

BRAIN. Broad Research in Artificial Intelligence and Neuroscience

e-ISSN: 2067-3957 | p-ISSN: 2068-0473

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Special Issue 1: *Neuroscience, Artificial Intelligence, and Innovation in Education*

Submitted: January 29th, 2025 | Accepted for publication: March 15th, 2025

Education of Patients and Their Families to Manage Emotional Impact of Skin Scars

Cristina Stanescu

Department of Morphological and Functional Sciences,
Faculty of Medicine and Pharmacy, Dunarea de Jos
University, 35 Alexandru Ioan Cuza Street, 800216 Galati,
Romania.

dr.cristinastanescu@gmail.com

<https://orcid.org/0009-0001-5120-9926>

Lucreția Anghel

Clinical Medical Department, Faculty of Medicine and
Pharmacy, Dunarea de Jos University, 35 Alexandru Ioan
Cuza Street, 800216 Galati, Romania.

anghel_lucretia@yahoo.com

<https://orcid.org/0000-0002-9477-6760>

Camelia Tamas

Department of Plastic Surgery, Faculty of Medicine,
Grigore T. Popa University of Medicine and Pharmacy, 16
Universitatii Street, 700115 Iasi, Romania.

camelia.tamas@umfiasi.ro

<https://orcid.org/0009-0005-2575-4153>

Anamaria Ciubara

Faculty of Medicine and Pharmacy, Dunarea de Jos
University, 35 Alexandru Ioan Cuza Street, 800216 Galati,
Romania.

anamburlea@yahoo.com

<https://orcid.org/0000-0003-0740-3702>

Abstract: Skin scars can have significant emotional and psychological effects on both patients and their families. Although the physical implications of scars are widely recognised, the psychological journey endured by individuals with scars often goes unnoticed. This study investigated how patient education influences psychological status and communication with healthcare providers to improve healthcare quality. We analysed the most efficacious educational and psychological support methods for patients with cutaneous scarring and the types of educational programs currently available. Scarring can lead to a variety of psychological symptoms, frequently resulting in diminished self-esteem. To alleviate psychological impacts and reduce the incidence of depression, it is essential to implement a comprehensive range of strategies. Educational initiatives, professional counselling, and therapeutic interventions can offer essential emotional support and assist individuals in managing their emotional responses to scars. Advancements in medical science have opened the door to various scar treatment options, yielding beneficial effects on an individual's psychological well-being. Promoting self-acceptance, exploring coping mechanisms, and building a support network can significantly aid in managing the depression risk associated with scars. The psychological impact can be particularly severe, with family members developing depression, anxiety, and posttraumatic stress disorders. Artificial Intelligence has the potential to enhance communication between doctors and emotionally fragile patients with trauma, offering both benefits and challenges. Educating patients and healthcare providers on the latest research findings on wound healing and scar revision can lead to more effective treatment strategies and improved patient outcomes.

Keywords: cognitive stimulation; computer-assisted therapy; psychiatric rehabilitation; MMSE; MoCA; training modules; AI in education.

How to cite: Stanescu, C., Anghel, L., Tamas, C., & Ciubara, A., (2025). Education of patients and their families to manage emotional impact of skin scars. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 16(Sup1), 324-341. <https://doi.org/10.70594/brain/16.S1/26>



1. Introduction

Scars can serve as constant reminders of painful experiences and trigger emotional distress in individuals (Heath, Shepherd, & Harcourt, 2018). The emotional journey following a scar is unique to each person and is influenced by factors, such as the cause of the scar, its visibility, and an individual's perception of it. In some cases, scars can evoke negative self-perceptions and a potential decline in mental well-being (Bosmans et al., 2015). Therefore, the risk of depression in patients with scars cannot be ignored. Depression can develop as a result of coping with scars. Understanding the emotional toll associated with visible scars is crucial for aiding affected individuals (Boersma-van Dam et al., 2021). Promoting emotional support, offering appropriate medical interventions, and fostering acceptance within society can help mitigate the risk of depression in patients with scars (Chaudhary & Ahmad, 2021). Joining support groups or seeking solace in online communities allows patients to share their experiences, gain insight, and feel less isolated (Li & Coombs, 2018). Recognising and accepting one's scars is an essential step toward emotional healing. Advocating for body positivity and self-acceptance fosters societal acceptance of scars and can significantly aid individuals in their pursuit of mental well-being. (Duke et al., 2018). This highlights the need for medical education to address the mental health implications of scarring, and not just its physical aspects.

