

Hair and cancer chemotherapy: consequences and nursing care – a literature study

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Hair is a body appendage that throughout history has been a symbol of the social, cultural and political climate, in addition to connoting religious affiliation. Hair loss on the other hand has been associated with a loss of attractiveness, individuality, a state of disgrace and illness, in addition to the ageing process, death and a loss of sexuality. One of the most common side-effects of chemotherapy is hair loss (alopecia). Alopecia can range from sporadic thinning of the hair to complete baldness. Several factors may contribute to the severity of hair loss including drug, dose and schedule as well as hair care practices. Prevention of alopecia has been a focus in the medical and nursing literature since the late 1960s. Mechanical, physical and biological measures have been used with varying success. The goal of prevention is primarily the reduction of patient distress caused by chemotherapy-induced alopecia. Patient reactions to alopecia vary and may be dependent on the individual importance of hair, prognosis, degree of expected hair loss, the amount of information and preparation given, and physical and psychological coping mechanisms. Nurses play an important role in assisting the patient to cope with alopecia by giving the needed information and teaching self-care strategies to minimize alopecia, cope with alopecia, and protect the skin and eyes following alopecia. These interventions are aimed at helping the patient move through a potentially devastating experience to a renewed sense of well-being.

Keywords: alopecia, chemotherapy side-effects, scalp hypothermia, body image, nursing interventions for alopecia.

INTRODUCTION

Throughout history, hair has been a symbol of the social, cultural and political climate (Freedman 1994), in addition to connoting religious affiliation. It reflects the varying international trends of personal expression, as well as being characteristic of beauty, age and one's sex. The presence or absence, distribution and relative abundance of hair in certain regions of the body plays a subtle role in socio-sexual communication (Williams 1995).

Hair is associated with personal growth, maturity, and life and life processes. Supra-normal life energy, some-

times amounting to the power of magic, resides in a wilderness of hair untouched by scissors (Shiva in Firth 1973). Furthermore, it is immortal because it survives death. This personal and biological origin gives hair richness and power.

Hair loss on the other hand has been associated with a loss of attractiveness, individuality, a state of disgrace and illness, in addition to the ageing process, death and a loss of sexuality (Firth 1973; Freedman 1994). Loss of hair symbolizes the destruction of personality, diminution of self or lowering of status, either in the course of nature, such as ageing, or artificially by an act of man, such as shaving the head. Natural hair loss whether temporary or permanent is usually deplored, as opposed to hair that is voluntarily removed.

Hair loss is regarded as unpleasant and an object of disgust. To find a hair in one's food or one's bath is usually

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met with revulsion. Hair intentionally severed from the head has often been prized and used as a symbol for manipulation, especially for memorial purposes. On the whole, deliberately shaving the head has taken on a ritual quality intended to mark a transition from one social state to another and, in particular, to imply a modification in the status or social condition.

Cutting the hair close or shaving the head often denoted mourning. Aristotle wrote 'in mourning, sympathising with the dead, we deform ourselves by cutting off our hair.' Voluntary shaving the head has been used to mark participation in religious rituals or entry into a religious order (Firth 1973). Religious institutions have required the shaved head as a rejection of world vanity and a sign of repentance (Freedman 1994). Enforced cutting or shaving of the hair has conveyed contempt and degradation throughout history (Firth 1973).

Many chemotherapy agents causes hair loss. Patients who receive several different treatments to keep their cancer under control can lose their hair repeatedly. Complex regimens were significantly associated with greater difficulty dealing with this effect (Richardson *et al.* 1988). Hair loss, although not life threatening, may be disturbing to patients already faced with other health problems (Davidhizar & Bartlett 1993). Alopecia comes at a time when the patient is often feeling physically ill, tired and demoralized (Poulson 1998). When patients experience hair loss, they experience many thoughts and feelings such as anger, sadness, embarrassment and fear of rejection (Chernecky 1983).

ALOPECIA: A PATIENT PERSPECTIVE

One physician who underwent chemotherapy described her experience with chemotherapy (Clement-Jones 1985):

'Mentally I had prepared myself for the likelihood of losing my hair and having to wear a wig; but the physical reality of the hair falling out posed emotional and practical problems which I had not anticipated. For 2 weeks I was in tears every morning, plucking the clumps of hair from all over the bedclothes. Intellectually I understood what was happening, but emotionally it reinforced my feelings that I was losing a part of myself.'

Psychological and social impact

Alopecia could be referred to as a stigma which, in its metaphorical use, is referred to as discrediting attributes

that may be physical, behavioural or biographical (Sim 1990). Patients experience embarrassment when hair falls out. They find it inconvenient to camouflage it and realize that they might not always be recognized by their friends. Individuals may avoid places where previous acquaintances would see them, although there is a comfort level with friends (Richards & Martinson 1987). Many women report that it is more difficult to cope with hair loss than the loss of their breast because it is outwardly visible to others, affects their femininity and is a constant reminder of their treatment (Kaderman *et al.* 1999).

Coates (1983) demonstrated that the severity of alopecia ranked third in the list of distressing symptoms for cancer patients after nausea and vomiting. This varied only slightly between women and men. The psychological and social impact of hair loss as summarized from current literature can be a symbol of cancer (for self), symbol of cancer (for others), personal confrontation with being ill or mortality, vulnerability, powerlessness, shame, loss of privacy, punishment, a change in self perception (for self) or a change in sexual attractiveness (for others) (Freedman 1994).

In a study performed by Gallagher (1992), a detailed examination was given on the meaning of hair loss over time in a sample of women receiving alopecia-inducing cancer chemotherapy. Personal history and experiences, as well as meanings of cancer images and one's hair, shape symptom responses. Analysis revealed three processes: affective anticipation rehearsal, which begins when one learns that hair loss will probably occur; confronting the hair loss, which is acknowledging real hair loss; and the last, management of the hair loss experience, which involves a number of appraisals and strategies intended to construct a new self. (Gallagher 1992, 1997).

These processes are similar to the common themes identified in a narrative analysis of 15 women participating in a descriptive study of alopecia (Williams *et al.* 1999). The common themes identified were: preparing for hair loss, experiencing hair falling out, realizing an altered sense of self, trying to look normal, being reminded of the disease, joking about alopecia, sharing being bald, having problems with wigs, taking control, experiencing hair growing back.

Although hair loss is usually reversible, it often has a dramatic psychological impact on the acceptance of treatment (Arzouman *et al.* 1991). Patients have been reported to have refused chemotherapy for fear of losing their hair (Kennedy *et al.* 1982; Wheelock *et al.* 1984; Wood 1985; Giacconne *et al.* 1988; Tierney & Taylor 1991). However, the drive for survival is often the most important goal,

which inhibits refusal of treatment. For many subjects physical characteristics may become less important as measures of worth and living becomes more important (Wagner & Bye 1979). In addition, it is not the mere occurrence of adverse events but the difficulty in managing them that contribute to non-compliance (Richardson 1988).

