Original Article

The case for specialist units

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There is considerable evidence that management in a specialist unit is beneficial both for the individual patient and for the economy. A specialised unit provides a focus for a campaign for prevention, for the improvement in care in areas such as orthopaedic, bladder, bowel, skin, etc and for the promotion of interdisciplinary work, combining the needs of public health, low-cost technology, and high quality. Strategy and training is dictated by the specific problems that occur in patients with spinal injuries, particularly the multisystem impairment, which is a feature of such injuries and can only be comprehensively dealt with in a specialised unit. For developing countries, training may be either on-site or in centres abroad, or a combination of both, and rather than training on an individual basis, it is preferable for a team to be trained together. The likely cost depends on local circumstances. However, even the cost of a purpose-built centre of 44 beds serving 3000 paralysed people in the UK is only the equivalent of the lifetime costs of about 12 people with SCI.

Spinal Cord (2004) 42, 443–446. doi:10.1038/sj.sc.3101633; Published online 15 June 2004

Keywords: spinal unit; spinal injury

The need for a specialist spinal unit

The case in favour of specialised units cannot be put across too strongly or too frequently, particularly at this time when many countries' health services do not even acknowledge that there is a problem, and are happy to consign spinal cord injury to a minor part of rehabilitation (eg Sri Lanka, despite the number of spinal cord injuries (SCI)).

In order to put the case for a specialised spinal unit, some specific questions need to be answered. What is the size of the problem? What is the cost to the patient, the family, and to the community? What are the specific difficulties and how are these answered by a specialist unit?

The size of the problem

SCI is less frequent than many other types of injuries and debilitating diseases. In developing countries, there is a higher incidence of SCI compared to the Western world. The exact size of the problem is not known because good epidemiological studies do not exist in most of the countries even in the United States where data have relatively been well collected. Even in the UK, the incidence is only estimated. Recent epidemiological

studies give an incidence for Russia of 29.7, for Rumania 30, for Turkey 12.7, and for Taiwan 18.8 per million. The overall incidence is in the range of 12–40 per million annually. The highest occurrence is in the age group 15–24 years, although the demographic profile is changing, with a rise in the number of elderly individuals suffering a spinal cord injury. The death rate is particularly high during the first week and peaks during the first 24 h.

The cost

The cost of SCI to both the individuals and society is enormous. SCI predominantly affects young people and as a result both the direct costs and indirect costs are very high. The actual cost to the individual and to society are difficult to estimate with any precision, but in the USA, the National Spinal Cord Injury Data Base of the Model Systems has carried out an enquiry into the economic impact of SCI.¹ Obviously, these figures do not precisely translate to other countries but, nevertheless, they indicate the enormous impact of SCI.

In the first year of postinjury, the mean cost (in 1992 dollars) incurred by a person with SCI/paraplegia is just under \$200 000, and in cervical injuries, it is over \$400 000. After the first year postinjury, the annual cost is a mean of nearly \$25 000. The average lifetime direct cost (again in 1992 dollars), for a person with spinal cord injury is nearly half a million dollars if the injury is at the age of 25 years.

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This paper is based on a lecture given in Sri Lanka, February 2003 and a submission to the Sri Lankan Ministry of Health

Reduce the cost

There are several ways to reduce these enormous costs. The first and foremost is to reduce the incidence of SCI such as targeting the leading causes of SCI, for example, motor vehicle crashes, gunshot wounds and diving injuries. This is a matter of national strategy of course. The other obvious ways to reduce the enormous costs of SCI is by the prevention of secondary medical complications, by improving the efficiency of treatment and by increasing the percentage of people who return to work after SCI.

Specific difficulties

In most countries, rehabilitation medicine is usually not as highly regarded as other specialities. It is easier to find an orthopaedic surgeon who will operate on the spine whether or not it is indicated, rather than management by an SCI specialist. Surgery is often isolated from any rehabilitation that might, in fact, never be offered to the patient. SCI results in multisystem dysfunction, multiple disabilities, and the risk of development of a wide range of complications.

The physiological functioning of most systems of the body may be disturbed. Impaired physiological responses are not static after SCI but are unstable and labile. Localised conditions can lead to far-reaching effects. For example, an anal fissure may trigger spasticity anywhere below the level of the lesion, and this, in turn, may lead to urinary retention, respiratory embarrassment, falling and bone fracture, or a combination of all these.