2. Counselling Therapy

Mental health professionals can provide guidance and support tailored to specific needs. Therapeutic approaches, such as cognitive-behavioural therapy (CBT) and acceptance and commitment therapy (ACT), can be effective in addressing body image concerns, anxiety, depression, and post-traumatic stress disorder (Carrougher et al., 2021). Counselling therapy, also known as talk therapy or psychotherapy, is a form of mental health treatment that involves working with trained therapists to explore and address various emotional and psychological challenges (Dukes et al., 2022).

Counselling therapy typically involves regular sessions with a therapist once or twice a week. The duration of therapy can vary depending on individual needs, with some individuals engaging in short-term therapy (a few weeks to a few months), and others engaging in long-term therapy (several months to years). Therapists create a safe and confidential space for clients to discuss their concerns, emotions, and experiences (Schneider et al., 2012).

Therapists use different techniques and approaches based on clients' needs and goals. Some common therapeutic modalities used in counselling therapy include the following:

- **Cognitive-behavioural therapy** focuses on identifying and changing negative thought patterns, beliefs, and behaviours that contribute to distressing emotions or behaviours. CBT often involves practical techniques and exercises to help individuals develop healthy coping strategies and problem-solving skills (Xie et al., 2022).
- **Psychodynamic therapy** explores an individual's unconscious thoughts, feelings, and early life experiences to gain insight into current difficulties. This approach aims to identify and resolve underlying conflicts or unresolved issues that may contribute to emotional distress (Askay & Patterson, 2008).
- **Acceptance and commitment therapy** focuses on accepting difficult thoughts and emotions while committing actions aligned with personal values and goals. ACT emphasises mindfulness and self-compassion (Sinha et al., 2019).
- **Mindfulness-based therapy** incorporates mindfulness practices to develop awareness and acceptance of present-moment experiences. This can help manage anxiety, depression, and stress (Schulz et al., 2019).

The goals of counselling therapy are unique to each individual, based on their specific concerns and needs. Some common goals include the following:

- Understanding and resolving emotional challenges such as depression and anxiety

- Developing healthy coping mechanisms and strategies for managing stress
- Improving self-esteem and self-confidence
- Resolving conflicts or relationship issues
- Increased insight into behaviours, thoughts, and emotions
- Enhancing interpersonal skills and relationships
- Processing and integrating traumatic experiences
- Increasing self-awareness and personal growth

Therapists are bound by professional ethics and confidentiality rules to ensure that information shared during therapy remains private (Seekles et al., 2011). The therapeutic relationship between the client and therapist is an essential aspect of counseling therapy. A strong therapeutic alliance built on trust, respect, and empathy forms the foundation for effective therapy (Tyack et al., 2017). Therapists provide support, guidance, and feedback to help clients gain insight, explore emotions, and develop strategies for positive changes. Counselling therapy is a collaborative process between therapists and clients. It provides a supportive space in which individuals can explore their concerns, gain insight, develop strategies for personal growth, and improve their well-being (Hutter, Smolle, & Kamolz, 2022).

3. Therapy Group

Connecting with other patients with similar experiences is immensely beneficial. Support groups or peer support networks can provide space for individuals to share their feelings, exchange coping strategies, and feel better understood and supported. Support groups are a form of peer support in which individuals facing similar challenges or circumstances come together to share their experiences, provide emotional support, and gain insights and coping strategies from one another (Spronk et al., 2018).

Goals of Support Groups. The primary objectives of support groups are to offer a secure and non-judgemental environment where individuals can share their experiences, emotions, and challenges (Hutter, Smolle, & Kamolz, 2022; Lee & Arora, 2023):

- **Emotional support.** The ability to express feelings, fear, and frustration in a supportive environment with others who can relate.
- **Validation.** Hearing others share similar experiences and realise that you are not alone in your struggles.
- **Education.** Learning about strategies, coping skills, and resources from group members who face similar challenges.
- **Peer guidance.** Gaining insights and advice from others who have successfully navigated similar difficulties.
- **Empowerment.** Building self-confidence and resilience by witnessing the strength and progress of fellow group members.
- **Social connection.** Building friendships and a sense of belonging with individuals who understand and empathise with their experiences.

