A SUPPLEMENT TO

JOURNAL OF DRUGS IN DERMATOLOGY

JDD

DRUGS • DEVICES • METHODS

Skincare for Cancer Patients and Survivors in the European Nordic Region: A Review by the Nordic European Cutaneous Oncodermatology Management (NECOM) Group

ISSN: 1545 9616

December 2021 • Volume 20 • Issue 12 (Supplement)

Nordic supported the research and development of the algorithm with an unrestricted educational grant.

This supplement to the *Journal of Drugs in Dermatology* is funded by International Dermatology Educational Foundation.

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doi:10.36849/JDD.M1221

 ORIGINAL ARTICLE Journal of Drugs in Dermatology

Skincare for Cancer Patients in Scandinavia

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ABSTRACT

Preventive measures, earlier diagnosis, and markedly improved anticancer treatments have resulted in increasingly more patients living with or surviving cancer. Frequently cancer treatment-related cutaneous adverse events (cAEs) occur, which can severely impact patients' quality of life (QoL) and interfere with anticancer treatment outcomes. Currently, cAEs related to anticancer treatment may be under-appreciated to prevent or provide early and effective treatment. The Nordic European Cutaneous Oncodermatology Management (NECOM) project explored clinical insights in cAEs and focused on skincare regimens involving hygiene, moisturization, sun protection, and camouflage products. The NECOM panel discussed and reached a consensus on evidence and opinion-based best practice recommendations for oncology skincare programs to support all stakeholders in the Nordic European healthcare setting working with oncology patients throughout the entire continuum of care achieve optimal outcomes, improving patients' QoL.

J Drugs Dermatol. 2021;20:12(Suppl):s4-14.

INTRODUCTION

The estimated global incidence of cancer per 100,000 population in 2020 in Denmark is 350, Norway 325, Sweden 285, Finland 270, and Iceland 260.[1] The four most commonly diagnosed cancers in Sweden, Finland, Denmark, and Norway are lung, breast, prostate, and colorectal cancer.[1] In 2020, these four cancer types accounted for almost half of all cancer diagnoses (175,925) in the Nordic European countries.[1] These statistics exclude skin cancer, which, according to the Swedish National Cancer register, comes in third place after breast and prostate cancer. Basal cell cancer accounts yearly for more than breast and prostate cancer together with over 50,000 new cases versus 10,000 and 9,000 cases, respectively. Increasingly, more patients live with or survive cancer due to an early diagnosis and an improved quality of cancer treatment.[2] In the Nordic European countries in 2010, the relative survival percentage of males and females in Sweden was 70% and 69%, in Finland 65% and 68%, Denmark 62% and 65%, and in Norway for either gender, 69%.[2]

The choice of anticancer treatment depends on the type and stage of cancer and patient-related factors.[3] Anticancer treatments comprise surgery, radiation, transplantation, and systemic therapies or combinations of these treatments.[3] Systemic treatment includes chemotherapy, targeted therapy, immunotherapy, and hormonal therapy.[3]

Frequently cancer treatment-related cutaneous adverse events (cAEs) occur, which can be severe and bothersome to patients.[4-10] Tactile exchange may be altered due to cAEs, impeding interpersonal and emotional life, severely affecting

the quality of life (QoL). Moreover, cAEs can be disabling or disfiguring, cause pruritus or pain, leading to reduction or discontinuation of anticancer treatment, reducing patient outcomes.[4-10]

Clinically significant physical health deficits correlate with cAEs severity and threaten long-term outcomes such as for breast cancer survivors.[11] Despite improving survival rates, cancer treatment frequently leads to emergency department visits and hospitalization due to reactive rather than proactive management of cAEs.[10] Supportive care programs that extend beyond the anticancer treatment are needed to reduce the number and severity of cAEs, maintaining health, and enhancing the survivorship period after treatment and onwards.[10,11]

Early and preemptive management of cAEs can improve body image, physical, emotional and functional wellbeing, treatment adherence, and treatment response.[5,6,10] One of the measures is a preemptive over-the-counter (OTC) skincare regimen, which has been shown to improve patient's QoL and skin condition.[5,6,10] In a study of ninety-five patients receiving panitumumab-containing therapy, the forty-eight patients who received pre-emptive skincare showed a 50% reduction in incidence and severity of cAEs compared to the forty-seven patients in the reactive skincare group. The latter received the regime after cAEs had occurred.[5]

Despite many publications on cAEs related to anticancer treatment, cancer patients and oncology treatment teams have limited awareness of the use of preemptive skincare comprising cleansers, moisturizers, and sunscreen to improve skin condition.[10,12] A multidisciplinary oncology treatment team should educate on prevention, treatment, and maintenance using OTC skincare as part of their cancer patients' comprehensive care before cancer treatment starts.[10]