SCI patients may present significant diagnostic and management difficulties because the abnormality of sensation markedly alters the presentation of incidental conditions and complications. See, for example, Ditunno *et al.*² An intra-abdominal catastrophe or a skeletal fracture in a tetraplegic patient would not result in pain or any of the usual symptoms and signs. This may result in a delay of diagnosis in some patients or unnecessary surgical interventions in others. Owing to the lack of sensation, the development and perpetuation of problems such as pressure sores occurs. A ureteric stone may not present as renal colic. The immune system may be depressed and patients are at risk of developing chest infections, urinary and skin infections, and septicemia.

The responses of SCI patients to various pharmacological agents may be different or exaggerated. Management of bladder, bowel, and sexual function is usually poorly organised, skin care overlooked with resulting pressure sores, and patients are likely to develop complications and die of chest or urinary infections or untreated autonomic dysfunction.

The psychological, social, financial, and economic effects are as devastating as the medical effects and as long lasting. This applies not only to the patient but to the partner and family members and the community in general. A poorly managed paralysed patient would add to the burden of the partner and may result in

matrimonial disharmony or the breakdown of a relationship.

Doctors and specialists tend to be attracted to areas of medicine that are more in vogue, with a higher profile, and are more lucrative. In many countries, particularly in the developing world, physiotherapists may be in less numbers and are not always adequately trained. In some countries, occupational therapy may not exist as a speciality, and social workers have little or nothing to offer in terms of state help.

Frequently, there are major obstacles to successful rehabilitation. These obstacles include limited financial means both within the community and within the household. This prevents survival with dignity. The loss of a job results in a changing social role, physical dependence, and loss of status within the family and within the community. Stress on the family and continuing to struggle with the physical environment within and around the house impose enormous problems, again, particularly in developing countries. In many cases, wheelchairs may not be available or are too expensive to provide.

A recent study³ compared the specialist management of SCI in spinal units to management in a nonspecialised environment that was usually an orthopaedic or general rehabilitation department. The study showed the benefits in terms of health, functional, and social perspectives of the specialist spinal unit systems. It is, however, a retrospective study and subjects were not matched for severity.

In *health*, complications such as pressure sores, deep vein thrombosis, chest infection, urinary tract infection, constipation, abdominal pain, uncontrolled autonomic dysreflexia, and severe depression were all markedly less common in those subjects treated in a specialist spinal unit. Randomised clinical trials of prevention of deep vein thrombosis were conducted in specialised SCI units and have been incorporated into recommendations for care guidelines.⁴

The *functional outcome*, as measured by the level of assistance required, and *social activity* including employment was considerably better in those subjects treated and managed in a specialist spinal unit.

The evidence is overwhelming that management in a specialised unit is beneficial both for the individual patient and for the economy since those patients who are not treated and managed in a spinal unit are likely to have a markedly increased use of health-care services. Guttmann, in Stoke Mandeville Hospital in 1945, introduced the integrated management of spinal injury and the provision of care from 'injury to grave'. This has been shown to be the most cost-effective and time-tested system of care for patients with SCI.

A specialised unit provides a focus for action. A focus for a campaign for the prevention of SCI, a focus to improve care in various areas such as orthopaedic, bladder, bowel, skin, etc. A dedicated centre can promote interdisciplinary work, combine the needs of public health, such as low-cost technology and care, and high quality. In addition, the development of new therapeutic

measures and the imminent translation of basic science to clinical practice can only take place with the cooperation of specialised spinal centres.

Planning the strategy and training

'Injury to grave' The principle of management is the integrated treatment from 'injury to grave' and this requires the infrastructure of a well-managed and well-coordinated multidisciplinary team led by a dedicated physician or surgeon who is specifically trained to manage all aspects of spinal injuries.

Specific problems What sort of problems is one likely to meet in a spinal centre? A study of a British centre for spinal injury⁵ indicated that over 50% of the patients admitted had multisystem impairment. The associated injuries included haemopneumothorax, skeletal fractures (limbs, ribs, sternum, clavicle, pelvis, skull), brain injury, brachial plexus injury, and ruptured aorta. This study showed clearly that patients admitted within 1 week of injury to a specialised unit had a shorter period of hospitalisation, that is, 19 weeks compared to those patients who were admitted to a specialist unit over 2 months from the time of injury (74 weeks).

