

The specialty of spinal injuries in the UK

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ABSTRACT At the outset of the Second World War, spinal units were established in the UK, but they were little more than hospitals where patients with spinal injuries were received. The treatment was deplorable, with patients typically suffering from pressure sores and renal sepsis. In the south of England, a spinal unit was not established until the appointment in 1944 of Ludwig Guttmann, who was trained in rehabilitation, neurology, neurosurgery, psychiatry and research. Guttmann devoted himself single-handedly to the care of his patients, turning and catheterising them himself. Within six months, he demonstrated that he could cure their sores and discharge them to a meaningful life. Recognition followed immediately, and doctors came from other units to learn Guttmann's methods and set up rehabilitation centres for spinal patients in the UK.

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Author's note: The author is in a unique position to document the development of the specialty of spinal injuries since he first visited the national spinal injuries centre at Stoke Mandeville (acknowledged as being the first successful spinal unit) in 1955. The unit was founded in 1944, and the author worked there from 1956 until 1993, when he retired. He also worked at the Liverpool centre, founded in 1948, from 1965 to 1970. During this time, he worked with consultants and nursing staff who could remember back to the early days of the development of the specialty.

Under the Freedom of Information Act the author was able to access the Public Record Office archives and the Ministry of Health's plans for all the spinal units in the UK. These 539 pages of letters and memoranda gave an immediate insight into the obstacles encountered in setting up spinal units. Structured interviews with surviving medical and nursing staff, physiotherapists, occupational therapists, administrators, secretarial staff and patients have also provided first-hand knowledge.

INTRODUCTION

Injuries of the spinal cord have been known since antiquity but have been inevitably fatal, a 'living death'. While there had been accurate clinical descriptions of the condition, there was no treatment apart from keeping patients comfortable until they died from the complications of fulminating urinary tract infections and pressure sores. At the end of the nineteenth century, Wilhelm Wagner, working in a small hospital for coal miners at Königshütte in Silesia, was the first to treat these patients successfully.¹ He reduced sepsis of the renal tract by meticulous attention to the bladder, and prevented pressure sores by regular turning. During the First World War, his pioneering work was amplified and

spinal units were set up in Germany, France and the UK to treat the many military casualties. These units all relied on the collaborative efforts of different specialists. After the war, the units closed and progress ceased.

In Germany, with the advent of National Socialism, disabled people were more often candidates for active euthanasia than rehabilitation. There was opposition to specialised hospital medicine, and Jewish doctors were forbidden to practice and later expelled. All these factors contributed to the erosion of previously high-quality German medicine. France was little better since its healthcare suffered from poverty and parochialism.

In contrast, in the US, the visionary neurosurgeon Donald Munro set up a unit for the treatment of cranial and spinal trauma in Boston in 1936. Munro delineated the basic principles of the modern management of paralysed spinal cord patients: focusing on the care of the neural damage, not on the vertebral column; turning patients two-hourly to prevent pressure sores; using tidal drainage for the paralysed bladder; and providing excellent rehabilitation facilities. Thus he demonstrated that patients with traumatic injuries could be rehabilitated and returned to a productive life.²

In Britain during the First World War, the neurologists Henry Head, George Riddoch and Gordon Holmes had carried out seminal work on spinal injuries at the London Hospital and the specialised spinal unit at the Empire Hospital. After the war, they returned to their commitment to neurology. They continued to publish their fundamental research work on the spinal cord based on their wartime experience, but had no active role in looking after patients with spinal injuries.² Between the wars there was a custodial unit at the Royal Star & Garter Home, in Richmond, for patients with chronic injuries. However,

with the advent of the Second World War, the treatment of patients with spinal injuries was no better than it had been in 1918.

An injury to the spine has many implications and affects different functions of the body. There is a loss of motor power, sensation and control of the autonomic nervous system, resulting in paralysis of the bowels and bladder with retention and infection of urine and pressure sores. Thus, the successful treatment of spinal injury requires an integrated approach, bringing together different medical specialties – neurology, neurosurgery, orthopaedics and urology – as a team alongside nursing staff, physiotherapists, occupational therapists and social workers.

This article explores how, during the Second World War, the specialty of spinal injuries developed successfully in Britain with the setting up of specialised units that served as models for the rest of the world. As expertise developed, knowledge and insight from the specialty in turn influenced neurosurgery, orthopaedics and plastic surgery.