Scope

The Nordic European Cutaneous Oncodermatology Management (NECOM) project initiated by La Roche-Posay aims to improve cancer patients' and survivors' quality of life by offering guidance for preventing and managing cAEs. Two members of the Canadian Skin Management in Oncology Group (CaSMO) participated to share their experience with the subject. The NECOM group explored clinical insights in addressing skin issues in oncology patients and focused on skin care regimens involving hygiene, moisturization, sun protection, and camouflage products. The NECOM panel of clinicians who treat cAEs developed, discussed, and reached a consensus on evidence and opinion-based best practice recommendations for oncology skincare programs. The aim is to support all stakeholders in the Nordic European healthcare setting working with oncology patients and cancer survivors throughout the entire continuum of care to achieve optimal outcomes, improving patients' QoL.

METHODS

The NECOM project used a modified Delphi communication technique for interactive decision-making for medical projects following the AGREE II instrument.[13,14] Due to COVID-19 travel restrictions, the method was adapted from face-to-face meetings and a questionnaire to a virtual meeting and online-follow up to discuss the outcome of literature searches. The process entailed preparing the project, selecting the panel, and conducting systematic literature searches. Followed by a virtual panel meeting on February 6, 2021, to discuss the systematic literature review results addressing OTC skincare for prevention, treatment, and maintenance of CAEs, and discuss and adopt statements using evidence coupled with the expert opinion and experience of the panel. An online process was used to fine-tune the evidence and opinion-based best practice recommendations for oncology skincare programs and to prepare and review the publication.

Literature Review

Searches identified the literature on current best-practice in cAEs using OTC skincare before the expert panel meeting. The selected literature was clinically relevant to oncodermatology in the Nordic European countries and addressed efficacy, safety, quality of life aspects, handling and comfort, adherence to treatment, and availability of the skincare regime. The inclusion criteria comprised guidelines, consensus papers, reviews, clinical trials describing current best-practice in cAEs using OTC skincare, and clinical research studies published in the English language from 2010 to 2020. Excluded were articles with no original data (unless a review article was deemed relevant), not dealing with skincare or topical treatment for prevention and treatment of cAEs, and publication language other than English. A dermatologist and a physician/scientist conducted the searches on January 12 and 13, 2021, on PubMed and Google Scholar as a secondary source of the English-language literature, using the terms:

Skincare regimes prevent and treat cutaneous toxicities associated with radiation treatment, chemotherapy, targeted therapy, immunotherapy, hormonal treatment, prevention, management, maintenance of cutaneous toxicities, and health-related quality of life. Adjunctive skincare, OTC skincare, staff and patient education, communication strategies, adherence, concordance, efficacy, safety, tolerability, and skin irritation.

The results of the searches were evaluated independently by two reviewers who resolved discrepancies by discussion. The searches yielded one hundred and six publications. After excluding duplicates (n = 56) and articles deemed not relevant

TABLE 1.

Grading of the Evidence from Clinical Studies		
Reference	**Clinical Study Type**	**Grading**
Lee J. *Cancer Res Treat.* 2018 Oct;50(4):1186–93.[4]	Cross-sectional survey	B-2
Lacouture ME. *J Clin Oncol.* 2010;28(8):1351–1357.[5]	Open label RT	B-2
Aizman L. *JDD.* 2020;19(5):477–482.[6]	Cross sectional survey	C-3
Chen ST. *JAAD.* 2020;82(4):994–996.[7]	RS	C-3
Barrios DM. *JAAD.* 2017;76(6):AB45.[8]	RS	C-3
Barrios DM. *JEADV.* 2020; 34(6):1340–1347.[9]	RS	C-3
Friese CR. *Cancer.* 2017;123(1):43-51.[11]	Survey	C-3
Schnur JB. *Psycho-Oncology.* 2011;20:260–268.[20]	Qualitative analysis	C-3
Freites-Martinez A. *JAMA Dermatol.* 2019;155(6):724–728.[21]	Outcomes study	B-2
Biswal SG. *Indian J Dermatol.* Jan-Feb 2018;63(1):41–6.[22]	Clinico-epidemiological study	B-2
Yagasaki K. *Asia Pac J Oncol Nurs.* 2018;5(2):172–177.[32]	CS	C-3
Yu Z. *JAMA Dermatol.* 2020;(7);e201795.[33]	CS	C-3
Berger A. *Breast Ca: Basic Clin Research.* Vol. 2018;12:1–7.[37]	CS	C-3
Wohlrab J. *Oncology.* 2011;34:62.[38]	Cross-over RT	B-2
Luftner D. *Onco Targets Ther.* 2018 Sep 17;11:5865–72.[39]	CS	C-3
Gandhi M. *Supportive Care in Cancer.* 2011;18:1461–1468.[45]	Quantitative study	C-3
Chen SC. *Psychooncology.* 2016; 26: 1376–1383.[47]	RCT	B-2
Wakeda T. Tumori J. 2019;8.[49]	CS	C-3

