NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Medical technology guidance

SCOPE

The ReCell spray-on skin system for treating skin loss, scarring and depigmentation after burn injury

1 Technology

1.1 Description of the technology

ReCell Spray-On skin is a rapid autologous cell harvesting, processing and delivery system for treating skin loss and preventing scarring and depigmentation in adults and children with burns. ReCell Spray-On skin is prepared by harvesting keratinocytes, melanocytes, fibroblasts and Langerhans cells which are normally contained within a thin split-thickness biopsy. The cells are processed into a suspension, which is delivered to the treatment area using a proprietary 'spray-on' application process and cells from the dermal-epidermal junction are able to rapidly proliferate and migrate in the wound bed. The regenerative nature of these skin cells promotes the growth of healthy skin to facilitate rapid healing. It takes approximately 20-30 minutes in total to collect the tissue and prepare and apply the cell suspension. The procedure is designed to be carried out by clinicians, without input from specialised laboratory staff.

1.2 Regulatory status

The ReCell received an updated CE mark in January 2013 (updated from first approval in March 2005) for autologous cell harvesting and topical spray application system.

1.3 Claimed benefits

The benefits to patients claimed by the sponsor are:

- a reduction in skin graft donor site size and depth
- fewer complications, reduced morbidity and shorter healing time at the donor site
- shorter wound healing time at the recipient site, leading to:
  - improved burn wound aesthetic result with a lower likelihood of scarring and better match of skin colour
  - repopulation of melanocytes to reduce hypopigmentation in healed wounds.
- reduced dressing change frequency (weekly rather than daily).
- less need for dressing changes under anaesthetic.

The benefits to the healthcare system claimed by the sponsor are a reduction in:

- length of stay in hospital; weekly rather than daily dressing changes allowing earlier discharge and outpatient management, thus reducing the costs of care

- need for re-dressings under anaesthetic, again reducing the costs of care
- requirement for external technical laboratory support
- likelihood of later readmission for corrective surgery as a result of improved aesthetic results.

1.4 Relevant diseases and conditions

Burns are relatively common and often extremely painful. Although most burns are minor, serious burns can result in disabling or disfiguring scarring, amputation or death. Recovery from a serious burn injury is associated with emotional and physical challenges and can have a significant impact on quality of life. A study of people hospitalised for burns found that around half changed job status as a result of their injury (Weichman and Patterson, 2004). Burns can also lead to increased fear, grief, anxiety and depression and in some cases, post-traumatic stress disorder. Scarring can lead to negative body image, feelings of social isolation and social stigma.

The majority of burn injuries are caused by heat, with around 5% caused by chemical injury or electrocution. The main causes of severe burn injury are flame burns and liquid scalds.

Around 250,000 people in the UK seek medical attention for burns each year. Of these, around 175,000 attend emergency departments and the UK admission rate is 0.29 per 1,000 cases of burns or smoke inhalation[1]. In England, in 2011/12 there were 12,213 hospital admissions for burns and corrosions, of which 9,043 were emergency admissions. The average number of burns-related deaths in the UK each year is 300.

1.5 Current management

The treatment of burns can be considered in two phases; acute and reconstructive. The acute phase is focussed on the initial management of the patient's injury with the intention that burn wound healing will occur with minimal scarring and physical limitation. The reconstructive phase is focussed on improving the functional or visual impact of scarring, usually by surgical means, and may be undertaken months or years after the initial injury.

The first step in managing a burn injury is to assess the depth of the burn, the proportion of the body area involved and the site of injury. Burn depth is classified according to the level of skin or tissue affected.

Epidermal and superficial dermal wounds tend to heal without scarring or surgical intervention within 21 days. Deep dermal and full-thickness burns may require surgical excision (to remove the burnt skin and tissues) and skin grafting to ensure rapid healing, to minimise scarring and reduce complications. It is usual for surgical excision to take place within a day or two of admission. For mixed depth partial thickness scalds or burns, decision making normally occurs over 14-21 days unless the patient deteriorates before this. If after 14-21 days wounds are still unhealed skin grafts can be used to achieve a better cosmetic result.

Full-thickness burns more than 1cm in diameter will require skin grafts, as the regenerative components of the skin have been lost. Healing can only occur from the edges of the wound, but this will lead to contraction of the skin with poor cosmetic outcome and reduced mobility. Deep dermal burns are unlikely to heal within three weeks and will therefore often require grafting.

Skin grafts may be classified as partial or full-thickness grafts, depending on how much of the dermis is harvested by the surgeon. The clinical 'gold standard' for skin grafting is an autologous split-thickness graft taken from an area of unburnt skin. Grafts should ideally be taken from donor sites adjacent to the injury to improve the match with the surrounding skin. The donor site is itself a wound and will require treatment to ensure healing. If large grafts are required for extensive wounds the donated skin can be perforated (or meshed) to increase the surface area. The pattern of meshing can be visible after healing, so that sheet grafting is preferable to improve the cosmetic result. Allografting (using skin from another person, often a cadaver) and xenografting (using skin from animals) can also be used for temporary wound closure as these will ultimately be rejected by the body. Other alternatives to autologous grafts for deep partial-thickness and full-thickness wounds include artificial skin products.

2 Reasons for developing guidance on ReCell for treating skin loss, scarring and depigmentation after burn injury

The Medical Technologies Advisory Committee considered that ReCell Spray-on skin may be advantageous in the management of both partial thickness (where only ReCell is used) and large area burns (as an adjunct to skin grafting).