HISTORICAL BACKGROUND

Before the nineteenth century there were no descriptions of spinal injuries in England. Astley Cooper (1768–1841), a surgeon at Guy's Hospital in London, described a series of patients with spinal injuries and a laminectomy by his teacher, Henry Cline.³ Charles Bell, a surgeon at Middlesex Hospital in the early nineteenth century, also described individual cases⁴ and was involved in a celebrated controversy with Cooper over the need for a laminectomy, which he rejected as irrelevant and dangerous. Surprisingly, in the nineteenth century there was great interest in the treatment of all forms of diseases of the spine, caries, lateral curvature and malignant diseases, and there was even a small spinal unit opened by Edward Harrison in London.⁵

Spinal patients were treated on an individual basis by the surgeon under whose care they were initially admitted, so that individual surgeons saw too few patients for any systematic approach to develop. Marshall Hall, one of the first doctors to develop an interest in neurology and spinal injuries, was a controversial figure. Like Guillaume Duchenne in Paris, he had no patients under his care. He had to travel to different hospitals to document unusual spinal cases but had no input into their treatment, nor were any other specialists asked to see these patients: the surgeon carried out the treatment alone.²

Because of the sheer number of casualties in the First World War, the whole method of treating military casualties in Britain had to be revised. All types of injuries could no longer be treated in one hospital. Specialised hospitals had to be set up for the treatment of facial maxillary injuries, venereal diseases, neurotrauma, shell shock, spinal injuries and orthopaedic surgery and

rehabilitation. Most patients with spinal injuries died from their intercurrent injuries on the battlefield or at the receiving hospital. Many of the British soldiers who survived came under the care of Gordon Holmes, a general physician who was working as the British Army's neurologist in close collaboration with Sir Percy William George Sargent, a general surgeon who carried out some of the first operations on the brain and spinal cord at military hospitals numbers 13 and 14 in Boulogne.

Harvey Cushing, an American neurosurgeon serving with the British forces before the US entered the war, was consulted about some of these patients as were a number of general surgeons dealing with the bladder. There were combined meetings involving urologists, neurologists and surgeons. The British soldiers were transferred to the London Hospital under the care of Henry Head. Under the guise of economy, all military patients were transferred from the London Hospital to Bethnal Green Hospital, but Head protested at losing his spinal injury patients and an exception was made so that he kept them at the London Hospital with its strong neurological tradition. Eventually the officers were transferred to the Empire Hospital in central London under George Riddoch, and Head's patients were sent to London's King George V Hospital, where a spinal unit had been established. They were later transferred to the Royal Star & Garter Home, founded by Frederick Treves, a surgeon from the London Hospital.

The fundamentals of treatment were recognised:

- Early transfer to specialised centres, where the patient could be rehabilitated;
- Prevention of complications, pressure sores, urinary tract infections, and meticulous treatment until the fracture had stabilised.

THE SECOND WORLD WAR

When war was declared in 1939 there were fears in Britain that the large number of casualties would overwhelm the medical facilities. Committees were set up to establish the best methods of dealing with these anticipated large numbers, including a peripheral nerve injury committee of which Riddoch was chairman. Riddoch remembered his experience in the First World War and was determined that provision would be made for servicemen with spinal injuries. A distinction was made between acute spinal trauma and long-term incurable patients. The former would require resuscitation, surgery upon the spinal column and the spinal cord, access to pathology and radiography departments and all the facilities of a properly appointed neurosurgical and orthopaedic unit.

At the outbreak of war, existing medical facilities were insufficient and there was a shortage of 350,000 beds. Emergency Medical Service (EMS) hospitals were built to provide for the treatment of civilian and service casualties

due to enemy action. Other patients were subsequently admitted until, by the end of the hostilities, civilian patients of all categories, for whom the best treatment was considered essential, were included. In the early days of the EMS, the authorities did not wish to have surplus fully staffed military hospitals, which would lie empty for long periods of time. Instead, huddled hospitals would be set up to treat civilians and be available to service patients if required. The original EMS hospitals were built of wood because of a shortage of brick. Despite being erected on a temporary basis with a lifespan of 21 years, many are still in use today. Mental hospitals were a popular choice for the establishment of spinal units as they had adequate space, patients could be isolated from society and no one would be affected by the sight of the disabled in wheelchairs.

In 1940 five units were constructed and designated to receive casualties, including acute traumatic injury of the spinal cord: the Robert Jones and Agnes Hunt Hospital in Oswestry, Winwick Hospital in Warrington, the Royal National Orthopaedic Hospital in Stanmore, Haywards Heath Emergency Hospital in West Sussex and Bangour Hospital in Scotland. The situation in Scotland was more favourable, and Professor Norman Dott established an acute brain and spinal cord unit at Bangour Hospital, staffed by a distinguished team of surgeons and therapists. There were excellent facilities for the treatment of acute casualties from warfare: operating theatres, radiology departments, physiotherapy and occupational therapy and pathology laboratories. Some of the patients were actually flown by air to Edinburgh, arriving on the day of their war injury. Immediate care was enhanced later in the war by the use of mobile neurosurgical units, early admission and blood transfusions. The Ministry of Pensions Hospital, Edenhall, was used for rehabilitation purposes, with visits from the consultants.

