THE ROLE OF SPORT IN THE REHABILITATION OF PATIENTS WITH SPINAL INJURIES

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SUMMARY
Disabled people have been participating in sport since historical times as a means of improving their physical health. After the First World War, servicemen who had lost limbs or had been blinded took part in competitive sport. Until the development of the modern treatment of spinal injuries, patients with paraplegia died rapidly from overwhelming sepsis but as a result of modern treatment people with paraplegia returned to work and developed their own sports movement. They now compete successfully in dramatic wheelchair sports such as marathon racing and the exciting sport of wheelchair basketball. This paper describes the development of this movement.

INTRODUCTION
There used to be a misconception that there was no treatment for a patient who sustained a spinal injury, however, this changed with the Second World War when the government developed specialised spinal units. Even then, it was believed that a patient who survived the initial trauma of a spinal injury should be put on one side in a custodial unit away from society and left to die, because they embarrassed people.[1] But the patients were young and vigorous, they demanded rehabilitation and when physicians could not provide it they made their own rehabilitation and this involved sport. Sport benefits everyone but the specific advantages of sport for disabled people are shown in Table 1.

Sport improves the self-esteem of disabled people. It helps them reintegrate with society as they can compete against other disabled people and against able-bodied people in certain sports.

There is a disadvantage, which also occurs with able bodied people, some patients become obsessed with physical fitness, making the attending of the gym and participating in sport a full-time commitment. They devote their whole lives to physical fitness to the exclusion of obtaining a job and they neglect family life. It becomes an end in itself.

HISTORICAL BACKGROUND
Historically, the first record of disabled people participating in sport was in the Napoleonic wars when a team of one-armed patients of Greenwich Hospital played a team of one-legged patients at cricket.[2] Also in the nineteenth century two one-legged amputees were each provided with a wooden leg and held a walking race during a sports festival at Newmarket Heath to the enthusiasm of the spectators.[3] During the First World War in the UK, volleyball was introduced for people with amputations and non-competitive swimming was being used as a method of rehabilitation.[4]

In Germany, sport was developed for blind people and people with amputations. This started during the First World War and between the wars techniques were well-developed and competitive meetings were held.[5, 6]

Deaf people had their own sports movement and their own Olympics. The British were predominant in tennis and soccer and at the International Games held in Nuremberg in 1931 complained bitterly not only that the foreigners were receiving subsidies, which they were not, but also that there had been cheating in their football game against Czechoslovakia.[7] They were thus truly competitive sports. This movement became significant and assumed an international role. The whole subject is admirably reviewed by Guttmann.[3]

PATIENTS WITH SPINAL INJURIES
The First World War saw a large number of casualties with spinal injuries. Proper treatment was only possible in a comprehensive spinal unit but after the war these closed down and so between the wars patients with

TABLE 1
The benefits of sports to patients.

Physical benefits

- The more active the sport, the more beneficial to a disabled person. Sport improves strength, coordination and endurance. It also enables exercise to take place in a recreational situation.
- Sport is used to complement physiotherapy. It is of particular value in helping with tasks of daily living such as transfers, standing and pushing a wheelchair.

Psychological benefits

- Sport gives people confidence, improves their self-esteem and breaks down social, physical and racial barriers.
- Sport opens up people's minds. It integrates disabled people, they become part of the community through sports. It helps them regain contact with the world. In sports such as snooker and archery disabled people can compete with the able-bodied.
- Sport is an outlet for frustration.

