

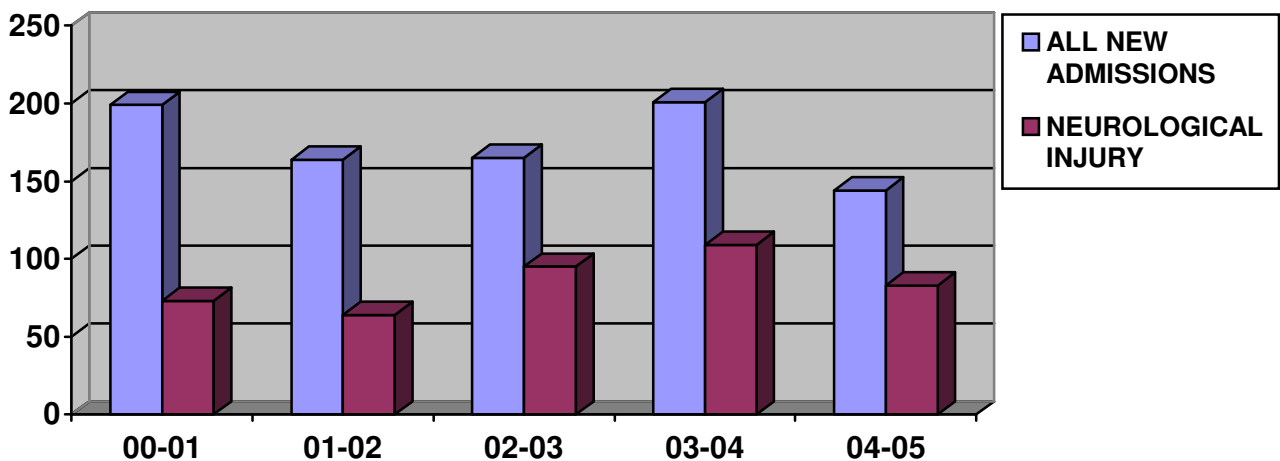
1.0 Introduction

The Queen Elizabeth National Spinal Injuries Unit is responsible for the management of all patients in Scotland who have a traumatic injury to the spinal cord. This involves the acute management of the injury, rehabilitation to maximise function and life long follow up to prevent the complications of paralysis.

The Unit also provides support to all hospitals in Scotland who admit fractures of the spinal column. This support varies, from simple advice to local visits and consultations. Complex fractures, without neurological injury, requiring surgery or specialised rehabilitation are admitted as necessary.

Patients whose spinal fracture is complicated by a neurological injury often require acute surgical intervention combined with a period of SITU or HDU care before a prolonged period of rehabilitation. Rehabilitation consists of education, physiotherapy, occupational therapy, and multi-disciplinary care to maximise the full potential remaining following injury. Inpatient stays can be long. Historically in the UK averaging one year for tetraplegics and six months for paraplegics. The unit has a policy of early rehabilitation and discharge into the community with appropriate support. Those with neurological injury drive the workload of the unit where a small number of severe injuries have a significant impact on the workload.

During the year there was a rolling programme of painting throughout the unit. This resulted in an average of six beds closed at any one time over a six-month period. There was no significant impact on neurologically injured patients but inevitable some non-neurologically injured were managed conservatively in their referral hospital rather than being transferred to the unit.



Over the course of the year a total of one hundred and forty four patients were admitted to the unit. There were sixty-nine patients who had sustained a complete or incomplete neurological injury. The number of patients with no neurological deficit decreased significantly due to a decreased incidence, improvements in managing patients in their local hospital and a temporary decrease in available beds.

2.0 Activity

The annual report and its associated appendices contain a comprehensive analysis of the Spinal Injury Unit activity and the individual reports of each department or associated body.

2.1.1 New In-Patient Activity

An increasing number of referred patients were treated by outreach medical services or as outpatients due to limitations on beds. Despite the number of bed closures all patients with a neurological injury in Scotland were managed in the unit.

	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	TOTAL 1992- 2005
NEW ADMISSIONS	199	164	165	201	144	2021
Neurological	73	64	95	109	83	897
Non-neurological	126	100	70	92	61	1124

Appendix DA1

In excess of 190 patients were referred to the unit during 2004-2005. Orthopaedic consultants managed over fifty patients without neurological deficit in the referral hospital following advice. The Units consultant medical staff or Liaison nursing staff managed a number of cases in the referral hospital. An increasing number of elderly patients with cervical injuries necessitated halo fixation in the referral hospital with outpatient follow up in the unit. A number of patients were managed in the Neuro-surgical and Orthopaedic wards of the Southern General Hospital because of concomitant injuries. In a few cases the referrals were inappropriate for admission but could be treated as outpatients. We continue to receive referrals for advice via the Internet.

