UK, two million people live with or have had cancer. This number is rising by 3% each year (Macmillan Cancer Support 2008a).

Long-term survivors of cancer may report poorer health and wellbeing than the general population, including functional or psychological disability as a result of their cancer diagnosis and treatment. Greater use of healthcare services to manage these symptoms may place a significant burden on the healthcare system. As cancer is predominately diagnosed in people over 60 years who may also have existing comorbidities causing pain, such as arthritis and osteoporosis. Therefore, the development of cancer-related chronic issues, such as pain, altered bowel or bladder function, altered speech or swallowing function and alterations to physical function, may increase the need for long-term symptom management and rehabilitation (Sun et al 2008).

During active treatment, patients may experience acute, short-term pain related to diagnostic or interventional procedures, such as bone marrow aspiration, long-term central venous device insertion, repeated peripheral intravenous cannulation, chemotherapy and/or radiotherapy, or acute post-operative pain. Pain management therapies should be planned and used for all procedures, interventions and treatments that may cause pain. The risk of developing pain following cancer treatment usually depends on several factors (Earle 2007).

Pain and discomfort influence patients’ experience of cancer care and treatment. In some cases, for example after surgery, untreated moderate to severe pain may contribute to the development of chronic pain syndromes (Lyne et al 2002). Pain after surgery may be a continuation of pain the patient had before the operation or it may be caused by tissue damage. This damage is
inevitable during surgery and many types of tissue are injured during an operation. It is important to realise that any injury affects the peripheral and central nervous system. Changes can occur at several levels, for example at the peripheral pain receptor, the spinal cord and the brain. Persistence of these changes may be the causative factor in many post-surgical pain syndromes. Adequate pain relief after surgery can reduce some of the changes in this process, decreasing the risk of these changes becoming chronic (MacIntyre and Schug 2007). Appropriate use of analgesia and topical local anaesthetics may prevent or reduce pain, improving patient satisfaction and concordance with interventions and treatment (Lyne et al 2002).

Pain syndromes resulting from chemotherapy, radiotherapy, surgery or interventional procedures may have a considerable effect on a cancer survivor’s quality of life. Nurses are uniquely placed to assess cancer survivors’ pain and ensure effective treatment strategies are initiated. This article provides a brief overview of the concept of cancer survival. It focuses on chronic pain syndromes occurring after cancer treatment, analysing the effect of such pain on quality of life.

Cancer survival

A cancer survivor has been defined as ‘someone who has completed initial treatment and has no apparent evidence of active disease, is living with progressive disease and may be receiving treatment but is not in the terminal phase of illness, or someone who has had cancer in the past’ (Macmillan Cancer Support 2008a).

This definition is also cited in the Cancer Reform Strategy (Department of Health (DH) 2007). As early diagnosis and treatment of cancer improve, more people are surviving cancer. Chapter 5 of the Cancer Reform Strategy, entitled Living with and beyond cancer, details a new National Cancer Survivorship Initiative (NCSI). The NCSI is considering a range of methods by which services and support available to cancer survivors might be improved (DH et al 2010). The NCSI sets out a commitment that, by 2012, cancer survivors will have:

▷ A personalised assessment and care plan.
▷ Sufficient support to self-manage their condition.
▷ Information regarding the long-term effects of living with and beyond cancer.
▷ Access to specialist care for the management of common complications following cancer.

Cancer survival has been described as a life-changing experience, which begins at diagnosis. Patients have reported that a cancer diagnosis creates uncertainty about the future, increases anxiety and awareness of mortality, and has positive and negative effects on life and lifestyle decisions (McKenzie and Crouch 2004, Doyle 2008).

Doyle’s (2008) concept analysis found that the main themes of cancer survival relate to physical, psychological, social and spiritual health. Pain was identified as one of the physical consequences of cancer and/or its treatment (Doyle 2008, Phillips and Currow 2010).

