Summary and Conclusions

Radiotherapy for Cancer

A Systematic Literature Review

The Swedish Council on Technology Assessment in Health Care

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Summary and Conclusions of the SBU Report on:

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SBU Summary and Conclusions

Introduction

Cancer is a general term used to describe a wide range of tumour types. In principle, cancer can appear anywhere in the body. These tumours can grow at the location where they appear, invade surrounding tissue (infiltrate), and spread throughout the body (metastasize). Many types of cancer can be cured, mainly those which are localized, but even some cancers which have metastasized can be cured. Nevertheless, cancer continues to be regarded by patients as more alarming and threatening than many other diseases which may have a course that is substantially more severe. The most common cause of death among men and women in Sweden is not cancer but diseases of the cardiovascular system, which account for more than 50 per cent of all deaths. Cancer is responsible for somewhat over 20 per cent.

In 2000, around 45 500 cases of cancer were reported to the National Cancer Registry in Sweden. Approximately equally as many men and women were affected. Of these cases, about 39 000 were individuals affected for the first time. The total number of people in Sweden who have, or have had, cancer is somewhat over 310 000. This figure includes both those who have been successfully treated and no longer have signs of cancer and those who continue to be treated.

Since cancer mostly is an age-related disease, the age structure of the population is an important factor in cancer prevalence. One half of all patients who get cancer are older than 70 years of age. Throughout the 1900s, the population in Sweden increased, as did the average life expectancy. During the past 20 years, the number of people above 65 years of age increased by nearly 40 per cent and those over 80 years of age increased by nearly 50 per cent.

This trend is projected to continue, and the number of people diagnosed with cancer will therefore increase. Every third individual in Sweden can expect to develop a cancer during his or her lifetime, usually at a more advanced age.

In many cases, cancers can be successfully treated by surgery, radiotherapy, or medical therapy involving chemical agents (chemotherapy) and hormones. The most common treatment approach is to remove the tumor surgically. Surgery can also be combined with radiotherapy and/or chemotherapy and hormones.

In 1996, SBU published a systematic literature review on radiotherapy for cancer. This report has now been enhanced by a systematic literature review of scientific studies published during the past 5–10 years.

Radiotherapy

Some types of tumours can be treated by radiotherapy alone, intended to either cure the disease or alleviate its effects. The term "curative treatment" is used when the intent of treatment is to cure the patient. The term "palliative treatment" is used when the intent is to alleviate pain and other symptoms. For the individual patient, these two types of treatment may overlap.

Radiotherapy involves the use of ionizing radiation from x-ray equipment and electron accelerators, but may also involve radioactive isotopes. The aim of treatment is to kill the tumour without destroying the healthy surrounding tissue. This is a complicated and technically advanced process which involves several different steps that must be adapted to each individual patient. Initially, a comprehensive investigation is carried out to determine the type of cancer and its spread. Decisions concerning many different details are made prior to treatment. These include defining the target volume to be irradiated, prescribing the radiation dose, and how the dose should be distributed over time (fractionated), fixation of the patient and determining the treatment technique (radiation quality, number of fields, etc), and checking the planned treatment by simulation. Treatment is usually a team effort

involving the patient on one hand and several different specialists on the other, eg, oncologists, surgeons, radiologists, radiophysicists, and their assistants, and nurses.

In Sweden nearly all radiotherapy, both curative and palliative, is delivered at specialized oncology departments. There are eight oncology departments at the county hospitals and nine at the regional hospitals. Gynecological tumours are usually treated at special departments for gynecologic oncology, which are available at seven of the nine regional hospitals.

Studies of Practice in Sweden

SBU has studied radiotherapy practices in Sweden and found that the number of treatments per year increased by over 50 per cent between 1992 and 2001. The number of cancer patients who at some time during their disease received radiotherapy increased from 32 per cent in 1992 to 47 per cent in 2001. The large majority of these patients receive external radiotherapy, ie, radiation delivered from a source outside of the body. The previous report showed that only a very small percentage received brachytherapy, ie, a radioactive source is applied directly near or in the tumour. Previously, this method was used nearly exclusively in gynecological tumours, but prostate cancer has now become the most common tumour treated by brachytherapy. Furthermore, there has been some return to earlier practice as regards tumours in the head and neck, where brachytherapy based on modern technology has once again become more widely used.