On the other hand, in a study by Tierney (1992) it was reported that while 38 patients (58%) had expected hair loss to be the worst side-effect of all, only 13 (21.7%) rated it as such at the end of treatment. Another study reported that, although patients found hair loss disturbing, it is tolerable provided wigs are available and advance warning is given of what is likely to happen (Edelstyn *et al.* 1979). Subjects also reported that alopecia bothered them very little because they had been told about it and expected it (Richards *et al.* 1987). Kiebert *et al.* (1990) reports that breast cancer patients receiving adjuvant chemotherapy considered hair loss a severe side-effect although it was not prominent enough to cause a significant change in well-being.

Relationship to body image

Most individuals consider their hairstyle an important part of their personal identity and hair plays an important role in social and sexual communication. If we are aware of the major contribution of a patient's hairstyle to overall appearance, then the relationship becomes clear between the presence of one's hair, self-concept and body image (Baxley *et al.* 1984). Body image, one component of self concept, involves the picture of one's own body which we form in our mind, the way in which our body appears to ourselves (Schindler 1935). It includes the accumulated sensory experiencing of the body known as body perception (Miller 1991).

Hair changes experienced as a result of chemotherapy place one at risk for an altered body image (Freitas 1998) and can have an effect on significant others through changed visual communication. These changes can be reflected in the three aspects of the body: the body as a way of being in the world, which includes sensations and symptoms, the body as a symbol or social expression and the body as a necessary expression of existence (Cohen *et al.* 1998).

Studies have been done to establish the influence of alopecia on body image. The first study was performed by Wagner & Bye (1979) in a group of private patients who received chemotherapy for haematological malignancies and solid tumours. This study was performed in 77

patients, of which 43 had observable alopecia and 34 did not. The body cathexis scale, developed by Secord & Jourard (1953) and deemed as one of the most appropriate instruments to measure body image, was used for this study. In addition, there were allowances made for influencing variables on body image such as physical discomfort, degree of independence and the ability to carry out activities of daily living. Patients were also asked to indicate how important hair was to the way they looked and felt about themselves (Wagner & Bye 1979).

Although subjects with alopecia decreased their social activities, it was not significant and this study did not confirm a negative association between alopecia and body image. Only those patients who had reported that their hair was important to them had demonstrated significantly different scores in body image between the alopecia group and the group without alopecia. The authors state that many patients reformulate body image by focusing not on physical appearance but on spiritual issues, a sense of inner worth and strengthened family relationships.

The second study by Baxley *et al.* (1984) is similar to Wagner and Bye's study and was performed by the authors to re-examine the relationship between body image and hair loss. The body cathexis scale was also used in this study and was given to 40 patients receiving varying types of chemotherapy on an in- and out-patient basis. Twenty patients experienced hair loss and 20 did not. The results were analysed accordingly. Unfortunately, the authors do not state at what time in the treatment trajectory the measurements took place nor do they take influencing variables into consideration. Nevertheless, the results demonstrated that alopecia could negatively influence body image. These two studies have limitations in design and outcomes and denote a need for further studies to establish positive or negative associations between hair loss and body image.

In a study by Frank-Stromborg (1984), alterations of self-image were either negative body image changes or positive emotional references. The positive emotional reference refers to a possible shift in values from a materialistic orientation to an increased valuation of people, relationships and nature.

Self esteem, of which one component is body image, has not been studied in relation to alopecia, however, as body image was significantly lower in some patients experiencing alopecia and as changes in body image can affect self esteem, it is reasonable to conclude that alopecia may affect self esteem. Self esteem develops over time through an individual's interpretation of exchanges with the social

environment (Foltz 1987). Individuals lose important aspects of self including symbols of femininity such as hair, which places them at risk of lowered self esteem (Carpenter & Brockopp 1994). Alopecia has a very negative psychological effect particularly on female and young patients, conditioning the patient's quality of life with serious consequences (Dean *et al.* 1983; Wheelock 1984). Although the male self image is just as affected by alopecia, men seem to deal with it more easily because male baldness is more socially acceptable (Vandegrift 1994). Younger patients have more difficulty with the side-effects of chemotherapy (Richardson 1988). In children, hair loss may block opportunities to interact successfully with the environment and thus prevent the development of self-image or self esteem (Reid 1997).

As altered body image can have an effect on sexuality it is important to realize that the patient's partner may not want to have sexual contact because alopecia may be a daily reminder of the partner's cancer. Loss of pubic hair may be sexually exciting, or it may remind the patient or partner of being a child so that sex is avoided because it may feel like incest. Single patients may be reluctant to date because of the effect of alopecia on body image (Gates & Fink 1997).

Changes in body image may be negotiated. When examining treatment alternatives, individuals may perform a risk/benefit analysis, consider the attractiveness of the choices available and seek new information regarding these choices (Kraus 1999), and make choices for treatments that do not involve hair loss.

Present-day views of the body in western society seem to reflect a growing relaxation with the symbolism of hair. An increased acceptance is seen for persons with physical disabilities and the limitations of the body. Clothing and hair should be functional. Hopefully these changing societal views will provide a greater acceptance of patients who lose their hair from chemotherapy. Patients themselves may vary in the amount of distress they experience with hair loss, as it is entirely dependent on the individual concerned (Holmes 1979).

CHEMOTHERAPY-INDUCED ALOPECIA

Drug therapy has the ability to influence hair growth. The most common cutaneous side-effect of drug therapy with cytostatics is alopecia (Dunagin 1982). Structural damage of human scalp hairs occurs following the administration of a variety of cancer chemotherapeutic drugs (Crouse & Van Scott 1960). The effect on the hair follicle may be decreased rate of hair growth, or partial or complete hair

loss (Wagner 1979). Most of the drugs used in cancer chemotherapy affect the growth and metabolism of not only malignant cells but certain normal tissues as well. Tissues with rapid metabolic and mitotic rates such as the roots of scalp hairs are most noticeably affected (Crouse 1960).

One explanation for this phenomena is that up to 90% of all hair follicles are in a phase of rapid growth and the high blood flow rate around the hair bulbs results in an optimal bio-availability of many compounds to this area (Junqueira *et al.* 1995). In addition, studies have shown that human hair follicles possess an armament of enzymes necessary to toxify and detoxify drugs or other potentially toxic environmental compounds (Orfanos & Imcke 1991). The majority of cancer chemotherapeutic drugs that cause hair changes such as alopecia are alkylating agents, vinca alkaloids, antimetabolites, anthracyclines and antibiotics, as well as the new classes of drugs, the taxoids (Goodman *et al.* 1996).

The literature varies greatly in the categorization of which agents cause severe, moderate or mild alopecia. Table 1 describes a compilation of frequently administered chemotherapy agents and the severity of hair loss experienced. As with most chemotherapy-related toxicity, the severity of the side-effect is also route, dose and schedule dependent (Howser 1996). In addition, there may be marked differences in the potential for alopecia between drugs belonging to the same generic class (Joss *et al.* 1988) and whether or not they are drugs are given in combination (Lederle 1990). Some chemotherapy agents do not cause alopecia at all, such as fludarabine, estramustine, lomustine and cladribine.