The original site selected in 1940 for a spinal unit serving the south of England was the Nuffield Hospital in Oxford, but Herbert Seddon, professor of orthopaedic surgery, would not release any beds. Stoke Mandeville, near Aylesbury in Buckinghamshire, was then chosen, but the unit was not established for four years because no one could be found to provide neurological and neurosurgical care. Eventually, in desperation, the now Brigadier Riddoch, an ill and overworked man in charge of the whole neurological service of the army, offered his support. After a delay of four years, a team was created at Stoke Mandeville Hospital under a full-time physician, Ludwig Guttmann. Gathorne Robert Girdlestone, orthopaedic surgeon at the Wingfield Morris Orthopaedic Hospital in Oxford, Joseph Pennybacker, neurosurgeon at the Radcliffe Infirmary, Oxford, and Eric Riches, urologist at Middlesex Hospital, provided a referral consultant service.

Stoke Mandeville was a Ministry of Pensions Hospital which served two purposes: it was a naval hospital with a nominal naval commander; its own resident surgical

officer and naval consultants, and a sector civilian hospital under the aegis of Middlesex Hospital. Although the facilities for patients with acute trauma of the spinal cord were satisfactory, the day-to-day care of patients with spinal injuries was uniformly unsatisfactory in all aspects, including access and staffing. Guttmann found he had a series of orderlies who had never nursed before. There was a total lack of physio-therapists and, although lip service was paid, no designated area for treatment. The patients were scattered around the wards without a designated doctor looking after them. Housemen Phillip Harris and TS Dick stated that they looked after patients but were part of a general neurological team, and not specifically allocated to the spinal injury patients.^{6,7} The patients were admitted late, and Dick said that all of them were covered with sores, had urinary tract infections and, after three years of treatment, were no better than when they were admitted.

NEW UNITS AS A RESULT OF THE NHS

When the war ended, hospitals were returned to their original use and spinal injury patients were moved elsewhere. Some spinal units closed down or relocated. The Ministry of Health recognised that, before the establishment of the NHS in 1948, nothing could be done on a national scale to help patients. With the advent of the NHS, however, efforts were made to provide comprehensive facilities to cover the whole of the UK (see Table 1). The hospitals and other locations housing the spinal units were under different administrative heads: some, such as Stoke Mandeville, were Ministry of Pensions hospitals; others, such as Wharnccliffe, were EMS hospitals. There was great pressure from the local authorities to regain their mental health facilities.

There was pressure from different sources to set up spinal units. In 1947, coal mining was a major industry in the UK, employing one million workers. The Coal Mining Welfare Board was an extremely influential committee, and its chairman, Sir Reginald Watson-Jones, wished to provide proper facilities for miners.² The doctors were confronted with patients covered in sores, with stones in their kidneys and with severe urinary tract infections, many of them dying of septicaemia. It was appreciated that there were places where these patients could be better treated. A team of surgeons, including Frank Holdsworth, was sent to the US in 1948 to see how patients were being treated by Munro in Boston and at the Veterans Administration's spinal units. Other doctors visited Stoke Mandeville Hospital.

These developments resulted in the following:

1. A spinal unit was established at Wharnccliffe Hospital in Sheffield. Later, this unit was found to be unsatisfactory and was moved to Lodge Moor, Sheffield, where there was better access to rehabilitation.⁸
2. The Winwick Hospital unit was closed and beds were returned to the mental hospital. Patients were discharged

TABLE 1 Current UK spinal units

Name	Type of hospital	Date established (new unit established)
Stoke Mandeville, Aylesbury	Part of general hospital	1944 (1983)
Southport	Access through link corridor to district general hospital	1948 (1991)
Pinderfields, Wakefield	General hospital	1950
Rookwood, Cardiff	Part of chronic hospital	1952 (1972)
Oswestry	Part of orthopaedic hospital	1965 (2000)
Musgrave Park, Belfast	Part of rehabilitation hospital	1972
Royal National Orthopaedic Hospital, Stanmore	Orthopaedic hospital	1984
Oddstock, Salisbury	Part of general hospital	1984
Southern Hospital, Glasgow (previously at Phillipshill and Edenhall)	Teaching and general hospital	1992
Royal Northern Hospital, Sheffield (previously at Wharncliffe and Lodge Moor)	Teaching hospital	1994
Middlesbrough (previously at Hexham)	District general hospital	2003

to Liverpool and scattered around different hospitals. This led to the regional neurosurgeon, Sutcliffe Kerr; the regional urologist, Cosby Ross, the regional medical officer and the professor of surgery at the University of Liverpool opening the unit in Southport in 1948.