The study of current practice shows that approximately one half (54 per cent) of the treatments are delivered for a curative purpose. Curative treatment has also increased, mainly at the county hospitals, while the regional hospitals report an unchanged proportion in both general and gynecological oncology.

Curative treatment is given mainly to patients with breast cancer, rectal cancer, head and neck cancer, and gynecological cancers. The previous SBU report suggested that palliative radiotherapy had not been applied to the extent motivated by findings

in the scientific literature. This has now changed, and palliative treatment has increased substantially. Patients in whom cancer has metastasized to bones are, as previously, the largest single group to receive radiotherapy for palliative purposes. In palliative radiotherapy the treatment periods are generally rather short. Most patients can receive radiotherapy without being hospitalized.

As shown earlier, several different specialties participate in the treatment of most cancer patients. Only 20 per cent of the treatments for primary tumours involve radiotherapy alone. A combination of medical and surgical methods are used in up to 80 per cent of the treatments. The previous report showed that only 3 per cent of the treatments were delivered in some type of controlled clinical study. This has not improved. Most likely, this is due to the lack of economic incentives for radiotherapy treatment studies.

Central or regional treatment guidelines are available for most types of cancer. These guidelines do not usually give detailed descriptions of the practical procedures of radiotherapy. Hence, nearly one third of all curative treatment is delivered according to individually adapted treatment schedules, ie, based on local judgement.

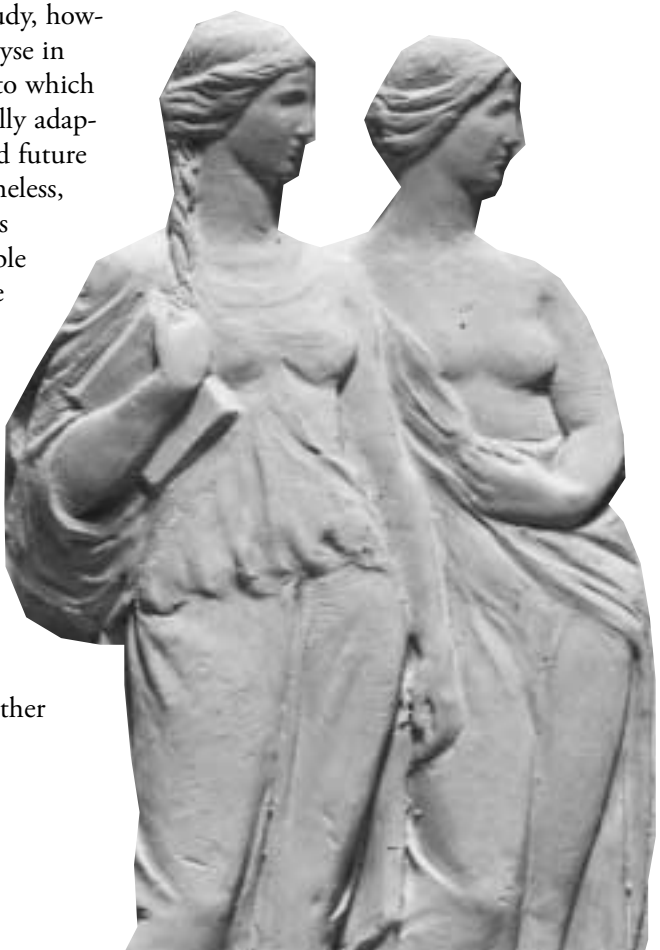
Resources and Costs in Sweden

A special study has investigated the cost of radiotherapy in Sweden. The acquisition value of radiotherapy equipment increased from 490 million SEK in 1991 to approximately 800 million SEK in 2000. The increased acquisition value can be largely explained by the replacement of equipment (26 accelerators), but also by an increase in capacity by seven accelerators. Concurrently, the volume of radiotherapy, based on the number of fractions per accelerator, increased by 20 per cent, which demonstrates an increase in productivity for external radiotherapy during the 1990s. The cost for radiotherapy in cancer patients represents nearly 6 per cent of the costs for all cancer care, which is basically unchanged in comparison to the previous report.