A = Randomized, double-blind clinical trial (RCT) of high quality; B = Randomized clinical trial of lesser quality;
C = Comparative trial with severe methodologic limitations. Randomized controlled trial (RCT), Randomized trial (RT), Retrospective study (RS), Clinical study (CS)
Grading: 1 = Further research is unlikely to change confidence in the estimate of effect; 2 = Further research is likely to have an important effect on confidence in the estimate of effect and may change the estimate; 3 = Further research is very likely to have an important effect on confidence in the estimate of effect and is likely to change the estimate; 4 = Any estimate of effect is very uncertain.[15]

for the statements aimed at the Nordic European countries (other subjects, low quality, a small number, case studies), fifty papers remained. Thirty-two were review articles, including four systematic reviews, four guidelines/algorithms, one book, three definitions, and methodology articles, and eighteen clinical studies. The literature search results were evaluated independently by two reviewers who graded the clinical publications according to study type (A, B, or C) and assigned a level of evidence (level 1 to level 4) using the pre-established criteria.[15] Of the eighteen clinical publications, most addressed cAEs impacting QoL, and only two studies (graded C-3 and B-2) evaluated a specific skincare regimen (Table 1).

Evidence and Opinion-Based Best Practice Recommendations

The reviewers drafted statements based on the selected literature before the meeting. During the virtual meeting, the NECOM group set and fine-tuned five consensus statements from the draft list of twelve statements and revised them online after the meeting. Through blinded reiterations and votes, the NECOM panel defined the final statements. The panel's consensus was established as an eighty percent agreement being obtained.

RESULTS

Statement 1: *Dermatologic toxicities associated with cancer treatment are common and can significantly impact QoL and disrupt cancer treatment.*

Depending on the anticancer treatment, various cAEs may occur.[3,16,17] The NECOM group used the Common Terminology Criteria for Cutaneous Adverse Events (CTCAE) version 5.0.[18] The CTCAE system has five grades (Grade 1: Mild, Grade 2: Moderate, minimal, local, or noninvasive intervention indicated, Grade 3: Severe, medically significant but not immediately life-threatening, Grade 4: Life-threatening consequences, urgent intervention indicated, Grade 5: Death related to the cAEs); however, not all five grades apply for cAEs.[18] This paper focuses on best practice recommendations for oncology skincare programs. Therefore, only a short overview of cAEs is provided to inform clinicians on the conditions that may benefit from a skincare regimen.

Many studies are available on cAEs; however, information on prevention, treatment, and maintenance using general measures and OTC skincare is lacking.[4-12]

TABLE 2.