Universal matters

This applies, of course, to all neurological problems. For developing countries, the first essential is not to blindly apply the methodology used in the developed world, but rather to adapt the principles of treatment to local needs, limited financial means, and any possible cultural differences. Obviously, some matters are universal:

- Clinical and neurological assessment (repeated)
- Nursing principles
- Principles of management by physiotherapists (with 24 h service)
- Management by occupational therapists
- Bladder and bowel management
- Home adaptations

In many parts of the world, expensive technology such as powered turning beds and occupational therapy equipment will not be widely available. Handling of patients is likely to be manual. Low-cost technology and self-reliance are likely to be more important than the misplaced creation or attempts to create sophisticated equipment.

A comprehensive programme

A comprehensive programme must include:

1. Prevention of spinal injuries
2. Education of the general public
3. Improvement in handling, lifting, and transportation of patients
4. Training of staff
5. Involvement of carers and relatives in managing patients in hospital as well as at home

6. In developing countries, setting up appliance services to manufacture low-cost wheelchairs, mattresses, and cushions
7. The provision of psychological and social support, utilising family members, and religious or spiritual leaders in the community
8. Identification of problems relating to discharge, for example, architectural problems within the house, and/or community
9. Long-term follow-up and outreach team

Designation of referral centre

Probably, the most important area from which all else will flow is the designation of a hospital or hospitals to be the referral centres for the specialised treatment of these spinal problems.

Training

Training may either be on-site or in centres abroad, or a combination of both. For developing countries, training on-site could be undertaken by experienced staff spending 1–3 months in the country, and I have no doubt that many spinal units would contribute towards this training. Training abroad could be carried out on the same basis that I have found so successful in the training of overseas postgraduate doctors as neurologists. Registrars were chosen by the medical schools and postgraduate institutes in their own country, and then came to spend a year with me in Southampton, training in both clinical neurology and in neurophysiology. At the end of their year, they went back to their own countries to their designated posts. A similar system can easily be arranged and I know of several spinal units that would be very happy to take part in this kind of training.

Rather than organising training on an individual basis, it is preferable for a team to be trained together. It is not just a clinical experience that is needed but the ability to work together as a coordinated group. It is suggested that such a team should consist of a doctor, a nurse, a physiotherapist, an occupational therapist, and a social worker, and the training would probably be required for a period of about 6 months.

Staffing

This obviously needs a great deal of discussion but to give some idea of the staffing required for an efficient unit, I quote the example of one such unit in the UK: at least 40 beds for a population of 8 million. The staff should include a director, about seven doctors at registrar and SHO grade and visiting consultants. The visiting consultants are extremely important. For example, it is essential that orthopaedic surgeons and urologists, neurosurgeons and neurologists, and a plastic surgeon are involved. A total of 50 nurses would be required, eight physiotherapists, four occupational therapists, a psychologist, a social worker, community

coordinators, and secretarial staff. This may seem like a huge number, but bear in mind that a unit like this is beneficial, not just for the individual patient, but for the economy in general.

Cost and funding

The cheapest way is to make space available in an existing building and it would be an advantage for a spinal unit to be part of a general hospital with access to the facilities of general medicine and general and orthopaedic surgery.

What is this likely to cost? A purpose-built centre in the UK of 44 beds serving 3000 paralysed people in a population of 8 million costs about £3.5 million to build and has a budget of £3.7 million per year (Waghi El-Masry, personal communication). Using the available space in existing buildings would considerably lessen the cost. Let me put it this way: a unit of this size will have an average of 110 new admissions per year, 250 readmissions (for example, for bladder surgery, rehabilitation, management of pressure sores, etc) and an average of 1400 outpatients are seen in the clinic. Such a unit costs the equivalent of lifetime costs of about 12 people with SCI.

A specialised, dedicated, spinal unit that is within the framework of a general hospital is the recommended alternative to fragmentation of care, which will be expensive and inefficient.

Conclusion

SCI is a significant problem that represents an enormous cost not only to the individual but also to the family members and the community. The most cost-effective and the humanitarian solution is the integrated management within a specialised unit.

Acknowledgements

I acknowledge the help and advice, which I received from Mr Waghi El-Masry, Oswestry, Dr A Soopramanien, Salisbury, and Dr J Ditunno, Philadelphia.

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