Appraiser:

Author(s):

Year:

Title:

Study Performance – circle the relevant score

Patient Selection	Present	Incomplete	Absent
Methods of randomization/selection. Equivalence of intervention and control groups. Dropouts prior to commencement of intervention.	2	1	0
Description/specifications of the interventions			
Adequate description for both intervention and control groups.	2	1	0
Specification and analysis of study			
Sample size; statistical methods used; clear specification of outcome measure.	2	1	0
Patient disposal			
Length of follow-up; dropouts; compliance failures.	2	1	0
Outcomes reported			
Fullness and clarity of reporting. Missing results; statistical summary. Whether conclusions were consistent with data.	2	1	0

Study Design – circle the relevant score

Patient Selection	Study Performance Score
Large RCT	5
Small RCT	3
Prospective, non-randomized comparative	2
Retrospective comparative	1
Non-controlled series	0

Total Quality Score (Performance + Design) =

Consensus Score =

Final (Mean) Score =

Scoresheet for Qualitative Studies

Date: Appraiser:

Author(s):

Year:

Title:

Study Performance – circle the relevant score

Research Question	Present	Incomplete	Absent
Methods of randomization/selection. Equivalence of intervention and control groups. Dropouts prior to commencement of intervention.	2	1	0
Research Design			
Adequate description for both intervention and control groups.	2	1	0
Sampling			
Sample size; statistical methods used; clear specification of outcome measure.	2	1	0
Data Collection			
Length of follow-up; dropouts; compliance failures.	2	1	0
Data Analysis			
Fullness and clarity of reporting. Missing results; statistical summary. Whether conclusions were consistent with data.	2	1	0
Results			
Fullness and clarity of reporting. Results link to research question.	2	1	0

Total Quality Score (Performance + Design) =

Consensus Score =

Final (Mean) Score =

Scoresheet for Economic Studies

Date: Appraiser:

Author(s):

Year:

Title:

Criteria – circle the relevant score

	Present	Absent
1) Was a well-defined question posed in answerable form?	1	0
2) Was a comprehensive description of the competing alternative given?	1	0
3) Was the effectiveness of the programmes or services established?	1	0
4) Were all the important and relevant costs and consequences for each alternative identified?	1	0
5) Were costs and consequences measured accurately in appropriate physical units?	1	0
6) Were costs and consequences valued credibly?	1	0
7) Was an incremental analysis of costs and consequences of alternatives performed?	1	0
8) Was allowance made for uncertainty in the estimates of costs and consequences?	1	0
9) Did the presentation and discussion of the study results include all issues of concern to users?	1	0

Summary Score =

Final Consensus Score =

Classification of Satisfaction Studies

Date: Appraiser:

Author(s):

Year:

Title:

Criteria – indicate by a check mark when criteria is present or absent

	Present	Absent
1) Reference to satisfaction with the service in the text; no details provided.		
2) Simple questionnaire approach; no comparison with a non-telemedicine alternative.		
3) Questionnaire with implied comparative component.		
4) Questionnaire with specific comparison questions.		
5) Comparative study, with simple outcome measures.		
6) Comparative study satisfaction outcome measures developed further statistical summary.		
7) Randomized study.		

Summary Score =

Final Consensus Score =

APPENDIX C: FINAL SELECTION FOR BACKGROUND OR DESCRIPTION OF TELEONCOLOGY APPLICATIONS

I = Internet-Based Applications

T = Telephone-Based Applications

V = Video-Based Applications

B = Background Information (including definitions; * = review, ** = systematic review)

C = Described Application in Cancer Continuum of Care (1= Prevention, 2 = Screening, 3 = Diagnosis and Treatment, 4 = Psychosocial and Supportive Care, 5 = Rehabilitation, 6 = Palliative Care)

S = Study for Assessment of Quality and Reliability (1 = Clinical study: Quantitative approach, 2 = Clinical study: Qualitative approach, 3 = Clinical study: Mixed methods approach, 4 = Cost study, 5 = Satisfaction study)

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Allen A, March A Telemedicine at the community cancer centre **Oncology Issues**	2002 USA	To describe the use of telemedicine at the University of Kansas Medical Centre. The Centre operates a number of remote clinics to bring oncology services to people in rural areas.			X		3	
Allen A, Hayes J Patient satisfaction with teleoncology: a pilot study **Telemedicine Journal**	1995 USA	To assess levels of satisfaction among rural cancer patients being seen for clinic visits by their remote university-based oncologist, using interactive videoconferencing.			X		3	5
Alter CL et al. Supportive telephone intervention for patient receiving chemotherapy: a pilot study **Psychosomatics**	1996 USA	To assess the feasibility of a psycho-educational intervention over the telephone for cancer patients receiving chemotherapy.		X			4	
Atlas I et al. Videoconferencing for gynaecological cancer care: an international tumour board **Journal of Telemedicine and Telecare**	2000 Israel	To illustrate through three case reports the operation of the International Tumour Board.			X		3	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Axford AT et al. Virtual multidisciplinary teams for cancer care **Journal of Telemedicine and Telecare**	2002 UK	To describe the use of telemedicine in cancer care using a team-building tool allowing case reviews and development of plan of care.			X		3	
Badger T et al. Telephone interpersonal counseling with women with breast cancer: symptom management and quality of life **Oncology Nursing Forum**	2005 USA	To examine the effectiveness of telephone interpersonal counselling intervention (TIP-C) compared with usual care attentional control for symptom management (depression and fatigue) and quality of life (positive and negative affect, stress) for women with breast cancer.	X				4	1
Badger T et al. A case study of telephone interpersonal counseling for women with breast cancer and their partners **Oncology Nursing Forum**	2004 USA	To present a single case study of one woman with breast cancer and her partner to provide a firsthand account of an innovative telephone interpersonal counselling intervention.	X				4	
Barry N et al. Implementation of videoconferencing to support a managed clinical network in Scotland: lessons learned during the first 18 months **Journal of Telemedicine and Telecare**	2003 UK	To describe the use of videoconferencing to support the gynecological oncology managed clinical network in the West of Scotland and the key factors affecting success and sustainability.			X		3	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Basch E et al. Patient online self-reporting of toxicity symptoms during chemotherapy **Journal of Clinical Oncology**	2005 USA	To describe the patterns of patients' use of a web-based system that allows self-reporting of toxicity symptoms during chemotherapy.	X				3	1 & 5
Bauman G et al. A pilot study of regional participation in a videoconferenced multidisciplinary genitourinary tumor board **The Canadian Journal of Urology**	2005 Canada	To describe the implementation of a multidisciplinary genitourinary tumour board and measure physician satisfaction.			X		3	
Bessell TL et al. Do Internet interventions for consumers cause more harm than good? A systematic review. **Health Expectations**	2002 Australia	To systematically review the effect of consumer use of online health information on decision making, attitudes, knowledge, satisfaction, and health outcomes.				**		
Bielli E et al. A wireless health outcomes monitoring system (WHOMS): development and field testing with cancer patients using mobile phones **BMC Medical Informatics and Decision Making**	2004 Italy	To develop a new system for transmitting patients' self-reported outcomes using mobile phones or the internet, and to test whether patients can and will use the system via a mobile phone.	X	X			3	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Billingsey KG et al. The development of a telemedical cancer center within the Veterans Affairs health care system: a report of preliminary clinical results **Telemedicine Journal and e-health**	2002 USA	To describe the organization and function of the telemedical cancer centre and to report early clinical results.			X		3	
Bohnenkamp SK et al. Traditional versus telenursing outpatient management of patients with cancer with new ostomies **Oncology Nursing Forum**	2004 USA	To measure the impact of telenursing technology on patients discharged with new ostomies related to a cancer diagnosis.			X		3	1 & 4 & 5
Bowen DJ et al. Early experience with a web-based intervention to inform risk of breast cancer **Journal of Health Psychology**	2003 USA	To present early data on the use patterns and predictors of use of a web-based intervention (breast health education) in a population-based subsample of women aged 18 to 74.	X				1	
Braden C et al. Self-help intervention project: women receiving breast cancer treatment **Cancer Practice**	1998 USA	To determine the efficacy of self-care/self-help promotion and uncertainty management interventions offered by the Self-Help Intervention Project (SHIP) for women receiving treatment for breast cancer.		X			4	1

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Broadstock M, Borland R Using information for emotion-focused coping: cancer patients' use of cancer helpline **British Journal of Health Psychology**	1998 UK	To investigate the role of information in coping through use of a cancer-specific helpline by 101 adults with cancer.		X			4	1 & 5
Broom A The emale: prostate cancer, masculinity and online support as a challenge to medical expertise **Journal of Sociology**	2005 UK	To explore experiences of online support groups.	X				4	
Broom A Virtually healthy: the impact of Internet use on disease experience and doctor-patient relationship **Qualitative Health Research**	2005 UK	To investigate how access to information and online support affects men's experience of disease and, in particular, the possible implications of the internet-informed patients for the doctor-patient relationship.	X				4	2
Bucher JA, Houts PS Problem-solving through electronic bulletin boards **Journal of Psychosocial Oncology**	1999 USA	To describe two computer-driven s ources of information and support: the CHESS Program and the Telepractice and COPELINE systems, which are specifically designed to reinforce problem-solving learning among family caregivers of people with cancer.	X	X			4	
Campbell NC et al. Systematic reviews of cancer treatment programmes in remote and rural areas **British Journal of Cancer**	1999 UK	To review published evidence about programmes that have set out to provide oncology services in remote and rural areas in order to identify evidence of effectiveness and problems.				**		

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Carlsson ME et al. Telephone help line for cancer counseling and cancer information **Cancer Practice: A Multidisciplinary Journal of Cancer Care**	1996 Sweden	To assess the experience of the telephone helpline after 3 years of operation and to compare the results with telephone services in other countries.		X			4	
Chen X, Siu LL Impact of the media and the Internet on oncology: survey of cancer patients and oncologists in Canada **Journal of Clinical Oncology**	2001 Canada	To evaluate the use of the news media and the internet as sources of medical information by patients and oncologists in Canada and to investigate the impact on patients' treatment decisions and the patient-doctor relationship.	X				4	
Church J et al. Voices and faces: a qualitative study of rural women and a breast cancer self-help group via an audio teleconferencing network **Centres of Excellence for Women's Health Research Bulletin**	1999 Canada	To develop an explanatory model of the use of audioteleconferencing in the provision of social support to survivors of breast cancer among women living in rural Newfoundland.		X			4	
Cluver JS et al. Remote psychotherapy for terminally ill cancer patients **Journal of Telemedicine and Telecare**	2005 USA	To assess the feasibility of using remote psychotherapy in terminal cancer patients with diagnoses of adjustment disorder or major depression.			X		6	
Coile RC The digital transformation of health care **The Physician Executive**	2000 USA	To describe opportunities offered by the internet in healthcare delivery.				X		

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Colón Y Telephone support groups: a nontraditional approach to reaching underserved cancer patients **Cancer Practice**	1999 Canada	To develop an explanatory model of the use of audioteleconferencing in the provision of social support to survivors of breast cancer among women living in rural Newfoundland.		X			4	
Cook Gotay CC, Bottomley A Providing psycho-social support by telephone: what is its potential in cancer patients? **European Journal of Cancer Care**	1998 USA & Belgium	To assess the feasibility of telephone-based psychosocial interventions and the most effective delivery method and cost-effectiveness, and to identify the patient group that can benefit the most.				*		
Coyle N et al. Audio-visual communication and its use in palliative care **Journal of Pain and Symptom Management**	2002 USA	To report the results of a 3-month trial of using audiovisual communications as a complementary tool in care for a complex palliative care patient.			X		6	
Crane L et al. Effectiveness of a telephone outcall intervention to promote screening mammography among low-income women **Preventive Medicine**	1998 USA	To evaluate the impact of a telephone outcall intervention (based on the Transtheoretical Model) on screening mammography behaviour among lower income, older women.		X			2	1
Curran VR, Church JG A study of rural women's satisfaction with a breast cancer self-help network **Journal of Telemedicine and Telecare**	1999 Canada	To report the evaluation of a pilot project to facilitate a self-help peer support group network for rural women with breast cancer.		X			4	5

