The Impact of Acne, Atopic Dermatitis, Skin Toxicities and Scars on Quality of Life and the Importance of a Holistic Treatment Approach

Brigitte Dreno1
Jean Michel Amici2
Ann Laure Demessant-Flavigny3
Charlotte Wright4
Charles Taieb5
Seemal R Desai6
Andrew Alexis7

1Dermatology Department, CHU Nantes, CIC 1413, CRCINA, Nantes University, Nantes, Pays de la Loire, France; 2Dermatology Department, Bordeaux University Hospital, Bordeaux, Nouvelle-Aquitaine, France; 3La Roche-Posay Dermatological Laboratories, Levallois-Perret, France; 4Speak the Speech Consulting, Asnières-sur-Seine, Ile-de-France, France; 5Patients Priority Department, European Market Maintenance Assessment, Fontenay Sousbois, Ile-de-France, France; 6Department of Dermatology, The University of Texas Southwestern Medical Center & Innovative Dermatology, Dallas, TX, USA; 7Skin of Color Center, Mount Sinai St. Luke’s and Mount Sinai West, Icahn School of Medicine at Mount Sinai, New York, NY, USA

Abstract: Skin conditions such as acne, atopic dermatitis, skin toxicity from oncology treatment, and scars are among the most common health conditions and negatively impact quality of life (QoL). Yet the physician perception of this impact often varies greatly from the patient perception. This is important because patient illness perception is closely linked with seeking help and treatment adherence behaviors. The objective of this review is to better understand the impact of these four highly prevalent skin conditions on QoL including their health-related economic factors to improve treatment outcomes. The literature search included literature published on QoL with acne, atopic dermatitis, scars (from any cause) and skin toxicities on PubMed between 2015 and 2020. We found that patients with skin conditions have a much higher frequency of altered QoL and psychological distress than those without. Also, skin conditions negatively impact self-image and can cause feelings of isolation, loneliness, lower self-esteem, and lower body satisfaction. Additionally, physical discomfort adds to the psychological distress. These physical and psychological impacts are an enormous financial burden on patients, their families and society. We found evidence that holistic treatment including treating the skin condition itself, providing wider peer and psychological support as well as shared decision-making, therapeutic patient education and dermatologist involvement improves outcomes. Holistic history-taking, checklists, or the use of more formal QoL scoring tools can be incorporated into routine consultations to better assess patient well-being and provide clinicians with important information for adapting treatment to individual patient requirements. In conclusion, this review highlights the overall impact of skin conditions (including psychological and QoL impacts) and the importance of providing holistic care to optimize treatment outcomes. A comprehensive QoL screening tool would be useful to help provide patient-centered treatment.

Keywords: quality of life, acne, atopic dermatitis, scars, burns, skin toxicities

Plain Language Summary

Skin conditions are very common and affect many people around the world. Sadly, these conditions can reduce a patient’s quality of life and physicians often underestimate this impact. This review examines how skin conditions affect patients and how treatments can be tailored to ensure the best individual outcome.

We searched the PubMed online database of medical articles for information on quality of life and acne, eczema, side effects from cancer treatment affecting the skin and scars (from any cause).

The information found from this search revealed that these common skin conditions can cause mental health disorders such as depression, suicidal thoughts, and low self-esteem.
along with physical discomfort. Unfortunately, these conditions are costly for the patient, their family and society.

It was also found that by appreciating the full impact of the skin conditions, well-rounded patient-centered treatment starts with treating the skin condition itself and is followed by providing mental health support, education and shared decision-making. This gives the patient the best chance of an optimal treatment outcome.

**Introduction**

Skin conditions are among the most common health conditions affecting around 2 billion people and negatively impact quality of life (QoL). When considering disability-adjusted life years (DALYs), it was ranked as the fourth leading cause of non-fatal burden in 2013, directly following iron-deficiency anemia, tuberculosis and sense organ diseases and was the 18th leading cause of global DALYs.

One of the most common skin conditions is acne, affecting approximately 85% of 11 to 30-year-olds with an estimated global prevalence of 9.4% making it the eighth most prevalent disease worldwide. Atopic dermatitis (AD) affects 20% of infants and adolescents and up to 3% of adults worldwide. However, this rate is increasing globally, particularly in developed nations, due to its links with increasing urbanization and industrialization.

Skin toxicities from oncology treatments are highly prevalent and negatively impact QoL. Cancer has a vast global burden with over 18 million new cases in 2018 alone. Skin toxicity occurs in a third of patients on immune checkpoint inhibitors (immunotherapy) while the QoL impairment from skin toxicity appears unexpectedly more severe in patients treated with targeted therapy. Radiotherapy is associated with cutaneous adverse events such as radiodermatitis with up to 95% of patients developing moderate-to-severe skin reactions.