Support groups can vary in structure and format. Members were encouraged to share their experiences and provide support to others. Active listening and respect for others' perspectives are important group norms (Stanger & Harris, 2005).

Participating in support groups can offer numerous benefits, such as emotional support and validation, coping strategies, motivation, creating connections and friendships with individuals who understand their experiences, and reduced feelings of isolation. Recognising that you are not alone in your experience can reduce your feelings of loneliness and isolation. Support groups are valuable sources of emotional support, guidance, and empowerment. They provide a space where individuals can connect with others facing similar challenges, share insights, and find encouragement during their life journeys (Leichsenring et al., 2006).

Integrating the mental health aspects of scarring into medical education would serve a dual purpose: improving patient care by equipping future doctors with the knowledge to address the psychological impacts of scarring and potentially help medical students better understand and cope with patient mental health challenges. This can be incorporated into a broader competency-based curriculum that addresses both clinical and psychiatric aspects of medical practice (Modi et al., 2015). Skin scars can have significant psychological impacts on patients, and educational protocols play a crucial role in improving their mental well-being. The severity of scarring correlates with greater psychological distress, but some mild scarring can have a significant impact on the quality of life, influenced by factors such as adaptation time, age at occurrence, and subjective appraisal of the scar (Tan et al., 2022). Children are particularly vulnerable to the negative effects of scarring. Children exposed to violence or trauma resulting in scars may experience long-term psychological effects, such as anger, withdrawal, posttraumatic stress, and desensitisation to violence (Garbarino, Bradshaw, & Vorrasi, 2002).

The psychological impact of facial scars appears to be more significant than that of scars at other locations. Available research has shown that facial scars can lead to increased psychological impact and anxiety, even when considered minor. The face is recognised as a "psychologically significant area of the body," with disfigurement potentially leading to numerous social consequences. (Tebble, Thomas, & Price, 2004). Tan et al. (2022) found that even individuals with mild acne scars have a significant impact on their quality of life. Facial scars appear to have a disproportionate psychological impact compared to other body locations because of the face's importance for identity, social interaction, and self-image. The visible nature of facial scars can lead to lower self-esteem, social anxiety, depression, and reduced quality of life (Levine et al., 2005).

Research suggests that early and efficacious treatment may minimise pigmentary abnormalities and keloid scarring (Murakami & Shigeki, 2024). This highlights the importance of educating patients about timely interventions and tailored treatment regimens for different skin types (Kutcher et al., 2013). While many studies have focused on medical treatments, there is growing recognition of the need for holistic approaches that address both physical and psychological aspects. Collaboration among dermatologists, plastic surgeons, mental health professionals, and educators could lead to more comprehensive support systems for patients dealing with the psychological effects of skin scars (Mekereş et al. 2023).

Effective educational protocols should combine medical knowledge of scar treatment techniques with a comprehensive understanding of the psychological impact of scarring. This holistic approach would enable healthcare professionals to provide better care for patients with scars and address their physical and mental health needs (Boydell et al. 2007).

Patient education regarding proper wound care is a simple, yet effective method for improving the cosmetic appearance of surgical and traumatic scars (Sahni, 2018). Implementing educational protocols in scar care is crucial because patient participation is paramount for obtaining optimal outcomes (Wu et al., 2023). Postoperative visits should serve the dual purpose of continued patient education, reinforcement of proper care, and screening for signs of scar hypertrophy (Fried & Wechsler, 2006). Despite the importance of patient education, there is a lack of standardised educational protocols for scar management. Most studies focus on various scar treatment modalities rather than patient education strategies.

4. Material and Methods

This review used a literature search of PubMed, Embase, Web of Science, Google Scholar, and Cochrane Database following the PRISMA guidelines. Keywords: education, depression, skin scars, counselling therapy, cosmetic interventions, communication. Once the titles and summaries of the articles were carefully read, relevant studies were identified for inclusion in our review. After applying the inclusion and exclusion criteria, studies that did not meet the criteria were excluded, and articles that provided relevant information were critically reviewed.