3. A further unit opened in Hexham in 1949.
4. The Pinderfields unit opened in 1950 in Wakefield, and the Rookwood unit in 1952 in Cardiff.
5. In Scotland, the Bangour unit was closed and two small spinal units were set up: Edenhall, serving Edinburgh, and Phillipshill, serving Glasgow. Both lacked facilities by being sited at chronic tuberculosis and fever hospitals.

Other than Stoke Mandeville, all these new units were isolated and without access to the comprehensive facilities of the district general hospitals. Isolation made recruiting nursing staff difficult. Sites were chosen not for the benefit of the patients but, as Professor Robert Roaf remarked, 'were placed anywhere where there was space.'⁹ Wharncliffe, for example, was on a hillside: access to specialist departments was nonexistent, and an ambulance had to be organised to take patients to X-ray. There was no space for physiotherapy.

With the refounding of the units and the development of the health service, local authorities, regional boards and central authorities were all fighting over scarce resources. In Southport, for instance, the administrators wished to turn the spinal unit into administrative offices. The lack of facilities meant that there was no place for the treatment of female patients or children with spinal injuries in the UK. Many years after the formation of the Sheffield unit, desperate female patients were writing to request treatment.¹⁰

From the outset the Ministry of Health believed that patients admitted to these units needed acute medical and surgical facilities on site. This included comprehensive orthopaedic, neurosurgical, bacteriological and intensive care, as well as X-ray and rehabilitation facilities, backed up by a team of well-trained consultants. However, this was resisted by the local authorities, who still wanted spinal injury patients isolated in mental, tuberculosis or fever hospitals; wherever there were beds available.

Medically, it was shown, particularly by Holdsworth in Sheffield, that the only way to treat patients with spinal injuries was to admit them immediately to specialised facilities.¹¹ The south of England was badly served in this regard, with only Stoke Mandeville. Guttman had resisted taking acute admissions and only started admitting these patients after Holdsworth had shown the benefit. In 1965, Roaf opened a spinal unit at Oswestry. In 1967, following a meeting at the Ministry of Health, it was decided that two new units should be set up to serve the south of England, one at Stanmore in the Royal National Orthopaedic Hospital and the other at Oddstock near Salisbury, attached to a general hospital. Both were set up in 1984.

Stoke Mandeville was unique as it had very comprehensive special units for plastic surgery and rheumatology but was also part of a general hospital with superb facilities. Guttman had developed the unit in hatted accommodation (Figure 1), but eventually these huts began to fall down and there was a move by the Ministry of Health to close one of the wards. In 1979, patients at Stoke Mandeville chained themselves to the radiators on the opening day of the Conservative Party conference, and Gerard Vaughan, the Minister for Health, came to see the unit. The TV personality Jimmy Savile

offered to raise the funds to build the unit privately. Amid much publicity, a free-standing, purpose-built unit was opened in 1983, with 110 beds and access to the rest of the hospital by a link corridor.

Free-standing, purpose-built spinal units were also attached to specialist hospitals at Stanmore, Oswestry, Middlesbrough and Southport. Edenhall and Phillipshill in Scotland were combined and shifted to a brand-new, purpose-built unit attached to the Southern Hospital in Glasgow, a teaching hospital with a specialised neurosurgical and neurological unit. Lodge Moor, originally an isolation hospital, was moved to the Royal Northern Hospital, a comprehensive teaching hospital. In general, there were two patterns, purpose-built units as part of a general district hospital or as part of a rehabilitation hospital. All required full facilities, including a computer tomography scanner and magnetic resonance imaging scanner as well as operative facilities.

THE MEDICAL STAFF

During the war, a spinal injury was primarily thought to be a neurosurgical problem. Neurosurgeons were few and far between, mainly because of an overall shortage of specialists in all fields but also because they were called up for service in the forces. Neurosurgeons did not have their own departments, and when they did have beds they were so few that patients had to be admitted under the neurologists, transferred to the neurosurgeons for a short spell while they were operated on, and discharged back to the care of the neurologist.