Scars negatively impact QoL and have a considerably high prevalence globally. An estimated 100 million people per year in developed countries acquire scars from surgical procedures and approximately 6 million people suffer traumatic burns worldwide every year. It is estimated that three to four people per 1000 population in Europe are living with at least one scar.

A physician’s perception of how these common skin conditions can impact their patient can vary greatly from the patient’s perception of their illness. For example, it has been suggested that it is more important to consider a patient’s perception of acne severity rather than physician-reported severity since acne patient perception is an indicator of body image satisfaction and self-confidence. Illness perception (IP) is defined as the cognitive and emotional representation of an illness or health threat held by an individual and is intimately linked with behaviors such as seeking help and treatment adherence. Nagpal et al. identified a direct relationship between IP and QoL meaning more information about IP and its impact on QoL will help clinicians identify and acknowledge patient perceptions and potentially positively impact patient wellbeing. Using QoL measures can improve clinician awareness of the patient’s perspective, the burden the patient and their family experiences as well as lesion severity are not necessarily correlated with impact on QoL. QoL impairment is such an important concept that Finlay proposed the new word “quimp” to mean QoL impairment and promote consideration of QoL into routine clinical practice. The objective of this review was to further understand the impact these skin conditions have on QoL and health related economic factors, and to identify treatment approaches to improve patient outcomes and well-being.

**Materials and Methods**

A current literature review was performed using PubMed with publications in English dated from 2015 to 2020. We searched “quality of life” with each skin condition using the terms “acne”, “atopic dermatitis”, “scars” and “skin toxicities”. For scars, we included any form of scar including burns, surgical scars, acne scars and keloid scars. Skin toxicities from oncology treatment included radiodermatitis and toxicities caused by systemic chemotherapy. Article abstracts were read initially. Papers were excluded if they did not include information on the impact of these skin conditions, QoL, QoL scoring tools, wider impact of the skin condition or treatment approaches to improve QoL. If the content was unclear, the full-text was read. Once included, each article was read completely and any data relating to the four skin conditions and search criteria were extracted onto a spreadsheet. Data were also extracted from any additional relevant articles identified during this process. Although this was not a systematic review, we endeavored to conduct the most thorough review possible considering we did not have access to Embase.

**Health-Related Impact of Skin Conditions**

**Psychological**

Patients with skin conditions have a much higher frequency of psychological distress and altered QoL than...
those without. Studies have demonstrated the levels of social, psychological and emotional problems and the impact on QoL reported by acne patients are as great as those reported by patients with chronic disabling asthma, epilepsy, diabetes, back pain, arthritis, or coronary heart disease. Similarly, people with AD have a lower QoL than other chronic conditions including heart disease, diabetes and high blood pressure with moderate and severe AD being associated with a dramatically lower QoL. In children, generalized AD has the second-largest impact on QoL following only cerebral palsy. Depression, anxiety, and suicidal ideation are more common in people with AD and acne than in the general population, even with mild to moderate disease, and acne is an independent risk factor for suicide. The greater the impact on QoL, the more severe the anxiety and depression. Adolescents are particularly at risk of these psychiatric disorders since they are more psychologically unstable and susceptible to appearance changes. If these disorders go undetected and untreated, the consequences can be severe.

Most research on scarring focuses on severe scarring such as burns but there are few data on the psychological impact of scars from routine elective or aesthetic surgeries. Post-traumatic stress disorder (PTSD) has been found to occur commonly following severe burn injuries. In a large study of 438 patients in the Netherlands, 33% had severe PTSD one to two years post-burn. However, 10 years after a burn injury, QoL is, on average, comparable to the general population.

Emotional
Skin conditions negatively impact self-image. Acne can cause feelings of isolation, loneliness, lower self-esteem, and lower body satisfaction. When comparing acne to other skin conditions, 20–30% of patients with psoriasis, AD, contact dermatitis or urticaria were withdrawn into themselves compared with more than 50% of people with acne. Burn survivors may experience feelings of shame, lack of confidence, low self-esteem, and avoidance of social situations while facial scars are associated with severe psychological, emotional, and social sequelae.

When scarring (from any cause) is visible, patients may feel self-conscious and struggle with personal, work, and social relationships, and communication. Visible scars have the greatest impact on QoL while it appears that it is the presence of the scar rather than the severity which affects QoL. One study revealed that patients wished scars in both visible and nonvisible sites were less noticeable and 91% would value even a small improvement in scarring. Keloid and hypertrophic scars and chronic skin conditions have a similar impact on QoL due to internalized stigmatization, physical symptoms, and restricted mobility.