The cost per patient treated varies partly depending upon whether the treatment is curative or palliative and partly on the type of cancer being treated. On the basis of the estimates presented in the SBU report from 1996, the average cost per patient for curative treatment can be as high as 55 000 SEK and for palliative treatment as high as 17 000 SEK in 2002 prices. These costs address only radiotherapy and do not include costs for other healthcare interventions.

In addition to the investment in equipment, specially trained personnel such as oncologists, oncology nurses, and radiophysicists are also required. The report specifies the staff employed for radiotherapy at the various units. In recent years, the lack of trained staff has become apparent, which has placed limitations on activity. The SBU study, however, did not analyse in detail the extent to which staffing is optimally adapted to current and future activities. Nevertheless, such an analysis is necessary to be able to estimate future recruitment needs.

Increased dispersion of resources for radiotherapy occurred during the 1990s. This has benefited patients, but it also means that other



types of coordination are needed to enable assessment of diagnosis and care throughout the full continuum of care. Hence, it is essential to review the structure of oncology care, its organization, and resource utilization.

Scientific Literature

This report consists of two volumes. Volume 2 presents an assessment of the extensive scientific literature for different types of cancer. Several databases were used to search the relevant studies. An author for each section has read, classified, and assessed all references and prepared a draft. One or two members of the project group reviewed the draft. The literature assessment as a whole was then reviewed by both a Swedish and an international group of independent researchers.

To be comparable with the previous report, the studies were classified and ranked according to a system developed at that time. It consists of two components, classification based on the type of study and assessment of the scientific quality of the study. Quality was rated for each type of study. Consequently, a high percentage of high-quality studies appears in the tables. The methodology is described in the introduction to Volume 2. The respective sections present classifications and rankings for each individual study in the overview tables and references.

Because the process differs, the evidence concepts used for the conclusions concerning the different types of cancer do not completely agree with those used in later SBU reports (Evidence Grades 1–4). However, the project group made a considerable effort and set higher standards for uniformly assessing the evidence used in the conclusions. Therefore, eg, if a conclusion presents high-grade evidence it must be backed up by a randomized controlled trial or meta-analysis of high quality.

Current practices in radiotherapy in Sweden were compared with the findings presented in the scientific literature. This comparison is presented in Volume 1, Chapter 7. The changes reported in the practice survey are generally aligned with the practices

predicted in the previous report and supported by the scientific literature.

The facts presented in the two volumes of the report are based on more than 2 500 scientific studies, including the studies presented in the 1996 SBU report. These studies, in total, include one million patients. Several important studies have been presented since publication of the previous SBU report. Some of these studies are systematic reviews of high scientific value. The studies of lower quality, eg, those with methodological deficiencies or where too few patients are included to yield a reliable result, are many. These were excluded from detailed assessment and are not presented in the SBU report.

Scientific Evidence

This report, like the previous report, assesses the scientific literature on radiotherapy for cancer in adults. Other methods for treating cancer have been assessed only if they are directly compared with radiotherapy, which has occurred relatively seldom. Hence, statements concerning other treatment methods are based on weaker evidence than those referring to radiotherapy.

The scientific literature currently available provides substantial information about the effects of radiotherapy for the most common types of cancer. It shows that surgery in combination with radiotherapy can have curative effects on many types of cancer, eg, breast cancer, rectal cancer, sarcoma, and cervical and uterine cancer. In some cases, radiotherapy alone can have curative effects on, eg, the head and neck region and some lymphomas. With other types of tumours, eg, brain tumours, radiotherapy often provides relief but seldom cure. Radiotherapy is shown to have good palliative effects for metastasized cancer. This applies mainly to skeletal metastases and symptomatic metastases in the brain. The literature review does not cover the more uncommon types of cancer.

Role of Radiotherapy in the most common types of Cancer

The following summary describes the effects of radiotherapy in the most common types of cancer (approximately 80 per cent of all cancers). The risk for death from cancer following diagnosis or treatment is reported in various ways in the different studies. It is most common to calculate the percentage of 5-year or 10-year total survival, in some cases 5-year, relapse-free survival. Only exceptionally has median survival been presented in weeks, months, or years. Regarding palliation, effects are reported mainly in terms of reduced pain and/or reduced risk for fracture (in skeletal metastases). In some cases, palliation involves a reduction in the tumour accompanied by a reduction in symptoms related to tumour size, eg, pressure and obstruction.