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Curran VR, Church JG Not alone: peer support through audio teleconferencing for rural women with breast cancer **Canadian Medical Association Journal**	1998 Canada	To describe a pilot project to facilitate a self-help peer support group network for rural women with breast cancer.		X			4	
Davis NA et al. Evaluation of three methods for improving mammography rates in managed care plan **American Journal of Preventive Medicine**	1997 USA	To identify which of three methods was most effective in increasing mammography rates in a managed care population. The three methods were (1) birthday card reminder, (2) birthday card reminder with letter from medical director and materials promoting mammography, and (3) birthday card and a multi-component telephone call (scheduling and counselling).		X			2	1
Davison AG et al. Telemedicine for multidisciplinary lung cancer meetings **Journal of Telemedicine and Telecare**	2004 UK	To describe the use of telemedicine for multidisciplinary lung cancer meetings.			X		3	
De Conno F, Martini C Video communication and palliative care at home **European Journal of Palliative Care**	1997 Italy	To describe the video-assistance project for assessing palliative cancer patients in their home.			X		6	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Delaney G et al. Comparison of face-to-face and videoconferenced multidisciplinary clinical meetings **Australasian Radiology**	2004 Australia	To test the feasibility of improving access to multidisciplinary clinical discussions through videoconferencing and to analyze the differences in interpersonal behaviour that occurred when breast cancer clinical meetings were changed from a face-to-face format to videoconferences.			X		3	
DeLenardo C Web-based tools steer patient-focused care **Nursing Management**	2004 Canada	To outline how one facility linked oncology patients to programs and services through a web-based portal.	X			X	3	
Demichelis F et al. Design and initial implementation of a regional tele-oncology project **Journal of Telemedicine and Telecare**	2000 Italy	To describe the design and implementation of an oncology teleconsultation service.				X		
Dezzani Martin S, Berry Youngren K Help on the Net: Internet support groups for people dealing with cancer	2002 USA	To review internet support groups, an effective alternative to standard support groups for those dealing with cancer who cannot or do not wish to leave home.	X			X	4	
Doll R et al. Improving access to psychosocial/ supportive care: an investigation of the potential of technology **British Columbia Cancer Agency Sociobehavioural Research Centre**	2004 Canada	To explore the potential of telecommunication technologies to improve access to psychosocial care for cancer patients and their families.				*		

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Donnelly JM et al. A pilot study of interpersonal psychotherapy by telephone with cancer patients and their partners **Psycho-Oncology**	2000 USA	To test the feasibility of telephone interpersonal psychotherapy (IPT) for cancer patients and their partners during oncology treatment and to preliminarily examine its efficacy in reducing psychological distress.		X			4	1 & 5
Doolittle GC, Spaulding A Online cancer services: types of services offered and associated health outcomes **Journal of Medical Internet Research**	2005 USA	To discuss various types of cancer services that are available online and address both positive and negative health outcomes that have been linked to utilizing such services.				*		
Doolittle GC et al. An empirical chart analysis of the suitability of telemedicine for hospice visits **Telemedicine and e-Health**	2005 USA	To conduct a needs assessment for a project that will study the utilization, acceptance, diagnostic, accuracy, and cost of telehospice.				*		
Doolittle GC et al. A cost analysis of a teleoncology practice in the United States **Journal of Telemedicine and Telecare**	2004 USA	To analyze the costs associated with providing teleoncology clinics to a rural Kansas town for two fiscal years, 1995 and 2000.			X	X	3	4
Doolittle GC Telemedicine in Kansas: the successes and the challenges **Journal of Telemedicine and Telecare**	2001 USA	To describe the experience of implementing telemedicine in Kansas, including teleoncology and telehospice.			X	X	6	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Doolittle GC A cost measurement study for a home-based telehospice service **Journal of Telemedicine and Telecare**	2000 USA	To measure costs for traditional hospice care, as well as those associated with launching and operating a telehospice service.			X	X	6	4
Doolittle GC et al. Hospice care using home-based telemedicine **Journal of Telemedicine and Telecare**	1998 USA	To describe the feasibility and implementation of a telehospice project developed collaboratively between the University of Kansas Medical Centre and the Kendallwood Hospice.			X		6	
Doolittle GC et al. A cost measurement study for a tele-oncology practice **Journal of Telemedicine and Telecare**	1998 USA	To measure the costs of providing oncology services through conventional clinics (patient seen by oncologist at the hospital), closer to home service (oncologist traveling from a central hospital to rural areas), or using telemedicine clinics.			X	X	3	
Doolittle GC et al. A cost analysis of a teleoncology practice **Journal of Telemedicine and Telecare**	1997 USA	To measure the costs of providing oncology services through conventional clinics (patient seen by oncologist at the hospital), closer to home service (oncologist traveling from a central hospital to rural areas), or using telemedicine clinics.			X	X	3	
Doolittle GC, Allen A Practicing oncology via telemedicine **Journal of Telemedicine and Telecare**	1997 USA	To describe the role of telemedicine in the practice of clinical oncology (includes a definition for teleoncology).			X	X	3	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Doolittle GC, Allen A From acute leukemia to multiple myeloma: clarification of a diagnosis using tele-oncology **Journal of Telemdicine and Telecare**	1996 USA	To describe the use of telemedicine to diagnose multiple myeloma through the use of videoconsultation with family physician and patient.			X		3	
Edgar L et al. Providing Internet lessons to oncology patients and family members: a shared project **Psycho-Oncology**	2002 CAN	To examine the feasibility and outcomes of presenting one-to-one internet training sessions to patients with cancer and their family members.	X			X	4	
Eysenback G The impact of the Internet on cancer outcomes **CA: A Cancer Journal for Clinicians**	2003 USA	To summarize the available evidence on how cancer patients use the internet and how it impacts them.	X			*	4	
Ferrer-Roca O, Subirana R A four year study of telephone support for oncology patients using a non-supervised call centre **Journal of Telemedicine and Telecare**	2002 Spain	To compare the numbers of outreach visits and hospital visits before and one year after implementation of the service.		X			3	1 & 4
Finfgeld DL Therapeutic groups online: the good, the bad, and the unknown **Issue in Mental Health Nursing**	2000 USA	To present seminal findings regarding advantages and disadvantages of online therapeutic groups.				X		

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Fleisher L et al. Relationships among Internet health information use, patient behaviour, and self-efficacy in newly diagnosed cancer patients who contact the National Cancer Institute's (NCI) Atlantic Region Cancer Information Service (CIS) **Proceeding of the AMIA Annual Symposium**	2002 USA	To examine the relationship between the use of health-related information from the internet by people newly diagnosed with cancer and patient task behaviour and perceived self-efficacy.	X				4	1
Fogel J Internet breast health information use and coping among women with breast cancer **CyberPsychology & Behavior**	2004 USA	To study, among breast cancer patients, if internet health information use is associated with coping.	X				4	1
Fogel J et al. Racial/ethnic differences and potential psychological benefits in use of the Internet by women with breast cancer **Psycho-Oncology**	2003 USA	To investigate potential psychological benefits of internet use and how it varied as a function of race and ethnicity.	X				4	
Fogel J et al. Internet use and social support in women with breast cancer **Health Psychology**	2002 USA	To investigate psychological benefits associated with internet use among breast cancer patients seeking information related to breast health issues.	X				4	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Frosch DL et al. A randomized controlled trial comparing Internet and video to facilitate patient education for men considering prostate specific antigen test **Journal of General Internal Medicine**	2003 USA	To compare the clinical effectiveness of an internet-based decision aid with a video for educating men about issues relevant to prostate-specific antigen (PSA) screening.	X				2	1 & 5
Gagliardi A et al. Feasibility study of multidisciplinary oncology rounds by videoconference for surgeons in remote locales **BMC Medical Informatics and Decision Making**	2003 Canada	To assess the feasibility of using videoconferencing to involve community-based surgeons in interactive, multidisciplinary oncology rounds.			X		3	
George D Teleconferencing support: women with secondary breast cancer **International Journal of Palliative Nursing**	1998 UK	To describe teleconferencing as a new, cost-effective approach to providing psycho-social support for women with secondary breast cancer.		X			4	5
Glajchen M, Moul JW Teleconferencing as a method of educating men about managing advanced prostate cancer and pain **Journal of Psychosocial Oncology**	1996 USA	To describe a telephone-based interdisciplinary educational intervention delivered to 197 men diagnosed with prostate cancer.		X			4	5

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Goldsmith D et al. Improving cancer related symptom management with collaborative healthware **MEDINFO**	2004 USA	To demonstrate the system's potential to enhance communication and clinical decision making between patients and their providers.	X				3	
Gustafson D et al. Use and impact of eHealth system by low-income women with breast cancer **Journal of Health Communication**	2005 USA	To determine how low-income women with breast cancer use the e-Health system and its impact.	X				4	
Heiney SP et al. Evaluation of a therapeutic group by telephone for women with breast cancer **Journal of Psychosocial Oncology**	2003 USA	To determine whether (1) therapeutic factors were operational within the group, (2) differences in group climate were reported, and (3) therapeutic factors could be identified from group transcripts.		X			4	1
Høybye NT et al. Online interaction effects of storytelling in an internet breast cancer support group **Psycho-Oncology**	2005 Denmark	To explore how support groups on the internet can break the social isolation that follows cancer, by analyzing the storytelling emerging on the Scandinavian Breast Cancer Mailing List.	X				4	2
Hunter DC et al. Teleoncology in the department of defense: a tale of two systems **Telemedicine Journal**	1999 USA	To describe the infrastructure and cost, consultative process, technical aspects, and conference format of two teleoncology programs.	X		X		3	
Kane B et al. Enabling change in healthcare structures through teleconferencing **Trinity College**	2005 Ireland	To examine how the work of a multidisciplinary team is affected by extending the meeting to remote locations.				X		

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Kaunonen M et al. Oncology ward nurses' perspectives of family grief and a supportive telephone call after the death of a significant other **Cancer Nursing**	2000a Finland	To increase existing knowledge about nurses' support to a grieving family by describing (1) family grief and mourning as nurses perceive it, and (2) nurses' experience of the supportive telephone call as a finishing point of family nursing.		X			6	2 & 5
Kaunonen M et al. The impact of supportive telephone call intervention on grief after the death of a family member **Cancer Nursing**	2000b Finland	To describe the impact of a supportive telephone call on grief 4 months after the death of a family member.		X			6	3
Kedar I et al. Internet based consultations to transfer knowledge for patients requiring specialized care: retrospective case review **British Medical Journal**	2003 USA	To assess whether transferring knowledge from specialists at centres of excellence to referring doctors through online consultations can improve the management of patients requiring specialized care.	X				3	1
Klemm P et al. Online cancer support groups **Computers, Informatics, Nursing**	2003	To explore current research on online cancer support groups.	X			**	4	
Klemm P, Hardie H Depression in internet and face-to-face cancer support groups: a pilot study **Oncology Nursing Forum**	2002 USA	To examine depression in internet cancer support groups as compared with traditional (face-to-face) cancer support groups and to explore the relationship between internet use and levels of depression.	X				4	1

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Kuebler KK, Bruera E Interactive collaboration consultation model in end-of-life care **Journal of Pain and Symptom Management**	2000 USA	To describe the development of the interactive collaborative consultation model and its demonstration between a rural palliative care nurse practitioner and an urban medical research physician.	X				6	
Kunkler IH et al. A pilot study of tele-oncology in Scotland **Journal of Telemedicine and Telecare**	1998 UK	To explore the feasibility of teleconsultations between healthcare professionals.			X		3	5
Lamberg L Online support group helps patients live with, learn more about rare skin cancer CTCL-MF **JAMA**	1997 USA	To describe an online support group for patients with rare skin cancer CTCL-MF.	X				4	
Lieberman MA, Goldstein BA Self-help on-line: an outcome evaluation of breast cancer bulletin boards **Journal of Health Psychology**	2005 USA	To test the effectiveness of self-directed internet groups in providing help to participants.	X				4	1
Lieberman MA et al. Electronic support groups for breast carcinoma: a clinical trial of effectiveness **Cancer**	2003 USA	To examine the feasibility of providing electronic support groups (ESGs) for women with breast carcinoma.	X				4	1

