like Neonatology, Obstetrics, and Gynecology and its sub specialties like High Risk Pregnancy, Labor Rooms, Emergency, and Trauma units, Burns Unit, Intensive Care Units and other areas like hospice facilities, assisted living etc. Nurse also must be able to function as a teacher, researcher, manager, and leader in providing health education and family counseling.

In order to improve and maintain the standards in nursing education, the institutions imparting the training and employing the nurses must be brought under strict scrutiny of National Accreditation Boards and other quality and standard controlling authorities. Research and Administration both at micro and macro levels in the Nursing Education must be made mandatory.

**Nursing Education: Lessons to Learn:**

Therefore significant and striking changes must be brought in the nursing education and how much and how to deliver for the consumption of nursing student. The emerging global technologically advanced trends should encourage to carve out a model for Healthcare System that and incorporates the advances taking place in teaching and training. Lessons from the failures and successes of British National Health Services and United States Private Sector policies and practices must become areas of interest to extract what is good that is needed for its country.

**'Nursing Robot’-‘The Pearl’**: 

There is an explosive research taking place to combat the challenge of shortage of nurses. The research is led the innovators to invent "Nursing Robots". But is it possible? May be one day it is likely in limited areas of nursing like dispensing medicines and making beds etc. Scientists are confident that a Nurse Robot can play a role in assisting the elderly and that might ease ‘the burden on the overburdened nurse’. The Japanese Scientists researching nicknamed Nurse Robot as ‘Pearl’.

**Nursing Model for Healthcare Services:**

Therefore significant and striking changes must be brought in the nursing education and how much and how to deliver for the consumption of nursing student. The emerging global technologically advanced trends should encourage to carve out a model for Healthcare System that and incorporates the advances taking place in teaching and training. Lessons from the failures and successes of British National Health Services and United States Private Sector policies and practices must become areas of interest to extract what is good that is needed for its country.

**Nursing-A Trustworthy Profession:**

Finally, it must be stressed that for centuries families and society did not accept Nursing profession as a decent one. Some, however, dared to become a nurse out of frustration in the family or to live in a dignified manner independently. One did choose to become a nurse. But for decades the government and the bureaucracy did not accept the nursing profession as a profession who should be compensated on par with other similar professions, encouraging migration. Country of origin was left to suffer from deficiencies. However the outburst of healthcare needs and the progressive medical and surgical management leading to increased survival rate began to admit nursing in the main stream of medical profession.

It is to be noted that the Healthcare industry is a thriving and flourishing 'industry'. It is a fact that the suffering humanity trusts the nurse most. However it must be noted that the basic objective of becoming a nurse is "Service to Humanity".

**ADVANCED NURSING PRACTICE IN BURNS MANAGEMENT**

*Pain after burn injury is preventable, and nurses are central to Achieve that goal*


**Abstract**

Burns are the most intensely painful injuries. All patients will experience pain, regardless of the cause, size, or depth of the burn. In spite of advances in topical wound care and pharmacological management and palliative care, wound care is the main source of the pain associated with burn injury. A deeper understanding of the many aspects of treating burns and their associated pain can help nurses to provide more effective analgesia. Nurses play a vital role in understanding the management of burn wound, prevention of infection and pain management.

**Key Words :** Burns, Fluid management, Wound care, Rehabilitation, Skin Grafting

**Introduction**

Recent discoveries and new therapies resulting from clinical and basic research are continually being incorporated into burn care worldwide. As a result, the mortality of burned children and length of the hospital stay have been greatly reduced over the last 25 years. Advances in the last 25 years have not only improved the length of hospital stays and survival rates, but also tremendously improved the long-term outcomes of severely burned patients. These patients have skills and developmental improvements that are truly outstanding, making them effective, productive and thoughtful members of society. This review will summarize some of the more significant changes that have occurred in the field of burn care. These have resulted in improved survival and functional status. It highlights innovative fields of research which may be responsible for further improvement in outcome.

**Phases of Burns Management**

Burn injury can be divided into three phases: emergent, acute and rehabilitative.

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pain control, nutritional support (as much as 10,000 calories a day may be required), surgical intervention, physical and occupational therapy, and psychosocial support.

- The rehabilitative phase lasts from complete wound closure through the active scar maturation process and its average is 1-2 years. Complete rehabilitation may be lifelong, involving reconstructive procedures and contracture releases.

