- Second-degree (partial thickness) burns damage the entire epidermis and a variable depth of the dermis. They are characterised by a red or mottled appearance with associated swelling and blister formation. The surface is wet and painfully hypersensitive, even to air currents. They will probably need skin grafting.
- Third-degree (full thickness) burns cause complete destruction of the epidermis and dermis. All the skin appendages, including hair follicles, sweat and sebaceous glands and sensory fibres are destroyed. This results in an initially painless, insensate dry surface that may appear either white and leathery or charred and cracked with exposure of underlying fat.
- Fourth-degree burns involve fascia, muscle and bone.

FLUID ADMINISTRATION

Fluid is administered intravenously to all patients with > 20% body surface area (BSA) burn. A 14G cannula should be placed, if necessary through the burn. The estimated crystalloid requirement for the first 24 hours after injury is calculated based on the patient's weight and percentage BSA burn. Usually the Parklands formula is recommended. Ringer's lactate is used.

Volume required = 4 ml x BSA (second-, third- or fourth-degree burns only) x body weight (kg).

One half of the calculated volume is given during the first 8 hours after injury, and the remaining volume is infused over the next 16 hours. It should be emphasised that the formula is only an estimate, and more or less fluid may be required to maintain adequate tissue perfusion as measured by rate of urine output (1 - 2 ml/kg/h). It is helpful to monitor the haematocrit (HCT). A normal level is about 40%. If the haematocrit is rising, e.g. to 45% or 50%, this implies haemoconcentration, and the rate of fluid infusion is increased. Conversely, if the HCT falls below 40%, then the rate can be reduced.

ADJUNCTS

- Analgesia — adequate analgesia (preferably morphine) should be given intravenously.
- Bladder catheterisation if burn > 20%
- Nasogastric drainage
- Tetanus prophylaxis
- Antibiotics — there is no place for routine systemic antibiotic prophylaxis
- Escharotomies may be required for ventilation and prevention of compartment syndrome.

The local care of the burn wound includes appliance of local antimicrobial agents, early tangential excision of the burn tissue and skin grafting.

ELECTRICAL BURNS

Possible problems can include cardiac arrest or arrhythmias, extensive muscle damage (often the external injury is minor), compartment syndrome, fracture of long bones or spine, renal failure due to myoglobin. ECG, cardiac enzymes and radiography for suspected fractures are necessary investigations. It is important to hydrate the patient and secure good diuresis to prevent renal failure, and to excise the dead tissue and check viability of the underlying muscle.

REHABILITATION IN A NUTSHELL

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What is the aim of rehabilitation?

Physical rehabilitation aims to achieve maximum functional independence for the patient in all activities of daily living. These activities include dressing, grooming, bathing, toileting, feeding and walking as well as functioning in the work or family environment within the restrictions of the disability.

Which patients are suitable for rehabilitation?

Patients with the following conditions will benefit from rehabilitation:

- cerebrovascular accidents (CVA)
- head injury (HI)
- neurological disorders, e.g. Guillain-Barré syndrome
- burns
- joint replacements
- polytrauma
- amputations
- spinal cord injury (SCI).

What makes a patient unsuitable for rehabilitation?

- coma
- Inability to co-operate and respond to therapy
- severe infection
- respiratory distress.

Patients may benefit from a period in a 'step down' facility at this stage, and then be reassessed for rehabilitation suitability.

What does rehabilitation involve?

- Initial assessment by a trained assessor to evaluate if the patient is suitable for rehabilitation.
- Full assessment on admission by the multidisciplinary 'team', consisting of:
  - doctor
  - physiotherapist
  - occupational therapist
  - speech therapist
  - social worker.
- Planning of treatment, length of stay and planning for discharge.
- Full involvement of family, with regular feedback at 'family' meetings.
- Involvement of other professionals as required, e.g. urologist, dietician, psychologist (including sexual counselling), psychiatrist.
- Full nursing support for all general care, particularly with bladder, bowel and pressure area care.

What is the average length of stay (excluding complications)?

- CVA: 3 - 6 weeks
- HI: up to 12 weeks

- Neurological disorders: 8 - 12 weeks
- Burns: extremely variable, depending on severity and social circumstances
- Joint replacement: 2 - 4 weeks
- Polytrauma: multiple fractures, particularly lower limb, require prolonged stay, often because of restrictions for weight bearing
- Amputations: 4 - 6 weeks
- SCI: paraplegia — average 12 weeks; quadriplegia — average 24 weeks.

What does therapy involve?

- Doctor: daily visits to monitor general medical problems (see below) and liaise with therapists.
- Physiotherapy: by specialised neuro-physiotherapists, also utilising a hydrotherapy pool.
- Occupational therapy: restoring function in all activities of daily living, assessing equipment needs, wheelchair mobility and work, and home visits.
- Speech therapy: particularly for CVAs where speech and/or swallowing is affected.
- Group and individual therapy: e.g. education for spinal patients with regard to all aspects of their condition.
- Social worker: support for disability grants, pensions, Commission for Occupational Injury and Disease (COID), Road Accident Fund (RAF) and all aspects of family and social support, including counselling.

Which complications commonly arise in patients undergoing rehabilitation?

- Uncontrolled hypertension and diabetes — mainly in CVAs.
- Pneumonia: particularly aspiration if dysphagia is present.
- Urine infections: most patients are admitted with urine catheters. SCI patients eventually perform self intermittent catheterisation or may have a suprapubic catheter.
- Deep-vein thrombosis and/or pulmonary embolus: all SCI patients are given anti-thrombotic prophylaxis for 3 months after injury. Joint replacement patients also receive similar prophylaxis until sufficiently mobile.
- Seizures: common after CVA, HI, polytrauma.
- Muscle spasms: extremely common after SCI and can also occur in CVA patients.
- Neuropathic pain: extremely common in SCI patients.
- Wound sepsis: after surgery.
- Pressure sores: SCI patients are not infrequently admitted with established sores which significantly delay full, active rehabilitation.
- Myositis ossificans: common after multiple fractures or prolonged hospitalisation, e.g. severe burns or sepsis.
- Depression and/or anxiety: present in most patients in the rehabilitation setting. Early treatment with antidepressants and counselling is essential.
- Autonomic dysreflexia: in 'high' paraplegia (above T6) and quadriplegia. Commonly caused by constipation, blocked catheter or sepsis. MUST be treated as an acute medical emergency.

What are the financial implications?

- Financial cover is generally available from:
  - COID
  - the mining industry
  - Road Accident Fund
  - some medical aids.
- The costs do not stop after the period of rehabilitation, but may continue for the life of the patient (e.g. in spinal injury).
- Government funding is extremely limited, and not generally available.

What role can the GP play after the patient is discharged?

- Ensure that the patient is seen regularly to monitor progress and actively prevent further complications.
- Be aware of the common complications (as listed) which are not confined to the period of rehabilitation.
- Do not hesitate to refer back to therapists for advice.
- Provide counselling and support for immediate family or carer. Refer to social worker or psychologist if necessary.
- Understand that patients who have spent many weeks or months in a hospital environment are anxious and will have lost self-confidence. A caring GP will be an enormous support to both the patient and the family.

Further reading

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SECURING INTERCOSTAL DRAINS IN TRAUMA SURGICAL PRACTICE — HOW I DO IT

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The insertion of intercostal drains is one of the most common procedures in trauma practice, frequently carried out by junior staff in the course of resuscitation, as an emergency procedure in an awake and often intoxicated and unco-operative patient. This makes the procedure somewhat different from drains placed in the operating room environment after a thoracotomy, or