5. Inclusion and Exclusion Criteria

Studies were included if they focused on the prevalence, diagnosis, impact, and management of depression and anxiety in patients with skin scars, using a multidisciplinary approach. Articles that were not available in the full text or written in other languages were excluded (Table No. 1).

Table 1: Inclusion and Exclusion Criteria for Studies Included in this Review

Inclusion criteria	Exclusion criteria
Studies published in English	Studies not published in English
Studies reporting education, communication, and mental disorders in patients with scars	Studies reporting depression or mental health outcomes by other causes
Articles about patients diagnosed with scars	Articles published before 2000

6. Data Synthesis

Data extracted from relevant articles were summarised using narrative synthesis and qualitative analysis, highlighting similarities and differences.

7. Results

A total of 286 articles were identified in the database, of which 102 were finally selected according to the eligibility criteria. Studies have shown that the prevalence of depression in patients with scars is higher than in the general population.

Several scar types are associated with an increased risk of emotional damage

- Highly visible scars on some parts of the body, such as the face, arms, or legs, can lead to an increased negative impact on the body image. This visibility can make individuals more prone to feelings of embarrassment, shame, and social anxiety, thereby contributing to the development of depression (Parvizi et al., 2023). Scars in less visible areas, such as the abdomen or back, may be easier to hide and may have a lesser impact on body image or self-esteem; however, this may not be the case for everyone, as the perception of scars can vary widely among individuals. It is important to recognise that the emotional impact of scars can be highly individualised and that factors such as previous experiences, cultural influences, and personal resilience can also play a role in determining how a person copes with and perceives their scars (Wong et al., 2007).
- Post-burn scars are typically caused by thermal skin injuries. The severity of scars varies from mild to extensive tissue damage. Burn scars often have distinct features such as fibrosis, contracture, and potential loss of function. These physical characteristics can affect mobility and daily activities, and further affect the emotional well-being of individuals with such lesions. This may require future medical and surgical treatment with long-term rehabilitation, thereby increasing the emotional and physical burden on these patients (Kelter et al., 2020).
- Disfiguring scars that result in significant changes in an individual's appearance, such as keloid or burn scars, can have a profound psychological impact. These scars may be more difficult to conceal and may attract unwanted attention or stigma, leading to increased emotional distress and the risk of developing depression (Sadeghi-Bazargani et al., 2011).
- Scars resulting from traumatic events, such as accidents, surgeries, or violence, can have a lasting impact on an individual's psychological well-being. These scars may serve as constant reminders of the traumatic event, triggering symptoms of post-traumatic stress disorder (PTSD) and increasing the risk of depressive symptoms (Bibi et al., 2018).
- Scars resulting from self-injury can have a deep emotional significance. These scars may reflect underlying mental health issues such as depression, anxiety, and personality disorders. The act of self-harm and subsequent scars can exacerbate mental health conditions, leading to a higher risk of depression (Duke et al., 2018).

The emotional impact of postburn and posttraumatic scars may differ. Burn scars are often associated with trauma to the initial burn incident, as well as with potentially life-changing consequences. Given the visibility and potential functional impairments associated with burn scars, individuals may experience body image issues and psychological distress (Wiechman et al., 2023; Druery et al., 2017). Posttraumatic scars, while also capable of affecting self-esteem, may not carry the same deep-seated emotional burden because they are not closely linked to a specific traumatic incident (Mehrabi et al., 2022; Fauerbach et al., 2007). The emotional impacts of postburn and posttraumatic scars can vary significantly. Factors such as the size, location, and visibility of scars, as well as an individual's coping mechanisms and social support, can influence the psychological impact of scars (Bhatti et al., 2020).

Postburn scars often have specific treatment protocols, owing to their unique characteristics (Ullrich, Askay & Patterson, 2009). Surgical interventions such as skin grafts or reconstructive surgeries may be necessary to improve the appearance and functionality of burn scars. The treatment options for posttraumatic scars are diverse and may include scar revision surgery, laser treatment, or other forms of scar management (Żwieręłło et al., 2023).