Management of burns patient

Emergent Phase

During the emergent phase, rapid assessment and intervention are essential, the nursing care is prioritized as follows:

- Initial assessment by primary survey includes a rapid examination of the ABCs: airway stabilization and C-spine immobilization (if needed), breathing and circulation (check status and start IV lines and fluid).
- History taking based on AMPLE (Allergies, Medications, Past Medical History, Last Meal and Events Preceding Injury).

- Accurate burn size estimation using Rule of nine. The fluid resuscitation needs within the first 24 hours after burn injury, is calculated using the following formulae:
  - Parkland formula
  - Modified Brooke formula
  - Consensus formula

- All pain medications should be given intravenously, tetanus status should be checked and baseline laboratory studies obtained.

Acute Phase

- Infection control and wound care constitute the primary focus during the acute phase.

Wound care

- The overall goals of wound care for burn patients are universally accepted and seek to:
  - Eliminate media for bacterial growth; promote healing of partial-thickness wounds; prevent conversion of burn wounds
  - Promote patient comfort and
  - Minimize scarring and contracture.

Wound care procedures such as wound cleansing, debridement, skin grafting (including donor site care and the removal of surgical staples anchoring skin grafts into place), dressing removal, insertion and inflation of tissue expanders, passive range of motion exercises in affected joints, and splint application helps to achieve these goals.

Recent Advancement in Burns Management

Hydrotherapy

Hydrotherapy is used to vigorously flush the burn wound, cleaning the wound and removing loose, nonviable tissue. Most often, a shower gurney is used for this purpose. Because this method reduces the risk of infection, it is preferable to another form of hydrotherapy known as Tanking, in which the patient is immersed into a tank of turbulent warm water. An antimicrobial soap such as Dial liquid soap or Hibiclens should be used, with water, to wash the burn wound before the application of any antimicrobial ointment. Followed by hydrotherapy Manual debridement is often done by nurses after wound cleansing. It involves the scraping or pulling off of loose nonviable skin. Deep surgical debridement is also done to remove adherent eschar under general anesthesia within three to five days after injury. Moistening the adherent dressings prior to removal will minimize patient discomfort.

Skin grafting Substitutes

There are various ways to classify the skin substitutes. A classification was proposed based on composition as follows:

- Class I: Temporary impervious dressing materials
  - Single layer materials
    - Naturally occurring or biological dressing substitute, e.g. amniotic membrane, potato peel
    - Synthetic dressing substitute, e.g. synthetic polymer sheet (Tegaderm, OpSite), polymer foam or spray

- Class II: Relining materials
  - Bi-layered tissue engineered materials, e.g. TransCyte

Collagen dressing

Collagen dressings are dressings that are derived from animal sources, such as bovine (cattle), equine (horse) or porcine (pig) sources. The collagen helps to promote the growth of new collagen at the wound site, prompting an often speedier recovery period. Collagen dressings can also help with fibroblast production and according to, some dressings may also help maintain the appropriate temperature of the wound site's microenvironment.

- There are different types of collagen dressing
  - Hydrocolloid:
    - Hydrocolloid dressings are used on burns, light to moderately draining wounds, necrotic wounds, under compression wraps, pressure ulcers and venous ulcers.
  - Hydrogel:
    - This type of dressing is for wounds with little to no excess fluid, painful wounds, necrotic wounds, pressure ulcers, donor sites, second degree or higher burns and infected wounds.
  - Alginate:
    - Alginate dressings are used for moderate to high exuding wounds. They are not recommended for chronic or stalled wounds, burns, donor sites, venous ulcers, and chronic wounds.
  - Skin Grafting
    - A collagen dressing can be used for chronic or stalled wounds, ulcers, bed sores, transplant sites, surgical wounds, second degree or higher burns and wounds with large surface areas.
  - Banana leaf dressing
    - It is the less expensive and widely used dressing for burns. Banana leaves are a cheap and effective alternative to traditional medical wound dressings. Wounds treated with banana leaves heal in the same period of time as wounds treated with Vaseline gauze dressings.
  - Aquacel foam dressing
    - The only silver foam dressing that offers the healing benefits is AQUACEL. Combining hydrocolloid technology with Hydrofiber Technology and ionic silver, AQUACEL Ag Surgical dressing provides the following benefits:
      - Waterproof: Provides excellent absorption and retention capabilities for moderate to highly exuding wounds.
      - Antimicrobial Protection
      - Comfortable and Flexible: Comforts to the wound surface to form an intimate contact.
      - Skin Friendly: Helps reduce wound pain while the dressing is in situ and upon removal.
      - Supports wound healing by providing a moist wound healing environment.
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- Class II: Tissue analogues
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    - AQUACEL Ag Surgical dressing provides the following benefits:
      - Waterproof: Provides excellent absorption and retention capabilities for moderate to highly exuding wounds.7
      - Antimicrobial Protection8
      - Comfortable and Flexible: Comforts to the wound surface to form an intimate contact,1
      - Skin Friendly: Helps reduce wound pain while the dressing is in situ and upon removal.6,7 Supports wound healing by providing a moist wound healing environment.