Table 1. Drugs that cause alopecia and their severity

Mild alopecia	Moderate alopecia	Severe alopecia
Bleomycin	Busulphan	Cyclophosphamide
Carmustine	Nitrogen mustard	Daunorubicin
Fluorouracil	Floxuridine	Adriamycin
Hydroxyurea	Methotrexate	Vinblastin
Melphalan	Mitomycin	Vincristine
Dacarbazine	Teniposide	Vindesine
Cisplatin	Actinomycin	Ifosphamide
Cytosine arabinoside	Camptothecins	Etoposide
Thioguanine		Taxoids
Streptozocin		
Chlorambucil		
L-asparaginase		
Thiotepa		
Mercaptopurine		
Hexamethylmelanine		

This list was adapted from Schlesselman 1988; Joss 1988; Goodman *et al.* 1996; Society of Comprehensive Cancer Centres, VvIK 1997.

It is while they are growing, in anagen phase, that hair follicles are subject to the disruptive effect of antineoplastic drugs. Hairs that are in the telogen phase are not affected by antineoplastic agents (Dunagin 1984). Alopecia can be the result of atrophy to the hair root causing hair to be lost readily, either falling out spontaneously or being removed by casual procedures such as combing the hair. Alopecia can also be the result of diminution of the diameter of the hair bulb. This causes hair shaft constriction which results in hair breaking off at the point of constriction (Crouse 1960). Telogen effluvium is another mechanism; this is characterized by an accelerated entering of hairs into the telogen phase, followed by increased hair loss several months later (Kligman 1961).

Studies by Orfanos 1991 showed that, in more than 50% of all cases of hair loss due to cytostatic agents, loss of hair not only occurs on the scalp but on other regions of the body. Long-term therapy may result in the loss of pubic, axillary and facial hair in addition to scalp hair (Howser 1996; Seipp 1997). Typically hair on the crown and the sides of the head above the ears fall out first, probably due to mechanical friction, as these areas come in contact with bed linens, pillows and head coverings (Howser 1996). Many patients report difficulties such as scalp sensitivity, loss of body heat through the scalp and shedding hair (Ehmann *et al.* 1991). Male patients may lose facial hair or reduce the frequency of their shaving from 1 to 3 times per week. The rate of hair growth can be reduced to 0.004–0.1 mm per day as opposed to the normal value of 0.35 mm per day although regrowth can occur within 3 months, but if chemotherapy continues hair can continue to fall out (Howser 1996).

Incidence and prevalence of chemotherapy-induced alopecia

The incidence and severity of chemotherapy-induced alopecia appears to be dependent on many factors such as the half-life of the active metabolite of the chemotherapy agent(s), mono- or combination therapy, the dose (Hood 1986), the length of the infusion and possibly the condition of the hair. Hair loss usually begins 7–10 days following the initiation of chemotherapy, may be quite prominent within 1 or 2 months of treatment (DeSpain 1992) or within 2–3 weeks following chemotherapy (Villani *et al.* 1986; Howser 1996; Camp-Sorrel, 2000) and may be rapid (Howser 1996). Continued loss can continue over the next 3–4 weeks (Howser 1996). The toxic effects on the hair are almost always reversible. A delay of several weeks is common before regrowth begins (Dunagin 1982), possibly 4–6 weeks (Camp-Sorrel, 2000).

When hair regrows following chemotherapy, approximately 65% experience a change from their previous hair but this has not always been documented or reported with any regularity (Robinson & Jones 1989). Some authors report that alteration in colour and texture of hair can occur with regrowth (Didonato 1985), with a colour difference as the most common change. Some patients noticed that their hair had greyed, ageing them considerably. Approximately 33–35% of patients experienced a change in hair structure and texture (Fairlamb 1988). It has been reported that hair grows back about 0.25 inch per month and, in general, is more coarse. Hair may return thinner than prior to chemotherapy (Hood 1986). Data on alterations of hair characteristics following cytostatics for testicular cancer include 28% alteration in hair colour, 41% change in hair texture and 53% change in hair type (Higgs 1990).

Hair loss and hair regrowth have been insufficiently described per cytostatic agent and comparisons need to be made between hair loss caused by monotherapy and hair loss from combination therapy. Early reports on the incidence of alopecia in chemotherapy patients came from Simister (1966). The unfortunate epilating effect of cyclophosphamide and thiotepa is shared by other cytotoxic drugs. Vincristine produced alopecia in 42% of children with acute lymphocytic leukaemia. Practically every alkylating agent when given in large enough doses will produce alopecia (Whitshaw 1963). Alopecia probably occurs more frequently with vincristine (42–65%), cyclophosphamide (0–100%) (Whitshaw 1963) and fluorouracil (10%) than with other agents (Simister 1966). Hennessy (1966) reports that hair loss does not occur in patients receiving intraperitoneal cyclophosphamide, indicating that exposure of the drug to the hair roots is necessary to produce this effect and that possibly low doses given locally will not penetrate the blood stream, protecting the roots from harm.

Bell (1962) found that fluorouracil (5FU) caused alopecia in 10% of patients, although the severity of the hair loss is not described. Taplin *et al.* (1997) specifies that grade 1 alopecia is a common side-effect of 5FU therapy, which causes little concern. Fulton supports that conclusion and states that hair loss is uncommon with 5FU, although partial hair loss or hair thinning can be expected (Fulton 1994). Sitzia *et al.* (1997) states differences in hair loss can be seen with different regimens in varying severity. The grading of severity is in line with the known variation between cytotoxic agents, e.g. doxorubicin and high-dose vincristine invariably producing severe alopecia, and methotrexate and cyclophosphamide producing alopecia to a lesser degree.

Treatment for testis cancer using either the bleomycin, etoposide, cisplatin (BEP) or cisplatin, vincristine and bleomycin (PVB) results in alopecia 2–3 weeks after the first treatment. Hair regrowth should begin within a month following completion of therapy and may not resemble the original shade and structure (Higgs 1990). In a study of side-effects of the cyclophosphamide, doxorubicin, oncovin and prednisolone (CHOP) schedule, alopecia was the most common problem noted with >90% of all patients experiencing some hair loss by cycle 3 (range 61–98%). From cycle 3 to the end of therapy, all patients experienced hair loss. The severity was assessed as a percentage loss. The mean severity after cycle 1 was 50% and became a peak of 95% after cycle 5 (Sitzia *et al.* 1997). In a study comparing CHOP with CNOP (mitoxantrone replacing doxorubicin), significantly less hair loss was seen, 61% versus 14% respectively, while both regimes offered equal effectivity (Bezwoda *et al.* 1995).

Patients with lung cancer experience problems related to the disease and treatment. Alopecia is associated with some of the common agents used to treat this disease, i.e. cyclophosphamide, doxorubicin and etoposide (CDE) (Moseley 1987). Doxorubicin causes alopecia in 80% of patients. Cyclophosphamide-induced alopecia depends highly on the dose (Wilkes 1996). Certain regimes in the treatment of breast cancer, ovarian cancer, lung cancer and lymphoma can cause 100% hair loss (Hillen *et al.* 1990).