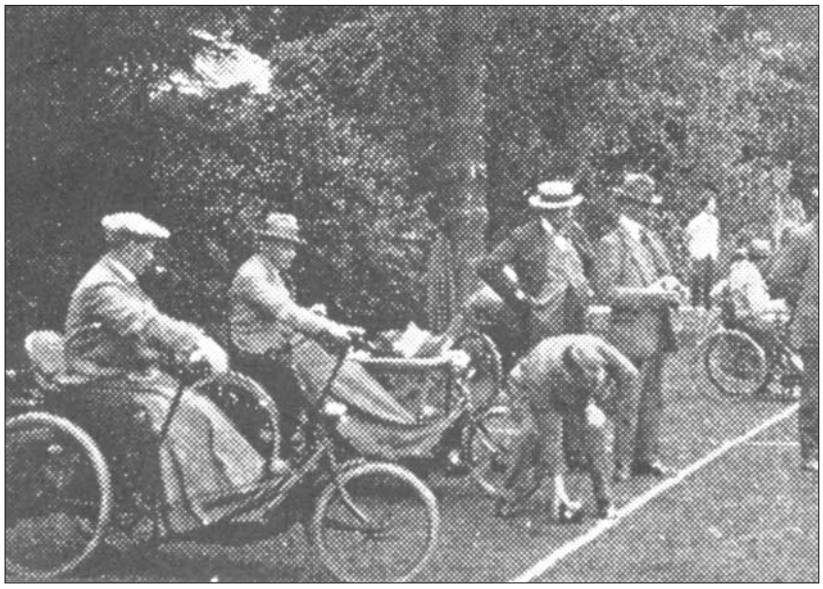

FIGURE 1

Bowling competition at the Royal Star & Garter Home. It is interesting to note the clothing in those happy amateur days. They are all in mufti. Reproduced with the kind permission of the *Royal Star & Garter Annual Medical Report,* 1923.

TABLE 2

The development of the International Paralympic Movement – summer games.

Year	Location	Comment
1948	Stoke Mandeville	National Stoke Mandeville Games for the Paralysed. 16 athletes from Stoke Manderville Hospital and Royal Star & Garter Home
1949	Stoke Mandeville	National Games. 6 UK teams
1952	Stoke Mandeville	1st International Games for the disabled. UK teams and a team from the Netherlands. 130 athletes
1953	Stoke Mandeville	International Games. Team from Canada
1954	Stoke Mandeville	International Games. Teams from 14 nations
1957	Stoke Mandeville	International Games. 360 athletes
1958	Stoke Mandeville	International Games. National team
1960	Rome	400 athletes from 23 countries. First games for disabled held in same venue as Olympic games
1962	Perth	British Paraplegic Commonwealth Games
1964	Tokyo	390 athletes from 22 countries. Wheelchair racing added
1968	Israel	750 athletes from 29 countries
1972	Heidelberg	1,000 athletes from 44 countries. 1st tetraplegic competition
1976	Toronto	1,600 athletes from 42 countries. 1st use of specialised racing wheelchairs. Other disabled athletes included those who were visually impaired
1980	Arnhem	2,500 athletes from 42 countries. Amputees and athletes with cerebral palsy included
1984	Stoke Mandeville	4,080 athletes from 42 countries. Wheelchair marathon introduced. Paralympics officially recognised by the International Olympic Committee
1988	Seoul	3,053 athletes from 61 countries. First Paralympics held with the same venues, athletes village and with an identical opening ceremony to the Olympics
1992	Barcelona	3,020 athletes from 82 countries
1996	Atlanta	3,195 athletes from 103 countries. Inclusion of the mentally handicapped
2000	Sydney	3,843 athletes from 123 countries

spinal injuries were looked after, on a custodial basis, at the Royal Star & Garter Home, in a 20-bedded unit annexed to the National Hospital for Nervous Diseases and at a home run by the Not-forgotten Association at Clapham Park.[8] There is a record of competitive sport at the Royal Star & Garter Home. In 1923, an obstacle zig-zag race in tricycle chairs took place, together with wheelchair races and shove ha'penny (Figure 1).[9]

It is not known if Sir Ludwig Guttmann,[10] who trained in Germany and was consultant at the Royal Star & Garter Home, was aware of these sporting activities, but when he established the spinal unit at Stoke Mandeville in 1944 he was treating young, vigorous soldiers and they began to participate in sporting activities on the wards. He was determined that these soldiers should not only survive but function as fully-contributing members of society. He introduced sport, primarily to train the body, but secondly to revive the spirit of accomplishment and self-worth.

Wheelchair sport has its root at Stoke Mandeville, however around the same time as Sir Ludwig Guttmann was establishing the Spinal Unit in England, the Thistle Foundation was established in 1944 in Edinburgh. The Foundation aimed to provide family housing suitable for disabled ex-service personnel and their families and, as time has passed, this provision has been extended to include people with physical disabilities who have no connection with the services.

The Thistle Foundation's founder and his wife, Sir Francis and Lady Tudsbery, had witnessed the consequences of the lack of adequate housing and support for disabled service personnel after the First World War. A swimming pool and gymnasium were included as part of the facilities and sport for the residents was encouraged. Over the years many residents have taken part in wheelchair sport and competed in National Games at Stoke Mandeville.