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    - Hydrogel:
      - This type of dressing is for wounds with little to no excess fluid, painful wounds, necrotic wounds, pressure ulcers, donor sites, second degree or higher burns and infected wounds.3
    - Alginate:
      - Alginate dressings are used for moderate to high amounts of wound drainage, venous ulcers, packing wounds and pressure ulcers in stage III or IV.
    - Collagen:
      - A collagen dressing can be used for chronic or stalled wounds, ulcers, bed sores, transplant sites, surgical wounds, second degree or higher burns and wounds with large surface areas.5,4
    - Banana leaf dressing
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Class II: Single layer durable skin substitutes
a. Epidermal substitutes, e.g. cultured epithelial autograft (CEA), Apligraft
b. Dermal substitutes
   • bovine collagen sheet,e.g. Kollagen
   • porcine collagen sheet
   • bovine dermal matrix, e.g. Matriderm
   • human dermal matrix, e.g. AlloDerm

Class III: Composite skin substitutes
a) Skin graft
   • Allograft
   • Xenograft
b) Tissue engineered skin
   • Dermal regeneration template, e.g. Integra
   • Biobrane

From the practical point of view, the skin substitutes are best classified as temporary or permanent and synthetic or biological.

Biological Skin substitutes

- Amnion

The amnion is a thin semi-transparent tissue forming the innermost layer of the foetal membrane. The amnion has been used as biological dressings for burns.12,13 As fresh amnion carries risk contaminations and disease transmission, amnion is collected from placenta of selected and screened donors. Various preservation methods have been introduced, including cryopreservation in liquid nitrogen, preservation in silver nitrate, storage in antibiotics solution, glycerol-preserved sheets, dried sheets and gamma-irradiated sheets.4 It has been claimed to be one of the most effective biological skin substitutes used in burn wounds, with efficiency of maintaining low bacteria count. It also has advantages of reducing loss of protein, electrolytes and fluids, decreasing the risk of infection, minimizing pain, acceleration of wound healing and good handling properties. Amnion is primarily used for covering partial-thickness burns until complete healing. It is particularly useful for superficial partial-thickness facial burns. When used in facial burns, it is noted to be adhesive, conformable and easily removable. It is also used for temporary coverage in wound bed preparation and sandwich grafting technique.

Cultured epithelial autografts
The culture of keratinocytes is an important advance in the burn care. CEA was first reported in the clinical use in 1981 in extensive full thickness burns. A large surface area of keratinocytes can be obtained from the relatively small biopsy of healthy skin from the patient. The autologous keratinocytes are isolated, cultured and expanded into sheets over periods of 3–5 weeks. The technique of suspension in fibrin glue has reduced the time for clinical use to 2 weeks.

Synthetic skin substitutes
Synthetic skin substitutes are constructed out of non-biological molecules and polymers that are not present in normal skin.5 These constructs should be stable, biodegradable and provide an adequate environment for the regeneration of tissue. It should maintain its three-dimensional structure for at least 3 weeks to allow ingrowths of blood vessels, fibroblast and coverage by epithelial cells. Biodegradation should preferably take place after this period. This process should occur without massive foreign body reaction as this process would increase the inflammatory response, which may be associated with profound scarring. It should also be composed of immunocompatible materials to avoid immunoreactive processes.