Anticancer Treatment-Related Cutaneous Adverse Events			
Type of Therapy	**Drug Class**	**Cutaneous Adverse Event**	**References**
Radiation Therapy	--	Acute RD: Erythema; DD; MD; Pruritus; Bleeding; Severe pain; Ulceration Chronic dermatitis: Pigmentary alteration; Telangiectasia; Atrophy and fragility; Permanent alopecia; Sweat gland atrophy; Necrosis of soft tissue, cartilage and/or bone; Fibrosis	7,16,19,20,37,43
Chemotherapy	Antimetabolites	Alopecia (RP); HFS/PPE; Nail changes; Phototoxicity	21,22,38,39
	Taxanes	Alopecia (RP); PATEO; Mucositis; Nail changes; Paronychia (± pyogenic granulomas)	--
	Vinca alkaloids	Oral lesions; Oral ulceration; Alopecia (R); Nail changes (Bau lines, leukonychia, Mees lines, Muehrcke lines, onychodermal band, pigmentation)	18
	Alkylating agents	Oral lesions; Alopecia (RP); Facial erythema; Facial urticaria; HFS; Skin pigmentation; Nail changes	--
	Platinum-based	Alopecia (R); Xerosis; Toxic erythema	--
	Topoisomerase inhibitors	Alopecia (R); HFS; Mucositis	--
	Antibiotics	--	--
	Anthracyclines	Alopecia (RP); HFS/ PPE; Mucositis; Nail changes; Paronychia (± pyogenic granulomas)	--
Targeted Therapy	EGFR inhibitors/ HER1 inhibitors	Papulopustular (acneiform) eruption; Alopecia (R); Nail changes; Paronychia (± pyogenic granulomas); Phototoxicity; Trichomegaly, hirsutism	28,29,32-34
	HER2 inhibitors	Nail changes; Papulopustular (acneiform) eruption; Paronychia (± pyogenic granulomas); Trichomegaly, hirsutism	--
	EGFR/HER2 inhibitors	Alopecia (R); Nail changes; Papulopustular (acneiform) eruption; Paronychia (± pyogenic granulomas); Phototoxicity; Trichomegaly, hirsutism	--
	Bruton's tyrosine kinase inhibitor	Petechiae, purpura and increased bleeding; Brittle nails; Softening and straightening of hair; Pruritus	--
	Multikinase inhibitors	Alopecia (reversible); HFSR; Mucocutaneous hemorrhage; Nail changes; Panniculitis; Trichomegaly, hirsutism	--
	MEK inhibitors	Nail changes; Papulopustular (acneiform) eruption; Paronychia (± pyogenic granulomas); Trichomegaly, hirsutism	--
	B-Raf inhibitors	HFSR; Panniculitis; Phototoxicity; Keratoacanthoma; Keratosis-pilaris like reaction; Photosensitivity; Morbilliform eruption	--
	mTOR inhibitors	HFSR; Mucositis; Papulopustular (acneiform) eruption; Paronychia (± pyogenic granulomas);	--
	VEGFR inhibitors	Mucocutaneous hemorrhage	--
	Hedgehog inhibitors	Alopecia; Folliculitis; Keratoacanthoma; Dermal hypersensitivity	--
Immunotherapies	CTLA-4 inhibitors	Maculopapular rash; Pruritus; Eczema/spongiosis; Lichenoid reactions; Psoriasis; Pyoderma gangrenosum; Grover's disease; Vitiligo; Bullous pemphigoid; Dermatitis herpetiformis; Prurigo nodularis; Vasculitis; Dermatomyositis; Sjögren's syndrome; Sarcoidosis; Sweet's Syndrome; Acneiform rash/papulopustular rosacea; Eruptive keratoacanthomas, actinic keratoses and squamous cell carcinoma; Erythema nodosum-like panniculitis; Radiosensitization; Photosensitivity; Urticaria; Alopecia, alopecia areata, hair repigmentation; Sclerodermoid reaction; Nail changes; Xerostomia	23-27
	PD-1 inhibitors		
	PD-L1 inhibitors		
Hormonal Therapy	Aromatase inhibitors	Flushing; Vulvovaginal dryness/atrophy	30,31
	SERMs	Alopecia (R); Flushing; Vulvovaginal dryness/atrophy	--

RD, Radiation dermatitis; DD, Dry desquamation; MD, Moist desquamation; RP, Reversible and permanent; EGFR, epidermal growth factor receptor; HER, human epidermal growth factor receptor; MEK, mitogen-activated protein kinase; BRAF, B-Raf proto-oncogene, serine/threonine kinase; mTOR, mammalian target of rapamycin; VEGFR, vascular endothelial growth factor receptor; CTLA-4, cytotoxic T-lymphocyte-associated protein 4; PD-1, programmed cell death 1; PD-L1, programmed death–ligand 1; SERMs, selective estrogen receptor modulators. HFS, hand-foot syndrome; HFSR, hand-foot skin reaction; Palmoplantar erythrodysesthia (PPE); Periarticular Thenar Erythema and Onycholysis (PATEO); Nail changes (onycholysis, pigmentary alteration, brittle nails)

About 90% of cancer patients receiving external beam radiation treatment develop radiation dermatitis.[16,19,20] Radiation treatment-related cAEs are categorized as acute or chronic radiation dermatitis. Skin damage is limited to the area that received radiation and can be aggravated by concurrent systemic therapies.[19]

Systemic cancer treatments such as chemotherapy, targeted, and immunotherapy are frequently related to cAEs. These cAEs include xerosis, erythema, hand-foot syndrome (HFS), nail changes (onycholysis, pigmentary alteration, brittle nails), and other (Table 2).[16-31]

Patients reported significant limitations to daily activities and reduced QoL due to cAEs.[4-6,20,21,32] Functional and emotional domains of QoL evaluated in patients receiving anticancer treatment showed multiple negative experiences such as increased psychological distress and avoidance of personal relationships, leading to social isolation.[4-6,21,32] Alopecia is especially bothersome for women and seems the most traumatic AE related to various systemic cancer treatments.[17,20-22]

Clinicians acknowledge the importance of considering the management of cAEs as a part of optimizing cancer-treatment efficacy; however, there is limited appreciation of the preemptive skincare's role in improving patients' QoL and avoiding cancer treatment interruption.[32-34]

The severity of cAEs clinically correlates with significant health deficits.[11] Therefore, if the patients' skin should be in an optimal condition and sufficiently moisturized before starting anticancer treatment, reducing the incidence and severity of cAEs enhances patients' QoL and treatment outcomes.[5,10-12]