Although both postburn and posttraumatic scars can have physical, emotional, and psychological implications, the unique causes, characteristics, and treatment approaches for each scar type can result in distinct differences in their impact on individuals (Burgess et al., 2022). Improving the mental status of individuals with postburn or posttraumatic scars can involve a combination of medical interventions, psychological support, and self-care strategies (Goverman et al., 2016). It is important to note that while these types of scars have been associated with an increased risk of emotional damage and depression, their impact can vary significantly among individuals (Al Ghriwati et al., 2017). Perception of and response to scars are highly subjective and dependent on various factors, including personal resilience, support systems, and individual coping mechanisms (Stockly et al., 2022).

8. Discussion

This study examined the emotional impact of scars, highlighting the importance of visibility and severity of the scars for the associated risks of depression, anxiety, and other mental disorders in affected patients, and identified evidence of a multidisciplinary approach for treatment and prevention in such cases (Figure 1).



Figure 1. Multidisciplinary approach for scar treatment

8.1. Education and Information

Providing accurate information about the nature of scars, their development, and the available treatment options can help these patients. This knowledge can enhance understanding, reduce fear or anxiety, and facilitate informed decision-making regarding treatment. (Compas et al.,

2012). Education and awareness campaigns can help foster an understanding and supportive environment for individuals with scars. This study highlights the importance of tailoring educational and treatment approaches to different patient populations. The effective management of the emotional impact of skin scars requires a comprehensive approach. This should include early and efficacious treatment to minimise potential sequelae (Bhattad & Pacifico, 2022), as well as education on the nature of scarring, available treatments, and coping strategies. Healthcare providers should also be aware of the potential long-term psychological effects on patients and their families, and provide appropriate support and resources (Ianovici et al., 2023). By addressing both the physical and emotional aspects of scarring, healthcare professionals can help improve patients' overall quality of life and well-being.

Education plays a crucial role in understanding the complex processes involved in scar formation. Wound healing involves four important phases: inflammation, proliferation, epithelialisation, and remodelling. Knowledge of these stages can help patients and healthcare providers to better manage the healing process and potentially improve outcomes (Zhou et al., 2023). Wound characteristics influence the rate and quality of wound healing. Education on the impact of mechanical forces on wound healing could lead to improved treatment strategies. For instance, understanding how tensile forces affect cell behaviour within the epithelia and how substrate stiffness influences cell morphology, proliferation, differentiation, and migration could improve wound care practices (Bayat & McGrouther, 2005). Educating patients and healthcare providers about the latest research findings, such as the role of lipids in wound healing and hypertrophic scar treatment, can lead to more effective treatment strategies and improved patient outcomes (Son & Harijan, 2014).

Comprehensive patient education regarding scar healing should encompass both the physical and emotional dimensions, as scars can exert significant psychological and physiological impacts on individuals. Such education should include an overview of the fundamental stages of wound healing and provide information on various mechanical, genetic, and pharmacological strategies available to mitigate scarring (Walmsley et al., 2015). Patients should be informed of the importance of proper wound care, including optimal wound care techniques and nutritional supplementation, to support healing. Education should also include treatment options and surgical revision techniques to manage existing scars (Vijn et al., 2017). Addressing emotional aspects is crucial because scars can lead to significant psychological stress and patient dissatisfaction. Patients should be made aware that scarring can affect their quality of life and potentially restrict movement (Belcastro & Ramsaroop-Hansen, 2017). Providing information on support groups or counselling services can be beneficial for patients struggling with the emotional impact of scarring.

8.2. Positive Self-Care Practices

Encouraging individuals to engage in self-care activities can boost overall well-being. This can include activities such as exercise, meditation, maintaining a healthy diet, practicing good skincare, and engaging in hobbies or activities that bring joy and fulfillment (Bryde Christensen et al., 2023).

8.3. A Body-Positive Mindset

A body-positive mindset is a perspective or attitude that promotes self-acceptance and appreciation of one's body irrespective of its appearance, shape, or size. It involves embracing and celebrating the uniqueness of one's body and prioritising self-love and self-care (Lannin, Vogel & Heath, 2017; Leenarts et al., 2013).