The artificial nature of these skin substitutes has some distinct advantages and disadvantages when compared to natural biological structures. The biological properties of the product can be much more precisely controlled. Various additives such as growth factors and matrix components can be added to enhance the effect. These products could also avoid complications due to potential disease transmission. However, these synthetic skin substitutes generally lack basement membrane and their architecture do not resemble native skin. The use of non-biological components can be problematic when trying to produce a biologically compatible material.

There are several synthetic skin substitutes that are available for wound coverage. However, there are also substantial number of synthetic substitutes undergoing in vitro or animal testing.5,11 Amongst the synthetic skin substitutes available in the market are DermaGraft, Integra, Apligraft, Matriderm, Oriol, Hyalomatrix and Renoskin.

- Biobrane
Biobrane consists of an inner layer of nylon mesh that allows fibrovascular ingrowth and an outer layer of silastic that serves as a vapour and bacterial barrier.15 It has been used to give a good effect in clean superficial burns and in donor sites. When used to cover partial-thickness wounds, the mesh adheres to the wound until healing occurs beneath. Biobrane should be removed from any full-thickness wound prior to skin grafting.

Biobrane is an established synthetic dressing for burn wounds, particularly in the paediatric population. Whitaker et al. published a critical evaluation of the evidence base for the used of Biobrane within the field of plastic and reconstructive surgery.15 They concluded that there is good evidence (Grade A) to support the use of Biobrane in the management of burns, particularly in partial-thickness burns in children. When dressed with Biobrane, patients with superficial partial-thickness burns experience less pain as compared to gauze and silver sulfadiazine dressing.16 Biobrane also significantly reduces hospital stay, wound healing time and requirements of pain medications.13 There are reported applications in patients with toxic epidermal necrosis, chronic wounds, or following surgical intervention.14

- DermaGraft
DermaGraft is a bioabsorbable polyglactin mesh sheet, which is a bioabsorbable polyglactin fibrin mesh.17 Indications for the usage of DermaGraft are in burn wounds, chronic wounds and diabetic ulcers. It can be used as a temporary or permanent covering to support the take of meshed split-thickness skin grafts on excised burn wounds.18

- Apligraft
Apligraft is a bilayered living skin equivalent. It is composed of type I bovine collagen and allogenic keratinocyte and neonatal fibroblast.17,22 It is indicated in partial to full thickness burns, skin graft donor sites, chronic wounds, diabetic ulcers and Epidermolysis Bullosa. It has to be applied “fresh” as it has a shelf-life of 5 days at room temperature.17 Apligraft has been shown to accelerate wound closure. Apligraft when combined with autograft has produced more favourable results than autograft only. Scar tissue, pigmentation, pliability and smoothness were significantly closer to normal with Apligraft.24

- Matriderm
Matriderm is a structurally intact matrix of bovine type I collagen with elastin. It is utilised for dermal regeneration. Its indications are full thickness or composite partial thickness skin wounds. The bovine collagen dermal matrix serves as a support structure for the ingrowth of cells and vessels. Its elastin component improves the stability and elasticity of the regenerating tissue.

As the healing process advances, fibrinost lays down the extracellular matrix and the Matriderm reabsorbs.25 Its indications seem to be similar to Integra. Schneider et al. compared the engraftment rate and rate of vascularisation of Matriderm and Integra in a rat model. They revealed no major differences in engraftment rates or vascularisation.26 However, unlike Integra, Matriderm has been shown to be able to accommodate immediate split thickness skin autograft without complications.27

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the scar are more randomly orientated. Clinical trials with a long-term clinical evaluation showed no difference in scar elasticity between the described dermal substitute and split thickness grafts alone.27

• **OrCel**

OrCel is a bilayered cellular matrix in which normal human allogeneic skin cells (epidermal keratinocytes and dermal fibroblasts) are cultured in two separate layers into a type I bovine collagen sponge. OrCel is a bilayer dressing resembling normal skin and was developed as a tissue-engineered biological dressing. It is indicated in the treatment of chronic wounds and skin graft donor sites. OrCel has also been used as an overlay dressing on split-thickness skin grafts to improve function and cosmesis.18,20,24

• **Hyalomatrix**

Hyalomatrix is a bilayered hyaluronan base scaffold with autologous fibroblast. It has an outer silicone membrane. The scaffold delivers hyaluronan to the wound bed, and the silicone membrane acts as a temporary epidermal barrier.30 It is indicated in burn wounds and chronic wounds.8

### Skin Grafting

Surgical debridement under anesthesia can facilitate the removal of nonviable tissue. There are two basic types of skin grafts: split-level thickness and full thickness. Split-Level Thickness Grafts involves removing the top two levels of the skin the epidermis and the dermis from the donor site. These grafts are used to cover large areas. A full thickness graft involves removing the muscles and blood vessels as well as the top layers of skin from the donor site.