Radiodermatitis has a wide-ranging impact on patients including changes to body image, clothing selection, ability to perform activities of daily living, lost work productivity, wound care costs, social isolation and affected QoL. Several studies in patients with gynecological cancers revealed dermatological adverse events impair functional, emotional, and physical well-being and significantly limit QoL, particularly because they persist long after completing chemotherapy.

Emotional impacts can also include difficulties in sexual and conjugal life as reported by 10–20% of people with acne and sleep disturbances in 30–50% of acne patients.

Physical
AD is associated with redness, flaking, bleeding, and chronic itching, which is linked to mental distress and increased risk of suicidal ideation. Flares caused by triggers such as S. aureus, viral infections, food allergens, cosmetics and fragrance, and exposure to environmental allergens such as pollens, dust mites, molds, cigarette smoke and animal dander not only exacerbate symptoms but are also linked to worse QoL scores.

Scars, particularly burns, cause physical and psychosocial sequelae which negatively affect QoL and are one of the most influential causes of DALYs according to the WHO. Furthermore, acne marks and scars have been shown to significantly alter QoL regardless of age group. The physical and sensory changes alongside the burden of complete scar treatments mean the impact on QoL can be ongoing.

Physical discomfort, perceived disfigurement and cosmetic dissatisfaction occur with radiation induced breast telangiectasias and are a constant reminder of the patient’s breast cancer. One study interviewed patients undergoing radiotherapy for breast cancer. 32% described itching, pain, and tenderness. The main forms of skin toxicity associated with immunotherapy are maculopapular rash and pruritus but psoriasis, acneiform rashes, autoimmune skin disease and sarcoidosis can also occur, all of which can profoundly
diminish QoL and impact treatment adherence.\textsuperscript{9,10} Periungual inflammation and palmoplantar lesions from targeted therapy are accompanied by pain, and limited ability to perform self-care daily activities.\textsuperscript{59} Skin toxicities during oncology treatments can be so severe that treatment is significantly disrupted thus affecting both QoL and optimal anticancer treatment\textsuperscript{50} and limiting the use of specific treatment protocols.

Children
AD affects children in numerous ways including itching, pain, bleeding, dietary limitations, behavioral problems, crying, irritability, inattention/hyperactivity, anxiety, depression, and conduct disorders.\textsuperscript{26,60} 46–60\% of patients experience disturbed sleep which is a major factor impacting QoL.\textsuperscript{61} The significant impact of AD on sleep has possible long-term impacts on daytime functioning and may be more injurious at a young age during rapid brain development compared with similar levels of sleep disturbance in later childhood.\textsuperscript{62} However, AD in children impacts the wider family as well as the child. Parents of young children are particularly affected by sleep deprivation and the emotional distress of seeing their child suffer.\textsuperscript{63} 23–75\% of parents experience sleep disturbance and excessive tiredness.\textsuperscript{64,65} One study comparing AD and asthma found that mothers spent 78 minutes and fathers spent 90 minutes per night attending their child with AD while parents of children with asthma spent no time.\textsuperscript{63}

Socioeconomic Impact of Altered QoL in Skin Conditions
The impact of skin conditions causes huge financial burdens on patients, their families and society. The direct costs include prescriptions, clinician visits and hospital costs while indirect costs include presenteeism (reduced productivity at work) and absenteeism (missing work).\textsuperscript{26} In 2015 in the USA, a conservative estimate of the annual burden of AD was $5.297 billion including $1.009 billion direct costs, $619 million in decreased productivity and $2.6 billion due to decreased QoL.\textsuperscript{26} These costs are likely underestimated since prevalence has increased since a study conducted in 2004.(Ref 26)

Missing school and reduced productivity are common with AD.\textsuperscript{66} One study found 12.2\% of patients missed 1–2 days of work and 2.3\% missed 3 or more days.\textsuperscript{25} Another study found 32\% of patients believed AD impacted their school or work life and 14\% felt it had hindered their career progression.\textsuperscript{66} In a 2019 study, an average of 7.1 work hours were missed in the previous seven days.\textsuperscript{56} Estimated mean productivity loss is almost 10\% and mean presenteeism is 9.2\%.\textsuperscript{67}

Acne also has a large health economic impact with one study estimating that over the previous 30 days, 1.9 days of work and 1.7 days of school were missed due to acne recurrence. Extrapolating this data gives a better idea of the scale of this impact. For example, “Objectifs Peau” estimate there to be 3.3 million French citizens over 15 years of age affected by acne with 188,000 likely to experience acne recurrence, therefore resulting in 350,000 days lost due to acne recurrences.\textsuperscript{24}

