



RESEARCH ARTICLE

SKIN CARE IN SPINAL CORD INJURY PATIENTS: A PRACTICAL AND SCIENTIFIC APPROACH TO THE DEVASTATING PROBLEM.

Sachin S. Shabadi¹ and VijayKumar S. Shabadi².

1. Post graduate in M.Ch Plastic Surgery, Government Medical College Kottayam, Kerala, India.
2. Consultant Neurosurgeon, Bagalkot, Karnataka, India 587101.

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Abstract

Background: Spinal cord injury subjects the patients to multitude of complex problems which have bearing on physical, mental, psychological and social aspects of the individual. It leaves the patients crippled for various aspects and mobilization being the important one which is severely impaired. Among all the problems, skin care constitutes an important aspect.

Methods: Various comprehensive aspects of skin care like Grading of decubitus ulcers, preventive methodologies and management is reviewed.

Conclusion: Skin care in Spinal cord injury patients is an important aspect of the rehabilitation process. It plays a pivotal role in maintaining the well-being of spinal cord injury patients. It involves simple common sense steps which the patients or the care givers can adapt and make it a daily routine to ensure the integrity of the neurologically impaired skin. Timely observation and action are the keys to the approach.

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Introduction:-

A pressure sore (or bed sore) is an injury to the skin and tissue under it. Sitting or lying in the same position will begin to cut off the flow of blood to that area, blocking oxygen and vital nutrients from maintaining healthy tissue^{1,9}.

Definition of decubitus ulcer: Pressure sores will also be referred to as pressure ulcers or decubitus ulcers. Breach in the continuity of epithelium and underlying tissue due to prolonged pressure on the skin. Prolonged pressure reduces blood supply and essential nutrients and oxygen supply to underlying tissues eventually resulting in skin breakdown^{9,12}.

Susceptibility^{1,4,14}:-

1. Decubitus ulcers are common in patients with spinal cord injury with paraplegics and quadriplegics.
2. Reason: loss of sensation, loss of muscle function, reduced blood supply, poor nutrition, abnormal postures resulting from spasticity, pressure from external devices like prosthesis or wheel chair.
3. Spinal cord injury patients have reduced capacity to reposition or shift their body postures in bed or on wheelchair resulting in pressure sores. Hence they need periodic daily assessment of vulnerable areas to look for any skin changes.

Corresponding Author:- Sachin S. Shabadi.

Address:-Post graduate in M.Ch Plastic Surgery, Government Medical College, Kottayam, Kerala, India.

Skin care is an integral part of management of patients with spinal cord injury patients. People with spinal cord injury living life in a wheelchair are at greater risk of skin damage like pressure sore areas due to loss of feeling and reduced sensation to parts of their body. Combined with loss of muscle function, poor circulation and often poor nutrition people with spinal cord injury often develop pressure sores. Left unattended these can quickly become life threatening^{2,8,11}.

While both vulnerable, people with quadriplegia and tetraplegia are more susceptible than those with paraplegia due to the reduced capacity and strength in upper limbs to reposition or shift their body weight in a wheelchair or bed. It's important to check skin on a daily basis in order to reduce the risk of developing problems such as pressure sores^{3,7}.

Characteristics of Neurologically impaired skin^{4,6,10}:-

1. Reduced elasticity and tensile strength
2. Reduced resistance to ischemia, physical insult (friction, heat, rub etc..)
3. Muscle atrophy
4. Reduced sensation
5. Altered maintenance of constant body temperature
6. Impaired reflex vascular changes below the level of lesion

Signs of impending bedsores^{13,15,19}:-

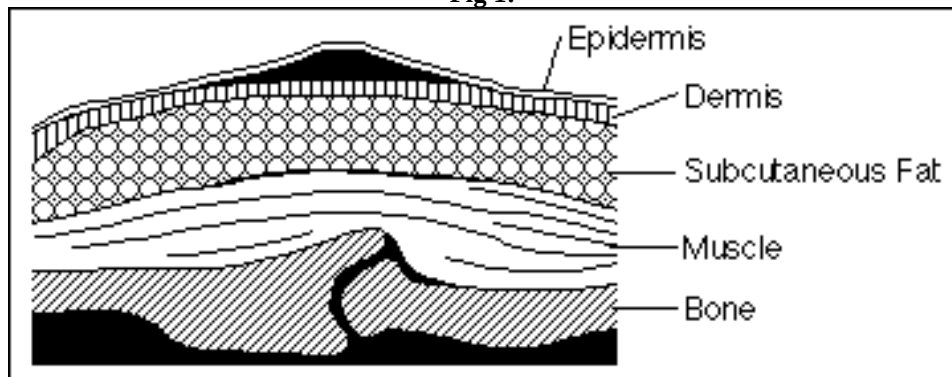
- Reddened areas
- Damp soft white areas
- Rashes, pimples, blisters, bumps
- Cuts, bruises, scrapes, scratches, insect bites
- Hard lumps beneath the skin surface
- Marks from seams or elastic binding
- Dry flaky skin