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
London JW et al. The implementation of telemedicine within a community cancer network **Journal of the American Medical Informatics Association**	1997 USA	To describe the implementation of telemedicine within a community cancer network.			X		3	
Mair F et al. Patients' perceptions of a telemedicine specialty clinic **Journal of Telemedicine and Telecare**	2000 USA	To elicit cancer patients' views of telemedicine consultations.			X		3	2 & 5
Malbaša V Telemedicine and oncology **Annals of the Academy of Studenica**	2001 Yugoslavia	To provide a definition for teleoncology and examples of the use of the technology for cancer patients.				X		
Marcus AC et al. Increasing fruit and vegetable consumption among callers to the CIS: results from a randomized trial **Preventive Medicine**	2002 USA	To describe the types of clients who call the Cancer Information and Counseling Line, their topics of inquiry, and the potential contributions of telephone-based counselling programs in psycho-oncology.		X		X	4	
Marcus AC et al. Increasing fruit and vegetable consumption among callers to the CIS: results from a randomized trial **Preventive Medicine**	1998 USA	To test an educational intervention to increase fruit and vegetable consumption among callers to the Cancer Information Service (CIS).		X			1	1

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Marcus AC et al. A feasibility test of a brief educational intervention to increase fruit and vegetable consumption among callers to the cancer information service **Preventive Medicine**	1998 USA	To report the results from a pilot study designed to test the feasibility of a proactive educational intervention delivered to callers of the Cancer Information Service.		X			1	
McAleer JJA et al. Broadcast quality conferencing for oncology **The Oncologist**	2001 Ireland	To describe the broadcast-quality teleconferencing system developed in Ireland in order to address the need to convey expert information between larger cancer centres and their remote counterparts.			X	X	3	
McBride CM, Rimer BK Using the telephone to improve health behavior and health service delivery **Patient Education and Counseling**	1999 USA	To provide a broad overview of telephone interventions published in the past 10 years to identify gaps in knowledge about these services and make recommendations for future program development and evaluation.				**		
McDonald MV et al. Can just-in-time, evidence-based "reminders" improve pain management among health care nurses and their patients? **Journal of Pain and Symptom Management**	2005 USA	To test the effectiveness (including cost) of two-nurse targeted, e-mail-based interventions to increase home care nurses' adherence to pain assessment and management guidelines, and to improve patients' health outcomes.	X				6	1 & 4

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
McManus M Online support: Listservs offer women with metastatic cancer information and more **Advanced Breast Cancer**	2001 USA	To outline listservs available to women with metastatic cancer.	X				4	
McPherson CJ et al. Effective methods of giving information in cancer: a systematic literature review of randomized controlled trials **Journal of Public Health Medicine**	2001 UK	To systematically review randomized controlled trials that have evaluated methods of information giving to cancer patients and their families.				**		
McTavish FM et al Cultural differences in use of electronic discussion group **Journal of Health Psychology**	2003 USA	To investigate the mechanisms of effect of the Comprehensive Health Enhancement Support System (CHESS: http://chess.chsra.wisc.edu), with particular attention to explaining differential effects for disadvantaged women (women of colour).	X				4	3
Miller SM et al. Enhancing adherence following abnormal Pap smears among low-income minority women: a preventive telephone strategy **Journal of National Cancer Institute**	1997 USA	To test the effectiveness of a brief telephone counselling intervention directed to low-income, inner-city women after they had received an abnormal Pap smear result.		X			3	1

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Mishel MH et al. Helping patients with localized prostate carcinoma manage uncertainty and treatment side effects: nurse-delivered psychoeducational intervention over the telephone **Cancer**	2002 USA	To test the efficacy of an individualized uncertainty management intervention delivered by telephone to Caucasian and African-American men with localized prostate carcinoma and directed at managing the uncertainties of their disease and treatment.		X			4	1
Mooney KH et al. Telephone-linked care for cancer symptom monitoring **Cancer Practice**	2002 USA	To explore the feasibility of using a telephone-based computerized system to monitor post-chemotherapy symptoms. To assess the quality and usefulness of the symptom data obtained. To determine participant satisfaction, level of acceptability, and usability of the telephone-linked care (TLC)-Chemo alert application.						1 & 5
Murdock J et al. Aggressive natural killer cell leukemia/ lymphoma: case report, use of telesynergy and review of the literature **Leukemia & Lymphoma**	2004 Ireland	To describe the experience of the use of telesynergy to access specialty consultation for the treatment of natural killer cell malignancies.			X		3	
Myers C Telehealth applications in head and neck oncology **Journal of Speech-Language Pathology and Audiology**	2005 Canada	To describe the use of telehealth technology to provide speech-language pathology services to people living with head and neck cancer.			X		5	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Nguyen HQ et al. Internet-based patient education and support interventions: a review of evaluation studies and directions for future research **Computers in Biology and Medicine**	2004 USA	To systematically review studies that have evaluated the impact of professionally facilitated internet-based programs for diverse clinical populations on health outcomes, utilization, and user satisfaction.				**		
Olver I Telemedicine in oncology **Telemedicine and Teledermatology**	2003 Australia	To describe applications of oncology (includes a definition for teleoncology).				X		
Olver I, Selva-Nayagam S Evaluation of a telemedicine link between Darwin and Adelaide to facilitate cancer management **Telemedicine Journal**	2000 Australia	To evaluate the use of telemedicine between Darwin and Adelaide to facilitate cancer management.			X		3	
Owen JE et al. Randomized pilot of a self-guided Internet coping group for women with early-stage breast cancer **Annals of Behavioral Medicine**	2005 USA	To examine the effect and potential mechanisms of action of a self-guided, internet-based, coping-skills training group on quality-of-life outcomes in women with early-stage breast cancer.	X				4	1

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Owen JE et al. Improving the effectiveness of adjuvant psychological treatment for women with breast cancer : the feasibility of providing online support **Psycho-Oncology**	2004 USA	To report 2 phases of a feasibility study: Phase I: To assess internet access and perceived interest in online support among 136 women with breast cancer. Phase II: To document accrual rates among several methods of recruitment during a randomized trial and report changes over time in internet access.	X				4	
Passik SD et al. A feasibility study of Dignity Psychotherapy delivered via telemedicine **Palliative and Supportive Care**	2004 USA	To report the results of a feasibility study that used videophones to deliver Dignity Psychotherapy in patients' homes.			X		6	
Pierce JP et al. Feasibility of a randomized trial of a high-vegetable diet to prevent breast cancer recurrence **Nutrition and Cancer**	1997 USA	To describe the results of the randomized trial in which major change in dietary patterns was promoted using intensive telephone counselling.		X			1	
Poe M, DeVore LM Using the telephone for cancer information **Cancer Practice**	1996 USA	To provide an overview of the telephone-based resources available from two cancer-concerned organizations: National Cancer Institute and American Cancer Society.		X			4	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Reid Ruddy R et al. Participants' perceptions of a peer-helper, telephone-based social support intervention for melanoma patients **Health Communication**	2001 USA	To examine perceptions of a peer-helper, telephone-based, social support intervention for melanoma patients receiving immunotherapy.		X			4	1 & 5
Rock CL et al. Reduction in fat intake is not associated with weight loss in most women with breast cancer diagnosis: Evidence from a randomized controlled trial **American Cancer Society**	2001 USA	To describe the weight change observed in women enrolled in the Women's Healthy Eating and Living (WHEL) Study during their first year of participation.		X			1	1
Rodgers S, Chen Q Internet community group participation: psychosocial benefits for women with breast cancer **Journal of Computer-Medicated Communication**	2005 USA	To examine the psychosocial benefits of internet community group participation in women with breast cancer.		X			4	2
Samarel N et al. Effects of two types of social support and education on adaptation to early-stage breast cancer **Research in Nursing & Health**	2002 USA	To test a Roy adaptation model-based support and education intervention for women with early-stage breast cancer in a 3-group, 3-phase randomized clinical trial.		X			4	1

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Sangdren AK, McCaul KD Short-term effects of telephone therapy for breast cancer patients **Health Psychology**	2003 USA	To compare two brief therapies, delivered by telephone, intended to help women to cope with breast cancer.		X			4	1
Sangdren AK et al. Telephone therapy for patients with breast cancer **Oncology Nursing Forum**	2000 USA	To test the effectiveness of a telephone-administered cognitive-behavioural therapy in a study of patients with breast cancer.		X			4	1 & 5
Schultz PN Providing information to patients with a rare cancer: using Internet discussion forums to address the needs of patients with medullary thyroid carcinoma **Clinical Journal of Oncology Nursing**	2002 USA	To describe the use of e-mail groups to answer questions about medullary thyroid carcinoma.	X				4	
Schultz PN et al. Internet message board use by patients with cancer and their families **Clinical Journal of Oncology Nursing**	2003 USA	To describe an online message board for patients with cancer and their families.	X				4	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Scura KW et al. Telephone social support and education for adaptation to prostate cancer: a pilot study **Oncology Nursing Forum**	2004 USA	To evaluate the feasibility of an intervention of telephone social support and education to increase the physical, emotional, functional, and interpersonal adaptation of men to prostate cancer.		X			4	1
Sezeur A et al. Teleconsultation before chemotherapy for recently operated on patients **The American Journal of Surgery**	2001 France	To analyze the potential benefit of a videoconference consultation before chemotherapy for recently operated-on patients.			X		3	4 & 5
Sharf BF Communicating breast cancer on-line: support and empowerment on the internet **Women & Health**	1997 USA	To describe communication accruing through an online discussion group: Breast Cancer List.	X				4	
Sharp J The Internet: changing the way cancer survivors receive support **Cancer Practice**	2000 USA	To describe communication tools available on the internet.				X		

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Solberg S et al. Experiences of rural women with breast cancer receiving social support via audioconferencing **Journal of Telemedicine and Telecare**	2003 Canada	To examine the experiences of a sample of breast cancer survivors who had participated in an audioconferencing social support program.		X			4	2
Sorrentino C et al. Using the Intranet to deliver patient-education materials **Clinical Journal of Oncology Nursing**	2002 USA	To describe the use of the intranet to deliver patient education materials.	X				4	
Stalfors J et al. A cost analysis of participation via personal attendance versus telemedicine at a head and neck oncology multidisciplinary team meeting **Journal of Telemedicine and Telecare**	2005 Sweden	To evaluate the costs of presenting patients face to face versus telemedicine.			X		3	4
Stalfors J et al. Satisfaction with telemedicine presentation at a multidisciplinary tumour meeting among patients with head and neck cancer **Journal of Telemedicine and Telecare**	2003 Sweden	To determine patients' satisfaction with the multidisciplinary meeting and whether or not telemedicine affected patients' opinions of the care provided.			X		3	5

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Stalfors J et al. Accuracy of tele-oncology compared with face-to-face consultations in head and neck cancer case conferences **Journal of Telemedicine and Telecare**	2001 Sweden	To investigate whether the classification of the tumour or the treatment plan would depend on whether patients attend the conference in person or via telemedicine.			X		3	
Stevens L Online patient support: mostly a boom, but challenges remain **Medicine on the Net**	2004 USA	To outline advantages and challenges of online support for both patients and professionals.				X		
Street RL Mediated consumer-provider communication in cancer care: the empowering potential of new technologies **Patient Education and Counseling**	2003 USA	To present two health communication frameworks to help guide future research and development of innovative technologies for cancer care and education.				X		
Subirana-Serrate R et al. A cost-minimization anaiysis of oncology home care versus hospital care. **Journal of Telemedicine and Telecare**	2001 Spain	To compare the costs of patient care for 2 groups of 10 oncology patients.			X		3	4