Cyclophosphamide, methotrexate and 5FU (CMF) that is given for breast cancer is associated with a gradual rise in both the incidence and severity of alopecia through the treatment period. By cycle 4, 95% of patients were reporting hair loss (Sitzia & Higgins 1998).

High-dose intermittent intravenous therapy is commonly associated with sudden and almost complete hair loss (Wilkes 1996). Reports have been made that irreversible hair loss has been seen by patients who underwent three conditioning treatments prior to stem cell transplantation (M. Holtkamp, personal communication). In addition, two verbal reports have been made of permanent hair loss with Taxotere (E. Hroarsdottir, personal communication). Drugs given orally daily or on a weekly schedule at lower doses cause significantly less hair loss, even though the total dose may be large (Joss *et al.* 1988).

Description of hair loss from standard chemotherapy regimes is not often present in the literature. Patients who receive standard cancer chemotherapy regimes usually have a good prognosis, often remain active and sometimes continue to work. It is therefore important to develop more incidence data on this side-effect.

Factors contributing to hair loss: hair care practices

Although there are many reasons why individuals may lose their hair, the mechanical manipulation of the hair during or prior to chemotherapy is of particular interest. Bergfield 1981 has alluded to the fact that certain hair care practices could influence hair changes in patients, but studies have not been done to support this hypothesis. Under normal circumstances, daily hair care can be performed without causing any major visible changes of the hair. 'Wrong care', however, when performed for many years may cause considerable alterations or trauma to scalp skin and the hair shaft. The result is increased fragility and circumscribed or diffuse hair loss (Bergfield 1981). Cosmetic hair procedures invariably cause changes in the hair structure even when applied with care. Bleaching, for example, diminishes the keratin matrix and the framework of the hair breaks down. Bleached hair, when visualized under the microscope, looks similar to hairs under influence from chemotherapy (W. P. M. Breed, personal communication). Clinically, one finds short hair stumps, circumscribed areas of hair matting and some scarring alopecia. At the microscopic level the hair shaft appears rough without brightness and irregular breakage can be found. Following breakage of the hair as a result of mechanical or chemical damage, individuals often state that their hair fails to grow. In severe forms, bald areas can appear on the scalp (Orfanos 1991).

A patient-related factor that may influence the degree of scalp hair loss is the variability of scalp hair growth among individuals. Individuals who have relatively few hairs in the anagen phase will be less sensitive to the effects of chemotherapy. Possibly the condition of the hair prior to chemotherapy plays a role. Damaged, tinted, permed and blonded hair may potentiate the risk for alopecia (Bergfield 1981; Camp-Sorell, 2000), as well as repeated manipulation and/or pulling of the hair (Orfanos 1991). Therefore, there are certain factors that could compound the severity of chemotherapy-induced alopecia.

PREVENTION OF CHEMOTHERAPY-INDUCED ALOPECIA

Principles of prevention

Since the late 1960s, oncologists and oncology nurses have used methods which attempt to prevent chemotherapy-induced scalp alopecia, with varying success. These methods have included mechanical methods such as scalp tourniquets to physical devices such as hypothermia and biological agents such as folic acid, alpha-tocopherol

(Wood 1985; Martin *et al.* 1986) or, more recently, the cytokines. The goals of preventative techniques are to prevent hair loss, improve physical appearance, optimize social interaction and preserve body image.

Mechanical measures

Scalp tourniquet methods and successes and failures have been described by a number of authors (Hennessey 1966; O'Brien *et al.* 1970; Lyons 1974; Pesce *et al.* 1978; Soukoup *et al.* 1978; Holmes 1979; Lovejoy 1979; Maxwell 1980; Kennedy *et al.* 1982). Scalp tourniquets are the application of bands around the head, which are applied under pressure. They work by temporarily decreasing blood flow to the scalp and limiting follicle exposure to cytostatics (Simister 1966).

With scalp tourniquets, various methods were used to obtain pressures ranging from 10 mmHg above the systolic pressure to 300 mmHg around the scalp. Optimal tourniquet pressures have not been identified (Cline 1984). These tourniquets were applied either 5 minutes prior or immediately prior to chemotherapy administration until 5, 7, 20, or 30 min following the administration of the chemotherapy agent(s). Chemotherapy agents used were cyclophosphamide, vincristine, methotrexate, adriamycin, VM26 and actinomycin, either alone or in combination regimes. Although authors describe mild to moderate hair preservation with this technique, the studies were either performed in small numbers of patients or patients were excluded from final data collection owing to refusals to use the tourniquet. In addition, the methodology was often inconsistent and/or control groups were absent. The chemotherapy types and doses varied as well as the tourniquet pressures used (Cline 1984). With the advent of scalp hypothermia techniques, this rather time-consuming, cumbersome and uncomfortable method became obsolete.

Physical methods

Hypothermia for prevention of alopecia is the application of cold to the scalp and is described and tested by many authors (Anderson *et al.* 1981). Hypothermia works by three mechanisms: reduced scalp perfusion of hair follicles by means of vasoconstriction thereby limiting the amount of exposure to the cytostatic agent (with a reduction of intradermal scalp temperature to 30°C; scalp blood flow decreased to 25%), reduced temperature-dependent cellular uptake of chemotherapy, and a reduced intrafollicular drug metabolic rate (Bülow *et al.* 1985; Hillen

1990). In cell culture, the uptake of doxorubicin into cells as well as its cytotoxicity greatly diminishes when cells are cooled to 30°C (Hill *et al.* 1976; Herman *et al.* 1981). Very few of the cytostatics used have such half-lives that just a temporary reduction the delivery of these agents can be expected to protect these cells from their cytostatic effects. Therefore, the protective effect of scalp cooling is probably as a result of one or both of the other possible mechanisms (Hillen *et al.* 1990). Hair conservation can be obtained when scalp temperature is reduced to a level $\leq 24^\circ\text{C}$ (Cooke *et al.* 1981; Gregory *et al.* 1981).

There are many articles found that describe the use of hypothermia for preventing chemotherapy-induced alopecia. The earliest report of scalp hypothermia found in the literature was in 1973. Luce (1973) reports that patients who received adriamycin as a single injection every 3 weeks, either alone or in combination with a 5-day course of imidazole-4-carboxamide (NSC 453888), underwent scalp cooling for a period lasting from 5 min before chemotherapy until 10–20 min after each adriamycin injection. Cooling was applied with a room air conditioner having the cool air piped by a 3-inch flexible hose to a hole in the top of a plastic helmet placed over the patient's head. The air stream entered the helmet at 5°C and the scalp was cooled to 18–28°C. This randomized study showed that the 16 patients without scalp cooling lost an average of 80% of their hair. The 12 patients who had scalp cooling lost an average of 30% of their hair. This study demonstrated that scalp hypothermia could offer benefit to patients that receive epilating chemotherapy.