Initially physiotherapists used sport as a form of rehabilitation. It was carried out in the wards, in the gymnasium, in the car park and lawns of Stoke Mandeville Hospital. It began with a few sports that included archery, snooker and table tennis. This was further enhanced with the introduction of team sports such as wheelchair polo and basketball.

COMPETITIVE SPORT

On 28 July 1948, 16 paralysed British ex-servicemen and women from the Royal Star & Garter Home and Stoke Mandeville engaged in an archery competition on the lawns of Stoke Mandeville Hospital. This transformed the face of sport from rehabilitation to competition. The number of athletes and the number of countries participating rose steadily and more sports were introduced. Patients with other disabilities were able to take part (Table 3).

TABLE 3
The development of the international paralympic movement – winter games.

Year	Location	Comment
1976	Sweden	250+ athletes from 14 countries. Blind people and people with amputations included. Sledge racing.
1980	Norway	350+ athletes from 18 countries. All locomotor disabilities included. Sledge downhill racing.
1984	Austria	350+ athletes from 22 countries. Giant slalom, three track skiers.
1988	Austria	397 athletes from 22 countries. Sit skiing.
1992	France	475 athletes from 24 countries. Alpine and cross country skiing for athletes with mental disabilities
1994	Norway	1,000+ athletes from 31 countries. Sledge hockey.
1998	Japan	571 athletes from 32 countries.

EQUIPMENT

Initially competitors used standard Travaux wheelchairs but these were heavy and difficult to manoeuvre and best suited to stationary activities such as archery (Figure 2). Other sports demanded adaptations.

For activities that demanded mobility of the chair, such as basketball, lightweight wheelchairs (Everest & Jennings) were introduced from the US along with the sport of wheelchair basketball which Deaver had developed in the US (Figures 3 and 4). Specialised devices for anchoring wheelchairs for fencing were first used in 1961[11] and specialised racing wheelchairs made their first appearance in the Paralympic Summer Games in Toronto in 1976 (Table 4).

Prostheses for athletes with disabilities, allowing them to perform in sport, have improved significantly. However, this article deals primarily with wheelchair sport. People who have lost a limb and others with impairments that qualify them to participate in wheelchair sports, do so in specialised sports wheelchairs.

Nowadays sports wheelchairs are light, manoeuvrable and strong, and rather like a sports shoe, have been developed to a level where chairs are tailor made for the individual and enable them to maximise performance. Materials such as titanium and light alloys combined with creative design have led to the sports wheelchair being both functional and aesthetically pleasing. Specialised equipment, in the form of special skis, is now available for athletes to participate in snow sports.

FACILITIES

In the early days at Stoke Mandeville the visiting teams

FIGURE 2

Fencing competition in the car park at Stoke Mandeville Hospital. Note the old travaux wheelchairs, which are not anchored and again the clothing in these happy amateur days. They are all in mufti. Reproduced with the kind permission of Kluwer Academic/Plenum Publishers from *The History of the Treatment of Spinal Injuries* by JR Silver.

FIGURE 3

Disabled people using modern racing wheelchairs. Reproduced with the kind permission of © Graham Bool Photography. Thanks also to the British Wheelchair Sports Foundation for their assistance.

FIGURE 4

People with amputations participating in basketball, using lightweight wheelchairs in a special stadium. Reproduced with the kind permission of © Graham Bool Photography. Thanks also to the British Wheelchair Sports Foundation for their assistance.

TABLE 4
Historical development of the sporting movement.[11]

Date*	Sport
from WW1	Darts, table tennis, snooker, skittles
1944	Wheelchair polo
1948	Archery
1949	Netball, bowling
1950	Field events such as javelin and shot put
1951	Snooker, table tennis
1953	Swimming
1955	Fencing
1956	Basketball
1958	Club throwing
1961	Lawn bowling, weightlifting, fencing (épée) and discus throwing
1964	Wheelchair racing and slalom
1976	Winter sports: sledge downhill racing
1984	Wheelchair marathon. Giant slalom, three track skiers
1988	Sit skiing
1992	Alpine: downhill, special, giant, super G, alpine and cross-country skiing for athletes with learning difficulties
1994	Sledge hockey
1996	Equestrian, sailing and wheelchair rugby

*Most dates taken from minutes of meetings of Managers and Trainers when the resolution was passed to include these sports.

slept in the wards, in the laboratories, and in doctors' quarters to the detriment of medical treatment (Table 5). Appropriate sleeping accommodation suitable for disabled people had to be provided.