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Sullivan CF Gendered cybersupport: a thematic analysis of two online cancer support groups **Journal of Health Psychology**	2003 USA	To obtain a deep understanding of the experience of participating in a virtual support group and to gain insight into the ways in which males support males and females support females online.	X				4	2
Sutherland G, White V Teachable moments in diet and nutrition for family and friends calling the Cancer Helpline **Australian and New Zealand Journal of Public Health**	2005 Australia	To outline opportunities for "teachable moments" to callers using the Cancer Helpline.		X			1	
Till JE Discussion groups on the Internet: journaling **The Canadian Journal of Oncology**	1995 Canada	To outline an example of the use of the internet: the e-mail based breast cancer discussion group.	X				4	
Till JE Discussion groups on the Internet: where to begin? **The Canadian Journal of Oncology**	1995 Canada	To outline an example of the use of the internet: the e-mail ovarian cancer discussion group	X				4	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Twomey C Telephone contacts with a cancer nurse specialist **Nursing Standards**	2000 UK	To audit the nature of telephone consultations with a Macmillan nurse specialist.		X			3	
Viswanath K The communications revolution and cancer control **Nature Reviews Cancer**	2005 USA	To highlight the opportunities offered by technologies to intervene and influence the trajectory of cancer control.				X		
Walsh SM et al. Individual support for family caregivers of seriously ill cancer patients **MEDSURG Nursing**	2004 USA	To describe and explore major sources of concerns for family caregivers as they care for seriously ill family members.		X			4	
Walsh SM, Schmidt LA Telephone support for caregivers of patients with cancer **Cancer Nursing**	2003 USA	To evaluate recruitment and intervention protocols for the Tele-Care II intervention. To test the feasibility of a pre-post test assessment package and to measure the results of the intervention.		X			4	
Ward JD et al. The value and impact of the cancer information service telephone service. Part 4 **Journal of Health Communication**	1998 USA	To evaluate knowledge and attitudes, changes, expected intentions of callers, and self-reported behaviour shifts.		X		4	1 & 5	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Weinerman B et al. Can subspecialty cancer consultations be delivered to communities using modern technology? A pilot study **Telemedicine and e-Health**	2005 Canada	To evaluate patient and physician acceptance of subspecialty oncologic teleconsultation for distant communities.		X		3	1 & 5	
Weinerman BH et al. Calling long-distance–is teleoncology the future of rural cancer treatment? **Oncology Exchange**	2003 Canada	To investigate the feasibility and acceptability of subspecialty teleconsultations.		X		3		
Whitten P et al. Creating a framework for online cancer services research to facilitate timely and interdisciplinary applications **Journal of Medical Internet Research**	2005 USA	To provide an overview of the contributions of recent studies on online cancer services that focus on utilization, information use, individual goals, and outcomes.			X			
Whitten PS, Mackert MS Addressing telehealth's foremost barrier: provider as initial gatekeeper **International Journal of Technology Assessment in Health Care**	2005 USA	To review literature concerning perceptions and to present data from 2 studies to support the hypothesis that the provider is the most important initial gatekeeper for telemedicine.				X		

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Whitten P et al. Telehospice in Michigan: use and patient acceptance **American Journal of Hospice & Palliative Medicine**	2004 USA	To examine the acceptance of telehospice from a patient's perspective.			X		6	5
Whitten P et al. Telehospice: end-of-life care over the lines **Nursing Management**	2003 USA	To outline the positive and negative predictors of telehospice use.			X		6	
Winzelberg AJ et al. Evaluation of an Internet support group for women with primary breast cancer **Cancer**	2003 USA	To measure the psychological benefits of online breastcancer support groups (particularly asynchronous support groups, e.g., newsgroup).	X				4	1
Wright K Social support within an on-line cancer community: an assessment of emotional support, perceptions of advantages and disadvantages, and motives for using the community from a communication perspective **Journal of Applied Communication Research**	2002 USA	To evaluate an online support community for people with cancer and their families from a communication perspective.	X			X	4	

Author, title, journal	Year/ country	Objective	I	T	V	B	C	S
Wysocki WM et al. The new dimension of oncology–teleoncology ante portas **Critical Reviews in Oncology/ Hematology**	2005 Poland	To present the wide range of possibilities in providing cancer care at a distance (includes a definition for teleoncology).				X		
Zdravkovic S et al. Teleoncology in the Institute of Oncology Sremska Kamenica–strategy of development **Annals of the Academy of Studenica Journal of Telemedicine and Telecare**	2001 Yugoslavia	To present directives of developing a strategy of teleoncology in the Institute of Oncology Sremska Kamenica (includes a definition for teleoncology).				X		
Ziebland S The importance of being expert: the quest for cancer information on the Internet **Social Science & Medicine**	2004 UK	To explore how people who have been diagnosed with cancer describe their use of the internet.	X			X	4	
Ziebland S et al. How the Internet affects patients' experience of cancer: a qualitative study **BMJ**	2004 UK	To explore how men and women with cancer talk about using the internet.	X			X	4	2

APPENDIX D: Details of Selected Clinical and Cost Studies

The classification of study design, quality, and reliability described in Section 6 of the report are used in this appendix.

Abbreviations

CES-D = Center for Epidemiologic Studies Depression Scale

CHESS = Comprehensive Health Enhancement Support System

CIS = Cancer Information Service

CTCAE = Common Terminology Criteria for Adverse Events

EORTC = European Organization for Research and Treatment of Cancer questionnaire

ESG = Electronic support group

FF = French francs

FTF = Face to face

GI = Gastrointestinal

IPT = Interpersonal psychotherapy

NCI = National Cancer Institute

NSD = No significant difference

NSS = Not statistically significant

RCT = Randomized controlled trial

PSA = Prostate-specific antigen

SEK = Swedish krona

SHIP = Self-Help Intervention Project

SS = Statistically significant

TIP-C = Telephone interpersonal counselling

TLC = Telephone-linked care

TNM = American Joint Committee on Cancer (AJCC) TNM system

Internet and Web-Based Applications

Author/ study design	Objective	Approach	Setting and study population
Basch E et al., 2005[16] USA Quantitative/ Non-controlled series	To describe the patterns of patients' use of a web-based system that allows self-reporting of toxicity symptoms during chemotherapy.	Adaptation of the National Cancer Institute (NCI) Common Terminology Criteria for Adverse Events schema (CTCAE) for the web-based patient reporting system. Participants underwent a 10-min teaching session and were provided with a wallet-sized instruction card, a unique password, and technical contact information. Patients were provided access to log in at the cancer centre and from home.	Memorial Sloan-Kettering Cancer Center, New York. 80 patients with gynecologic malignancies Nine clinicians

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	It is unknown whether the NCI was involved in the adaptation of its CTCAE tool. Validation process of other instruments is unclear. Majority of participants held a college or a graduate degree and were under 70 years old. Feedback regarding the use of the approach in clinical settings was received through an informal process and from a small number of clinicians.	Mean: 8.5 [C: Fair]	All patients completed an initial log in. At each subsequent appointment, most enrolees (80% to 85%) reported symptoms using the online system, with a mean of three follow-up visits per patient during the observation period (range, 1 to 6). 60 of 80 patients (75%) logged in at least once from home. Use was significantly associated with prior internet experience.	Indication that cancer patients with prior internet experience are capable of reporting symptoms experienced during chemotherapy using a web-based interface. **Author's note:** Patient self-reports have become the standard for quality-of-life evaluations conducted in clinical trials.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Broom A, 2005[92] USA Qualitative/ Phenomenology	To investigate how access to information and online support affects men's experience of disease (the objective was broader, i.e., includes impact on doctor-patient relationship, but this aspect was not considered for the purpose of this review).	Home interview exploring the impact of the internet on coping and decision-making ability, and the implications of becoming internet informed for interactions with medical specialists.	Three local support groups for men with prostate cancer operating in Victoria, Australia. 33 men of varying ages and prognoses with prostate cancer.
Fleisher L et al., 2002[18] USA Quantitative/ prospective, non-randomized comparative	To examine the relationship between the use of health-related information from the internet by people newly diagnosed with cancer and patient task behaviour and perceived self-efficacy.	Callers were stratified in 1 of 3 categories: direct users of internet health information, indirect users who use internet health information obtained by friends or family, and non-users. Follow-up telephone interviews were done with participants 6 weeks after initial contact to assess impact of the use of the internet on perceived patient task behaviour and self-efficacy.	Cancer Information Service (CIS) Atlantic Office located at Fox Chase Cancer Center and funded by the NCI. 357 adults calling the 1-800-4-CANCER newly diagnosed with cancer and had not begun cancer treatment.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Heterogeneity of the sample. Recruitment from a setting where men would already receive face-to-face support. Research question and purpose unclear.	Mean: 4 [C: Poor]	Experiences and attitudes differed for each participant and were influenced by many factors such as disease stage, age, literacy level, socio-economic status, and social support networks. However, the role of the internet in enhancing participant's power and control over their disease and decision-making processes were prominent themes within the interviews.	Study suggests that internet usage (access to information and online support) has the potential to provide patients with a sense of empowerment and greater control on their disease.
Limited validity of adapted or developed data collection tools.	Mean: 10.5 [B: Good]	Results indicate a strong relationship between internet use, self-efficacy, and patient task behaviour.	Indication that having access to internet health information might have a direct relationship with (1) having confidence to ask questions of a physician as well as on perceived relationship with physician and (2) ability to make decisions.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Fogel J, 2004[26] USA Quantitative/ Prospective, non-randomized comparative	To study, among breast cancer patients, if internet health information use is associated with coping.	Participants were mailed a packet with a questionnaire containing demographic, medical, and standardized psychological questionnaires.	Two breast surgeon practices at Columbia-Presbyterian Medical Centre, New York. 178 women (65 years of age or less) with a diagnosis of ductal carcinoma in situ or invasive breast cancer within the past 3 years.
Frosch DL et al., 2003[15] USA Quantitative/ Large RCT	To compare the clinical effectiveness of an internet-based decision aid with a video for educating men about issues relevant to prostate-specific antigen (PSA) screening.	Men were assigned to either view a video describing the information relevant for making an informed decision about the PSA test or to access a website containing the same information as the video, adapted to the internet.	Health Appraisal Clinic of the Department of Preventive Medicine at Kaiser Permanente, San Diego. 226 men, aged 50 years or older.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Self-report measures. Lack of coping measurement over time (e.g., twice a week for a month) in order to assess the coping styles and levels.	Mean: 7.5 [C: Fair]	Internet health information use is not associated with psychological coping in breast cancer patients.	Study indicates no coping benefits from internet health information use among breast cancer patients.
Lack of pilot testing of internet-based decision aid. Non-equivalence of the interventions (e.g., access to video from clinic at a prescribed location versus access to internet-based decision aid from home or work when convenient to participant).	Mean: 14.5 [A: High]	Participants assigned to the video group were more likely to review the materials than were individuals assigned to the internet group (98.2% versus 53.5%). Participants in the video group showed greater increases in PSA knowledge and were more likely to decline PSA test than individuals assigned to the internet group. However, participants in the internet group who reviewed the entire online presentation showed similar increases in PSA knowledge as video participants.	Study indicates no benefits from using the internet as opposed to a video for educating men about issues relevant to PSA screening. **Author's note:** Simply providing access to an internet-based decision aid is not as effective as showing a video in the clinic.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Høybye MT et al., 2005[23] Denmark Qualitative/ Ethnography	To explore how support groups on the internet can break the social isolation that follows cancer, by analyzing the storytelling emerging on the Scandinavian Breast Cancer Mailing List.	Participant observation and interviews x 2 (face-to-face or online). Participants were observed on the basis of their daily involvement in the internet mailing list and in two physical meetings.	Scandinavian Breast Cancer Mailing List hosted by the Association of Cancer On-line Resources. 15 women with breast cancer speaking a Scandinavian language and active in the mailing list from 27 April to 15 December 2000.
Kedar I et al., 2003[17] USA Quantitative/ Non-controlled series	To assess whether transferring knowledge from specialists at centres of excellence to referring doctors through online consultations can improve the management of patients requiring specialized care.	Retrospective case review of Partners Online Specialty Consultations. This service allows patients around the world to initiate internet-based consultations with specialists at centres of excellence. Consultations are initiated through the patient's doctor. Consultations included specialist opinion, assessment of imaging studies, and pathological images.	US teaching hospitals affiliated with an organization providing internet-based consultations. Doctors in various settings around the world engaging in internet-based consultations.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Disclosure of the name of the mailing list versus privacy of members. Researchers' role as the "primary data collection instrument" and potential biases unknown. Procedures related to data analysis absent.	Mean: 6.5 [B: Fair]	Between 27 April and 15 December 2000, 1156 postings were made on the mailing list. The analysis led to 4 empowerment strategies: empowerment through knowledge, tears and laughter, entering a new social world, and social intimacy.	Study suggests that taking part in a self-help group for breast cancer patients on the internet, through personal storytelling, could breach the social isolation experience that is a consequence of breast cancer.
Data collection limited to the use and type of services with minimal reported outcomes.	Mean: 2.5 [E: Poor]	79 consultations were conducted online. 90% (n = 71) were related to oncology. A new chemotherapeutic regimen was recommended for 54 patients. The average turnaround time for all consultations (oncology and non-oncology) was 6.8 working days compared with an average of 19 days to see a specialist with a similar level of expertise.	Internet-based consultations between specialists at centre of excellence and referring doctors might facilitate timely access to specialist knowledge.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Klemm P, Hardie T, 2002[28] USA Quantitative/ Prospective, non-randomized comparative	To examine depression in internet cancer support groups as compared with traditional (face-to-face) cancer support groups and to explore the relationship between internet use and levels of depression.	**The participants:** In the face-to-face group, received a paper survey consisting of an investigator-developed questionnaire, including demographic information, medical history, support group history, and a depression measure. The internet group received similar instruments with additional questions about internet support group history.	Local support groups. 40 patients with cancer who participated in two support groups (14 patients with prostate cancer were involved in face-to-face contact and 26 patients with different cancer diagnoses participated in the internet support group).
Lieberman MA, Goldstein BA, 2005[29] USA Quantitative/ Non-controlled series	To test the effectiveness of self-directed internet groups in providing help to participants.	Participants were asked to fill out online questionnaires measuring depression, post-traumatic growth, and psychosocial well-being, when they joined the bulletin board, and again 6 months later.	Five breast cancer bulletin boards providing emotional support 114 women, new members to breast cancer bulletin boards (one who had joined the board less than 8 weeks before joining the study).