Evidence to Support a Holistic Treatment Approach
Treatment of the Condition
Holistic treatment starts with treating the skin condition itself. It has been shown that providing effective treatment for skin conditions improves QoL.\textsuperscript{15,35,42,58,68–72} During chemotherapy and radiotherapy treatments, detecting and treating any skin toxicities early is essential.\textsuperscript{73} Alongside treatments, focusing on techniques that patients already know including clothing choices, cleaning and emollients can help improve QoL.\textsuperscript{74} (See Table 1)

Psychological Support
Unfortunately, current approaches to treatment are often limited to the physical symptoms of the skin conditions and do not sufficiently address the psychological ramifications. The psychological distress experienced by patients may be underestimated by health care providers,\textsuperscript{21} or conversely, resources to address recognized psychological effects of skin disorders may be lacking in many practice settings. Zuberbier et al. found that 74\% of patients and caregivers reported that their physician had never discussed the emotional impact of their AD and 84\% did not know support groups existed.\textsuperscript{66} In fact, over half of AD patients are not used to discussing their QoL with their physician with 22.4\% of AD patients and 35.7\% of other eczema patients feeling unsupported by their physician.\textsuperscript{74} One study found that 40\% of specialist consultations did not discuss QoL.\textsuperscript{75}

The relationship between acne and its psychiatric comorbidities is hugely disabling and ignoring this relationship during patient evaluations may result in undertreatment, poor adherence, and treatment dissatisfaction and contribute to an increased risk for anxiety, depression and impaired QoL in the future.\textsuperscript{31,39}
A study by Brewin highlighted the serious neglect of psychosocial rehabilitation during burns treatment in the UK. It was suggested that psychological support was provided for profoundly disturbed patients when, in fact, routine screening for psychological distress should be performed for every patient.41

Adopting a multidisciplinary approach to the treatment of skin conditions including psychological support rather than focusing just on the dermatological aspects would be extremely beneficial.31 Ideally, symptoms and QoL should be evaluated to establish disease burden, identify patients needing step-up treatment and screen for any patients with psychological disturbances.25 While QoL may be indirectly assessed by clinicians (e.g. through history taking), validated assessment tools that are practical, efficient, and widely accepted in the community practice setting remain elusive.

Shared Decision-Making and Therapeutic Patient Education

When considering surgical scars, there is disparity between the patient’s and physician’s opinion on what is “acceptable”. In a UK study, 67% of women and 33% of men said they had concerns about a scar which the physician thought was “acceptable”.76 It has been shown that communication between patients and physicians, both before and after surgery, could be improved. Physicians report being aware of scarring being a concern for their patients and discussing this with them. They also reported attempting to prevent or improve scarring during surgery. However, over two-thirds of patients felt they were more concerned about scarring than the physician.43

This disparity between perceptions could be improved through shared decision-making (SDM) to improve treatment adherence and consequently improve QoL. This approach respects clinical evidence and the patient’s preference for specific treatment goals.77 It is defined as “an approach where clinicians and patients make decisions together, using the best available evidence”.78 This way, the physician and patient discuss the patient’s priorities for treatment and a management plan is created reflecting both the physician’s and the patient’s perspective. Physician’s use their professional judgement and work collaboratively with the patient to achieve the patient’s desired outcome.79

Using QoL measures may encourage patients to be involved in SDM.19

SDM is an important part of therapeutic patient education (TPE) which is a patient-centered process aiming to provide patients and caregivers with the skills needed to manage and cope with their condition. In all conditions,

### Table 1 A Holistic Treatment Approach

| Assess the skin condition and its overall impact | • Conduct holistic history-taking.  
• Consider using appropriate QoL scoring tools to identify disease burden, patients requiring step-up treatment and screen for patients with psychological disturbances.  
• Detect skin toxicities linked to oncological treatments. |
| Treat the physical symptoms | • Treat the skin condition itself using appropriate guideline treatment.  
• Treat, manage, and mitigate skin toxicities early.  
• Encourage patients to use known techniques such as emollients, clothing choices and supportive skin care. |
| Psychological support | • Refer or provide appropriate psychological support.  
• Ensure the patient and their family has knowledge about peer support. |
| Therapeutic education | • Provide therapeutic education for the patient and caregiver to ensure they can manage and cope with their condition.  
• Use shared decision-making to work collaboratively with the patient and achieve their desired outcome. |

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effective patient and caregiver therapeutic education is necessary and important and has been shown to improve outcomes such as severity, treatment adherence and QoL. When possible, TPE should ideally be multidisciplinary and use various methods and tools to transfer knowledge. QoL measures may enable personalized educational input to the patient by revealing specific issues.