Since then many other studies have shown that the effectivity of the various techniques employing hypothermia can range from 0% to 90%. Several cooling systems have been devised such as the application of the ice turban (Timothy *et al.* 1980; Belpomme *et al.* 1982; Bryan 1983; Dean 1983; Samonigg *et al.* 1984), cooling fluid ring turbans (Guy *et al.* 1982; Dixon & Jones 1984; Belleau 1987; Ciambellotti 1993; Tollenaar *et al.* 1994), cold air (hoods) (Luce *et al.* 1973; Symonds *et al.* 1986; Hillen 1990; Adams *et al.* 1992) and cryogel caps (Edelstyn *et al.* 1977; Anderson *et al.* 1981; Cooke 1981; Gregory 1981; Goldhirsch *et al.* 1982; Hunt *et al.* 1982; Di Giulio *et al.* 1983; Dugan 1983; Howard & Stenner 1983; Satterwhite 1984; Johansen 1985; Middleton *et al.* 1985; Villani *et al.* 1986; Parker 1987; Robinson *et al.* 1987; Giacconne *et al.* 1988; Dougherty 1996). The ice and cooling fluid turban have less popularity since the development of cryogel caps. In general, gel caps for ease of use are superior to ice packs because they are simpler to prepare, less uncomfortable and cause no problem (such as melting during

treatment). In terms of effectivity, it cannot be ascertained from these studies which method is the most effective. The exception is the use of cold air to achieve an epidermal scalp temperature of $<15^{\circ}\text{C}$. This method seemed more effective than cryogel caps in controlling alopecia related to treatments with doxorubicin (Hillen 1990; Tolenaar *et al.* 1994). Scalp cooling with cold air was effective when a dose of $50\text{mg}/\text{m}^2$ was administered (Adams *et al.* 1992). Symonds (1986) also reported effectivity.

Only patients that are treated with drug combinations that are rapidly administered ($<60\text{min}$) seem to benefit from scalp hypothermia (Belpomme *et al.* 1982). Dose has been considered an issue for the success of hypothermia. Several reports have been made that doxorubicin causes significantly more hair loss at doses $>50\text{mg}/\text{m}^2$ (Howser 1996).

Hypothermia is not 100% effective. The effectivity of scalp cooling is dependent on a number of factors, such as the presence of liver metastases or liver dysfunction, which can prolong the half-life of certain cytostatics (Anderson *et al.* 1981; Cooke 1981; Guy 1982; Hunt 1982; Di Giulio *et al.* 1983; Cline 1984; Johansen 1985; Parker 1987; Robinson 1987; Giacconne *et al.* 1988).

The degree of scalp cooling can also influence the success of hypothermia. It has been suggested that temperatures $<22^{\circ}\text{C}$ are necessary to obtain a hair-preserving effect (Cooke 1981; Gregory *et al.* 1982; Bulow *et al.* 1985). Maximal cooling is accomplished following 20–30 min of hypothermia (Gregory 1982) but must be maintained until the half-time of the active drug is complete or the scalp is sufficiently cooled (Gregory 1981). Other factors that play a role in the effectivity are the application of the cooling device: how close it is to the scalp, the presence of air preventing contact and how long it remains in place. Many investigators wet the hair to increase conduction of the cold (Guy 1982; Hunt *et al.* 1982; Johansen 1985; Dougherty 1996).

Scalp metastases have been reported in the literature and their development have been a major limitation for the broad-scale application of hypothermia. Theoretically, tumour cells that have seeded in the scalp might not receive adequate treatment during hypothermia with cytostatic agents allowing them to grow at a later date (Keller 1988; Franssen & Hillen 1991). The risk of scalp metastases is therefore an important consideration in the use of techniques to reduce chemotherapy exposure of the hair follicles. Various authors have reported an incidence of scalp metastases occurring in 0.25–11% (Dean 1983; Seipp 1983; Smith & McCabe 1984; Middleton *et al.* 1985; Keller 1988) of patients. There have been several patients who developed scalp metastases at a distance from their

primary site (Seipp 1983). It is advised that scalp hypothermia should not be used in leukaemia's or other neoplastic diseases in which numerous stem cells may be present in the scalp (Dean *et al.* 1979). Drawing on the evidence of a study of 7800 women with breast cancer, two experienced a recurrence in the scalp (Dean *et al.* 1983). Less than 10% of all patients with malignant tumours have scalp metastases (Smith 1984). Four patients were found to have scalp metastases in a study of scalp cooling (Middleton *et al.* 1985). Belleau (1987) states that hypothermia is a contraindication in patients with scalp tumours or at risk for scalp metastases (Witman *et al.* 1981). On the basis of this data, the use of scalp hypothermia was halted by the Federal Drug Association in America (Siepp 1997).

Some authors have reported no occurrence of scalp metastases (Giacconne *et al.* 1988; Ron *et al.* 1997) and feel that the need for hair preservation far outweighs the risks (Ron 1997). Others have stated that hypothermia could be made available to patients with advanced disease when there would be no detriment to hindering the curative process (Hunt 1982; Johansen 1985), although it is contraindicated in patients presenting with scalp metastases (Franssen 1991). If the treatment is palliative, the possibility of scalp metastases should not present a serious obstacle. However, if treatment is preventive, as in adjuvant chemotherapy for breast cancer, this risk may be enough to rule out the use of scalp hypothermia (Smith & McCabe 1984).

The degree of success with hypothermia is also dependent on the type of cooling used and how it is applied to the scalp. If the scalp cooling apparatus is ill-fitting, the cooling will be non-uniform (Adams *et al.* 1992). Poor conductivity is a major problem common to scalp cooling with cryogel and ice packs filled with cooled water. The cooling apparatus is often very heavy and uncomfortable. Owing to size and weight it is difficult to keep in position. Its application takes time, is expensive and constant temperatures are difficult to achieve. In addition, the side-effects are uncomfortable.

The most common side-effects reported in the studies were: headache, dizziness, aversion for ice, nausea (N) and vomiting (V), cold feeling on the scalp and/or throughout the body, a heavy feeling on the head, scalp metastases and transient light-headedness following cap removal (Satterwhite 1984). In patients with a tendency to develop migraines, hypothermia is a contraindication (Belleau 1987).

Despite the large number of studies on hypothermia, they are difficult to compare with one another owing to the plethora of differing variables: the types of scalp

cooling devices, the varying scalp temperatures, varying chemotherapy regimens and methods of applying the cooling. In addition, many studies had small patient numbers and were non-randomized or had no control group. Assessment parameters for measuring alopecia also varied per study as well as the definition of clinically relevant alopecia. A degree of success was seen in most studies but was dependent on the different types of chemotherapy regimes used, the dose and how hypothermia was administered. These findings make the studies difficult to compare. In addition, the patient's reactions were under-reported, as well as the details of the hypothermia procedure. Patients have stated the length of time for the procedure was worse than the procedure itself (Dougherty 1996). One of the most important reasons why this intervention has been well accepted was that the chemotherapy patients had been told that they would not suffer from serious hair loss, although that was not always the case (Ciambellotti 1993). Efficiency of the appliances in terms of patient comfort and their invested time, staff time/effort ratio and costs vary with the methods used. Many studies did not address these issues or only anecdotally (Tigges 1981; Cline 1984; Tierney 1987; Keller 1988; Hillen 1990). Acquiring consensus on the effectivity of hypothermia remains difficult owing to many factors. Therefore this modality cannot be used as a standard preventative treatment (Franssen 1991).