The number of athletes increased and the standard of competition improved, spurring the need for more, and better, facilities. Facilities suitable for recreation or therapy were not suitable for competition. Wheelchair basketball could not be played competitively on a gravel car park. It had to be moved indoors to a sports hall with a special floor.[12] Certain sports such as swimming could not take place until the pool provided for hydrotherapy was built but this proved too small for competitive events.

Competitors demanded more appropriate facilities and money was raised to build a sports stadium at Stoke Mandeville by public appeal on the understanding that the facilities would be made available to the general public. The Ministry of Health made the ground available at £1 per year rent. By September 1969 the Building Fund stood at £296,922 and the stadium was officially opened for the 1969 International Games. Over the years many facilities have been added. An Olympic village was completed in time for the 1981 International Stoke Mandeville Games and the stadium was refurbished in 2003 at a cost of £10·2 million.

TABLE 5
Evolution of the facilities at the National Spinal Injuries Centre.

Date	Facility
1944–1952	Sports held on the front lawns
1944–1952	Sports held in the car park
1952	Hydrotherapy pool opened
1955	Prefabricated huts erected for visiting teams, sports field made available at rear of hospital
1961	Visiting teams still sleeping in the hospital
1964	6 lane, 100 metre track built
1969	Sports stadium opened
1974	Indoor bowling and bar opened
1981	Completion of Olympic village
2003	Refurbishment of stadium

The stadium now has the following facilities: sleeping accommodation, badminton courts, separate indoor bowling green, athletics track, multi-sports hall and swimming pool. It also serves as a conference centre with meeting rooms, a group training studio, a café/bar, and a crèche. Such facilities are expensive to build, run and maintain. The stadium at Stoke Mandeville now costs around £1,000,000 per year to run. It is also the headquarters of the British Wheelchair Sports Foundation, which costs £500,000 per year to run.

The British Wheelchair Sports Foundation is the national organisation for wheelchair sport and the umbrella body for some 16 sports. Founded by the late Sir Ludwig Guttmann as the British Paraplegic Sports Society, the Foundation owns the recently developed Stoke Mandeville Stadium adjacent to the hospital site. The British Wheelchair Sports Foundation organises wheelchair sport for all ages and abilities and provides opportunities for recreational and competitive sport. Jean Stone, MBE, is the Chairman of the Foundation's Sports Executive Committee and has been involved with wheelchair sport and the Paralympic Movement for more than forty years. During that time the Paralympic Games have grown from 400 athletes in the first Games in Rome in 1960 to the 5,000 athletes and officials who will take part in the XII Summer Games in Athens in 2004. The Foundation still plays an important role in the use of sport within rehabilitation and annually hosts the Inter

Spinal Unit Games for recently paralysed people. These Games provide an introduction to sport, which can often be the catalyst for increased confidence and self-esteem. However, sport is a billion-pound industry and, although it can be initiated on an *ad hoc* basis, its maintenance is a fully professional task. Countries with disabled sports centres include Japan, Spain, Switzerland, Israel, Italy, France and a number of countries in the Middle East. Some centres are attached to hospitals while others are freestanding.

THE SPORTS MOVEMENT

Sport for disabled people has evolved from rehabilitation to competition. The first teams to compete at Stoke Mandeville were from the UK. The idea spread and the Dutch competed there in 1952. The Paralympic Summer Games were held abroad in 1960 in Rome and have since taken place subsequently in Perth, Tokyo, Israel, Germany, Toronto, Arnhem, New York, Seoul, Barcelona, Atlanta and Sydney. Sweden hosted the first Paralympic Winter Games in 1976; by 2000, athletes from 123 countries competed in Sydney (see Table 2). Just as with other sporting movements, facilities alone were not enough. There had to be professional organisation. The Paralympics have attracted large crowds, in 1964 in Tokyo there were 100,000 spectators during the four days of competition.

CLASSIFICATION

A major problem has been that of classifying the different degrees of paralysis. There is a great difference between a paraplegic patient who has sustained a complete transection of the spinal cord in his or her mid-thoracic region, another patient with an incomplete cauda equina lesion, and an even greater difference with a tetraplegic patient. They cannot all compete in the same categories. This problem could be overcome with doctors assessing the different levels of lesion. Classification is currently carried out by qualified classifiers who are not always medically qualified.