Many of the high-quality studies reviewed compare different methods of radiotherapy, eg, various ways of dividing the total dose into few or many treatment sessions (hypo- or hyperfractionation). Several studies also compare different ways of combining radiotherapy with surgery, eg, prior to or following the surgical intervention.

In 2000, there were 960 cases of *tumours diagnosed in the head and neck region*, corresponding to approximately 2 per cent of all cancer.

Due to the many

different therapeutic combinations and the different locations of these tumours (eg, oral cavity, pharynx, larynx, nose) the literature is diverse and difficult to summarize.

Radiotherapy, either alone or in combination with surgery, has a decisive effect on the success of treatment for tumours in the head and neck. Altered fractionation (hyperfractionation) can enhance tumour control, but may also have severe, acute side effects. Radiotherapy in combination with chemotherapy may also enhance tumour control, but at the price of severe side effects. The scientific literature suggests that these treatments can have greater local effects on cancer, but there is insufficient evidence concerning later side effects.

In recent decades, the use of brachytherapy has increased for certain types of cancer. The conclusions presented in the previous SBU report on brachytherapy can be verified, namely that approximately 10 per cent of the patients are candidates for this type of treatment. However, it should be noted that randomized studies that compare the effects of brachytherapy with external radiotherapy are lacking.

In 2000, there were 378 cases of *cancer diagnosed in the esophagus*, which corresponds to nearly one per cent of all cancer. Esophageal cancer was not addressed in the previous SBU report.

Surgery is first-line treatment for patients with esophageal cancer. In cancer where surgical intervention is not an option, concurrent chemotherapy in combination with radiotherapy (radio-chemotherapy) yields better survival than conventional radiotherapy alone. It has been shown, however, that pre- and postoperative radiotherapy does not increase survival compared to surgery alone.

In 2000, there were 1 817 cases of *rectal cancer* diagnosed, corresponding to 4 per cent of all cancer. In the studies reviewed, the tumours have been located in the rectum between 12 and 20 centimeters from the anal orifice. Anal cancer is not included under the definition of rectal cancer. Anal cancer is located in the skin surrounding the rectal orifice.

Rectal cancer is treated mainly by surgery. Improved surgical methods and the concentration of surgical intervention have improved the results. Total control of rectal cancer is important since local relapse often results in severe symptoms and a reduced quality of life. Radiotherapy has been shown to reduce local relapse and can increase survival (approximately 10 per cent).

Preoperative radiotherapy is more effective than postoperative. It is unclear whether concurrent chemotherapy and radiotherapy is more effective than radiotherapy alone. It has been shown that radiotherapy can enable surgery in many patients where initially the tumour was not resectable. Radiotherapy can be used to ameliorate symptoms in patients where surgery is not an option.

In 2000, there were 2 846 new cases of *lung cancer* diagnosed, corresponding to 6 per cent of all cancer. The most common form, non-small cell lung cancer, comprises 80 per cent of all lung cancer. Only this type is addressed in the report.

Surgery is the most common treatment for non-small cell lung cancer in stages I and II. Radiotherapy can lead to cure in some patients where surgery is not an option. In patients with locally advanced lung cancer, and in generally good physical condition, there is strong scientific evidence that a combination of radiotherapy and chemotherapy yields results superior to radiotherapy alone. The studies do not suggest that postoperative radiotherapy is of value following surgical removal of non-small cell lung cancer. In patients where surgery is not an option, continuous, hyperfractionated, accelerated radiotherapy is reported to be superior to conventional radiotherapy in terms of tumour response and survival. Palliative radiotherapy ameliorates symptoms associated with locally advanced lungcancer.

In 2000, there were 290 cases of *soft tissue sarcoma* diagnosed, which corresponds to 0.5 per cent of all cancer. Soft tissue sarcoma is an unusual type of malignant tumour.

The scientific data show that radiotherapy as adjunct to surgery for curative purposes in soft tissue sarcoma improves local control when the tumours are located in the extremities or the torso.