Cancer pain syndromes

Pain that persists after completion of treatment and beyond the expected time of healing can be viewed as a chronic pain syndrome (Merskey and Bogduk 1994). Treatment-related chronic pain syndromes in cancer survivors are associated with persistent nociceptive (pain receptor) pain or neuropathic (nerve injury) pain, or a combination of both. Chronic pain syndromes may occur within several months of completing treatment or long after treatment has finished. A systematic review of pain prevalence in cancer patients found an incidence of 33% in patients who had been cured of cancer (van den Beuken-van Everdingen et al 2007). Chronic cancer pain syndromes can result from (Burton et al 2007, Levy et al 2008):

▷ Cancer treatment, such as surgery, radiotherapy, chemotherapy or interventional procedures.
▷ Residual tissue damage from the cancer.
▷ Disease recurrence.
▷ New pain unrelated to cancer, for example arthritis or mechanical back pain.

Chronic pain after surgery

For post-surgical pain to be defined as chronic, it must meet the criteria listed in Box 1.

Surgery-related chronic pain syndromes are common after breast and lung surgery, and limb amputation (Burton et al 2007).

Pain after breast surgery Chronic pain after breast surgery is a well-recognised pain syndrome (Macdonald et al 2005, Vadivelu et al 2008). Prevalence rates range from 20% to 65% (Burckhardt and Jones 2005). Chronic pain may be reported after different types of breast surgery, including lumpectomy, mastectomy, axillary node dissection and breast reconstruction, augmentation and reduction. Perkins and Kehlet (2000) summarised the incidence of different types of pain experienced by women who had breast cancer surgery as follows:
Post-mastectomy pain syndrome is characterised by a dull burning and aching sensation in the anterior chest wall, arm and axilla (Macdonald et al 2005). Examples of causes of nerve injury pain include damage to the axillary nerve or intercostobrachial nerve during surgery. Neurona can also develop as a consequence of nerve injury during surgery: Swelling and regenerative sprouting of the injured nerve (axon) end occurs and nodules are formed (neuromas). In addition to pain, patients may report numbness, paraesthesia and sensitivity. Risk factors believed to be associated with developing chronic pain after breast surgery include younger age, being unmarried, type of surgery, intercostobrachial nerve damage, radiotherapy, chemotherapy and pre-operative anxiety (Perkins and Kehlet 2000, Vadivelu et al 2008). Vadivelu et al (2008) reported the incidence of chronic pain as 65% in women aged 30-49 years, 40% in women aged 50-59 years and decreasing in women over the age of 70 years. Pain after thoracotomy Post-thoracotomy pain syndrome is well documented (Pluimjs et al 2006). The incidence is between 29% and 67% for a posterolateral approach thoracotomy and between 22% and 63% for video-assisted thorascopic lung surgery (Perkins and Kehlet 2000). Pain after thoracotomy is probably related to injury to the intercostal nerves. The posterolateral approach thoracotomy involves making an incision in the intercostal space on the back. It is a common approach for operations on the lung or posterior mediastinum, including the oesophagus. This can cause mechanical trauma anteriorly and posteriorly. The intercostal nerves lie along the lower border of the ribs and are liable to injury (Macrae 2001). Patients report spontaneous and evoked chest wall pain as well as other sensory disturbances, such as hypersensitivity and pain caused by non-painful stimulation such as light touch (Macrae 2001).

Severity of pain and the timing of pain onset are variable. Immediate severe pain with gradual improvement over the months following surgery is often reported. Pertunen et al (1999) cited the prevalence of pain three months after surgery as 80%, decreasing to 60% at one year. Risk factors for the development of post-thoracotomy pain syndrome include type of surgery (anterolateral or posterolateral approach thoracotomy or video-assisted thorascopic lung surgery), unrelieved moderate to severe post-operative pain (Perkins and Kehlet 2000) and intercostal nerve dysfunction (Burton et al 2007).

Pain after limb amputation Pain can occur after the amputation of body parts such as limbs (Schley et al 2008), breasts (Rothemund et al 2004), bladder (Biley 2001), tongue and rectum (Ovesen et al 1991). Phantom limb sensation and pain after the amputation of upper or lower limbs is the most studied of these pain phenomena.

In the literature, the reported incidence of phantom limb pain varies from 2% to 97% (Schug 2008), but is thought to occur in 60-80% of amputees (Perkins and Kehlet 2000). This variability seems to occur as a result of differences in the definition of pain and data collection techniques. Bloomquist (2001) also reported that even seven years after amputation, 50% of patients continue to experience burning, cramping, throbbing or crushing phantom pain, described as continuous or intermittent.