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Small sample. Lack of randomization of groups. The groups differ significantly by percent of patients receiving active treatment, mean number of months in a support group, and level of depression. Other variance in study participants included types of cancer, gender, and self-selection for participating in both groups.	Mean: 5 [E: Poor]	The Center for Epidemiologic Studies Depression Scale (CES-D) mean score on the men in the internet group was significantly higher (27.42) than the mean score in the face-to-face support group (1.86). Large majority of internet group had major depressive disorders, compared with none in the face-to-face group.	Study suggests that use of internet as support may be related to depression in patients with cancer. **Author's note:** Before online interventions can be implemented effectively, their efficacy needs to be evaluated. Efficacy in Internet cancer support groups in providing psychoeducation and psychotherapeutic interventions has not been proven.
	Small sample size. Cause-effect relationship can be related to external factors. Participants recruited from five different boards. Characteristics of each board (including type of emotional support) unknown as well as percentage of participants within each board.	Mean: 5 [E: Poor]	Participants improved in measures of depression, emotional well-being, and post-traumatic growth after 6 months. Results support the hypothesis that participation in a self-directed bulletin board improves psychosocial quality of life for women with breast cancer.	Indication that participation in a self-directed bulletin board might improve psychosocial well-being for women with breast cancer.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Lieberman MA et al, 2003[24] USA Quantitative/ Non-controlled series	To examine the feasibility of providing electronic support groups (ESGs) for women with breast carcinoma by answering the following questions: – Will women with breast carcinoma participate in a real-time ESG? – Do women benefit from their participation in these groups?	Participants completed questionnaires before and after the intervention. The questionnaires measured depression, positive changes experienced by traumatized individuals, pain, cancer-related coping, and other psychological dimensions. The intervention consisted of participation in an ESG once per week for 16 weeks. Within a month of the ESG termination, the women participated in a 1-hour, audiotaped telephone interview.	The Wellness Community, a non-profit organization whose mission is to help people with cancer enhance their health through participation in a professional program or emotional support, education, and hope. 32 women with a confirmed diagnosis of breast cancer carcinoma.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Small sample size. The Cancer-Related Coping: the Mini-Mental adjustment to Cancer Scare (Short form: MAC) for outcome measures but results are very brief and mainly discussed for the dropout group.	Mean: 9 [C: Fair]	Participants reported decreased depression symptoms and reactions to pain. 67% of women reported being helped by the experience.	Study suggests that women diagnosed with breast carcinoma can benefit from participation in electronic support groups. **Authors note:** A large percentage of participants were from rural locations (49%), indicating that this type of intervention (ESG) may hold promise for serving those women who have access to facilitated support groups.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
McDonald MV et al., 2005[31] USA Quantitative/ Large RCT + Economic study	To test the effectiveness (including cost) of 2-nurse targeted, e-mail-based interventions to increase home care nurses' adherence to pain assessment and management guidelines, and to improve patient's health outcomes.	Each nurse was assigned to the control group (usual care), basic intervention, or augmented intervention group. Those in both intervention groups received an e-mail reminder every time an eligible cancer patient with pain was admitted to his/her care. The e-mail highlighted 6 clinical pain management recommendations, with the first letter of each recommendation spelling out the acronym "RELIEF." The augmented intervention expanded the information and resources available to the nurse.	Urban home health agency 336 home health nurses 673 home health patients with a primary diagnosis of cancer and self-reported pain at admission

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Limited information about training related to pain management provided to all home health nurses when hired by the agency. Patient groups differed in terms of surgery preadmission and time since cancer diagnosis. Pain measurement at 45-day follow-up interview asked patient to rate their pain intensity during the prior week.	Mean: 12.5 [A: High] Economic: 6/10	The intervention had limited effect on nurse-documented practices. Patients in basic and augmented groups reported SS reduced average and worst pain intensity, respectively, though NSD on EORTC pain scale. Probability of hospital stay during follow-up period lower for augmented than controls (NSS = 0.08). Average home care costs for usual care, basic and augmented groups \$2642; \$2789; \$2903. Overall costs \$5687; \$5966; \$5611. Augmented: \$96 per 10% improvement in pain at its worst; \$466 per 10% reduction in probability of hospitalization. Basic intervention: \$37 per 10% reduction in average pain.	Indication that e-mail reminders might play a role in improving pain management in cancer patients receiving services in their home, though effect sizes were small and NSS on 1 pain scale.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
McTavish FM et al., 2003[30] USA Mixed methods/ Concurrent procedure Quantitative: prospective comparative Qualitative: Phenomenology	To investigate the mechanisms of effect of the Comprehensive Health Enhancement Support System (CHESS: http://chess.chsra.wisc.edu), with particular attention to explaining differential effects for disadvantaged women (women of colour).	Women were randomized into CHESS (access to CHESS x 6 months) or "normal breast cancer care" Study focused on the experimental group: N = 121 Participants completed a pre- and post-test survey. Content analysis of messages (N =1860) posted on the online message bulletin board was conducted and coded into three main topics: cancer and its treatment, interpersonal relationships, and daily life and personal emotions and reactions to family.	Healthcare facilities in Madison, Chicago, and Indianapolis. Women newly diagnosed with breast cancer
Owen JE et al., 2005[22] USA Quantitative/ Small RCT	To examine the effect and potential mechanisms of action of a self-guided, internet-based, coping-skills training group on quality-of-life outcomes in women with early-stage breast cancer.	Participants were randomized into a waiting list control group (N = 30) or an internet-based discussion group (N = 32). The internet-based group was provided with a small discussion board coping group, 12 weeks of self-guided delivery of coping-skills training exercises presented through a series of web pages, and education on symptom management.	Medical Center in southeastern United States. 62 women diagnosed with early-stage breast cancer.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Small sample size. Outcome measures of pre- and post-tests unknown. High percentage of Caucasian women represented in the experimental group: N = 86). Unknown if facilitation of online bulleting board and CHESS included cultural topics. Low use of online bulletin board by women of colour during the experimentation.	Quantitative: 6.0 [D: Fair – Poor] Qualitative: 7.0 [B: Fair]	Women of colour used the discussion group differently from Caucasian women. Their messages were more focused on breast cancer, suggesting they used the discussion group more instrumentally.	Indication that e-mail reminders might play a role in improving pain management in cancer patients receiving services in their home, though effect sizes were small and NSS on 1 pain scale.
Small sample size. Majority of participants scored a "good quality of life" at baseline.	Mean: 10 [B: Good]	No main effects for treatment were observed at the 12-week follow-up.	No clear benefits from this approach.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Rodgers S, Chen Q, 2005[21] USA Qualitative/ Case studies	To examine the psychosocial benefits of internet community group participation for women with breast cancer.	A longitudinal content analysis of more than 33,200 postings from an online breast cancer bulletin board was performed. Also, a thematic analysis of 100 women "life stories" randomly selected from the bulletin board was conducted. The thematic analysis captured stories over a 3-year period.	Online breast cancer community in the form of a bulletin board. 100 women (a.k.a. "posters") during their entire membership in the online discussion board.
Sullivan CF, 2003[25] USA Qualitative/ Phenomenology	To obtain a deep understanding of the experience of participating in a virtual support group and to gain insight into the ways in which males support males and females support females online.	A phenomenological thematic analysis was conducted of the posted messages provided by the subscribers of two cancer mailing lists: Ovarian Problems Mailing List (OPML) (N = 1487 messages) and Prostate Problems Mailing List (PPML) (N = 1902 messages).	OPML and PPML. 170 subscribers of the OPML (included 134 women with ovarian cancer). 213 subscribers of the PPML (included 176 men with prostate cancer)

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Methods used to establish causality (cross-validation of content and thematic analysis) cannot establish causality. Missing data (e.g., demographic and geographic) due to the nature of the board (i.e., members are not required to provide all details about themselves).	Mean: 9 [A: Good]	Characteristics of online breast cancer discussion board: woman, 46, married with a professional occupation. Psychological benefits included receiving/giving information, receiving/ giving social support, optimism toward breast cancer, increased skill or ability to cope with disease, improved mood, decreased psychological distress, and strategies to manage stress.	Study suggests that online communities seem rich in storing medical information and knowledge about breast cancer and might provide substantial psychological benefits to participants.
Disclosure of the name of the mailing list versus privacy of members. Selected online support groups not facilitated by trained professionals (unmoderated) but included medical doctors or a nutritionist within the membership. Non–equivalence of groups	Mean: 6.5 [B: Fair]	Both groups seem empowered by their participation in the online support group. For the OPML, benefits included providing a safe place to vent feelings and express negative emotions; a place to build relationships and to help others cope with disease. For the PPML, benefits included receiving expert medical advice from several physicians and aiding in medical decision making.	Study suggests that each gender has different conceptions and ways of enacting supportive communication online.

Internet and Web-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Winzelberg AJ et al., 2003[20] USA Quantitative/ Small RCT	To measure the psychologic benefits of online breast cancer support groups (particularly asynchronous support groups, e.g., newsgroup).	Participants were assigned randomly to a12-week, web-based, social support group (Bosom Buddies) or a wait-list control group. The social support group was semi-structured, moderated by a healthcare professional, and delivered in an asynchronous newsgroup format.	California 72 women diagnosed with primary breast carcinoma
Ziebland S, 2004[19] UK Qualitative/ Phenomenology	To explore how men and women with cancer talk about using the internet.	The researcher recorded a narrative interview in the respondent's home, or elsewhere if preferred. Participants were asked to tell their own story, from the time when they began to think there might be a problem. At the end of the narrative, the interviewer used a set of semi-structured questions and prompts to explore particular issues further.	DIPEx charity (www.dipex.org) 175 men and women aged 19 to 83 years, with 1 of 5 cancers (prostate, testicular, breast, cervical, or bowel) diagnosed since 1992 and selected to include different stages of treatment and follow-up.