There were only a small number of neurosurgeons in Britain directly trained in Harvey Cushing's methods: Hugh Cairns at the London Hospital, Norman Dott in Edinburgh and Geoffrey Jefferson in Manchester. It is significant that all the spinal units set up at the outbreak of the Second World War were under their care: Cairns in Oxford, Dott in Scotland and Jefferson in Manchester. When Cairns was appointed neurosurgeon to the army, Jefferson became responsible for neurosurgery in the whole of England. Rowbotham, another neurosurgeon, was at Hexham. Holdsworth, an orthopaedic surgeon, worked in Sheffield and Cook, a neurologist, in Pinderfields.

Patients with spinal injuries need long-term care. Although neurosurgeons were treating these cases in the first instance, because of their commitments to operative surgery they were unable to provide day-to-day care, which is vitally necessary to the management of a patient with a spinal injury, or to initiate and oversee rehabilitation programmes.

It was serendipity that no one could be found to run the unit planned at Stoke Mandeville before Guttmann's appointment. He was trained not only in neurosurgery and neurology but also in the principles of rehabilitation after peripheral nerve injuries. When appointed,



FIGURE 1 A post-war aerial view of Stoke Mandeville Hospital with the National Spinal Injuries Centre's standard EMS hutted accommodation. (Reproduced with kind permission of Springer Science and Business Media.)

Guttmann incorporated these principles to the care of spinal injury patients, and showed determination, inspiration and leadership. He carried out monitoring, training, research and physiotherapy, and instituted sport as a means of rehabilitation. He received immediate recognition, and doctors from other units, such as Dick and Harris, visited him. It was only when other doctors learned and adopted Guttmann's principles and methods and implemented them in their own units that comprehensive care began.

Guttmann's role

When I started this research, I thought that the management of spinal injuries started in 1940 with the founding of the spinal units, and that Guttmann and Stoke Mandeville were merely *primus inter pares*. This was not the case. In fact, the four units that were founded were disasters, according to Dick who at the time worked at Stoke Mandeville and Winwick, and it was only when doctors incorporated the methods established at Stoke Mandeville that satisfactory management emerged. This can be attributed to one man, Guttmann. It is necessary to delve into his background to understand how he acquired his knowledge.

The original work on spinal injury management had been done by Theodor Kocher and Wilhelm Wagner. Kocher, working in Switzerland, had published extensively in Swiss journals describing the pathology of spinal cord injury, and Wagner wrote a superb textbook detailing how spinal injury patients should be treated and rehabilitated, with meticulous descriptions of turning beds, waterbeds, how patients should be positioned to avoid pressure sores, how the bladder should be drained and how the patients could be discharged home. Significantly, these works were quoted extensively after the First World War, but the only person who quoted them subsequently was Guttmann.²

Before training in medicine, Guttmann had worked as an orderly at the Königshütte hospital in Silesia, where Wagner had set up a spinal unit which shut in 1898. Guttmann

understood the vital role of the orderly and was aware of the very strong tradition of physiotherapy in Germany. When he qualified in medicine, he worked for Otfried Foerster, the leading neurologist/neurosurgeon in Europe between the wars. Foerster achieved fame from rehabilitating patients with peripheral nerve injuries, but during the First World War had set up spinal units and recognised the difference between paralysis of the spinal cord of cerebral origin, which gave rise to spasticity, and paralysis from peripheral nerves, which was flaccid. He also developed the technique of posterior rhizotomy, known as Foerster's operation, to treat this. Guttmann used a modified technique of alcohol block to render a spastic lesion flaccid. He would also later incorporate the work that Foerster had done with Heinrich Frenkel, a spa doctor, on rehabilitating tabetic patients.

Guttmann underwent meticulous training under a hard task master – Foerster was an extraordinarily difficult man, and no one wanted to work for him. Guttmann learned not just the techniques of spinal cord and peripheral nerve rehabilitation but also research techniques on sweating. He eventually became deputy to Foerster at his neurological institute, but when the Nazis came to power in 1933 was dismissed and became director of the Jewish Hospital in Breslau, where he gained administrative experience. He fled Germany in 1939 with his family and, deprived of clinical responsibility, worked at the Nuffield Institute at Oxford, where he carried out research on peripheral nerve injuries. Significantly, when asked to lecture on rehabilitation, Guttmann set forth all the peripheral nerve injury rehabilitation principles¹² which he subsequently used for the rehabilitation of spinal injury patients:

- The need for several specialised peripheral nerve injury centres
- Continuous treatment
- After-treatment and after-care
- The need for a nerve specialist to see the patient immediately
- Thorough records of all treatment, with proper documentation
- Supervision of patients immediately after injury
- Late supervision
- Availability of a public health service
- Co-operation of the health service with the Ministry of Pensions and employers
- Rehabilitation/work
- Not leaving the patient alone in the reconditioning period

Guttmann was frustrated by his inability to treat patients between 1933 and 1939 in Germany and 1939 and 1944 in Britain. When he came to rehabilitate the spinal injury patients at Stoke Mandeville, he applied all his principles with extraordinary energy. He was able to draw on not only his experience in Germany under Foerster but the previous work of Munro in the US.