Cultivating a body-positive mindset is an ongoing practice that requires self-reflection, challenging societal norms, and actively working toward self-acceptance and love. It can have profound impacts on mental well-being, self-esteem, and overall quality of life, helping individuals to develop healthier relationships with their bodies. (Lund et al., 2019).

8.4. Cosmetic Interventions

In some cases, individuals may choose to pursue cosmetic interventions such as scar revision surgeries or camouflage techniques. These options should be discussed with medical professionals and considered part of a comprehensive treatment plan. Cosmetic interventions are procedures or treatments aimed at improving a person's physical appearance. These interventions can be surgical or non-surgical and are often used to address aesthetic concerns or boost self-confidence (Jourdan et al., 2019).

Various cosmetic interventions have been developed for these purposes. Surgical procedures involve invasive techniques and may require anesthesia (facelifts, breast augmentation or reduction, liposuction, rhinoplasty, abdominoplasty, etc.). Nonsurgical procedures are minimally invasive or non-invasive treatments performed without surgery (botox injections, dermal fillers, laser hair removal, chemical peels, microdermabrasion, acne treatment, scar revision, skin resurfacing, and laser treatment for wrinkles or pigmentation). Dental procedures focus on improving the appearance of teeth and smiling, including tooth whitening, veneers, dental implants, and orthodontic treatments (Chen & Davidson, 2005).

People may choose to undergo cosmetic interventions for various reasons including enhancing self-confidence. Many individuals seek cosmetic interventions to improve their appearance and boost self-esteem. Some cosmetic interventions are performed to address physical abnormalities or imperfections, such as birthmarks, scars, or asymmetrical features, and can help reduce visible signs of aging, such as wrinkles, sagging skin, and age spots (Goslawski, Tranchito & Rabbani, 2023).

8.5. Potential Complications

Similar to any medical procedure, cosmetic interventions carry risks such as infection, bleeding, scarring, allergic reactions, and adverse side effects from anesthesia. Realistic expectations regarding cosmetic intervention outcomes are crucial. Thorough consultations with qualified professionals are advisable to discuss goals, potential results, and limitations (Marshall et al., 2018).

8.6. Psychological Impact

Although cosmetic interventions can provide positive changes in physical appearance, it is important to address any underlying psychological factors that contribute to dissatisfaction with appearance. When considering cosmetic interventions, it is essential to choose a qualified and experienced professional who is board-certified in their respective specialty and has extensive experience in performing specific interventions. It is important to make informed decisions and to carefully consider the risks, benefits, and potential outcomes of cosmetic interventions. Consulting with professionals and a thorough understanding of the procedure can help to ensure a safe and satisfactory experience. Treatment and support should be tailored to meet the specific needs of each individual, and a multidisciplinary approach involving medical and mental health professionals can provide comprehensive care (Loesch et al., 2014).

8.7. Several Associated Pathologies Can Increase the Risk of Depression in Scar Patients

1. Body dysmorphic disorder (BDD) is a mental health disorder characterised by an obsessive preoccupation with perceived flaws in one's appearance. Individuals with scars may develop BDD, leading to distress and an increased risk of depression (Barnes et al., 2020).

2. Body Image Issues. Scars can affect a person's body image, leading to feelings of shame and low self-esteem. This negative perception of appearance may contribute to the development of depressive symptoms (Swami, 2024).

3. **Post-traumatic stress disorder (PTSD).** A scar can be a reminder of a traumatic event such as an accident, surgery, or self-harm. Individuals with PTSD may experience flashbacks, nightmares, and intrusive thoughts related to trauma, which can contribute to the development of depression (Nijdam, Vermetten, & McFarlane, 2023).
4. **Chronic pain.** Scars resulting from injuries can lead to chronic pain. Living with ongoing pain can be physically and emotionally exhausting, leading to the development of depressive symptoms (Bicego et al., 2021).
5. **Social isolation.** Some individuals with scars may experience social isolation and fear of judgement. Isolated feelings can contribute to loneliness and sadness, thereby increasing the risk of depression (Tragantzopoulou & Giannouli, 2021).