Definitions of pain experienced after amputation can vary. However, it is useful to distinguish between phantom limb pain, phantom limb sensation and stump pain. Phantom limb pain is a painful sensation perceived in the missing limb. It may be described as shooting, severe burning, ischaemic or crushing pain, or agonising pain, as if the phantom limb is being hyperextended or placed in an unnatural posture. Phantom pain may be reported as either intermittent short bursts of pain or continuous severe pain (Flor et al 2006). Phantom limb sensation is any sensation of the missing limb except pain, for example pins and needles, tingling or pricking. Awareness of movement and positional orientation of the limb are widely reported (Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine 2010).

Stump pain is pain in the residual portion of the limb or stump (Prantl et al 2006). Causes of stump pain include neuromas, bone spurs (bony growths formed on normal bone) in the residual stump, localised skin disease and infection. Risk factors proposed for the development of phantom limb pain include the severity of pre-amputation pain and post-operative pain (Nikolajsen and Jensen 2001), older age (Schug 2008) and catastrophising and passive coping styles (Richardson et al 2007). Catastrophising refers to a coping style that even seven years after amputation, 50% of patients continue to experience burning, cramping, throbbing or crushing phantom pain, described as continuous or intermittent.

Criteria for chronic post-surgical pain

- Pain that developed after a surgical procedure.
- Pain of at least two months’ duration.
- Other causes for the pain have been excluded, for example continuing malignancy or chronic infection.
- The possibility that the pain is continuing from a pre-existing problem must be explored and exclusion attempted.

Chest wall, breast or scar pain (11-57%).
- Phantom breast pain (13-24%).
- Arm and shoulder pain (12-51%).

Post-thoracotomy pain after thoracotomy involves making an incision in the intercostal space on the back. It is a common approach for operations on the lung or posterior mediastinum, including the oesophagus. This can cause mechanical trauma anteriorly and posteriorly. The intercostal nerves lie along the lower border of the ribs and are liable to injury (Macrae 2001). Patients report spontaneous and evoked chest wall pain as well as other sensory disturbances, such as hypersensitivity and pain caused by non-painful stimulation such as light touch (Macrae 2001).
characterised by excessively negative thoughts and emotions in relation to pain (Vase et al 2011).

Pain after other types of surgery

Other types of cancer surgery are associated with the development of chronic post-surgical pain syndromes. Treatment for head and neck cancer may include neck dissection surgery. The accessory nerve and nerves of the superficial cervical plexus may be injured, causing an identifiable neuropathic pain syndrome. The incidence of pain at one year following surgery with or without radiotherapy is neck pain (33%), shoulder pain (37%), myofacial pain (46%), with associated loss of sensation in 65% of patients (van Wilgen et al 2004). In a study of 101 patients six months to two years after sphincter-saving surgery for colorectal cancer, 32% of patients reported abdominal pain and 18% reported pain in the rectum (Nikoletti et al 2008).

Predictive factors for the development of chronic post-surgical pain include moderate to severe pre-operative pain, repeated surgery, risk of nerve damage as a result of the planned surgical technique, acute moderate to severe post-operative pain, radiation, chemotherapy and a variety of psychological traits such as catastrophising and various coping styles (Perkins and Kehlet 2000).

Chronic pain after radiotherapy

Radiotherapy is a component of treatment for many types of cancer. The response of tissues and organs to radiation varies. Tissues and organs with active stem cell and differentiating populations tend to be more radiosensitive because of the high turnover of cells. Thus the skin, mucous membranes and bone marrow are likely to be most affected (Colyer 2003). Chronic effects are those that occur between six months and two years after completion of treatment. However, in some cases it can be much longer before pain is experienced (Burton et al 2007). Such effects are usually caused by a decrease in blood supply to the irradiated tissue, leading to neural damage, fibrosis, stenosis, necrosis (in extreme cases) or the development of secondary malignancies (Colyer 2003, Burton et al 2007). Considerations for the development of chronic pain after radiotherapy are listed in Box 2.