Guttmann set up an empire: as well as Stoke Mandeville he looked after Rookwood in Wales and visited the Duchess of Gloucestershire's house (78 beds), the Star & Garter, Chaseley (40 beds), Lyme Green and Garston (the latter two both for ex-servicemen). When the Ministry of Health wanted to open up another unit at Stanmore, Guttmann would not release Jack Walsh, his second-in-command. Stanmore, in turn, refused to have Guttmann as a visiting consultant. Guttmann told government officials that if they gave him another ward and a senior registrar, he would look after all the patients in the south of England.¹⁰

Guttmann's role as a doctor, teacher and visionary should not be underestimated. He travelled ceaselessly around the UK and the world, visiting 38 countries, encouraging doctors and shaming administrators into setting up proper facilities for the treatment of spinal patients. He founded the International Games for the Disabled, the International Spinal Cord Society and its journal, *Spinal Cord*. He insisted on respect for the disabled and on giving them an opportunity to work.

Day-to-day care

A spinal injury patient needs above all a well-trained physician to provide day-to-day care and deal with the catheterisation so that the bladder is adequately drained. Otherwise, overwhelming back pressure can occur, the kidneys get damaged and septicaemia results. Supervising the nursing staff, dealing with the care of the skin and pressure sores firstly by prevention and then treatment, and seeing that the patient is turned regularly and managing this so that the fracture does not cause further damage to the spinal cord are all the remit of the doctor.

Dick and Harris record that as junior doctors they were part of neurotrauma teams and could not devote all their time to the care of the spinal patients.^{6,7} R Lipschitz said that when he was working as senior registrar to Norman Dott he used to see the patients when he finished his other neurosurgical work.¹³ Eventually, senior hospital medical officers (SHMO) were appointed to supervise the rehabilitation of spinal injury patients, but they had no junior staff to support them and no previous training in rehabilitation.

It was difficult to find staff to look after the spinal units. They were appointed as SHMO, and A Hardy remarked that they were the best paid house doctors in the health service.¹⁴ Senior hospital medical officers were in permanent low-grade posts and, although they had the responsibilities of a consultant, did not have a higher qualification. They had to work as full-time medical specialists and could not do private practice. The establishment of this category was determined as much by workforce needs as anything else.

Doctors were not specifically trained in spinal injury treatment and rehabilitation, and there was no career pattern because they were not consultants in charge of the patients on the units and the work was unattractive: patients were covered in sores, smelly and incontinent, and care was on a custodial basis – essentially waiting for patients to die. When one doctor was invited to the Ministry of Health for interview, he described the situation:

In the spring of 1944 I was called to group headquarters for interview with the group officer, a surgeon of formidable character. 'Allen', he said to me, 'I am sorry to have to inflict this on you, but we have been ordered to open a spinal unit at Leatherhead Hospital and I want you to take charge of it. Of course, as you know, they are hopeless cases – most of them die, but you must do your best for them.' With these words of 'encouragement', I returned home sadly.¹⁵

Few British doctors could be found to take on the work, and the overall responsibility for the patient lay with the visiting neurosurgeon. The people appointed as SHMOs are listed in Table 2; most had no higher qualification. Eventually, Hardy said he would leave Lodge Moor unless conditions were improved. Holdsworth, when his unit was relocated to Lodge Moor, saw that Hardy received an honorary qualification (FRCS; Holdsworth was Vice-President of the Royal College of Surgeons of England) and was appointed consultant.⁸ JS Walsh received an honorary fellowship after his appointment as director of Stoke Mandeville Hospital.

Training

Until 1965 there was no training programme for doctors working in the field of spinal injuries; the few doctors who worked on the units came and went whenever they could find a job. The situation changed when there was an overall review of all the SHMO posts in Britain in 1965. Michaelis, Melzak, Damansky and Walsh were all upgraded to consultant posts, giving them attractive positions comparable to other consultants, particularly because they had beds and staff to look after patients unlike some peripatetic neurologist consultants. A training programme also started in 1965. The first senior registrar was appointed at Stoke Mandeville Hospital, and subsequently senior registrar posts became established at Oswestry and Sheffield, as well as in Scotland.