In 2000, 6 348 new cases of *breast cancer* were diagnosed in women, corresponding to 29 per cent of all newly diagnosed cancer in women and 14 per cent of all cancer. Breast cancer is the most common type of cancer in women. The assessment in this report is limited to radiotherapy given for curative purposes and the late side effects of such treatment.

The primary treatment for breast cancer is surgery, either mastectomy (removal of the entire breast) or breast conserving surgery. Radiotherapy following mastectomy reduces the risk for local relapse and also reduces the risk for death from breast cancer. It is uncertain whether total survival increases since radiotherapy patients are at greater risk for dying from other diseases, mainly cardiovascular diseases. The excess mortality from cardiovascular diseases may be lower with modern radiotherapy methods, but to date the scientific documentation is insufficient. Following breast conserving surgery, radiotherapy provides substantial reduction in relapse of breast cancer. Survival after breast conserving surgery combined with postoperative radiotherapy is the same as survival after mastectomy.

Gynecological cancers include cervical cancer, uterine cancer, and ovarian cancer. Treatment results for uterine cancer are reported every third year in reports containing data from over 100 specialized clinics which monitor and register their patients in a uniform manner (Annual Reports). These reports present treatment results from thousands of patients, which enables comparisons among different treatment strategies.

In 2000, there were 448 cases of *cervical cancer* diagnosed, which corresponds to one per cent of all cancer in Sweden. The incidence of cervical cancer continues to decline.

It is unclear whether a combination of surgical treatment and radiotherapy is superior to surgery alone or radiotherapy. In early stage cervical cancer, the combination of radiotherapy and chemotherapy is shown to yield longer disease-free and total survival. There is insufficient evidence to show that this applies in locally advanced stages.

In 2000, there were 1 292 cases of *uterine cancer* diagnosed, corresponding to 3 per cent of all cancer. Uterine cancer is the largest group of gynecological cancers.

Cancer in the body of the uterus is treated primarily by surgery. The literature shows that postoperative radiotherapy at early stages in high-risk patients reduces the risk for relapse, but does not influence survival. Radiotherapy can lead to cure in patients who have relapsed or are viewed to be inoperable for medical reasons.

In 2000, there were 826 cases of *ovarian cancer* diagnosed, which corresponds to 2 per cent of all cancer. Surgery and chemotherapy are the primary treatment options.

The literature shows that radiotherapy plays an insignificant role in treating ovarian cancer.

In 2000, 7 611 cases of *prostate cancer* were diagnosed, which corresponds to 17 per cent of all cancer. Prostate cancer is the most common form of cancer in men. There is a lack of well-executed randomized trials, but ongoing studies are expected to provide better knowledge on the benefit of different treatment strategies.

No randomized trials have been performed which compare radiotherapy with controls only. Curative external radiotherapy or brachytherapy in low-risk patients appears to yield the same survival as radical prostatectomy (surgical removal of the prostate). An increase in the radiation dose from 70 Gy to 78 Gy is thought to offer better protection against relapse in some high-risk patients, but it also has more side effects. No survival benefits have been shown. A higher radiation dose can be delivered using various methods to conform, to the extent possible, to the geometry of the target volume (conformal treatment). Treatment using these methods probably results in fewer late side effects in the intestine. Short-term initial (neo-adjuvant) hormone therapy is thought to yield better local control and longer relapse-free survival compared to radiotherapy alone. No effects on total survival have been demonstrated. Adjuvant hormone treatment (including surgical

removal of the testes) following radiotherapy is clearly shown to improve local control and disease-free survival, and possibly total survival.

There are no randomized trials to show the value of radiotherapy following prostatectomy when it is uncertain that the entire tumour has been removed. Short-term hormone treatment prior to such postoperative radiotherapy is thought to extend the time until biochemical relapse – relapse established exclusively by blood test (PSA).

In 2000, there were 2 086 cases of *urinary bladder cancer* diagnosed, which corresponds to slightly more than 4 per cent of all cancer. Most studies include relatively few patients, and the follow-up time is short. Urinary bladder cancer was not addressed in the previous SBU report.