Stages^{12,16,18}:-

Damage from a pressure sore will range from slight discoloration of the skin (stage 1) to open sores that go all the way to the bone (severe).

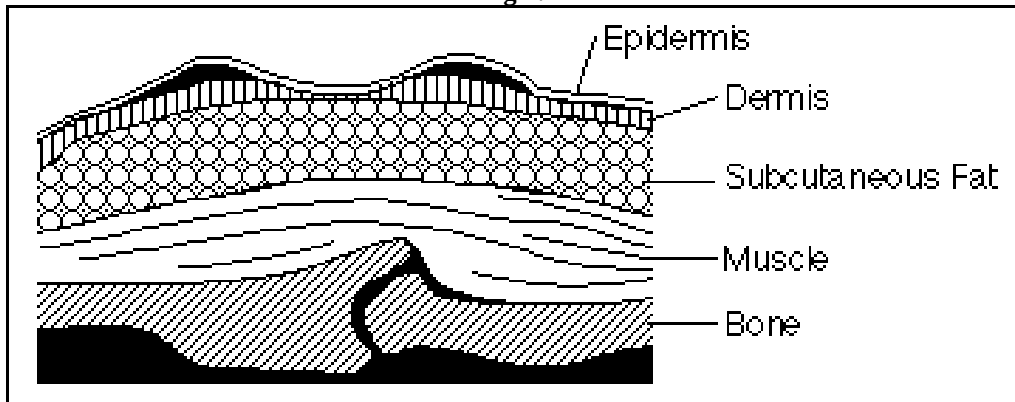
Stage 1:- Skin is not broken but is red or discolored. The redness or change in color does not fade within 30 minutes after pressure is removed.

Fig 1:-



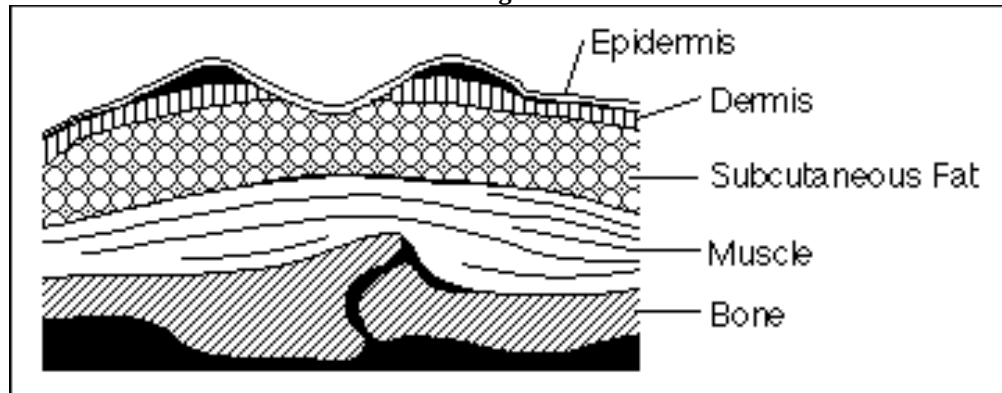
Stage 2:- The epidermis or topmost layer of the skin is broken, creating a shallow open sore. Drainage may or may not be present.