In 1982 the Royal Colleges recognised the treatment of spinal injuries as an accredited specialty so that it became part of the rehabilitation programme with its own certificate of completion of training. As a result, high-calibre candidates joined the specialty, many of them training and carrying out physiological research at Stoke Mandeville (many in conjunction with the author). The role of spinal injury consultants has evolved and today they are responsible for many aspects of care:

TABLE 2 Senior hospital medical officers in UK spinal units, 1944–65

Name	Unit	Experience	Qualifications
A Hardy	Lodge Moor	Practical (ENT)	Given an honorary FRCS
N Watson	Lodge Moor	Infectious Diseases	No higher qualification
L Michaelis	Stoke Mandeville	Ex-EMS orthopaedic surgeon	No UK higher qualification
J Melzak	Stoke Mandeville	Ex-Polish army	No higher qualification
JJ Walsh	Stoke Mandeville	Came to unit to study for primary FRCS	No higher qualification but later awarded honorary FRCS
M Damansky	Southport	Ex-Polish army	No higher qualification
DBF Jones	Oswestry	Psychiatry	MRCP
S Kerr	Edenhall	Limb fitting	FRCS consultant general surgery
R Thomas	Rookwood	Not known	No higher qualification

clinical care of the patients, co-ordination and supervision of a multidisciplinary team, management of spinal injury centres, research and audit of spinal injury management and advising primary care trusts and district general hospitals.

Urological care

A spinal injury paralyses the bladder and bowel and leads to retention of urine with severe ascending infection. The input of a urologist is vital. Wagner in the nineteenth and Munro in the twentieth century proved that the preservation of renal function was the key to survival for paraplegic patients.² Patients at Stoke Mandeville and Winwick would occasionally be seen by a visiting urologist. Later, at Wharnccliffe, Anderson and Williams were the visiting urologists, but the situation changed dramatically when David Thomas was appointed full-time urologist/spinal injuries consultant at the Lodge Moor centre. His contribution to the knowledge of the management of the bladder was outstanding.

At the Liverpool centre, the urologist had a much greater involvement from the outset. Norman Gibbon wrote his Mastership of Surgery thesis on urological management and used to cycle from the station at Southport to the spinal unit carrying his manometry equipment in one hand. Subsequently, Cosby Ross and Gibbon provided a first-class urological service, each of them seeing every patient on a weekly basis. They were part of a team looking after the patients and were involved in all aspects of care from the outset to the follow-up.



FIGURE 2 Ludwig Guttman teaching in the physiotherapy department at Stoke Mandeville Hospital. (Author's photograph.)

Orthopaedic care

A spinal injury does not occur in isolation but is the result of a generalised trauma. About 90% of patients have associated injuries that will require general surgical resuscitation and, particularly, an orthopaedic surgeon's expertise to deal with both the spinal injury if there is a fracture of the spine and the fractured limbs. There was a shortage of orthopaedic surgeons at the outbreak of the Second World War, with only 98 in 1940, and many of these were not fully trained. Their numbers had risen to 227 by 1949.

Gathorne Robert Girdlestone initially fulfilled the role of orthopaedic surgeon to Stoke Mandeville.² Because Herbert Seddon would not travel to Stoke Mandeville, Joseph Pennybacker agreed to look after neurosurgery but it was a long way for him to travel. Instead, D Le Vay, a junior orthopaedic resident, was put forward to be the orthopaedic surgeon.¹⁶ At Wharncliffe, fortuitously, the Coal Mining Welfare Board sponsored Holdsworth, who took an active interest in running the unit and visited regularly. He recognised the importance of the instability of spinal fractures and pioneered spinal fixation, but his most important contribution was to initiate the immediate transfer of acute injuries to a spinal unit.

The Hexham unit was run by an orthopaedic surgeon, but Dr A Winner in her report said it was unsatisfactory.¹⁷ At Southport, the orthopaedic surgeon, Roaf, was assisted by Geoffrey Osborne. The Scottish unit was initially run by Peter Edmond, a urologist; today it is directed by an orthopaedic surgeon. The unit at Stanmore is still directed by an orthopaedic surgeon, demonstrating the strong orthopaedic influence upon the direction of these units.

Currently, it is recognised that expert orthopaedic and neurosurgical treatment is necessary from the outset, particularly for the management of unstable spinal fractures and dislocations and especially at the C1/C2 level. Later on a neurosurgeon will be required to treat post-traumatic syringomyelia, should it occur.