Surgery is the primary treatment for urinary bladder cancer. With regard to radiotherapy, most studies have focused on various methods of radiotherapy. No studies have compared radiotherapy and surgery. Preoperative radiotherapy is not shown to be of value in comparison to only surgical removal of the urinary bladder. Palliative treatment of advanced bladder cancer can provide rapid symptom amelioration. The scientific documentation on radiotherapy for this type of cancer is deficient.

In 2000, there were 1 009 cases of primary *brain tumours* diagnosed, corresponding to approximately 3 per cent of all cancers. The assessment covers the most common types of brain tumours:

high-grade malignant glioma (50 per cent of cases), low-grade glioma, and meningioma.

There is no curative treatment for patients with high-grade malignant glioma. Potentially, primary brain tumours can be treated by surgery. The addition of radiotherapy can extend life by 3 to 4 months. The effect of radiotherapy with few fractions is probably similar to usual fractionation and more comfortable for patients. Low-grade glioma and meningioma are rare, having a prolonged course and high survival rates. The value of radiotherapy as palliative treatment in low-grade glioma is unclear.

Malignant lymphoma is classified into two main types Hodgkin's and non-Hodgkin's lymphoma.

In 2000, there were 176 cases of *Hodgkin's lymphoma* diagnosed, corresponding to 0.5 per cent of all cancer.

The use of radiotherapy as the only treatment for Hodgkin's lymphoma is declining since this strategy involves severe delayed effects. Hence, the treatment strategies have changed. Most younger patients (80 per cent at early stages, 60 per cent to 70 per cent in late stages) are cured with radiotherapy in combination with chemotherapy. The optimum radiation dose and treatment volume after chemotherapy is, however, not defined. It is being discussed whether radiotherapy is necessary in these patients. Long-term followup is necessary to assess the effects of the changes in treatment. In advanced stages of the disease, radiotherapy has good palliative effects.

In 2000, there were 1 342 cases of *non-Hodgkin's lymphoma* diagnosed, corresponding to 3 per cent of all cancer.

Radiotherapy alone is valuable in both low- and high-grade malignant forms of non-Hodgkin's lymphoma, stage 1. One third to one half of the patients were healthy at 15-year followup. One study has shown that the addition of chemotherapy does not improve the results for indolent (slow growing) lymphoma. Some data suggest that the addition of chemotherapy is valuable in cases of aggressive lymphoma. Radiotherapy could be used in palliative situations in lymphoma.

Skeletal metastases refer to cancer that has spread to the skeleton, where these metastases cause various symptoms depending on the part of the skeleton affected. In general, they cause pain, which can be severe. Skeletal metastases are the most common indication for palliative radiotherapy.

In skeletal metastases, radiotherapy is an effective treatment method for alleviating pain, preventing fractures, and giving patients pain-free mobility. Pain relief is achieved in 80 per cent of patients and remains for more than 6 months in 50 per cent of patients. The previous SBU report showed that only about 10 per cent of the patients with skeletal metastases are offered radiotherapy. The SBU conclusions stated that "all patients with cancer in advanced stages, regardless of where they reside in Sweden, should be offered various treatment options to alleviate their problems". The new survey shows that the number of treatments for skeletal metastases has increased substantially. It is difficult to determine whether the need for radiotherapy has been met. There are still no comparative studies with other types of palliative treatment for skeletal metastases.

Side Effects and Impact on Quality of Life

Ionizing radiation affects all tissue and can cause side effects in normal tissue within the irradiated tissue volume. The side effects that appear are either acute side effects that appear in direct conjunction with treatment or those which appear later from the long-term effects of radiation. The latter particularly include injury to the heart or lungs from irradiating the thorax (eg, breast cancer, Hodgkin's lymphoma) and the appearance of secondary tumours many years after treatment.

Acute tissue reactions usually appear in the mucous membranes and involve redness, swelling, lesions, and bleeding. Patients may find it difficult to eat if the treatment area includes the mouth, throat, and/or esophagus. Similar reactions can appear from radiation of the abdomen. Acute reactions appear generally after 2–3 weeks of treatment and peak when treatment ends or

several weeks later, and thereafter subside.