Pelvic radiotherapy for gynaecological or urological cancers is associated with the development of chronic pain syndromes. Baxter et al (2005), in a retrospective study of 6,428 female patients who received pelvic radiotherapy, reported an increase in lifetime hip fracture rate from 17% in the control group to 27% in the radiotherapy group. Faithfull (2003) described the experiences of men who had received radiotherapy for bladder and prostate cancer. Many of the men cited pain linked to radiation-induced dysuria as difficult to manage because it is transient, but severely intense. Other long-term effects of pelvic radiotherapy that can cause severe pain include spasm of the muscles lining the bowel. This results in a cramping pain on defecation, chronic constipation, anal stricture or anal fissures (Macmillan Cancer Support 2009a, 2009b).

Radiotherapy for breast cancer can also result in long-term effects. Approximately 1-5% of women will develop brachial plexopathy if the axilla was included in the radiotherapy treatment field (Burton et al 2007, Macmillan Cancer Support 2008b). The associated sensation is often described as shooting, burning, pins and needles, numbness and tightness (Burton et al 2007). It is important to distinguish brachial plexopathy as a result of radiotherapy from the possibility of recurrent disease.

A rare late side-effect can occur in any area of bone that has been irradiated (Khoo 2003, Macmillan Cancer Support 2008b). This can be problematic if the bone involved has a vital function, for example the jaw, or weight-bearing bones such as the femur or spinal vertebrae. Osteitis, pathological fracture, osteoradionecrosis (radiation-induced bone tissue necrosis) and radiotherapy-induced cancers are some of the possible late complications. Pain is often one of the most prominent symptoms of late side effects and can be deep seated, exacerbated by movement and related to the function of the surrounding muscles, nerves or subcutaneous tissues (Khoo 2003).

The tolerance of different soft tissues and organs to radiotherapy varies widely. The incidence and magnitude of any radiation-induced complications will depend on the type and volume of tissue irradiated, total dose and fraction scheme. Post-radiotherapy pain syndromes can occur months or years after radiotherapy treatment.

Chronic pain after chemotherapy

Chemotherapy-induced peripheral neuropathy (CIPN) describes a range of symptoms that affect the peripheral nervous system. The peripheral nervous system has three functional sections:

**Box 2**

**Considerations for the development of chronic pain after radiotherapy**

- Type of tissue irradiated.
- Volume of tissue irradiated.
- Dose and fraction scheme used.
- Baseline function of the organ at risk.

(Khoo 2003)
sensory nerves, which sense touch, pain, temperature and position; motor nerves, which are responsible for voluntary movement, muscle tone and co-ordination; and the autonomic nerves, which control intestinal motility, blood pressure and involuntary muscles (Armstrong et al 2005). Chemotherapeutic drugs that cause nerve damage are most likely to affect sensory nerves, but motor and autonomic nerves may also be affected (Macmillan Cancer Support 2009c). The incidence of severe CIPN has been estimated at 3–7% in people treated with single chemotherapeutic agents, and upwards of 38% in those treated with multiple agents (Cavalli and Zanna 2002).

Neuropathic pain will often resolve over time, with or without symptomatic treatment. However, for a small number of patients, it will persist as a chronic pain state. The severity of CIPN can be increased in incidence and severity if patients have any other pre-existing nerve damage such as neuropathy caused by diabetes, alcoholism, inherited neuropathy or paraneoplastic syndrome (a disease or symptom that results from the presence of cancer in the body, but is not caused by the local presence of cancer cells) (Armstrong et al 2005).

For a chemotherapeutic agent to cause CIPN, the drug must cross the blood–nerve barrier and the nervous system must be sensitive to the chemotherapeutic agent (Armstrong et al 2005). The degree of nerve damage is dependent on the type of chemotherapeutic agent, the duration of administration and the cumulative dose received. The combination of different chemotherapy drugs is common practice. However, if multiple chemotherapeutic agents known to cause neuropathy are administered, the risk of developing painful CIPN increases (Visovsky et al 2007). The chemotherapeutic agents most often associated with CIPN are platinum compounds, taxanes, vinca alkaloids, thalidomide and bortezomib (Armstrong et al 2005, Burton et al 2007).

CIPN is concerning for patients and physicians, as symptoms such as neurotoxicity can result in chemotherapy dose reductions, treatment delays or discontinuation of treatment (Visovsky et al 2007). Unpleasant sensory, motor and autonomic symptoms are caused by CIPN. The longer nerves are more vulnerable to injury. As nerves supplying the hands and feet are some of the longest in the body, peripheral neuropathy often affects the hands, feet and lower legs (Macmillan Cancer Support 2009c). Symptoms of peripheral neuropathy include changes in sensation, increased sensitivity, pain, numbness, muscle weakness and functional impairment (Macmillan Cancer Support 2009c).