Nursing

Before the Second World War, leading neurologists recognised the importance of nursing for spinal injury patients and the need for regular turning. However, fears were expressed that, in the early stages, this work would be too great a strain psychologically for the nursing staff. Staffing problems were universal: nurses were insufficient in numbers, untrained and of poor quality.¹⁸ The shortage of nursing staff was addressed by seconding untrained army orderlies to the wards. Complex administrative arrangements meant that if they returned to their units immediately after the war, they would be discharged. If they stayed at the hospital they had to remain in the armed services, a point of view that the senior officers sympathised with and accepted. This led to mutiny and exacerbated the already critical staff situation.² Stoke Mandeville had eight medical orderlies seconded from the army. When Guttman enquired of one of these first orderlies what his medical experience in the army had been, back came the cheerful answer: 'Shovelling coal, sir.' However, Guttman found that, despite their total lack of experience, these strong young men could be satisfactorily trained.¹⁹

At Winwick, the nursing staff had to provide a variety of care and were frequently moved to other wards. The number of trained staff was so inadequate that many dressings were performed by untrained nurses. In 1949 there were only five male orderlies for the whole 750-bed hospital. It rapidly became apparent that adequate numbers of specifically trained nursing staff were required. A nursing course was set up at Stoke Mandeville, attracting nurses from all over the world. Guttman insisted that the nursing staff should be entirely integrated and under the supervision of the medical staff. He was very much in favour of interchanging roles so that doctors frequently did nursing duties such as dressing sores, and nurses did medical duties such as catheterisation. The training of the nursing staff was integral in the development of the service.

Physiotherapy – rehabilitation

At the time of the First World War, physiotherapy was not a recognised specialty; nevertheless, it was used to treat patients. At the outbreak of the war there was an incorporated society of trained masseurs, which grew from 1,000 members in 1914 to 3,641 in 1918; these practitioners became adept at manipulation and restoring sensation. Electricity and hydrotherapy were used in a perfunctory way to treat patients, but there was no systematic treatment.

In the early 1940s, while all the spinal units attempted physiotherapy, due to staff shortages this was largely only a gesture. At Wharncliffe, physiotherapists were originally called remedial gymnasts, and there was no occupational therapy department.⁸ At Winwick, only two physiotherapists were available to treat 60 cases, of

whom half had spinal cord injuries. At Stoke Mandeville, physiotherapy was carried out in the middle of the ward. Miss Hobson, who worked on the unit in 1944, remembered particularly 'all those things we tried out for the first time... because there was no pattern of treatment for the physiotherapist to follow'.²⁰ There was, however, a new dynamic approach at Stoke Mandeville. Patients were made to stand and walk to relieve spasms. The massage school at the Middlesex Hospital used Stoke Mandeville as a training centre to the mutual benefit of both hospitals.²

SPINAL INJURIES AS A SPECIALTY

What does the evolution of the specialty of spinal injuries in the UK tell us about the development of specialisation in general? Opposition to specialisation during the nineteenth century has been reviewed by Weisz and Grandshaw.^{21,22} The specialty of spinal injuries has only been recognised since 1944. Acceptance was facilitated by the patronage of the Royal Colleges, by Head and Holmes during the First World War and by Riddoch during the Second World War.

The pattern of a general physician or surgeon being appointed with an interest in the subject was quite inappropriate to the specialty of spinal injuries since patients required such long-term treatment they were of little value for teaching students and would have attracted a disproportionate amount of resources. Following the Second World War, such was the cost of facilities that a general physician or surgeon could not develop a spinal injury unit single-handedly, nor could beds be allocated at teaching hospitals. Thus the development of the specialty was not driven by the profession, as with other specialties, but the NHS. The opening of the units was instigated by the Coal Board,

the regional health authorities and the patients themselves, who clamoured for proper facilities.

The problem of how the units were to be staffed was an intractable one. There was a total shortage of trained personnel, and it is acknowledged that the specialty in the UK could only develop in the context of the hospital setting while elsewhere in Europe there were specialists who trained and practised outside hospitals. There was no competition or demand to treat spinal injury patients as they were dying and the job was unpopular. The only doctors interested in treating them were the orthopaedic surgeons who wanted to carry out the initial investigation and operative management upon the spine, both at Stanmore and Birmingham, but they had no commitment to the long-term care of the patients following surgery.^{23,24}

Today, more than 700 new cases of spinal injuries arise in the UK each year. Spinal units cover the whole of Britain. The initial mortality of 70% at Wharnclyffe in 1948 has declined and now, provided patients survive the immediate catastrophic injury, they have a nearly normal life expectancy. Currently, it is estimated that more than 25% of the population of patients with spinal cord injuries is over 60 years of age, requiring significantly more in healthcare provision than a similarly aged, neurologically intact population.

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