Individuals with scars and associated pathologies require proper medical and psychological support to address these issues and reduce their risk of depression. (Boev et al., 2024). Posttraumatic scars can have significant psychosocial impacts, potentially leading to depression among the affected individuals (Mekereş et al., 2023). Similarly, disaster-related stressors and peri-traumatic emotional reactions, such as fear and dissociation, have been identified as strong predictors of depressive symptoms following traumatic events (Rosendal et al., 2011). These findings are consistent with research that indicates that PTSD symptom severity as well as negative alterations in cognition and mood are related to depression (Mayorga et al., 2023). While insomnia has traditionally been viewed as a secondary symptom of mental health disorders such as PTSD and depression, it is now considered an independent clinical disorder that can contribute to the development and severity of these conditions (Carlson et al., 2023). Coping style and dispositional hope have been found to influence the severity of PTSD and depression symptoms, with emotional difficulty and lower levels of hope being associated with increased symptom severity (Hassija et al., 2011). The literature suggests a complex relationship between posttraumatic scars, trauma exposure, and the development of depression.

Cognitive Therapy for PTSD has also shown efficacy in reducing PTSD symptoms, as well as comorbid depression and anxiety in the parents of affected children (Barbano et al., 2019). Pre-existing mental health conditions, such as depression and anxiety, can increase the likelihood of developing symptoms after traumatic events such as wildfires (Isaac et al., 2023). Moreover, patients with symptoms indicative of depression, anxiety, and PTSD have been found to have lower health-related quality of life, higher healthcare utilisation, and lower return to work rates (van der Vlegel et al., 2022). This underscores the importance of the early identification and treatment of these symptoms to facilitate recovery. The treatment of PTSD often involves pharmacological interventions and psychological therapies, which can also alleviate depression and anxiety symptoms (Al Zomia et al., 2023; Anghel et al. 2023). Pre-existing mental health conditions can exacerbate the development of PTSD, highlighting the need for thorough screening and appropriate treatment to improve outcomes in those affected by trauma (Chokshi et al., 2022).

8.8. Effective Communication with the Patient and Their Family

Open and honest information exchange is essential, as patients and relatives appreciate healthcare professionals who address both medical and psychological issues. This approach helps build trust and facilitates shared decision-making. When communicating with patients with scars and their families, healthcare professionals should be mindful of the emotional impact and potential anxiety that open discussions may trigger (Engel et al., 2023). It is important to align communication with the patients' and families' abilities to process and cope with information using clear and understandable language. Empathy plays a significant role in effective communication as it leaves room for positive coping strategies (Suarez-Almazor, 2004). Healthcare professionals should recognise the importance of family members in providing physical and psychological care to patients with scars. Balancing patient autonomy with relatives' desire to be protective is crucial, and negotiating strategies may be necessary considering the socioeconomic circumstances of both the

patient and family (Speice et al., 2000). It is essential to note that communication preferences may change over time, requiring healthcare professionals to adapt their approaches accordingly.

Doctor-patient communication plays a crucial role in healthcare quality by influencing patient self-management behaviour and health outcomes (Matusitz & Spear, 2014). Families are a unique source of support for many patients and doctors prefer family involvement at various stages of treatment. Family-centred rounds have been implemented in some institutions, allowing families to participate in attending physician rounds, which seems to improve communication and shared decision-making, and offers new learning opportunities for residents and students (Muething et al., 2007). While the importance of family involvement is acknowledged, most advanced communication skills training remains patient-centered and does not cover interactions with family members. This contradiction highlights the need for more comprehensive training programs that include modules to improve communication with family members. In addition, the doctor-patient-relative communication process is not static, with preferences changing over time, thus emphasising the need for adaptable communication strategies for each diagnostic (Datta et al., 2016; Tamas et al., 2021). The significant role of families in the communication between doctors and patients is particularly evident in the context of chronic diseases. Family involvement can enhance communication, improve patient care, and contribute to more favorable health outcomes.