OTHER DISABILITIES

A further problem was the position of people with other disabilities. Deaf people had their own sports movement and arrange their own competitions. Patients from Germany with amputations and visually impaired people also initially had sports movements but such was the success and the glamour of the paraplegic games that there was a movement to incorporate all disabled people in the Paralympics.

Controversy arose as to whether the paraplegic games should include all disabilities or should be restricted to paraplegic people alone. Other organisers, particularly Hans Lindström, an international swimmer before losing his leg, and competitors wanted to include people with other disabilities. In 1976 the games in Toronto included athletes who were blind or had sustained amputations.

PROFESSIONALISM

Initially the medical profession, personified by Guttmann, dominated the paraplegic sports movement. He insisted that doctors should be in charge but this led to problems. Athletes devoted more and more time to sport and sport for disabled people became more professional, particularly in the US, where participants could earn up to $50,000 a year. Consequently, demand arose for competitions where facilities were adequate and the sports were properly administered by the appropriate sporting body.

There are currently a few thousand professionals in disabled sport in the 25 different disciplines. In the UK alone there are 200 professional disabled athletes. Financial assistance is available to anyone who has medal potential, and prize money can be won in wheelchair races; tennis players on international tours are paid; some basketball players have sponsors; and Italy and Spain have national professional teams. Tickets were sold for the first time in 1996 in Atlanta, there was a corporate sponsorship programme and television rights were sold. In the UK, tennis officials are provided by the British Tennis Umpires Association. They can officiate in tennis matches with disabled and able-bodied people because the rules are the same apart from the fact that the ball is allowed to bounce twice for tennis players confined to a wheelchair. However, in wheelchair rugby the rules are entirely different so officials are hard to find.

SELECTION OF ATHLETES

Patients are introduced to sport and shown the equipment at spinal units. Initially, this is regarded as part of their treatment. If they show aptitude and willingness, they can participate on a competitive basis. There is the contrary view that games should be held purely on a participatory basis.

CONTROVERSIAL ISSUES

The sports movement has been an undoubted success.[13] It is a vigorous, controversial, developing field with new sports continually being introduced. There is a fear that disabled people will become totally immersed in the sports movement only mixing with other disabled sportspeople and will not integrate into society as a result. This fear was so real that Dr A Jousse, who was in charge of the Canadian Unit at Lyndhurst Lodge, felt that they should only compete with able-bodied people in sports such as moose shooting and not compete against other disabled people. Opinions differ as to whether sports for disabled people should fall under the governorship of the relevant sport, such as Rugby Union, or should have their own governing body. The athletes, coaches and clubs firmly believe in integration with organisation by sport not by disability. There should be one overall governing body responsible for sport for athletes with a disability.

There is also the very interesting issue of the use of the equipment by able-bodied people. Although a disabled sportsman may be a world champion shot putter in a wheelchair, is he the world champion if he were to compete against an able-bodied person using a wheelchair? From historical times disabled people, such as Lord Byron, have competed successfully with able-bodied people but even more remarkable is the example of paraplegic people who have participated competitively to an Olympic level in sports such as archery. Mrs Margaret Harriman, a paraplegic, became an outstanding archer and was chosen to represent South Africa in a championship competition of able-bodied archers held in Norway and came 8th out of 48 competitors.[3] The wheelchair athletes who participate in the London marathon have to start at a different time because they can cover the distance much faster than an able-bodied person running.

IMPACT ON SOCIETY

Society now sees disabled people in a different light as a result of legislation. The Disability Discrimination Act has affected all sectors of society; public transport, buildings and businesses are all required to make provisions for people with disabilities. In the sporting arena, this enables more people to access sports facilities near to their homes and it has a positive impact on the health of disabled people.

The Paralympic Games have also had a significant impact on how the world views disabled people. The positive image of disability sport, whether it is a blind runner or a wheelchair basketball player, has led to greater awareness of disability and greater understanding. Breaking down barriers for all disabled people has been a positive impact of the Paralympic Games,p in particular in countries where disabled people are considered second-class citizens. Sport not only has physical benefits there can also be social benefits enabling disabled people to play an active role in the community and to be integrated into society.

CONCLUSION

The sports movement has been very successful. It has improved the physical fitness, independence and self-respect of the participants. Disabled people are no longer consigned to the backroom but are the centre of worldwide television and radio coverage.

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