The Committee was advised that in small or partial thickness burns, using ReCell Spray-on skin may lead to improved healing with a reduction in the number of dressings required

The Committee considered that in full-thickness or deep partial thickness burns, the use of ReCell Spray-on skin may lead to a reduction in the size or number of skin grafts required as well as improved healing at the burn site. It concluded that benefits to patients may therefore include a reduction in pain and analgesia requirement as well as in complications including infection, blood transfusion requirement and death. It also considered that potential system benefits may include a reduction in procedural costs and hospital length of stay.

The Committee considered that ReCell Spray-On skin may provide particular benefits for patients who would currently be left with scarring at the burn site. This could avoid functional mobility complications in growing children, and psychological trauma for all patient groups as well as potentially avoiding corrective scarring operations.

The Committee was advised that ReCell Spray-On skin achieves better pigmentation to the skin as compared with skin grafting or cultured autologous cell applications.

3 Statement of the decision problem

	Scope issued by NICE
Population	Adults or children treated in Burns Units or Centres for: - Partial thickness burns including scalds caused by hot water where mesh grafting is not required - Large area burns; full thickness or deep partial thickness burns including where mesh grafting is required

Intervention	- Partial thickness burns including scalds caused by hot water:
	  o ReCell Spray-on skin alone, or in combination with biosynthetic or standard dressings
	- Large area burns and full or deep partial thickness burns where mesh grafting is required:
	  o skin mesh graft in combination with ReCell Spray-on skin.

Comparator(s)	- Partial thickness burns including scalds caused by hot water:
	  o Biosynthetic dressings
	  o Standard dressings
	- Large area burns; full or deep partial thickness burns where mesh grafting is required:
	  o Skin mesh graft alone
	  o Skin mesh graft plus biosynthetic dressing.

Outcomes	The outcome measures to consider include: • Speed of healing, including standard criteria such as number of days to full or 95% healing • Number of dressings to the wound with or without anaesthesia • Length of hospital stay per % of burn surface area • Wound infection rates • Degree of scarring including aesthetic and functional outcomes • Degree of pigmentation including aesthetic and functional outcomes • Re-admission to hospital for management of scarring • Transfusion rates during skin grafts • Number and size of donor sites • Growth rate in children • Surgical procedure and theatre time • Device-related adverse events.
Cost analysis	Comparator(s): The choice of comparator will depend on burn type: Partial thickness burns including scalds caused by hot water: ReCell alone, or combination with biosynthetic or standard dressings, compared with: • Biosynthetic dressings

	• Standard dressings Large area burns; full or deep partial thickness burns where mesh grafting is required: Skin mesh graft plus ReCell compared with; ○ Skin mesh graft alone ○ Skin mesh graft plus biosynthetic dressing Costs will be considered from an NHS and personal social services perspective. The time horizon for the cost analysis will be sufficiently long to reflect any differences in costs and consequences between the technologies being compared. Sensitivity analysis will be undertaken to address uncertainties in the model parameters, which will include scenarios in which different numbers and combinations of devices are needed.
Subgroups to be considered	None identified
Special considerations, including issues related to equality	Skin grafting in people with darker skin may result in a poorer colour match in the grafted area compared with normal skin. The ReCell Spray-on skin system may result in better colour matching of the resulting skin. The trypsin enzyme used to disaggregate the skin cells from the biopsy during the ReCell process is derived from pigs. This means that the treatment may be unacceptable to people from religious and cultural backgrounds that forbid contact with porcine material.

4 Related NICE guidance

Published

- moorLDI2-BI: a laser doppler blood flow imager for burn wound assessment. Medical technology guidance MTG2 (March 2011) Available from http://publications.nice.org.uk/moorldi2-bi-a-laser-doppler-blood-flow-imager-for-burn-wound-assessment-mtg2

Under development

NICE is developing the following guidance (details available from www.nice.org.uk):

- Trauma services: service delivery of trauma services, NICE clinical guideline (publication expected October 2014)
- Major trauma: Assessment and management of major trauma, NICE clinical guideline (publication expected June 2015)

5 External organisations

5.1 Professional organisations

5.1.1 Professional organisations contacted for expert advice

At the selection stage, the following societies were contacted for expert clinical and technical advice:

- Association of Burns and Reconstructive Anaesthetists (ABRA)
- British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS)
- British Burn Association
- Royal College of Surgeons

5.1.2 Professional organisations invited to comment on the draft scope

The following societies have been alerted to the availability of the draft scope for comment:

- Association of Burns and Reconstructive Anaesthetists (ABRA)
- British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS)
- British Burn Association
- Royal College of Surgeons

5.2 Patient organisations

At the selection stage, NICE's Patient and Public Involvement Programme contacted the following organisations for patient commentary and alerted them to the availability of the draft scope for comment:

- Action for Sick Children
- Black Health Agency (BHA)
- British Red Cross
- British Skin Foundation (BSF)
- Changing Faces
- Children's Burn Trust (CBT)
- Dan's Fund for Burns
- Equalities National Council (ENC)
- Ethnic Health Foundation
- Let's Face It
- Muslim Health Network (MHN)
- NCT
- South Asian Health Foundation
- Specialised Healthcare Alliance
- WellChild