In an American and European study, ninety-five patients treated with panitumumab received either preemptive skincare or reactive skincare and were followed during the seven-week anticancer treatment period.[5]The preemptive skincare regimen started one day before the anticancer treatment, continued for six weeks, and comprised a moisturizer and a broad spectrum (SPF >15) sunscreen. The reactive skincare regimen had the same products but started once the cAEs occurred. The incidence of cAEs had reduced, and patient-reported QoL impairment was lower in the preemptive skincare regimen group compared to those who received skincare once the cAEs had occurred.[5]

Facial cAEs such as acneiform rash particularly impair patients' QoL, as shown in a cross-sectional study including patients receiving targeted therapy with epidermal growth factor receptor inhibitors.[32] Further cAEs that markedly reduced patients' QoL comprised erythema, xerosis, pruritus, and paronychia in different parts of the body such as the face, neck, chest, abdomen, and thighs.[32-34]

Statement 2: *Early education and appropriate skin care, including cleansing, hydration, and photoprotection, may improve quality of life and prevent severe skin side-effects for cancer patients and survivors.*

Attention for prevention, early and correct diagnosis ruling out life-threatening cAEs can improve patients' QoL, adherence to cancer treatment, and, therefore, outcomes.[6-12]

Although data is scarce to support the prevention of severe skin sequelae for cancer patients and survivors, the NECOM panel agreed that early education on preventive measures using skincare is beneficial to patients.

The multidisciplinary oncology team including a dermatologist should build a therapeutic relationship with the patient enabling their active participation in the cancer treatment plan.[10,12] Before initiating treatment, the treating physician and nurse, or other multidisciplinary oncology team members, should have a detailed conversation with the

Box 1: Information and Patient Education

- Establish proactive contact with the patient before the start of the treatment.
- Allow patients to verbalize their experiences and related emotions.
- Show you are interested and prepared to listen.
- Encourage frequent communication, develop trust, and ensure open communication between the patient and the team.
- Have a detailed discussion with the patient, treating physician and nurse, or other team members explaining the treatment protocol, cAEs, hospital visits, diagnostic tests, management of cAEs, prophylactic, and preventative measures.
- Provide detailed patient education on the skin changes that may occur before starting the cancer treatment.
- Give patients contact information and explain who to contact, when, and why.
- Explain to the patients that they should always report their skin changes, regardless of severity.
- Reinforce that prevention and early treatment of cAEs lead to better cancer-treatment outcomes and quality of life.
- Explain the condition and rationale for applying cleansers, moisturizers, and sunscreen to prevent, treat, and maintain cAEs. Demonstrate the application process.
- Solicit input and questions.
- Provide instruction sheets or digital information and websites for later home reference and education.

Cutaneous adverse events (cAEs).
Used with permission from Sauder et al.[10,12]

Box 2: Resources

Title	Type	Function	Reference
AAD Dermatology World	Information leaflet	Quick reference to cancer treatments, cutaneous AEs, and approaches.	Ruth C. The Dermatology World/ December 2019
Support system. www.aad.org/dw/	Moisturizing cream or skin repairing balm once or twice/day	Moisturizing cream or skin repairing balm once or twice/day	Moisturizing cream or skin repairing balm once or twice/day
ASCO Cancer net	Website	Cancer physicians and oncology professionals provide information for cancer patients, their families and caregivers	https://www.cancer.net/coping-with-cancer/physical-emotional-and-social-effects-cancer/managing-physical-side-effects/skin-reactions-targeted-therapy-and-immunotherapy
Oncoderm Labs	Website	cAEs in cancer patients and products	Oncodermlabs.com

patient, addressing the treatment protocol, potential cAEs, hospital visits, diagnostic tests, and management of cAEs, and preventative measures (Box 1: Information and Patient Education).[10,12]The verbal information should be supported by printed or digital material to allow the patient to clarify and process the information (Box 2: Resources).[10,12]

Patients may underreport their cAEs as they may not recognize it as potentially serious or assume the condition is not treatment-related.[10,12] When determining the severity of the cAEs, check for fever, pain, mucosal involvement and significant blood abnormalities.[10,12] A glossary containing photographs and a checklist for identifying the cAEs risk may support non-dermatologists to undertake prompt and effective action (Figure 1).[10,12]

A dermatologist is to be involved in the early stages together with a plan for skin checkups at the beginning of the treatment and relevant time points during treatment. For instance, if cAEs occur in the first 2 weeks while the patient receives treatment with BRAF inhibitors, a dermatological appointment at that time should be scheduled.