Dermatologist Involvement in Oncology Treatments

In the context of oncologic treatment, discussions about dermatologic side effects are often limited, as are proactive strategies to mitigate them. Timely access to supportive oncodermatology treatment during the immediate post-treatment transition period can be lacking, resulting in inadequate management of long-lasting skin toxicities.

The emergence of novel cancer treatments and the longer life expectancy of cancer patients means skin toxicities will continue to expand. Dermatologists therefore have an increasingly important potential role in a multidisciplinary team managing or mitigating skin toxicities and helping to achieve optimal patient outcomes. There is increasing evidence demonstrating a relationship between dermatologist involvement for skin toxicities and improved QoL and outcomes. Involvement of dermatologists also reduces the number of patients unnecessarily discontinuing their anticancer treatment. More than 25% of referring physicians recommend discontinuing treatment when patients develop skin toxicities from targeted therapies compared with 4% of dermatologists. To ensure effective skin toxicity management some oncology clinics now have embedded dermatologists.

QoL Scoring Tools

Assessing patient QoL provides important information for adapting treatment to each patient’s unique requirements and may help make clinical decisions more patient-centred. Assessing the patient’s perspective enables comprehensive interpretation of treatment efficacy and impact. QoL measures in pediatric consultations may enhance communication between children and their parents or carers and allow the parent to have a better understanding of the child’s perspective. Systematically assessing patient QoL can enhance the clinician-patient relationship and demonstrate that the clinician is aware of the QoL impact and cares about the patient’s preferred outcomes. It can also promote discussions about treatment satisfaction and preferences, and disease burden. QoL is already an essential component of many oncology treatment decisions and should become more integrated in dermatological treatments through the development of practical and efficient tools that are suitable for most practice settings.

QoL scoring tools are readily available, they are largely used in the clinical research setting or by select tertiary care centers. It is important to choose the appropriate tool for the assessment. Generic instruments are used to compare QoL impairment in the skin condition in question with nondermatological conditions. Conversely, dermatology-specific instruments can compare QoL across different skin disorders. These instruments can have better capacity for differentiation, be more sensitive to change and make it less likely to miss issues associated with the condition.

Dermatology-specific instruments such as the Dermatology Life Quality Index (DLQI), the Dermatology Quality of Life Scales (DQOLS), and the Dermatology Specific Quality of Life (DSQ) are readily available. These have the advantage of assessing numerous domains impacted by a skin condition and provide information from patients with a wide spectrum of dermatological conditions. Disease-specific questionnaires are also available such as the Cardiff Acne Disability Index (CADI), Patient-Oriented Eczema Measure (POEM), and Brisbane Burn Scar Impact Profile (BBSIP). Many validated instruments are available assessing symptoms and QoL but do not comprehensively analyze all aspects of the condition.

Children, infant, and family-specific instruments include the Children’s Dermatology Life Quality Index (CDLQI), Infants’ Dermatitis Quality of Life Index (IDQoL), Dermatitis Family Index (DFI), and the Childhood Atopic Dermatitis Impact Scale (CADIS). However, no QoL instrument for infants, children, and adolescents with AD can be highly recommended because none fulfil all required criteria.

A systematic review was performed as part of the Global Research on the Impact of Dermatological Diseases (GRIDD) project analyzing 53 articles reporting on 36 different instruments. This review found that no single dermatology specific patient-reported outcome measure demonstrates sufficient evidence of adequate measurement properties to be recommended for use.

The GRIDD project is currently developing a patient-impact measurement tool (called PRIDD) aiming to offer new perspectives on the lives of the millions of people living with skin conditions. It is hoped this new tool will...
address the issues with the existing tools such as the weaknesses in the DLQI.92

Conclusion

The QoL impact of skin conditions is an important consideration for therapeutic decision-making. Holistic history-taking, checklists, or the use of more formal QoL scoring tools can be incorporated into routine consultations to improve patient well-being. TPE and SDM are key components of a holistic treatment approach and can improve treatment outcomes as well as patient satisfaction.

For cancer patients, dermatologists can play a vital role in managing potential skin toxicities related to oncologic treatments and thereby reduce disruptions or premature treatment discontinuation due to cutaneous effects.

In conclusion, this review highlights the overall impact of skin conditions (including psychological and QoL impacts) and the importance of providing holistic care to optimize treatment outcomes. A comprehensive QoL screening tool would be useful to help provide patient-centered treatment.

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Author Contributions

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