### Pain management

#### Pharmacologic therapies

- **Morphine** remains the gold standard in the treatment of moderate-to-severe acute pain.
- **Gabapentin** (Neurontin) and methadone hydrochloride (Methadone) can be used to control chronic pain. Methadone can also be used to help wean off patients from opioids after long-term use.

#### Nonpharmacologic modalities

Nonpharmacologic therapy includes relaxation techniques (for example, focused deep breathing and hypnosis), cognitive strategies (such as distraction, reappraisal, guided imagery, and visualization), biofeedback, music therapy, therapeutic touch, and the presence of significant others for emotional support, have been studied by researchers. Many of these have proven to be beneficial, but such modalities are adjuncts to, not substitutes for, narcotic analgesia during painful wound care.18

### Reintegrative Phase

Reintegration into society is difficult due to the disfigurement associated with burn injury. Support is available through various groups typically based at burn centers. School re-entry programs are available to help children with the transition back to school. A peer support counseling network, Survivors Offering Assistance in Recovery, is available throughout many areas of the country.15 A burn injury is challenging and requires specialized care across the continuum. Nurses are ideally suited to facilitate this process.

### Conclusion

Nurses spend their majority of time in direct patient care that affords them the opportunity to establish meaningful therapeutic relationships with burned patients and their families. Therefore, it is vital that nurses should update their knowledge on advanced practice for burns wound care to establish a standard and quality in nursing practice.
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Pharmacologic therapies

• Morphone remains the gold standard in the treatment of moderate-to-severe acute pain. Hospitalized burn patients should be treated with opioids after long-term use.

• Gabapentin (Neurontin) and methadone hydrochloride (Methadone) can be used effectively in controlling chronic burn pain. Methadone can also be used in patients with opioid use disorder.

Nonpharmacologic modalities

Nonpharmacological therapy includes relaxation techniques (for example, focused deep breathing and hypnosis), cognitive strategies (such as distraction, reappraisal, guided imagery, and visualization), biofeedback, music therapy, therapeutic touch, and the presence of significant others for emotional support, have been studied by researchers. Many of these have proven to be beneficial, but such modalities are adjuncts to, not substitutes for, narcotic analgesia during painful wound care.18

Rehabilitative Phase

During the rehabilitative phase, significant lifestyle changes become more evident to patients. Pruritus can be problematic, caused by a combination of dry skin and the release of histamine during scar remodeling. The relief strategies include cool or tepid baths, pressure garments, massage, avoidance of caffeine and the application of ice.35

Sensitivity to heat and cold is a problem for many patients with a high TBSA. These patients should avoid extremes in temperature, especially in the first year post-injury. They should dress appropriately for the weather, with an emphasis on layers of clothing that can be removed as needed.

Grafted areas have decreased sensation and require visual inspection for open areas, Scar and discoloration are topics of great discussion and controversy. Some agents may minimize hypertrophic scarring: pressure garments, silicon gel sheets (Silon, Cica-Care, Avogel), steroid injections and creams (Kenalog, Aristocort, Triderm), and Uvex face masks. Camouflage makeup may help with hypo- or hyperpigmentation.35

Reintegration into society is difficult due to the disfigurement associated with burn injury. Support is available through various groups typically based at burn centers. School re-entry programs are available to help children with the transition back to school. A peer support counseling network, Survivors Offering Assistance in Recovery, is available throughout many areas of the country. A burn injury is challenging and requires specialized care across the continuum. Nurses are ideally suited to facilitate this process.

Conclusion

Nurses spend their majority of time in direct patient care that affords them the opportunity to establish meaningful therapeutic relationships with burned patients and their families. Therefore, it is vital that nurses should update their knowledge on advanced practice for burn wound care to establish a standard and quality in nursing practice.
References