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Small sample size and highly educated participants. Information about women who completed post-intervention assessments appears inconsistent. Self-report diagnosis and measures. Postings by participants were not necessarily related to suggested topics. Short follow-up assessments.	Mean: 10 [B: Good]	The web-based program Bosom Buddies was effective in reducing participants' scores on depression, perceived stress, and cancer-related trauma measures.	Indication that a web-based support group might be useful in reducing depression, perceived stress, and cancer-related trauma. **Authors note:** Although web-based social support groups offer many advantages, this delivery mechanism presents a number of ethical issues that need to be addressed (e.g., confidentiality and privacy).
	Lack of information about the impact of the internet on the experience of cancer as suggested in the title.	Mean: 9.5 [A: Good]	Internet use was widespread and reported by patients at all stages of cancer care, from early investigations to follow-up after treatment. Patients used the internet for a wide range of information and support needs. Patients also used it to check their doctors' advice covertly and to develop expertise on their cancer.	Indication that access to internet allows patients to check covertly the tests, treatment, and advice they receive from health professionals.

Telephone-Based Applications

Author/ study design	Objective	Approach	Setting and study population
Badger T et al., 2005[43] USA Quantitative/ Prospective, non-randomized comparative	To examine the effectiveness of a telephone interpersonal counselling (TIP-C) intervention compared with usual care attentional control for symptom management (depression and fatigue) and quality of life (positive and negative effect, stress) for women with breast cancer.	Women were assigned to either the TIP-C intervention or usual care attentional control group. Participants received 6 weekly telephone calls. Participants nominated a close partner, usually a husband, to participate with them in the study. The partners received 3 calls.	Academic cancer centre and urban, private oncology offices. 48 women with breast cancer who were in their mid-50s. married, and employed at the time of the study.

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Small sample size. Exploratory nature of the findings. The length of the intervention (6 weeks) may not be sufficient to achieve the full impact of the intervention and measure the benefits to women for symptom management and quality of life. No statistical comparison of group outcomes. Although this was not the focus of the study, there was a lack of information about the impact of the study on partners.	Mean: 7.5 [C: Fair]	An increase in positive effect and a decrease in stress were found to be statistically significant in both groups. Trends were found for decreases over time in depression, negative effect, and fatigue for participants in the TIP-C group.	Indication that the telephone might be an effective method to deliver psychosocial interventions to meet the needs of cancer patients.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Braden CJ et al., 1998[40] USA Quantitative/ Small RCT	To determine the efficacy of self-care/ self-help promotion and uncertainty management interventions offered by the Self-Help Intervention Project (SHIP) for women receiving treatment for breast cancer.	Participants were assigned randomly to one of the three interventions or the control group. SHIP interventions consisted of: 1.Self-help course (SHC) 2. Uncertainty management (UM) via weekly telephone contact x 6 weeks 3. SHC+ UM 4 outcome variables were measured: self-care, self-help, psychological adjustment, and confidence in cancer knowledge.	Sites included the regional cancer centre, private practice offices, and health maintenance organization clinics. 193 women receiving treatment for breast cancer.
Broadstock M, Borland R, 1998[44] UK Quantitative/ Non-controlled series	To investigate the role of information in coping through use of cancer-specific helpline by 101 adults with cancer.	Callers' interview between 3 and 11 days post-telephone call to helpline. Some callers may have received mailed literature based on the type of information requested.	Victorian Cancer Information Service 101 adults with cancer.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Non-equivalence of interventions.	Mean: 11.5 [A: High]	Results are reported for the UM or SHC+UM groups compared with control group. Results demonstrated no significant difference between groups.	No clear benefits from the telephone contact approach.
Cause-effect relationship can be related to external factors. Exploratory nature of findings.	Mean: 8.5 [C: Fair]	Information received over the telephone was frequently associated with emotion-focused coping strategies, as well as with problem-focused strategies. Mailed literature was also associated with emotion-focused coping strategies.	Study demonstrates the potential role of information provided through cancer helplines on callers' coping strategies.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Crane LA et al., 1998[34] USA Quantitative/Large RCT	To evaluate the impact of a telephone outcall intervention (based on the Transtheoretical Model) on screening mammography behaviour among lower income, older women.	Participants were assigned to (1) control group, (2) outcall only, or (3) advance invitation + outcall. Mammography adherence was assessed through telephone interviews 6 months and 2 years after the initial call.	INFORUM (geodemographic database in Colorado) 3080 women.
Davis NA et al., 1997[35] USA Quantitative/Large RCT	To identify which of three methods was most effective in increasing mammography rates in a managed care population. The 3 methods were (1) birthday card reminder, (2) birthday card reminder with letter from medical director and materials promoting mammography, (3) birthday card and a multi-component telephone call (scheduling and counselling).	Participants were assigned to 1 of the 3 methods described in the 'Objective' section. Mammography adherence was assessed through a telephone interview 6 months post-intervention and claims data or self-report when claims data unavailable.	Health Maintenance Organization in Philadelphia. 395 women.

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Brief outcall intervention. Self-report of mammography behaviour as opposed to medical records. Unknown validity of questions used for classification of responses based on the Transtheoretical Model.	Mean: 12 [A: High]	Neither intervention had a significant effect at 6 months and 2 years post-intervention.	No clear benefits from this approach.
	Unknown validity of screening survey (state-of-change measurement). Claims data, which are frequently incomplete, may not provide valid measures of mammography rates. [non–equivalent interventions]	Mean: 12 [A: High]	The telephone intervention group had the highest percentage of women (28%) who obtained a mammogram, followed by the card-only group (15%), and the letter group (9%). Findings for the telephone group were statistically significant.	Indication that a telephone intervention (reminder, scheduling, and counselling) might be an effective method for promoting mammography.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Ward JAD et al., 1998[45] USA Quantitative/ Non-controlled series	To evaluate knowledge and attitudes, changes, expected intentions of callers, and self-reported behaviour shifts.	Callers were contacted by telephone 3 to 6 weeks after their call to the Cancer Information Service (CIS) in order to answer the following questions: (1) Is CIS meeting needs of callers? (2) Do CIS callers share the information they receive with others? (3) What impact does the CIS have on callers?	Cancer Information Service of the National Cancer Institute. 2629 callers using the service of CIS.
Donnelly JM et al., 2000[47] USA Quantitative/ Non-controlled series	To test the feasibility of telephone interpersonal psychotherapy (IPT) for cancer patients and their partners during oncology treatment and to preliminarily examine its efficacy in reducing psychological distress.	Single-arm study with a pre-test-post-test design. Participants received a directory of psychosocial and educational services for breast cancer patients. Weekly telephone sessions from start of chemotherapy to 4 weeks post-chemotherapy discharge. Psychosocial assessment measures at baseline, after completion of chemotherapy (3 months), and 2 weeks after the final session (5 months).	Setting not specified. 14 patients diagnosed with breast cancers and 10 partners.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Validation process for questionnaires unknown.	Mean: 9 [C: Fair]	Overall satisfaction was very high (95%). Three-fourths of respondents reported that they shared the CIS information with others and more often with family members. 69% of respondents stated that the CIS information had reassured them and 66.8% reported CIS information assisted them in making a health-related decision. 96% stated that CIS material was helpful in discussing their situation with a doctor or a health professional.	The survey suggests that the CIS 1-time telephone intervention can result in positive health actions.
Validity of psychosocial assessment measures unknown. Satisfaction component appears to have been assessed over the telephone by the therapist. Lack of reported outcomes aligned with objectives and psychosocial assessment measures.	Mean: 6 [D: Fair to Poor]	Participants rated their satisfaction with the program between "good" and "excellent." No clear trend in psychological distress scores (e.g., 5 patients with improvement, 4 with worsening, 3 stable)	No clear benefit from this approach **Author's note:** A randomized trial is needed to evaluate differences in psychological distress scores between those who receive telephone IPT and a control group.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Ferrer-Roca O, Subirana R, 2002[38] Spain Quantitative/ Retrospective comparative + Economic study	To compare the numbers of outreach visits and hospital visits before and 1 year after the implementation of telephone support for oncology patients through a non-supervised call centre. To outline costs of the call centre.	Patients seen at clinic allowed to contact their personal oncologist at any time. Telephone call data and interventions recorded on a survey sheet and in the electronic chart record. Variables recorded included duration of telephone call, measures of consultation efficiency (e.g., resolved, outreach visit, emergency or non-emergency admission), and type of consultation (informative, therapeutic, or psychological).	The Delfos Clinic in Barcelona. All patients seen at the clinic from 1997 to 2000 (average: 274 oncology patients diagnosed with solid tumours).
Ferrer-Roca O, Subirana R, 2002[38] Spain Quantitative/ Retrospective comparative + Economic study	To compare the numbers of outreach visits and hospital visits before and 1 year after the implementation of telephone support for oncology patients through a non-supervised call centre. To outline costs of the call centre.	Patients seen at clinic allowed to contact their personal oncologist at any time. Telephone call data and interventions recorded on a survey sheet and in the electronic chart record. Variables recorded included duration of telephone call, measures of consultation efficiency (e.g., resolved, outreach visit, emergency or non-emergency admission), and type of consultation (informative, therapeutic, or psychological).	The Delfos Clinic in Barcelona. All patients seen at the clinic from 1997 to 2000 (average: 274 oncology patients diagnosed with solid tumours).

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Little information on patient location (e.g., outreach patients versus hospital inpatients versus hospital-at-home patients). No baseline data regarding type of patients and patient functionality for 1996. It is unknown if the results are based on the same cohort of patients over time or not (1997 to 2000). Limited information on costs and did not include initial investment in setting up the call centre.	Mean: 6 [D: Fair to Poor] Economic: 2/10	The average number of outreach visits and non-emergency hospital visits was similar before and after introduction of telephone support. The average number of emergency hospital visits was 24 per year (0.9 per patient), compared with 42 per year (0.16 per patient) during the year before the telephone service. Total operating costs (year 2000) 0.25M pesetas. Set up costs of 1.02M pesetas excluded from estimates.	Indication that around-the-clock direct access of patients to personal oncologist via telephone might decrease the average number of emergency hospital visits. Unclear about cost advantages for both patients and clinic.
Little information on patient location (e.g., outreach patients versus hospital inpatients versus hospital-at-home patients). No baseline data regarding type of patients and patient functionality for 1996. It is unknown if the results are based on the same cohort of patients over time or not (1997 to 2000). Limited information on costs and did not include initial investment in setting up the call centre.	Mean: 6 [D: Fair to Poor] Economic: 2/10	The average number of outreach visits and non-emergency hospital visits was similar before and after introduction of telephone support. The average number of emergency hospital visits was 24 per year (0.9 per patient), compared with 42 per year (0.16 per patient) during the year before the telephone service. Total operating costs (year 2000) 0.25M pesetas. Set up costs of 1.02M pesetas excluded from estimates.	Indication that around-the-clock direct access of patients to personal oncologist via telephone might decrease the average number of emergency hospital visits. Unclear about cost advantages for both patients and clinic.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Ferrer-Roca O, Subirana R, 2002[38] Spain Quantitative/ Retrospective comparative + Economic study	To compare the numbers of outreach visits and hospital visits before and 1 year after the implementation of telephone support for oncology patients through a non-supervised call centre. To outline costs of the call centre.	Patients seen at clinic allowed to contact their personal oncologist at any time. Telephone call data and interventions recorded on a survey sheet and in the electronic chart record. Variables recorded included duration of telephone call, measures of consultation efficiency (e.g., resolved, outreach visit, emergency or non-emergency admission), and type of consultation (informative, therapeutic, or psychological).	The Delfos Clinic in Barcelona. All patients seen at the clinic from 1997 to 2000 (average: 274 oncology patients diagnosed with solid tumours).
Ferrer-Roca O, Subirana R, 2002[38] Spain Quantitative/ Retrospective comparative + Economic study	To compare the numbers of outreach visits and hospital visits before and 1 year after the implementation of telephone support for oncology patients through a non-supervised call centre. To outline costs of the call centre.	Patients seen at clinic allowed to contact their personal oncologist at any time. Telephone call data and interventions recorded on a survey sheet and in the electronic chart record. Variables recorded included duration of telephone call, measures of consultation efficiency (e.g., resolved, outreach visit, emergency or non-emergency admission), and type of consultation (informative, therapeutic, or psychological).	The Delfos Clinic in Barcelona. All patients seen at the clinic from 1997 to 2000 (average: 274 oncology patients diagnosed with solid tumours).