8.9. Using Artificial Intelligence to Improve Communication

Artificial Intelligence (AI) can significantly influence the implementation of educational programs for managing the emotional impact on burn patients in several ways. AI can enhance personalised learning experiences for patients with burns and their caregivers by tailoring educational content to individual needs and preferences (Uygun et al., 2024). This personalisation can help address the unique emotional challenges that burn survivors face, potentially improving the efficacy of peer support group programs (Won et al., 2021). AI-powered adaptive learning platforms and virtual tutors can facilitate continuous education and support for patients with burns, even outside traditional healthcare settings (Chisom, Unachukwu, & Osawaru, 2024). This extended access to resources may help address psychosocial recovery and reintegration of burn survivors into the community (E Moura, Amin, & Ekwobi, 2021; Yeh et al., 2023).

AI has the potential to enhance communication between doctors and emotionally fragile patients with trauma, offering both benefits and challenges. AI-powered tools such as Digital Twins of Doctors (DTDs) can provide efficient delivery of repetitive information and personalised patient care, potentially saving doctors time (Zalake, 2023). AI systems can support complex decision-making processes by analysing data and providing personalised information to healthcare professionals (Omotunde & Mouhamed, 2023). This could be particularly beneficial for patients with emotional fragility, as AI can help doctors tailor their communication approaches based on a patient's specific needs and trauma history. However, the integration of AI into doctor-patient communication has raised concerns regarding the misinterpretation of patients' symptoms or confusion regarding roles and responsibilities in the healthcare process (Shukur, Abd Ghani, & Bin Mohd Aboobaidar, 2024). For patients experiencing emotional fragility as a result of trauma, these issues may intensify their vulnerability and impede their therapeutic progress. The human element of psychotherapy remains crucial, particularly in trauma-related cases (Cary et al., 2024; Avula & Amalakanti, 2023). To ensure the ethical and effective use of AI in this context, healthcare professionals should maintain control over patient care and receive proper education regarding AI principles and competencies (Hatem, Ibrahim, & Yousuf, 2024; Olorunsogo et al., 2024).

In conclusion, although AI offers promising solutions for improving doctor-patient communication, treatment optimisation, and psychological support, its implementation must be carefully considered, particularly for emotionally fragile patients.

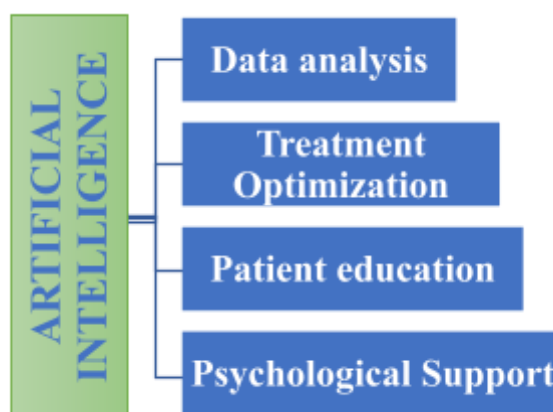


Figure 2. Implications of Artificial Intelligence in Skin Scar Management

Although patient education is acknowledged as a crucial component of scar management, there is a discernible gap in the literature concerning structured educational protocols. Future research should prioritise the development and assessment of standardised educational interventions for individuals with scars. These interventions should incorporate information on preventive strategies, wound care techniques, and available treatment options to enhance overall scar outcomes and mitigate the risk of depression associated with skin scars.

9. Conclusions

This study showed that individuals with visible skin scars are more likely to experience depressive symptoms, which depends on the visibility and severity of the scars. Psychological distress caused by scars can interfere with daily functioning and impair work or academic performance. It is essential to address the emotional impact of scars along with physical healing to prevent the development or worsening of depressive symptoms. Educating patients and healthcare providers on the latest research findings on wound healing and scar revision can lead to more effective treatment strategies and improved patient outcomes.

Author Contributions

Conceptualisation, C.S., and A.C.; methodology, L.A.; validation, C.S., and A.C.; formal analysis, C.T., and L.A.; investigation, L.A. and C.T.; resources, C.S and L.A.; data curation, C.T., and A. C.; writing—original draft preparation, C.S.; writing—review and editing, C.S., and A.C.; visualisation, C.T.; supervision, A.C.; project administration, C.S, and AC. All the authors have read and agreed to the published version of the manuscript.

Conflicts of Interest Statement

The authors declare that they have no conflicts of interest.

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