Corticosteroids are used in some chemotherapy protocols, such as in the treatment of myeloma. Osteonecrosis is a complication of long-term steroid use, typically developing within three years of treatment. It may occur as a complication of either intermittent or continuous treatment (Burton et al 2007). Weight-bearing joints are often involved, as are the shoulder, elbow, wrist, hand and vertebral bodies. Joint replacement surgery may be required to improve function and relieve pain (Burton et al 2007).

Painful CIPN is a dose-limiting side effect of certain chemotherapeutic regimens. Development of the syndrome is related to the type of agents used, particularly if more than one has neurotoxic effects, the duration of administration and the cumulative dose received. CIPN can have severe implications for a patient’s quality of life.

**Effect of pain on patients’ quality of life**

Survivors reporting being unprepared for managing long-term or chronic effects of cancer and cancer treatments (Haylock 2006). Patients often develop significant supportive relationships with healthcare providers and can feel abandoned or lonely when they finish active treatment (Schaefer et al 1999). While there is a support network for patients during treatment, there is not the same support to help them cope with the syndrome long term and improve their quality of life after cancer treatment (Jeffries 2002, Leigh 2006).

The development of pain post-treatment may cause people to think the disease has recurred. Chronic pain syndromes affect physical, psychological and social functioning. Patients often report anxiety and depression. In a qualitative study of people with CIPN (Bakitas 2007), the experience of CIPN was described as ‘background noise’. Patients stated that even though CIPN was not the central focus of their cancer experience, it was annoying, distracting and unpleasant. Important social activities and work roles were often affected by the presence of CIPN.

Chronic pain syndromes also affect functional abilities and sleep, which led to daytime fatigue and adverse effects on mood. Bakitas (2007) reported that the presence of multiple symptoms, such as pain, fatigue and sleep disturbance, contributed to low mood and was a source of symptom distress. Often this could have a significant effect on quality of life.

An observational outcomes study of patients treated for cancer of the head and neck reported that of those employed at the time of their diagnosis, 38.1% were unable to continue working because of their cancer and treatment (Buckwalter et al 2007). Five factors contributed to this in 90% of these patients: fatigue, speech difficulties, eating, pain or discomfort, and appearance. Only 40% of these patients were able to return to work within one year of treatment.
Pain assessment and management

Chronic pain can have a significant effect on a patient’s quality of life. Pain assessment and management are often divided into patient and professional barriers. Patient barriers include fear of addiction to strong analgesics, concerns about long-term side effects, a lack of belief that pain control can be achieved, and concerns that ongoing pain may indicate recurrent or progressive cancer (Ward et al 2001, Potter et al 2003). Professional barriers may include a lack of knowledge of the principles of pain management and side effect management, fear of patient addiction to strong analgesia, and lack of knowledge of the assessment and treatment strategies for neuropathic pain (Gee and Finns 2003, Randall-David et al 2003). If healthcare professionals are to improve the pain-related outcomes for cancer survivors, assessment and management of pain need to be more effective, particularly as the number of patients continues to increase. A simple assessment tool could be used in patient reviews so that pain issues are identified early and treatment strategies can be introduced. The publication of guidelines such as those of the British Pain Society (2010) can be used to educate and guide practice. It is essential to provide education for patients to address their specific concerns relating to addiction or the side effects of analgesia and to provide follow-up care (Sun et al 2008).

Risk factors for developing chronic pain

The risk of developing pain after cancer treatment usually depends on several factors (Earle 2007):

References


Macmillan Cancer Support (2008a) Two Million Reasons. The
Conclusion

Cancer survivors are unique and thus the pain they may experience is individual. Nurses working in primary, secondary and tertiary care settings should assess pain in cancer survivors and ensure that timely treatment strategies are initiated. This could have a profound beneficial effect on the quality of life of cancer survivors.

Effective treatment of the cancer survivor with chronic pain relies on early assessment, recognition and prompt treatment with pharmacological and non-pharmacological strategies as well as psychological support.

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