Statement 3: *Effective skincare for cutaneous toxicities should be based on evidence; it should be safe, effective, non-sensitizing, and have a pH close to that of the skin surface.*

Preventive measures for cAEs, including a skincare regimen, should be used throughout cancer treatment and continued after that.[10,12] A skincare regimen comprises gentle cleansers, moisturizers that help restore skin barrier integrity and function, photoprotection using sun avoidance measures, and sunscreen.[10,12]

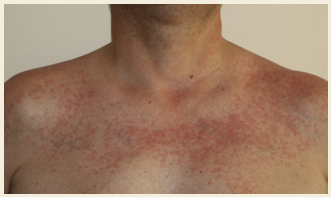
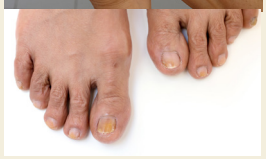
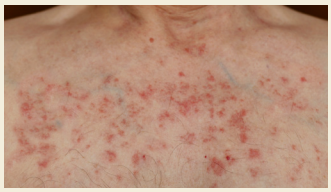
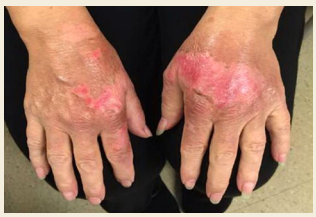
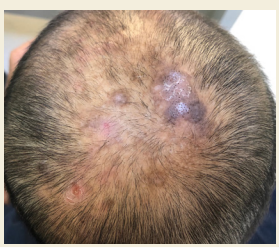
Products that contain allergens and irritants such as common preservatives causing allergy, fragrances, and perfumes are unsuitable for oncology patients.[12] Soaps, surfactants, and detergents, especially those with an alkaline pH (>7), remove skin lipids and elevate skin surface pH, triggering inflammation and lowering the diversity of the skin microbiome and should also be avoided.[10,12]

Moisturizers form a barrier that helps prevent transepidermal water loss (TEWL).[10,12,34,36,37] Additionally, hydrophilic humectants, such as glycerol, propylene glycol, butylene glycol, alpha hydroxyl acids (AHAs) including lactic, glycolic, and tartaric, may help to retain moisture in the skin.[10,12] AHAs should be used with caution as they can change the skin surface pH and be irritants.[10,12] Other ingredients such as dexpanthenol support stratum corneum hydration, reduce TEWL, and maintain skin softness and elasticity (Table 3).[33,34,36-39]

The growing body of evidence on a skincare regimen for the prevention and treatment of cAEs shows benefits for cancer patients undergoing anticancer treatment and cancer survivors; however, the evidence on specific ingredients is scarce.[5,6,10,12,16,19,33,34,36-39]

A multicenter, prospective study of 253 women with breast cancer evaluated the tolerability and benefit of skincare for preventing cAEs.[37] The regimen included thermal water-containing products, a cleanser, emollient, healing cream, and sunscreen. It was used during the 6-weeks of radiation treatment and demonstrated fewer cAEs for those that used skincare every day compared to patients that applied less skincare.[37]

FIGURE 1. Glossary cAEs. (a) Radiation dermatitis; (b) Skin abrasion after chemotherapy. Side effects from breast cancer treatment; (c) Discolouration of nails after chemotherapy. Side effects from breast cancer treatment; (d) Skin reaction on a man's chest after targeted therapy. (e) Phototoxic eruption from vemurafenib *(Courtesy of Dr Jonathan Leventhal Yale, New Haven CT).* (f) Alopecia related to hormonal treatment.

Treatment	Cutaneous AEs
Radiotherapy (a) 	RD: DD or MD, erythema, pruritus, bleeding atrophy, necrosis, and ulceration
Traditional chemotherapy with various types of drugs (b)  (c) 	cAEs: Alopecia (RP), HFS/PPE, nail changes (onycholysis, pigmentary alteration, brittle nails), phototoxicity, PATEO, paronychia (± pyogenic granulomas), and urticaria
Targeted therapies (d) 	cAEs: Papulopustular (acneiform) eruption, alopecia (R), pruritus, nail changes, paronychia (± pyogenic granulomas), phototoxicity, trichomegaly, hirsutism, keratoacanthoma, keratosis-pilaris like reaction, morbilliform eruption, and dermal hypersensitivity
Immunotherapy (e) 	cAEs: Non-specific maculopapular rash, pruritus, eczema/spongiosis, lichenoid reactions, psoriasis, pityriasis lichenoides-like reaction, exfoliative pyoderma gangrenosum, Grover's disease, vitiligo, bullous pemphigoid, dermatitis herpetiformis, prurigo nodularis, vasculitis, dermatomyositis, Sjögren's syndrome, Sarcoidosis, Sweet's Syndrome, acneiform rash/ papulopustular rosacea, eruptive keratoacanthomas, actinic keratoses, and squamous cell carcinoma, erythema nodosum-like panniculitis, radiosensitization, photosensitivity, urticaria, alopecia, alopecia areata, hair repigmentation, sclerodermoid reaction, nail changes, xerostomia
Hormonal therapy (f) 	cAEs: Alopecia (R); flushing; vulvovaginal dryness/atrophy