Late radiation reactions can appear from 6 months up to several decades after treatment concludes. The irradiated tissue loses elasticity, which can lead to stiffness and scar formation. Blood vessels can become fragile, bleed easily, and show increased arteriosclerosis. Irradiation of the heart may increase the risk for damage to the coronary arteries. The salivary glands may cease to function, thereby increasing mouth dryness and the risk for caries. Cataract may occur if the eyelens receives a high radiation dose. One of the most serious side effects involves damage to the spinal cord if the tolerance dose is exceeded.

The patient's experience related to an examination for suspected cancer, and subsequent diagnosis and treatment, is an important issue, but one which is seldom addressed in the scientific literature. Although reactions from patients have been reported in conjunction with the results of various treatments, the impact on quality of life has seldom been addressed systematically. Research using the instruments to measure quality of life that have been developed in recent years remains in an initial stage. It should be remembered that radiotherapy comprises only a part of the total care of a cancer patient. Hence, it is difficult to isolate the effects which one of many treatments may have on the quality of life, particularly in a disease like cancer where the diagnosis itself has a substantial psychological impact on the patient.

Radiotherapy has a pronounced technological orientation and involves a large number of specialists. In such treatment, it is particularly important for patients to have a good relationship with the physician. Unfortunately, studies on the patient–doctor relationship in radiotherapy are lacking. Although special units have been developed for psychological support (mainly for breast cancer patients) controlled studies of their effects are lacking.

Conclusions

- Treatment of cancer patients includes surgery, chemotherapy, and radiotherapy, all of which are part of the concept of oncological treatment.

- In Sweden, radiotherapy for solid tumours is practiced in general agreement with the evidence presented in the scientific literature.

- The role which radiotherapy plays in the curative and palliative treatment of patients with certain types of cancer has been documented. However, the evidence must be substantially strengthened through randomized controlled trials addressing the following issues:
  1. The relative advantages and disadvantages of different types of palliative treatment.
  2. Comparative studies of radiotherapy in relation to other treatment options for certain types of cancer.
  3. Comparative studies of side effects and patients' quality of life from different methods of radiotherapy and other types of treatment.

- To develop and improve the care and treatment of patients with cancer, more patients must be included in clinical trials.

- Curative radiotherapy is an important complement to treatment, mainly surgery, for most types of cancer addressed in this report.

- Palliative radiotherapy has increased, which is in line with the projection presented in the previous SBU report.

conclusions

- The volume and capacity of radiotherapy in Sweden is now largely the same as in other Western nations.

- The direct cost for radiotherapy averages approximately 55 000 SEK for a curative treatment series and approximately 17 000 SEK for a palliative series.

- It is essential to review the structure, organization, and resource utilization of oncology services. The advantages and disadvantages of centralizing treatment resources for patients with unusual types of cancer should be investigated. Such a review is essential to guarantee access to adequately trained staff and the medical outcome of cancer treatment. The staff requirements for cancer radiotherapy are uncertain, and hence it is essential to study this issue.

- Routines for quality assurance in radiotherapy should be developed and should also cover the quality of care and services.

- Future studies on the effects of various treatment options for patients with cancer should also investigate the impact on the patient's quality of life and well-being. More detailed investigations of both immediate and long-term side effects are needed. There are too few studies of this type.

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SBU Evaluates Health Care Technology

The Swedish Government has given SBU the following responsibilities:

- SBU shall evaluate the methods used in health care by systematically and critically reviewing the scientific evidence in the field.

- SBU's assessments shall cover the medical aspects and the ethical, social, and economic consequences of disseminating and applying medical and dental technologies.

- SBU's assessments shall be compiled, presented, and disseminated in such a way that all affected parties have access to the information.

- SBU shall contribute, through informational and educational initiatives, toward ensuring that the knowledge gained is used to rationally utilize available resources in health care.

- SBU shall draw on national and international experience and research findings in the field and shall serve as a focal point for health technology assessment in Sweden. This effort shall be managed in a way that secures success and respect for the organization, both domestically and internationally.

Radiotherapy for Cancer

The SBU report, “Radiotherapy for Cancer”, is based on a systematic and critical review of the scientific literature. It updates the previous edition of the “Radiotherapy for Cancer” report published by SBU in 1996.

The Summary and Conclusions of the updated report, presented in this booklet, have been approved by the SBU Board of Directors and the SBU Scientific Advisory Committee.

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