Fig 2:-



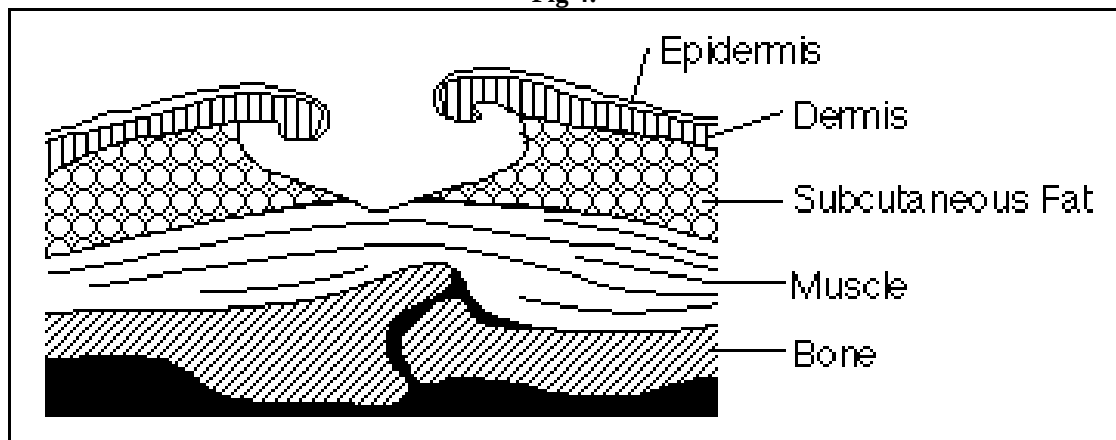
Stage 3:- The break in the skin extends through the dermis (second skin layer) into the subcutaneous and fat tissue. The wound is deeper than in Stage Two.

Fig 3:-

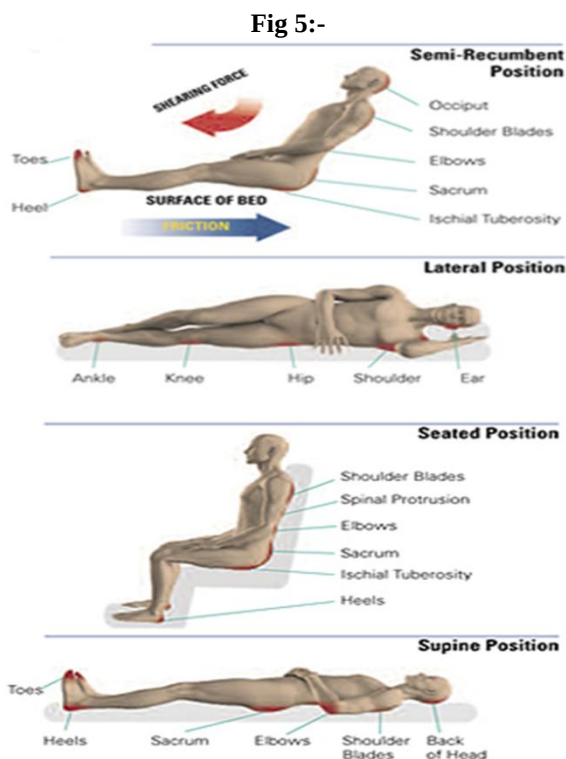


Stage 4: The breakdown extends into the muscle and can extend as far down as the bone. Usually lots of dead tissue and drainage are present.

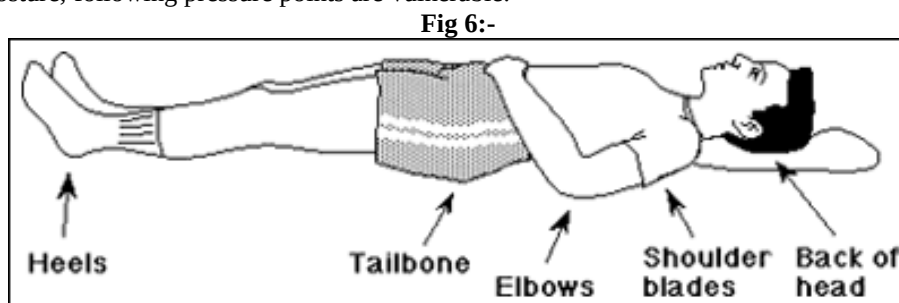
Fig 4:-



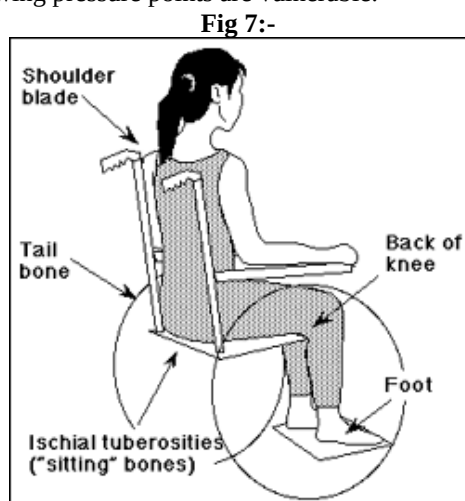
Susceptibility zones²⁰:-



In recumbent posture, following pressure points are vulnerable:



In wheel chair bound patients, following pressure points are vulnerable:



1. Risk assessment
2. Skin inspection
3. Pressure relief
4. Continence management
5. Skin care hygiene
6. Nutrition
7. Environmental evaluation
8. Equipement prescription
9. Exercise regimen
10. Education
11. Seeking advice

1. Waterlow index
2. Braden index
3. Norton index
4. NSW pressure sore prediction score
5. Waterlow index has highest predictive value in SCI patients. (Wellard and Lo, 200).

Fig 8:-

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Methods of taking care of skin in spinal cord injury patients^{25,28,30}:-**Nutrition:-**

The diet should consist of plenty of protein foods, fresh fruits, vegetables and liquids. In cases with existing pressure sores, the diet should be rich in proteins: lean meats, dairy foods and legumes; carbohydrates: breads, cereals;; vitamins: A,B6,C,E and minerals: Zinc and iron.

Circulation:-

With a lack of air circulation, feeling and movement daily skin care is very important in order to avoid infections, sores, and irritations. The skin is served by a large number of blood vessels, and adequate circulation is needed to maintain skin health. Following measures are needed to ensure healthy blood supply to the skin:

- **To avoid Smoking** - Nicotine in cigarettes causes blood vessel constriction and prevents blood, oxygen and nutrients from flowing to the body tissues.
- **Edema, or swelling** caused by fluid collecting in the tissues, usually occurs in a part of the body that is not moved frequently and is below the level of the heart (i.e., the feet, legs and hands). Skin over areas of edema becomes thin and pale and injures easily because of poor circulation. Edema can be prevented by elevating the limbs frequently, performing regular Range of Motion (ROM) exercises and wearing compressive stockings.
- **A massage technique** similar to squeezing a tube of toothpaste can be used to work the fluids out of the fingers and feet. After a couple of minutes massage the swelling should begin to subside.
- **Anemia:** Oxygen is essential for skin health, and is carried by red blood cells. A decrease in their number means less oxygen gets to the skin, which means that skin cells may become unhealthy or even die. Anemia should be evaluated and treated.
- **Vascular Disease**, or a narrowing of the blood vessels, can be caused by diabetes, smoking, high blood pressure or elevated cholesterol. The result is decreased blood flow to the skin. Work closely with your health care provider to manage conditions that can lead to vascular disease and cause skin problems.
- **Diabetes:** Diabetes damages the blood vessels and nerves. Wounds and sores can become infected easier and heal at a much slower rate. Its mandatory to perform the skin inspections more closely, paying special attention to any reddening of the skin as they can become dangerous faster than those who do not have diabetes.
- Avoiding using soaps labeled "antibacterial" or "antimicrobial." These tend to reduce the skin's acidity, which acts as a protection from infection.
- Keeping the skin clean and dry. Washing with soap and water daily is recommended.
- **Skin folds or creases** (as in the groin area and underarms) need washing more frequently -- twice a day, morning and bedtime. Rashes can easily form in these areas because of increased moisture and warmth. Increasing the air circulation to these areas to help prevent rashes can be accomplished by positioning the arms and legs so the skin surfaces are separated. For example, using the "frog" position to air the groin area.
- **Rashes** can be caused by tapes, soaps, fabrics or other irritants. Total body rashes may result from food or drug allergies. Early treatment is necessary to avoid skin excoriations.
- Avoiding using items that may dry the skin -- for example, harsh soaps or alcohol based products such as lotions. (A good non-drying lotion to use is Alpha Keri.)
- **Lubricating** dry skin with moisturizing creams or ointments (such as Eucerin or Aquaphor). Using care in applying creams over bony areas is necessary since they may soften the skin and promote skin breakdown.
- **Soiled skin** can break down easily. Urine and stool have irritants in them and should be cleaned up immediately to prevent weakening and breakdown of the skin surface.
- Avoiding using **talcum powders**, as they may support yeast growth. They can also "cake up" and keep moisture in, causing skin breakdown.
- **Calluses** may form on feet and hands. These can be removed by soaking frequently in warm water and towelling briskly to remove dead skin. Using moisturizing creams to help soften calluses.
- **Finger and toe nails** require special care. Soaking them and rubbing them gently with a towel to remove dead skin decreases the chance of hangnails forming. Nails are easier to cut after soaking; it is necessary to cut them straight across to avoid ingrown nails, and keep them short for safety.
- Preventing skin injuries and positional padding.
- **Skin inspection**^{32,36}:

Inspecting the skin daily is extremely important as pressure sores and infections could occur very quickly. Skin should be inspected at least once a day. Areas that need special attention are the groin area, behind knees, the areas around the ankles and elbows, and posteriorly hips and tailbone areas should be checked carefully.

The only way to know if skin is healthy and intact is to look at it regularly. In areas where sensation (feeling) is decreased, skin inspection is essential and should become a habit. Planning it as a part of regular routine -- like after a shower, before dressing in the morning or after undressing in the evening.

If patients are unable to see some parts of your body, using a mirror or teach another person to check the skin is recommended. Long handled mirrors and other specially designed mirrors are available. Checking all bony prominences or areas where the bones protrude slightly below the skin.

Fig 9:-



Following things to be looked for: Any reddened areas, rashes, cuts, bruises, scrapes, or indentations from seams or elastic binding. Check also for blisters, bumps, insect bites, dry flaky skin or pimples. Checking toenails for any redness or pus formation around the end of the nail.

Pressure releases^{33,37}:-

1. Appropriate body postures is a relatively simple and effective way
2. Use of draw sheets to reposition the patients should be avoided. Material slide sheets made of slippery material should be used to turn the patients
3. Prompt change of soiled linen
4. Repositioning every 2 hours . Intervals are reduced in cases with early signs of damage.
5. Alternating air mattresses during sleeping hours

In both bed and wheelchair, changing position according to skin tolerance is beneficial. Pressure releases in a wheelchair can be done by pushing straight up, leaning side to side, bending forward over knees, reclining the seat of electric wheelchair or having someone tilt the back in manual chair.

It is always better to use wheelchair cushion. In bed, body parts can be padded with pillows to keep bony prominences free of pressure.

Pressure relief surfaces^{2,15,26}:-

- Special equipment like wheelchair, mattresses, cushions, commode, shower chair, toilet seating, sling, slide board, car seat, lounge chairs etc require periodic review and maintenance at regular intervals.
- These special equipment should be used on expert prescription and after trial to suit the need.
- Manufacturer recommendations should be followed strictly to avoid damage to the skin by using harsh and domiciliary materials.

Check list for wheel-chair management^{38,40}:-

1. Proper placing of cushions as per instructions.
2. Proper inflation of air cushions
3. Appropriate recommended cushion cover.
4. Correct placement of vulnerable areas with added paddings
5. The height of footrests should be appropriate. Raising the height increases chances of seating pressures.

6. Periodic expert seating reviews .

Pressure management cushions^{1,6,10}:-

1. Appropriate material recommended by the manufacturer should be used.
2. The material should be 4 way stretch which is loose but neatly fitted over the cushion
3. Not to use: towels, sheepskin, pillow cases, sheets as they do not stretch and increase the chances of pressure sores.

Repositioning technique^{4,8,9}:-

Rule of 30:-

- Head end of bed should be elevated no more than 30 degrees
- Laterally inclined position of 30 degrees
- Hips and shoulders 30 degrees inclined from supine
- Support with pillows and wedges to maintain 30 degrees

Fig 10:-



Return to seating protocol^{22,24}:-

- Returning to seating protocol should begin as early as possible to avoid posture related vascular changes.
- Seating protocol promotes to increase skin tolerance and psychological benefits.

Continence management²⁹:-

1. Urinary/ fecal incontinence have implication on integrity of skin due to maceration, excoriation caused by the presence of moisture and pH of the soilage.
2. Use of absorbent briefs and gentle cleansing of skin in case of soiling
3. Avoiding use of plastic and draw sheets as they interfere with pressure redistributing surfaces.(Mac Donald 2001) (O'Connor 2006).