Grade 1: Mild, Grade 2: Moderate, minimal, local or noninvasive intervention indicated, Grade 3: Severe, medically significant but not immediately life-threatening, Grade 4: Life-threatening consequences urgent intervention indicated, Grade 5: Death related to AE. Note that not all cAEs have 5 grades.[18]
Look for fever, pain, mucosal involvement, significant lab abnormalities. CTCAE Grade 3/4 [possibly dangerous].
RD, Radiation dermatitis; DD, Dry desquamation; MD, Moist desquamation; RP, Cutaneous adverse events (cAEs); reversible and permanent (R and P)

TABLE 3.

Skincare Regimen and Protective Measures for cAEs	
Measure	**Details**
Hygiene	Gentle cleanser daily use
Skin Care	Moisturizing cream or skin repairing balm once or twice/day
Hand and Foot Reactions	Wear comfortable socks and shoes, or try gel insoles. Protect your hands and feet against injury. Do not put too much weight on your hands and feet, especially during the first two months of treatment. Use creams containing urea or salicylic acid. Gently remove excess callus. Apply a skin repairing balm or a urea-based cream once or twice/day
Fissure Care	Gently remove excess callus. Apply a skin repairing balm or a urea-based cream once or twice/day Use an advanced dressing (HCD, foam dressing, non-adherent contact layer, etc.). Use an antiseptic on the areas at risk for infection. Use ethyl-cyanoacrylate adhesives or adhesive tapes to close fissures and support the underlying tissue.
Photo-protection	Use protective clothing. Apply photoprotection anti UVA / anti UVB: minimum SPF 30 one application every 2 hours in case of sun exposure

A gentle cleanser respects the pH of the skin (pH 4.0–7.0).
Examples: Lipikar Syndet, Cleansing oil, Surgras bar, Surgras gel (all La Roche-Posay [LRP]), CeraVe liquid cleanser, bar, Hydrating cream-to-Foam Cleanser (all CeraVe), Sebamed shower oil, Decubal shower & bath oil.
Moisturizing creams that support skin barrier function maintenance and repair.
Examples Toleriane Ultra or Rich for the face, Lipikar Balm AP, Body Milk or ISO-Urea Body Milk (all LRP), CeraVe Moisturizing cream (CeraVe), Decubal Clinic cream.
Sun-screen, examples: Anthelios XL SPF50+ (LRP), Eucerin Sensitive Protect SPF 50+
Skin repairing balm, examples: Cicaplast Baume B5 (LRP), Aquaphor Skin Repairing Balm (Eucerin), Bepanthen (Bayer)
Cleanse the area with water and an antiseptic for infected areas.
Examples: Chlorhexidine, Povidone-iodine or Hypochlorous acid spray (Levicyn [IntraDerm Pharmaceuticals]). Avoid overuse of antiseptics and the use of topical antibiotics to avoid antibiotic resistance.
Hydrocolloid dressing (HCD), for example, Comfeel (Coloplast), Tegaderm HCD (3M).
Foam dressing, for instance: Biatain (Coloplast), Allevyn (Smith & Nephew), Tielle (3M + KCl), Mepilex foam (3M). Non-adherent contact layers include silicone coated dressings, examples: Biatain Contact (Coloplast), Mepitel (Mölnlycke), Adaptic (3M+KCl).
Dressing changes depend on the level of exudate and are typically twice/week.
Medical therapeutic topical and systemic treatments are outside the scope of the algorithm.

Frequently patients are concerned about toxic effects on the skin of skincare used during radiation therapy. However, skincare does not interfere with or increase the radiation dose to the skin and can be used in moderation before daily radiation treatments.[40,41] Patients will benefit from a skincare regimen that can be applied daily and liberally without restrictions, reducing patient confusion and anxiety.[40,41]

Patients undergoing radiation treatment for breast cancer may safely use antiperspirants, although inconsistencies exist across radiation treatment centers globally about the practice and recommendations.[42-44]

Sun Protection Measures

Patients should avoid intentional ultraviolet (UV) exposure for tanning and unintentional, intense direct exposure to the sun. Educate patients to use UV protection through clothing, a wide-brimmed hat, UV ray-filtering sunglasses, shade structures, and t-shirts (preferably darker-coloured clothing of tightly-woven material).[10,12]