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Little information on patient location (e.g., outreach patients versus hospital inpatients versus hospital-at-home patients). No baseline data regarding type of patients and patient functionality for 1996. It is unknown if the results are based on the same cohort of patients over time or not (1997 to 2000). Limited information on costs and did not include initial investment in setting up the call centre.	Mean: 6 [D: Fair to Poor] Economic: 2/10	The average number of outreach visits and non-emergency hospital visits was similar before and after introduction of telephone support. The average number of emergency hospital visits was 24 per year (0.9 per patient), compared with 42 per year (0.16 per patient) during the year before the telephone service. Total operating costs (year 2000) 0.25M pesetas. Set up costs of 1.02M pesetas excluded from estimates.	Indication that around-the-clock direct access of patients to personal oncologist via telephone might decrease the average number of emergency hospital visits. Unclear about cost advantages for both patients and clinic.
Little information on patient location (e.g., outreach patients versus hospital inpatients versus hospital-at-home patients). No baseline data regarding type of patients and patient functionality for 1996. It is unknown if the results are based on the same cohort of patients over time or not (1997 to 2000). Limited information on costs and did not include initial investment in setting up the call centre.	Mean: 6 [D: Fair to Poor] Economic: 2/10	The average number of outreach visits and non-emergency hospital visits was similar before and after introduction of telephone support. The average number of emergency hospital visits was 24 per year (0.9 per patient), compared with 42 per year (0.16 per patient) during the year before the telephone service. Total operating costs (year 2000) 0.25M pesetas. Set up costs of 1.02M pesetas excluded from estimates.	Indication that around-the-clock direct access of patients to personal oncologist via telephone might decrease the average number of emergency hospital visits. Unclear about cost advantages for both patients and clinic.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Heiney SP et al., 2003[50] USA Quantitative/ Non-controlled series	To determine whether (1) therapeutic factors were operational within the group, (2) differences in group climate were reported, and (3) therapeutic factors could be identified from group transcripts.	Therapeutic group by telephone x 6 weeks (90 min/week) led by two group therapists who followed a script based on the Fawzy's manual for cancer interventions for patients with cancer. Administration of two questionnaires: the Support Group Evaluation Tool and the Group Climate Questionnaire. Content analysis of group sessions (N = 16) using the Yalom's Therapeutic Factors Framework.	South Carolina Cancer Centre 33 patients aged 18 to 65 years who had been diagnosed with breast cancer within the previous 6 months (4 groups).
Kaunonen M et al., 2000[52] Finland Qualitative/Case studies	To increase existing knowledge about nurses' support to a grieving family by describing (1) family grief and mourning as nurses perceive it and (2) nurses' experience of the supportive telephone call as a finishing point of family nursing.	Supportive telephone calls were provided to family members 4 weeks after the death of a significant other in the ward. Nurses were provided with semi-structured diaries that inquired about the deceased patients, their significant other, the primary nurses, the nurses during the time of death, and the nurse who made the telephone calls. Data were collected from the diaries of the nurses.	Oncology Clinic of a Finnish University Hospital. 92 family members related to patients deceased on 2 inpatient wards of the clinic.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Because the participants chose to participate in the study, some selection bias may exist and may have influenced the evaluations. Validity and reliability of the Support Group Evaluation tool.	Mean: 3 [E: Poor]	The Support Group Evaluation Tool ascertained that the therapeutic factors of instillation of hope, altruism, universality, and imparting of information were present within the group. The Group Climate Questionnaire confirmed that the groups developed cohesion and bonded, as evidenced by increased engagement despite the lack of face-to-face interaction. The content analysis confirmed that therapeutic factors were present within and throughout the sessions.	Indication that therapeutic factors emerged even when participants are not face to face during sessions.
Cultural differences in mourning. Context of the study was not specialized for terminal care.	Mean: 10.5 [A: Good]	During the telephone intervention, the main themes concerned family members' grief and coping strategies and funeral. 6 categories emerged from the nurse's description of how the families survived the death of a loved one: deep and intense grief, grieving, lessening grief, acceptance of death, bitterness, and denial of grief. Family care's experience was reflected in 6 main categories, including satisfaction and dissatisfaction comments.	Study suggests that supportive telephone call intervention is an alternative and additional form of family support, as compared with group support.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Kaunonen M et al., 2000[53] Finland Mixed methods/ Concurrent procedures Quantitative: Prospective comparative Qualitative: Phenomenology	To describe the impact of a supportive telephone call on grief 4 months after the death of a family member	Data were collected with a postal questionnaire 4 months after the death of patients. The outcome measures included grief, social support, unexpectedness, and perception of the supportive telephone call.	University Hospital in Finland. 225 family members related to patients deceased on 2 inpatient wards of the clinic (intervention group N = 70: oncology ward; control group N = 155: medical and neurological clinic).
Marcus AC et al., 1998[32] USA Quantitative/ Large RCT	To test an educational intervention to increase fruit and vegetable consumption among callers to the Cancer Information Service (CIS).	Callers were randomized based on the day of week the call was made. The control group completed a baseline interview, as well as telephone interviews for outcome assessment at 4 weeks and 4 months follow-up. The same process was followed for the intervention group with the addition of a 6-min telephone education intervention and two follow-up mailouts that included educational materials.	6 of the 19 CIS offices (located in the following CIS regions; 1, 5, 9, 12, 13, and 18). 2109 callers to the CIS.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Small sample size. Context of the study was not specialized for terminal care. Validity of questionnaires/ processes for measuring social support, unexpectedness, and perception of the supportive telephone call unknown.	Quantitative: 6 [D: Fair – Poor] Qualitative: 10 [A: Good}	Altogether, 61% thought that the call helped “quite much or very much,” whereas 33% perceived it as helping a little. 89% described their experience as being positive. It included eight subcategories: satisfaction, social support, possibility for discussions, answers to questions, mutual experience, caring for the family member, respect for the deceased, and characteristics of the nurse. In terms of grief reactions, despair was found to be more intense in the intervention group. Personal growth was higher in the control group.	Indication that family members’ perceptions of the supportive telephone call were mainly positive. Indication of the need for support following death. **Author’s note:** It remains unclear whether the supportive intervention had an impact on the survivor after the death of a family member.
Self-report measures of fruit and vegetable consumption. The intervention group received more information about the correct definition of a serving size, which might then produce higher reporting levels in the intervention group. Unknown long-term effect of intervention.	Mean: 13.5 [A: High]	Significant intervention effect at 4-week and 4-month follow-up using single-item measure (0.65and 0.41 servings/ day). Similar effect at 4 months using a 7-item measure (0.34 servings/day).	Indication that cancer control interventions delivered over the telephone can increase fruit and vegetable consumption.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Miller SM et al., 1997[36] USA Quantitative/ Large RCT	To test the effectiveness of a brief telephone counselling intervention directed to low-income, inner-city women after they had received an abnormal Pap smear result.	Participants were randomized into 4 groups: (1) standard care, (2) pre-appointment telephone confirmation intervention, (3) pre-appointment telephone barriers counselling without booster, (4) pre-appointment telephone barriers counselling with booster.	Colposcopy clinic of two hospital sites
Mishel MH et al., 2002[42] USA Quantitative/ Large RCT	To test the efficacy of an individualized uncertainty management intervention delivered by telephone to Caucasian and African-American men with localized prostate carcinoma and directed at managing the uncertainties of their disease and treatment.	3 x 2 randomized block with three levels of intervention: (control, direct, and supplemented uncertainty management) crossed with two levels of ethnicity (Caucasian, African-American). The uncertainty management interventions included weekly telephone calls for 8 weeks with specific interview questions and interventions. In the supplemented arm, designated support person also received weekly telephone calls for 8 weeks.	Nine prostate cancer treatment facilities in central and eastern North Carolina. 239 men (134 Caucasian and 105 African-American) diagnosed with localized prostate carcinoma.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Mean: 14 [A: High]	Telephone counselling produced significantly higher adherence rates to initial colposcopy visit and 6-month repeat appointment compared with telephone confirmation.	Indication that telephone counselling might be an effective strategy for enhancing initial and long-term adherence to a follow-up cervical diagnostic procedure in a traditionally underserved population.
Exploratory nature of findings. Few intervention effects were found to hold over time (follow-up at 7 months). The length of the intervention (8 weeks) may not be sufficient to achieve the full impact of the intervention and measure the benefits to men living with prostate cancer. Although this was not the focus of the study, there was a lack of information about the impact of the study on partners.	Mean: 9.5 [B: Good]	Caucasian and African-American men who received the intervention either directly or supplemented by their family member had significant improvement in two uncertainty management methods: cognitive reframing and problem solving, at 4-month follow-up. Throughout the 7-month follow-up, no evidence was found to establish a benefit from the intervention for either patient-provider communication or cancer knowledge.	Indication that psycho-educational, telephone-delivered intervention directed at helping men with prostate carcinoma might provide benefits such as learning new cognitive and behavioural skills.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Mooney KH et al., 2002[37] USA Quantitative/ Non-controlled series	1) To explore the feasibility of using a telephone-based, computerized system to monitor post-chemotherapy symptoms. 2) To assess the quality and usefulness of the symptom data obtained. 3) To determine participant satisfaction, level of acceptability, and usability of the telephone-linked care (TLC) Chemo alert application.	Participants were instructed how to use the TLC technology (interactive voice response technology). Using their touchtone telephone, participants were requested to call the system daily, beginning 24 hours after chemotherapy administration of the current cycle until the end of the cycle. Participants were then interviewed to provide their opinions about the system and to obtain further suggestions for improvement.	Cancer centre outpatient clinic. 27 cancer patients.
Reid Rudy R et al., 2001[48] USA Quantitative/ Non-controlled series	To examine perceptions of a peer-helper, telephone-based, social support intervention for melanoma patients receiving immunotherapy.	Participants were assigned to a social support intervention or to a waiting list group at the time of their first immunotherapy treatment. The social support intervention consisted of two required telephone contacts initiated by the helper before the helpee's first and second immunotherapy treatments. The effect of the intervention was measured using surveys and telephone interviews.	Comprehensive cancer centre. 29 male and female Stage 3 or 4 melanoma patients (helpees), 29 former patients (helpers), and 30 control group patients.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Small sample size. Technology allows reporting of seven different symptoms only. Variance on adherence rates for daily call (35% to 100%). Limited information about the validation process for the development of thresholds to generate a chemo alert. Lack of information about the accuracy of the TLC alert report and information reported by patients.	Mean: 6.5 [D: Fair to Poor]	All participants reported at least one symptom during the course of their chemotherapy cycle. 67% (18) of the participants exceeded the preset symptom severity threshold at least one time and generated a TLC alert report that was faxed to their physician.	Indication that cancer patients are capable of reporting symptoms experienced during chemotherapy using the TLC technology.
Small sample. Exploratory nature of findings. Limited training for helpers. Intervention assessed only for the first two sessions of immunotherapy.	Mean: 6 [D: Fair to Poor]	Results indicated that (1) helpees became more sensitive and open to available social support in their environment; (2) helpers and helpees thought the intervention was effective; and (3) the telephone, as a medium for providing support, was a satisfactory substitute for face-to-face interaction.	Indication that the telephone might be relevant in providing social support interventions to patients diagnosed with melanoma.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Rock CL et al., 2001[33] USA Quantitative/Large RCT	To describe the weight change observed in women enrolled in the Women's Healthy Eating and Living (WHEL) Study during their first year of participation.	Dietary assessments, demographic, physical activity information, body mass index collected at baseline and at 12 months. Women were stratified by age and stage of cancer; randomly assigned to the intervention or comparison group. The diet intervention included a low-fat diet high in fibre, vegetables, and fruit, supported by telephone counselling. The comparison group was provided with general dietary guidelines.	Seven clinical sites located in California, Arizona, Texas, and Oregon. 1010 women with a diagnosis of primary operable breast carcinoma categorized as stage I, II, or IIIA.
Samarel N et al., 2002[39] USA Quantitative/ Large RCT	To test a Roy adaptation model-based support and education intervention for women with early-stage breast cancer in a 3-group, and a 3-phase RCT.	Experimental group: 13 months of combined individual telephone and in-person group support and education. Control group 1: 13 months of telephone-only individual support and education. Control group 2: 1-time mailed education information. Measured the effect on cancer-related worry, well-being, mood disturbance, loneliness, and the quality of relationship with a significant other.	Multiple sites providing care and recovery services in northern and central New Jersey. 125 women diagnosed with non-metastatic (TNM Stage 0, I, II, or III) breast cancer.