Recent developments show that the new generation cryogel cap, tested in Israel, showed moderate effectivity in patients with adjuvant breast cancer. The incidence of alopecia in the hypothermia group was 48%, while 81% of the group who had not undergone cooling lost scalp hair (Ron 1997). They have entered them onto the market.

New epilating cytostatics have been discovered, such as the taxoids (taxol and taxotere) and the camptothecins (CPT11). The incidence of alopecia with these new drugs is 100%, 100% and 56–60% respectively. The usual administration times are 3 h, 1 h and 1.5 h, respectively, prolonging the length of time needed for optimal hypothermia. This could add to the discomfort and side-effects of this procedure. Sufficient data on patient experiences with these new drugs is not yet available.

Hypothermia can diminish hair loss in certain circumstances. Hypothermia should only be applied to patients for which there is research-based evidence that it is effective (Tierney 1991). Scalp hypothermia may only be effective in a cytotoxic regimen containing anthracyclines as the sole alopecia-inducing agent (Tollenaar *et al.* 1994). Taking all the data into consideration, one could define a small patient population that could derive benefit

from hypothermia without the possible risk for scalp metastases.

Biological measures

Biological methods of hair preservation focus on promoting hair growth or protecting the hair follicle. Minoxidil 2% topical solution applied twice daily is known to induce hair growth and prevent hair loss in normal male pattern baldness. Minoxidil is a biological agent that promotes hair growth by anatomically enlarging the hair follicle causing an extension of the anagen cycle. Clinical investigation has demonstrated that minoxidil is most effective if some hair is present and stimulates suboptimal follicles (Shapiro & Price 1998). More recent studies demonstrate that minoxidil is effective in treating central hair loss in women with androgenic alopecia. The side-effects are few and present in <2% of patients (Burnett 1990). In a study involving women who underwent chemotherapy with cytoxan, adriamycin and cisplatin or vincristine, mitomycin C and cisplatin, no benefit was reported from twice daily applications of a 2% solution of minoxidil (Granai *et al.* 1991).

Other biological measures use biological substances derived from the body to combat hair loss. These are in a very early stage of development. The application of a steroid 5 alpha-reductase inhibitor (4MA) in non-bald preadolescent macaques has prevented baldness, whereas controls developed it during 2 years of treatment (Uno & Kurata 1993). This has not been tested further in humans.

There is evidence derived from testing in mice that the topical application of two immunosuppressive immunophilin ligands such as cyclosporin A (CSA) and FK 506 are potent hair growth modulators, i.e. inducers of hair growth or inhibitors of hair follicle regression as well as chemotherapy-induced alopecia (Maurer *et al.* 1997). Hussein *et al.* (1995) also demonstrated the effectivity of CSA as a chemoprotector of alopecia in animal models. Observations have been made that imuvvert and interleukin 1, biological response modifiers, protect against alopecia induced by cell cycle-specific chemotherapy agents such as Ara-C and doxorubicin in the new-born rat model, but further testing in humans is needed (Hussein 1993). AS101, an immunomodulator has demonstrated some effectivity in protecting chemotherapy-induced alopecia in man (Sredni *et al.* 1996).

Folic acid, when administered with methotrexate, can prevent alopecia (Franssen 1991). Large doses of the vitamin alpha-tocopherol (AT) was administered to patients who received doxorubicin and 69% did not experience alopecia (Wood 1985). These results have been chal-

lenged by Perez *et al.* (1986) and Martin Jimenez *et al.* (1986), who repeated this study and demonstrated that AT had no effect in preventing doxorubicin-induced alopecia. Powis *et al.* (1987) stated that other agents were added to the doxorubicin in both studies, which could have negated the effects of the AT. He demonstrated that supplementation of the diet in animal models was effective.

Although studies are ongoing to develop biological agents to prevent hair loss, little effectivity has been seen thus far, the use of AT remains unclear and standard application in the clinical setting is not recommended.

ALOPECIA: A NURSING PERSPECTIVE

Because alopecia is unavoidable in many patients who receive chemotherapy, nurses and physicians, even though it is considered as a minor toxicity in treatment evaluations (Villani 1986), must try to help the patient prepare for the sudden loss of their hair, thus minimizing the negative impact on the patient's self image (Wagner *et al.* 1979). They must be prepared for the rapid onset and transient nature of this side-effect (Howser 1996).

Understanding the meaning and the level of importance of hair to a particular woman is the first step to creating meaningful interventions (Freedman 1994). In addition, nurses should help patients control symptoms and identify and use more coping mechanisms. The significance for the partner and family/friends is also important (Goodman *et al.* 1996). Among the major concerns of breast cancer patients, concern for the family is the most prevalent (Wang *et al.* 1999).

Women reported needing more accurate expectations about the physical changes during hair loss. Women often experienced changes after the first treatment. Reported changes included scalp soreness, dryness and desquamation, as well as tactile sensory discomfort (Gallagher 1992). The positive value of specific information and its impact on hopefulness is well recognized (Cassileth *et al.* 1980) and the positive value of side-effect management information in self care for chemotherapy patients has been repeatedly shown (Dodd 1982, 1983; Rhodes *et al.* 1995). Emotional support may contribute to the quality of life of patients.

As patients often have to deal with alopecia at home, it becomes important that a variety of self-care interventions be taught so that the patient can choose which interventions will be appropriate for them. Providing the cancer patient with chemotherapy information about side-effect management techniques clearly has many advantages. The patient can identify the side-effect and be

prompt in resorting to self-care that will alleviate it (Dodd 1983).

Self care in relationship to alopecia

The change from in-patient to out-patient administration of chemotherapy in the last years has shifted the responsibility for managing the treatment of side-effects from health care providers to patients and their families (Camp-Sorell 2000). Therefore, patients must be instructed how to initiate self-care activities and health professionals must audit these self-care interventions and, when necessary, adapt them to the individual patient. Facilitating self care in patients with cancer who are receiving chemotherapy is essential to providing quality nursing care (Dodd 1982). Patients who receive side-effect management information perform more self-care behaviours than those who receive none (Dodd 1983).

Woods (1989) has defined self care as a person's attempts to promote optimal health, prevent illness, detect symptoms at an early date and manage chronic illness. Self care may also include processes of self monitoring and assessment; symptom perception and labelling; evaluation and severity; and evaluation and selection of treatment alternatives, such as self help, lay helping resources or formal health services. Orem (1990) has defined self-care as 'the practice of activities that individuals personally initiate and perform on their own behalf in maintaining life health and well-being. Conceptualizations of self care can range from those that focus on preventing illness to those that address well-being and self actualization'.