Broad-spectrum high SPF sunscreens are part of a complete program for sun protection, including protective clothing, sunglasses, and sun avoidance.[10,12,35] Sunscreens can be classified as UVB and UVA filters or physical blockers.[43] Broad-spectrum sunscreen and physical blockers protect against both UVA and UVB light.[44] Employ supplementary use of sunscreens in areas of the body that is not protected by clothing.[10,12,35]

Sunscreen should have a high SPF and provide equal protection from UVA and UVB rays.[44] They are effective immediately after application to the skin; however, the dose normally used is much lower than necessary to achieve the stated SPF. Therefore, apply sunscreen with an SPF of over 30 once in the morning and a second time immediately before

sun exposure and reapply it after water exposure or heavy sweating.[10,12,35,44]

Statement 4: *Effective management of dermatologic toxicities associated with cancer treatment is a multidisciplinary effort involving dermatologists, oncologists, primary care physicians, and other HCPs involved in cancer treatment. Telemedicine may be of benefit in this area.*

An interdisciplinary professional oncology team approach from the start of anticancer treatment is the most efficient way of providing cancer patients and survivors with cAEs the required dermatological care.[6-10,12,34,36,41,43,45]

Chemotherapeutic agents frequently cause cAEs, yet up to 84% of cancer survivors with cAEs are not referred to a dermatologist.[45]

Medical oncologists are more likely to pause or discontinue anticancer treatment due to cAEs, contrary to dermatologists who may prevent avoidable treatment interruptions.[7-9] The interdisciplinary oncology team approach may help identify and assist in managing dangerous or life-threatening cAEs.[10,12] Early and effective use of a skincare regimen may improve QoL and may be able to preserve anticancer treatment.[10,12]

The NECOM panel recommends that education, optimal communication, access to support information, and early reporting of cAEs will enable efficient use of dermatology services. The lack of dermatologists in several European countries and population aging along with increasing numbers of cancer patients and survivors challenges healthcare organizations.[35] Teledermatology or virtual consultation seems a suitable way to give patients and healthcare professionals access to dermatological expertise or can be used as an adjunct to face-to-face evaluations.[10,12,35] Telemedicine can include online patient portals, patient apps, remote monitoring, patient education, and clinical medical education on cAEs for healthcare providers.[10,12] These virtual tools further offer a suitable solution for rural areas where access to specialized multidisciplinary oncology teams may not be available. Finally, teledermatology software also allows for instant auditing of practices with the assessment of diagnoses, turnaround times, and outcomes.[35]

Statement 5: *Camouflage can mitigate some of the stigmas of cancer and contribute to a better quality of life.*

Cosmetic camouflage use on cAEs on manly exposed sites may improve QoL. A systematic literature review that included eighteen studies reported reduced QoL impact when using cosmetic camouflage in patients with skin disfigurement.[46]

A randomized controlled trial of sixty-six female head and neck cancer survivors reported that the 3-month skin camouflage program effectively improved facial disfigurement, fear of social interaction, the anxiety of social interaction, and body image.[47] A further systematic literature review concluded that the effectiveness of non-surgical cosmetic or other camouflage interventions could not be established and that more robust trials were needed.[48]

A Japanese study used Skindex-16 and visual analogue scale scores for thirty-nine female patients with cAEs comparing scores before and 2–3 months after self-administration of camouflage makeup. The use of camouflage makeup improved the patients'QoL even though the makeup was only applied when required.[49]

Another review concluded that there is a wide variation in the quality and modes of skin camouflaging. A simulated second skin technology appears to be effective; however, training on the technique is required for patients to benefit physically, psychologically, and socially from this treatment.[50]

LIMITATIONS

Statements used in the current review were based on a mix of data and expert opinion. While it is possible that alternatives for the management of cAEs could exist, the statements are suggestions for best practices developed from a panel of expert clinicians that are supported by peer-reviewed literature.

CONCLUSIONS

Cancer treatment-related cAEs are common and can severely impact patients' QoL and interfere with anticancer treatment outcomes. The NECOM project explored clinical insights in cAEs and focused on skincare regimens involving hygiene, moisturization, sun protection, and camouflage products. The evidence and opinion-based best practice recommendations for oncology skincare programs aim to support all Nordic European healthcare setting stakeholders working with oncology patients. When applying the skincare regimen throughout the entire continuum of cancer care, optimal outcomes can be achieved, improving patients' QoL.

DISCLOSURE

The authors disclosed receipt of the following financial support for the research, authorship, and publication of this article: This work was supported by an unrestricted educational grant from La Roche-Posay European Nordic countries. The authors received consulting fees from RCB Consultants.

All authors contributed to the development of this work and its review and agreed with its content.

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