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Validity of the Personal Habits Questionnaire developed for the WHEL study unknown.	Mean: 13.5 [A: High]	Diet intervention via telephone counselling to promote reduced fat and increased vegetable intakes is not associated with significant weight loss.	No clear benefits from this approach.
	Homogeneity of the sample.	Mean: 11.5 [A: High]	The study indicated group differences in mood disturbance, loneliness, and quality of a relationship with a significant other. Overall, social support and education, delivered by telephone and in-person groups or just by telephone, relieved certain aspects of the emotional distress experienced by women throughout the year following breast cancer diagnosis.	Indication that telephone support might provide an effective alternative to in-person support groups in women with breast cancer.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Sangdren AK, McKaul KD, 2003[41] USA Quantitative/ Large RCT	To compare two brief therapies, delivered by telephone, intended to help women cope with breast cancer.	Participants were randomly assigned to cancer education, emotional expression, or standard care. The study measured the effect of the interventions on mood and quality of life.	Two cancer treatment clinics. 222 women diagnosed with Stages I to III breast cancer.
Sangdren AK et al., 2000[49] USA Quantitative/ Small RCT	To test the effectiveness of a telephone-administered cognitive-behavioural therapy in a study of patients with breast cancer.	Participants were randomly assigned to therapy or control group. The telephone therapy involved ten sessions and focused on: providing support, teaching coping skills, managing anxiety and stress, and helping to solve patient-generated problems. The study measured the effect of the interventions on coping, mood, and quality of life. Therapy satisfaction measures were also obtained.	Tertiary cancer treatment centre serving rural areas of North Dakota and Minnesota. 53 women diagnosed with Stage I or II breast cancer.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Limited information about the standard care. Use of a single item to assess knowledge. Self-report measures. Potential limited expertise and lack of provision of appropriate training for conducting the expression therapy intervention.	Mean: 11.5 [A: High]	Contrasts between therapies and standard care failed to produce reliable between-groups differences on any of the mood and quality-of-life outcomes.	Study suggests that therapies (more specifically emotional expression intervention) may be ineffective.
Small sample size. Lack of information about type of care or services received by the control group. Participants used the nursing help line in addition to the intervention during their involvement in the study. Comprehensive comparison of demographics and outcomes between groups not available.	Mean: 6.5 [D: Poor to Fair]	At 4 months, most therapy participants reported a high degree of comfort with the telephone therapy, but showed only modest improvement (less anxiety and confusion) compared with women in the control group.	No clear benefits from this approach.

Telephone-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Solberg S et al., 2003[46] Canada Qualitative/ Grounded Theory	To examine the experiences of a sample of breast cancer survivors who had participated in an audioconferencing social support program.	Data were collected through interactive, unstructured, conversational interviews followed by semi-structured interview questions to enable fuller exploration. Each woman was interviewed once by two researchers. A research forum was held with participants, practitioners, policy makers, volunteers in support groups, and researchers to establish greater theoretical generalizability.	Rural Newfoundland and Labrador. Eleven women with breast cancer who had attended audioconfer-encing sessions.
Scura KW et al., 2004[51] USA Quantitative/Small RCT	To evaluate the feasibility of an intervention of telephone social support and education to increase the physical, emotional, functional, and interpersonal adaptation of men to prostate cancer.	Participants were randomized to one of two study treatment groups: an experimental group ($N = 7$) receiving 12 months of telephone social support and education via a mailed resource kit, and a control group ($N = 10$) receiving education via a mailed resource kit only. Data were collected at four points (Phase 1 to IV) using five quantitative tools. (Qualitative information was also gathered, not considered here.)	Urban New Jersey. 17 men diagnosed with prostate cancer within the previous 4 weeks of the intervention. Sample was ethnically varied with low income.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Title suggests a phenomenology approach but the description of the methods is related to a grounded theory approach.	Mean: 7.5 [B: Fair]	The women received support at a local site (faces) and through the network (voices). Therefore, two key terms were threaded through the women's descriptions of the process of social support: "faces" and "voices." This process consisted of four distinct but overlapping stages: (1) getting connected to the network; (2) finding a voice; (3) connecting with others; and (4) becoming empowered.	Study suggests that the use of telephone and audioconfer-encing technologies might be beneficial for the provision of information and support to people in rural and remote communities.
Small sample size. Exploratory nature of findings. Separate outcome results for intervention and control groups not reported.	Mean: 5 [E: Poor]	Declining physical, functional, and sexual well-being measures from Phase I to II. Slight improvements in emotional, social, and family well-being from Phase I to II. No significant differences between groups.	Indication that telephone social support in combination with education might improve men's adaptation to prostate cancer in the year following diagnosis. **Author's note:** As evidenced by previous telephone intervention studies, telephone counselling increases access to supportive services for men, specifically for those of lower socio-economic strata and men of colour, who usually are underrepresented in support groups.

Video-Based Applications

Author/ study design	Objective	Approach	Setting and study population
Bohnenkamp SK et al., 2004[54] USA Quantitative/ Prospective, non-randomized comparative + Economic study	To measure the impact of telenursing technology on patients discharged with new ostomies related to a cancer diagnosis.	After discharge from the hospital, patients were assigned to 1 of 2 groups: (1) home health visit only or (2) home health visit plus telenursing contact. Measures included social readjustment, satisfaction, and cost.	Large tertiary care centre in the southwestern United States. 28 patients with cancer with new ostomies (64% bladder, 32% colorectal).
Doolittle GC et al., 2004[59] USA Economic study	To compare costs of a teleoncology in its first year of operation, 1995, with those in 2000.	Comparison of administrative data from the teleoncology practice for the 2 years.	University medical centre, Kansas City and rural hospital in Hays, Kansas. 103 patient consultations in 1995 and 121 in 2000.

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Small sample size. Telemedicine group had more visits than face-to-face (FTF) group. Validation process of satisfaction surveys unknown. Findings related to social readjustment not reported. Admission to hospital for six participants might have influenced results. Type of ostomy might have impacted number of pouches used. Level of nursing expertise differed between the groups; unclear if the technology or level of expertise might have impacted results.	Mean: 5 [E: Poor] Economic: 3/10	NSD in time for patients to change their pouches independently. Telenursing patients indicated higher satisfaction but still believed that face-to-face visits were best. Cost per patient (health visit + travel + pouches used) $445 for both groups. Cost for pouches higher in FTF group than in telenursing group.	No clear benefits from this approach.
	Basis for equipment and room estimates are not entirely clear.	Economic: 4/10	Cost per teleoncology visit declined from $812 in 1995 to $410 in 2000. Decrease in costs at both centres associated with cheaper equipment and more efficient use of staff, and increase in consultations. The most recent analysis, for 2005, showed an average cost of $251 per visit.60 (An earlier paper147 gave costs per visit for an outreach service in 1995 as $897 and those for a conventional clinic visit as $149.)	Costs per consultation for a teleoncology service can be expected to decline as the practice grows and matures.

Video-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Doolittle GC 2000[58] USA Economic study	To assess cost of conventional hospice care and the cost of launching and operating a telehospice service.	Videoconferencing used to link hospice provider with patients and their families. Cost data collected from conventional hospice care Jan to March 1997 and 1998, and for telehospice Jan to March 1998.	Hospice and university telemedicine service in Kansas City.
Mair F et al., 2000[55] USA Qualitative/ Case studies	To elicit cancer patients' views of telemedicine consultations.	Patients were contacted by telephone within 10 days of their attendance of the teleoncology clinic. Telephone interviews were performed by a general practitioner using a 13-item, open-ended interview guide developed for the study.	Hays Medical Centre, Kansas. 25 patients who attended the teleoncology/ haematology clinic between January and July 2006.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Analysis did not include full details of either alternative and effectiveness was not measured.	Economic: 4/10	Conventional hospice cost per visit $126 in 1997 and $141 in 1998. Telehospice cost per visit $29 in 1998. Telehospice visit much less expensive than conventional visit and can offer method to deliver services to patients who live far away from the service provider.	Telehospice may help Medicare system to provide efficient end-of-life services to patients who live away from hospice services.
Validation process of interview guide unknown.	Mean: 5 [C: Poor]	Five main themes were identified in 22 interviews: (1) Positive comments regarding satisfaction with teleoncology. (2) Confident about expressing views. (3) Limitations of teleoncology. (4) Concerns about certain aspects of communication. (5) Unease with the nurse as a proxy examiner during teleoncology consultations.	Study outlines the fact that many patients view consultations with an oncologist using a video-based application as an adjunct to regular face-to-face consultations rather than as a substitute. For patients, convenience of access was the principal advantage of video-based consultations.

Video-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Sezeur A et al., 2001[61] France Cost estimates as part of a study on patient acceptance/ satisfaction	Appraisal of oncology consultations regarding chemotherapy.	Comparison of videoconferencing costs with cost of ambulance transport to second hospital.	Two Paris hospitals. Post-operative patients (N = 16) awaiting chemotherapy.
Stalfors J et al., 2005[57] Sweden Economic study	To measure costs of multidisciplinary team meetings on management of head and neck tumours, using face-to-face (FTF) and videoconferencing	Analysis included direct medical, direct non–medical, and indirect non–medical costs.	Regional hospital and two district general hospitals, western Sweden. Patients with head and neck tumours, N = 39 in FTF group, N = 45 in telemedicine group.

Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
Little detail on basis for cost estimates. Alternative of consultations being held at one hospital not considered.	Economic: 2/10	Cost per teleconsultation 188 FF; savings through avoiding ambulance transfer 510 FF per patient.	Use of videoconferencing provides savings over usual practice of transferring patients for face-to-face consultation.
Some information obtained from patient questionnaires. Some question as to what is usual practice for patients being accompanied by physicians to FTF consultations.	Economic: 6/10	Cost per FTF consultation SEK 2267 compared with SEK 2036 for teleconsultation (not statistically significant). If physician accompanied patient to all FTF consults, cost per consultation would be SEK 5366.	Telemedicine is capable of reducing costs of multidisciplinary meetings.

Video-Based Applications (continued)

Author/ study design	Objective	Approach	Setting and study population
Sezeur A et al., 2001[61] France Cost estimates as part of a study on patient acceptance/satisfaction	Appraisal of oncology consultations regarding chemotherapy.	Comparison of videoconferencing costs with cost of ambulance transport to second hospital.	Two Paris hospitals. Post-operative patients (N = 16) awaiting chemotherapy.
Weinerman B et al., 2005[56] Canada Quantitative/Prospective, non-randomized comparative	To evaluate patient and physician acceptance of subspecialty oncologic teleconsultation for distant communities.	30 sequential patients with gastrointestinal (GI) malignancy referred from the Central Island region were seen via videoconferencing and 30 sequential patients were seen face to face in Victoria by one oncologist. Patients and the oncologist filled out a satisfaction questionnaire.	British Columbia Cancer Agency, Vancouver. 60 patients with GI malignancy.

	Limitations	Quality scores/ [reliability]	Results/conclusion	Implications for decision making
	Little detail on basis for cost estimates. Alternative of consultations being held at one hospital not considered.	Economic: 2/10	Cost per teleconsultation 188 FF; savings through avoiding ambulance transfer 510 FF per patient.	Use of videoconferencing provides savings over usual practice of transferring patients for face-to-face consultation.
	Validation process of satisfaction questionnaire unknown. Lack of randomization.	Mean: 6 [D: Fair to Poor]	Chemotherapy given to 46.7% of telehealth group and 43.3% of face-to-face group after consultation. No difference was observed in patient satisfaction, whether patients were seen via videoconference or in person. Patients were very satisfied with teleconsultation, and it saved them hours of travel.	Indication that first-time oncology consultations could be done using videoconferencing for patients with various stages of GI malignancy.

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Notes

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- Cost-effectiveness in the detection of syphilis
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The Use and Benefits of Teleoncology determines the current state of evidence on teleoncology applications to improve access to care closer to home for rural patients and families affected by a diagnosis of cancer.

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