Orem (1990) describes the necessity that, when health is altered, the individual must meet health-deviation self-care requisites such as:

1. seeking and securing appropriate medical assistance;
2. being aware of and attending to effects of pathological conditions and states;
3. carrying out medically prescribed rehabilitative measures;
4. being aware of and attending to the uncomfortable or deleterious effects of medical measures;
5. modifying the self-concept (i.e. accepting oneself in a particular state of health);
6. learning to accommodate the effects of pathological conditions and of diagnostic and treatment measures within a lifestyle that promotes personal development.

Self-care interventions for alopecia

Based on Wood's, Dodd's and Orem's descriptions of self care one can derive the fact that patients need informa-

tion about alopecia and self-care strategies to deal with alopecia. This final section will deal with these aspects.

Information-giving about alopecia

Patient teaching and emotional support help the patient first anticipate hair loss, realize its impact, verbalize an understanding of factors that cause alopecia and learn self-care techniques (Wilkes 1996). Patients and their families should be informed as soon as possible, preferably before their treatments (Vandegrift 1994). Sudden alterations can be frightening for a child (Keller 1988). Patients should receive the following information both written and verbal over the following aspects of hair loss following chemotherapy:

- What is hair loss;
- Why hair loss occurs;
- Risk of undergoing hair loss;
- How hair will fall out (quickly or over time);
- When hair loss begins and ends;
- Where does it begin and the degree of hair loss;
- Symptoms or complaints associated with hair loss;
- How to minimize hair loss;
- How it will grow back, (ir)reversibility of hair loss;
- Changes in hair following hair loss;
- The impact of hair loss; psycho-social implications;
- Possible effects on body image and sexuality;
- Altered sense of self/appearance;
- What to do about hair loss;
- How to cope with hair loss;
- Scalp care following hair loss;
- How to use protective measures;
- When, where and how to purchase wigs;
- Information about wigs: activity limitation, what to watch out for;
- Wig care;
- How to deal with insurance coverage;
- Available resources for support are available such as the program 'Look good, feel better'.

This list has been compiled from suggestions for information-giving from various nursing authors in the reference list.

Self-care strategies to minimize alopecia

According to the literature, patients should receive the following information regarding minimizing hair loss when and if possible, although insufficient testing has been done on these interventions.

Following the first chemotherapy when hair loss begins, individuals with long hair should be encouraged to try a shorter style. Short hair tends to disguise hair thinning and also minimize the problem of shedding long hair, which may create anxiety (Didonato 1985; Keller 1988; Davidhizar 1993; Fulton 1994; Wilkes 1996; Kaderman *et al.* 1999; Camp-Sorrel, 2000), although Chernecky (1983) states that, by keeping the hair long if possible, hair can be arranged to cover areas of baldness.

It is advised to avoid daily shampooing. Patients can use a protein-rich shampoo or one that is pH balanced with conditioner every 4–7 days (Schlesselman 1988; Davidhizar 1993; Freitas 1998; Camp-Sorrel, 2000). It has also been suggested to use baby shampoo (Chernecky 1983; Didonato 1985; Rhodes *et al.* 1995). Subsequently, the patient should rinse thoroughly with lukewarm water, pat dry and let it dry naturally or use a soft towel (Schlesselman 1988; Davidhizar 1993; Freitas 1998; Camp-Sorrel, 2000).

It is suggested to comb with a wide-toothed comb or a soft-bristled brush (Didonato 1985; Joss *et al.* 1988; Davidhizar 1993; Gross & Johnson 1994; Rhodes *et al.* 1995; Wilkes 1996; Freitas 1998; Camp-Sorrel, 2000), comb gently (Keller 1988), and avoid excessive brushing and combing (Chernecky 1983). The use of a satin pillow-case minimizes friction when lying down (Goodman *et al.* 1997). Patients should avoid hair manipulation using e.g. hair clips, hair dryers, rollers, curling irons, dye or permanents (White *et al.* 1979; Chernecky 1983; Schlesselman 1988; Davidhizar 1993; Goodman *et al.* 1997; Freitas 1998).

Self-care activities listed for hair loss, such as shampoo and brush choice, were chosen by fewer than 25% of patients in one study and, of those, only two felt that using a soft brush was effective (Foltz *et al.* 1996). Also note that no relationship was found between post-chemotherapy hair loss and hair care practices, including shampooing, blow-drying, teasing, combing, brushing, washing and setting, history of permanents, or colouring use of hair spray or curling irons.

It is not uncommon to recommend that the patient shave his or her head once hair loss becomes pronounced. Patients seem to experience less scalp discomfort and pain compared with those who do not (Goodman 1992). In addition, it promotes even regrowth, often permitting the patient to go without a wig sooner (Camp-Sorrel, 2000).

Self-care strategies to cope with alopecia

Self-care strategies to cope with hair loss may be taught, which will hopefully contribute to diminishing the distress over this side-effect. It is important to explore past

experiences and feelings with illness, treatment and hair loss before teaching self-care strategies to cope with hair loss. In addition, it is important to explore the meaning of hair loss for both patients and their significant others (Gallagher 1992). Professional care providers should pay attention to the degree of perceived support of patients and changes in the social environment and the role of significant others (Courtens *et al.* 1996). This gives the nurses the necessary information to be able to provide the patient with individualized self-care strategies to cope with hair loss.

In a study performed by Degner *et al.* 1998, women with breast cancer found nine categories of information that would be important in assisting them to cope with their illness. Four of these are of relevance to hair loss: information about the ability to carry out social activities, information about how family and friends may be affected, information on how the treatment will affect feelings about the body and sexual attractiveness, and information about the possible unpleasant side-effects of treatment. Sexuality had a somewhat lower priority (Degner 1998). Continued changes in the health care delivery system, including increased reliance on out-patient services, have increased the information-processing demands required of the patient for self care while shortening the contact periods available for patient education (Lehto & Cimprich 1999). In a study conducted by Frost *et al.* 1999, patients reported that one of the most frequently reported positive and helpful aspects of care were providing exact details, having the time and willingness to listen and providing understanding. This study demonstrated the positive benefits of a multidisciplinary approach in which a concerted effort was placed on providing information in the out-patient setting (Frost *et al.* 1999). Several randomized trials have demonstrated that providing written information, in addition to verbal information, can increase patient's knowledge, satisfaction and compliance and decrease emotional distress (Whelan *et al.* 1998) as well as depression and anxiety (Fallowfield 1992).

Patients have stated that hair loss bothered them very little because they had been told about it and expected it (Richards & Martinson 1987). Alopecia in one study was found to be ranked as less severe than other side-effects. This may be partly owing to a policy of advising patients before treatment that their hair would grow back at completion of treatment, and to nursing staff ensuring that wigs were supplied (Sitzia *et al.* 1997). Many patients find comfort in talking with others who have had regrowth of hair after treatment (Fulton 1994) or discussing responses to alopecia with other patients (Goodman *et al.* 1996; Freitas 1998).