Skin care hygiene (Thomas et al 2001 protocol)^{30,34}:-

1. Controlling humidity
2. Avoiding extreme temperatures
3. Applying moisturizers to dry skin
4. Avoiding massage to reddened areas and bony prominences.
5. Controlling moistures.
6. Regular shower
7. Avoid excessive hot water and harsh cleansing agents, excessive force and friction while cleaning.
8. Monitor skin between toes for splits and fungal infections
9. Nail care and inspection for ingrowing toe nails.
10. Correct shoe size: one size larger to compensate gravitational edema
11. Perianal care : cleaning with normal saline and avoiding harsh solutions, effective cleaning and thorough drying.

Environmental evaluation^{36,40}:-

- Poikilothermic: unable to regulate their own body temperature thereby taking environment temperatures.
- Both spasm and excessive sweating resulting from excess cold and hot environment respectively can increase ulcer development
- Home, work and vehicle environment should be controlled to protect the skin

Temperature^{27,32}:-**Extremes of temperature call for extra caution in protecting the skin:-**

Heat -- Avoiding sunburn by covering up or using sun-block. Its wise to avoid heating pads or electric blankets and close proximity to fireplaces or heaters .

Cold -- its necessary to dress warmly to prevent frostbite if patients are out in cold weather for long periods of time. Dressing in layers of clothing will provide extra warmth.

Fever -- Skin tolerances can change due to the increased body temperature that occurs with a fever.

Equipment prescription³⁴:-

Extreme weather conditions and high altitudes will alter the consistency of cushions and mattresses. This must be considered while selecting the cushions and mattresses.

Expert prescription on equipment : wheel chair cushions, mattresses, commodes, slings etc. it is necessary to trial each piece to suit the needs of each individual.

Exercise Regimen³²:-

- Regular exercises should be tailored to the individual and prescribed.
- Patients as well as care givers' participation is vital in promoting the exercise regimen.

Advantages of exercises:-

1. Maintenance of skin integrity
2. Increase strength of muscles
3. Improve cardio-vascular endurance
4. Prevents fatigue and deconditioning
5. Psychological benefits

Body weight¹²:-

Too much -- Being overweight can cause increased pressure on bony prominences. Delayed healing may occur because there are fewer blood vessels in fat tissue.

Too little -- Excess pressure over bony prominences may occur because there is less padding (muscle and fat) over these surfaces. In addition, underweight persons may lack the proper nutrition to maintain healthy skin.

Clothing¹⁶:-

Proper fit is important. Avoiding sitting on seams and back pockets and always checking the skin carefully after wearing new shoes or clothing.

Too loose -- Loose clothing can form wrinkles that put pressure on the skin.

Too tight -- Overly tight clothing can hinder circulation.

Alcohol¹⁸:-

Over-indulgence in alcohol -- or any other drug -- may interfere with attention to the personal care needs. For example, while under the influence patient might forget to turn himself or be too weak to transfer himself properly.

Stress & Depression²²:-

Stress and depression can have a similar effect by causing patients to lose interest in their personal care and pay less attention to their skin and general health.

Spasticity²⁶:-

Spasticity may cause the arms and/or legs to bump against an object, or to fall off from armrest or footrest, and get injured. Spasms may cause skin to rub against something (for example, the sheets on the bed), which could produce an open sore.

Education^{1,2}:-

Education to nursing staff, patient, care takers and family is of pivotal importance to recognize the importance of skin care and their responsibility for the overall success of pressure sore preventive initiative.

A range of social support, financial support, psychological distress, cognitive impairment and substance abuse have all been found to compromise preventive measures.

Immediate actions for pressure sores^{2,8,10}:-

1. All pressure areas should be freed for 24 hours depending on site of pressure
2. Assess wound
3. Equipment review
4. Commence appropriate wound management by consulting health care professionals.
5. Antibiotic therapy if indicated
6. Relevant investigations
7. Surgical treatment: Debridement and dressings.

Conclusion:-

Skin care in Spinal cord injury patients is an important aspect of the rehabilitation process. It plays a pivotal role in maintaining the well-being of spinal cord injury patients. It involves simple common sense steps which the patients or the care givers can adapt and make it a daily routine to ensure the integrity of the neurologically impaired skin. Timely observation and action are the keys to the approach.

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