Nursing interventions appropriate for self-image changes which can help patients cope with hair loss include supporting/encouraging positive attitudes and preventing/changing negative self-image opinions. The nurse can assist the patient in adapting to disease and modifying body image by referrals to the appropriate health professionals or support programmes or self-help groups (Frank-Stromborg & Wright 1984).

In an interview session, feeling about hair loss can be validated, suggestions made, and reassurance and clarification of feelings and thoughts could take place. During the interview it is important to find out how the woman (or others) thinks about herself without hair, how she anticipates thinking and experiencing herself without hair, and what other people will do or think. What are her goals for handling her hair loss? The health professionals task is to ease the woman's way into the public arena (Freedman 1994). It is important to provide patients with the opportunity to discuss perceived losses and meaning to self and significant others, as well as to allow patients to grieve and resolve the loss, which could minimize the risk of occurrence or severity of body image disturbances (Freitas 1998). The nurse should use a gentle, caring and honest approach (Chernecky 1983).

Going bald without a wig 'coming out' as creation of a new social identity (Sim 1990) could be another way to cope with hair loss. Highlighting other features to distract from hair loss or emphasize other fine qualities that the patient has is also a strategy for dealing with hair loss (Didonato 1985). A person may make changes to convey different messages to others (Cohen Zichi *et al.* 1998). Patients should be encouraged to express positive and negative feelings about hair loss (Camp-Sorrel, 2000).

Richards and Martinsen (1987) state that the most frequently used coping strategy is to wear a head covering or wig. Wigs can be purchased from natural or synthetic hair. They should be selected before the patient has lost his/her hair in order to match the colour, style and hair texture (Joss *et al.* 1988; Keller 1988; Goodman *et al.* 1997; Seipp 1997). Otherwise a photo should be made and a snip of hair taken before hair loss occurs and used as a basis for purchasing the wig (Ehmann *et al.* 1991; Goodman *et al.* 1997). Women with long hair can opt to make a wig from their own hair (Davidhizar 1993). Information on financial assistance or third party coverage for wigs should be provided (Joss *et al.* 1988; Higgs 1990). Consideration should be given to the provision of a second wig for patients who need to wash it and use it again within a certain time frame (Tierney 1991).

Head coverings are another way to cope with hair loss. It may be used as a replacement or an addition to a wig to

minimize tension in social interactions. Some patients may not want to wear a wig because it feels strange, uncomfortable or hot, because they are not satisfied with the look, or because they do not want to care for it (Vandegrift 1994). Some men prefer to shave their head once hair has started falling out and wear baseball caps, while women may chose to wear scarves (Wilkes 1996). In a study by Foltz *et al.* 1996, Most patients reporting alopecia wore a wig or a hat. The total numbers were not stated. Fifteen patients (28%), all male, did not choose this action. In general, it is not uncommon to recommend that the patient have his or her head shaved once hair loss becomes pronounced (Goodman 1992). This assures equal regrowth. Hair which is falling out is a nuisance. Wearing a hair net at night to avoid covering the pillow case with hair is one way to cope with this problem (Schlesselman 1988; Tierney 1991).

Suggesting that patients participate in programmes or support groups such as 'Look Good, Feel Better' (Howser 1996; Seipp 1997; Kaderman *et al.* 1999) offered in many countries throughout the world can help patients optimize their appearance during hair loss (Freitas 1998) by using make-up and jewellery to highlight other features or camouflage lost eyebrows and eyelashes.

Self-care strategies to provide protection following alopecia

As hair has a protective function, it is important to teach patients how to protect themselves following hair loss. If one does not wear a wig or head covering following hair loss, protection of the scalp from cold, heat sun and mechanical irritation is important. In addition, hair loss in the facial area can detriment protection to the eyes. Self-care protective strategies include the following. Avoiding exposure to the sun (Joss *et al.* 1988) and using sun protection factors (Didonato 1985; Keller 1988; Schlesselman 1988; Higgs 1990; Davidhizar 1993; Gross 1994; Rhodes *et al.* 1995; Howser 1996; Goodman *et al.* 1997; Freitas 1998) are deemed important. Eyeglasses or sunglasses should be used to protect eyes (Didonato 1985; Joss *et al.* 1988; Wilkes 1996; Goodman *et al.* 1997). In addition, cleansing eyedrops to remove foreign particles from the eyes could provide soothing relief (Keller 1988). Head coverings to prevent scalp irritation to prevent heat loss and conserve warmth, or wearing a wig (Joss *et al.* 1988; Higgs 1990; Goodman 1992; Davidhizar 1993; Wilkes 1996; Goodman 1997; Seipp 1997; Freitas 1998) are advised. Ensure wig lining is comfortable and non-irritating (Goodman *et al.* 1997). Massaging and applying creme to the scalp may keep it soft, e.g. with baby oil

and mineral oil, or vitamin A & D ointment may used to reduce itching (Didonato 1985; Schlesselman 1988; Goodman 1992; Rhodes *et al.* 1995; Wilkes 1996).

CONCLUSIONS

Hair is an appendage of the skin which has a protective function in animals, but in man has more of a communicative function. Hair is a symbol of self and plays a role in visual appeal and socio-sexual interaction. In addition it may be a symbol of culture and religion.

Hair growth and hair loss are influenced by many factors. Drug therapy and, in particular, chemotherapy can influence hair loss and its extent ranges from 0% to 100%. Chemotherapy-induced alopecia in cancer patients remains one of the most frequently encountered side-effects of treatment and is experienced as one of the side-effects with the most impact. It has psycho-social implications and can have an effect on body image. Cultural backgrounds play a role in how individuals cope with alopecia.

The application of techniques to prevent alopecia are not always effective. Specifically, hypothermia remains controversial, owing to the risk of the development of scalp metastases.

It is important that the nurse is aware of the risk of hair loss in patients who receive chemotherapy and helps the patient prepare for the loss of their hair. The nurse should assess the patient with a potential for hair loss, for its possible impact on the patient, family and friends. Nurses should examine possible relationships with between hair loss and altered body image as evidenced by vulnerability, rejection, feeling different, withdrawal and non-social behaviour (Didonato 1985). In addition, assessing readiness to view changes and carry out self care is also important (Freitas 1998).

Subsequently, information should be given about the hair loss experience and patients should be taught self-care strategies for minimizing hair loss, coping with hair loss and using protective measures until hair growth resumes, as a means of achieving optimal outcomes.

Although there is a tremendous amount of information over hair, hair loss, patients perspectives and nursing care, much of this information is not research based. There is a great need to establish which information is valid, which interventions do patients want to use and indeed how effective these interventions are.

Nurses derive a sense of self, develop relationships with patients and develop a unique ability to feel positive in influencing the patient's experiences (Fall-Dickson & Rose 1999). By applying information and self-care strate-

gies taught by nurses, patients should be able to move through a potentially devastating experience to a renewed sense of well being.

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