2.1.2. New Admissions: Case mix Complexity

The severity of a Spinal Cord Injury is dependent on the anatomical level of and the extent of neurological damage. This has considerable bearing on the type and extent of rehabilitation each patient requires. This case mix complexity has been classified as follows.

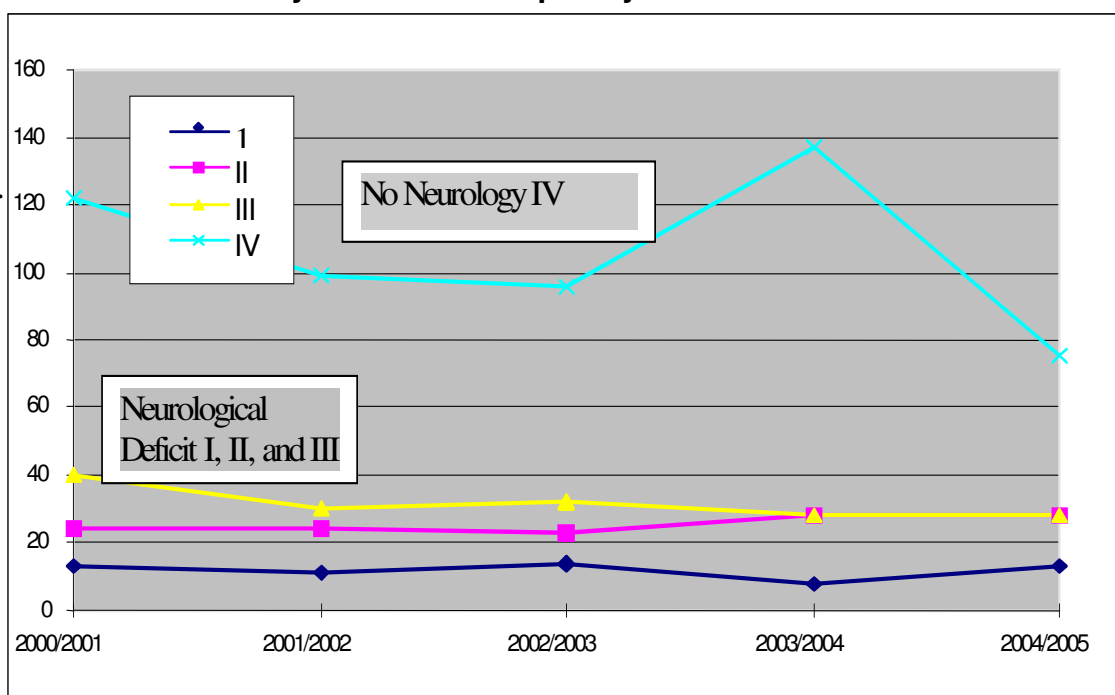
	ANATOMY	NEUROLOGY
GROUP I	Cervical Injury 1 - 4	High Tetraplegia
GROUP II	Cervical Injury 5 - 8	Low Tetraplegia
GROUP III	Thoracic, Lumbar and Sacral Injury	Paraplegia
GROUP IV	All levels of Injury with	Incomplete or no Paralysis

Group I patients have the most severe neurological injuries and are the most dependant. The numbers are expected to vary considerably each year.

Group II and **Group III** have a significant neurological loss and are very dependant and require the longest period of rehabilitation.

Group IV includes all patients with spinal fractures and incomplete or no paralysis. Many require significant input during their rehabilitation and possible return to work.

2.1.3 New Admissions by Case-Mix Complexity



Appendix DA2

GROUP	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	Total 1992/ 2005
I	13	11	14	8	13	135
II	24	24	23	28	28	317
III	40	30	32	28	28	445
IV	122	99	96	137	75	1124
Total	199	164	165	201	144	2021

There was a rise in the number of highly dependant Group I patients since the previous year. All patients with this level of injury were male. The number of patients admitted with no neurology decreased significantly. This is related to a reduction in incidence, and the opportunity for management at the primary referral hospital and the reduction in beds due to the painting programme. There was an increase in the number of patients managed by phone.

The variation in complexity in Group IV is better demonstrated by ASIA grades. The rate of throughput remains higher than any other spinal injury unit in the UK.

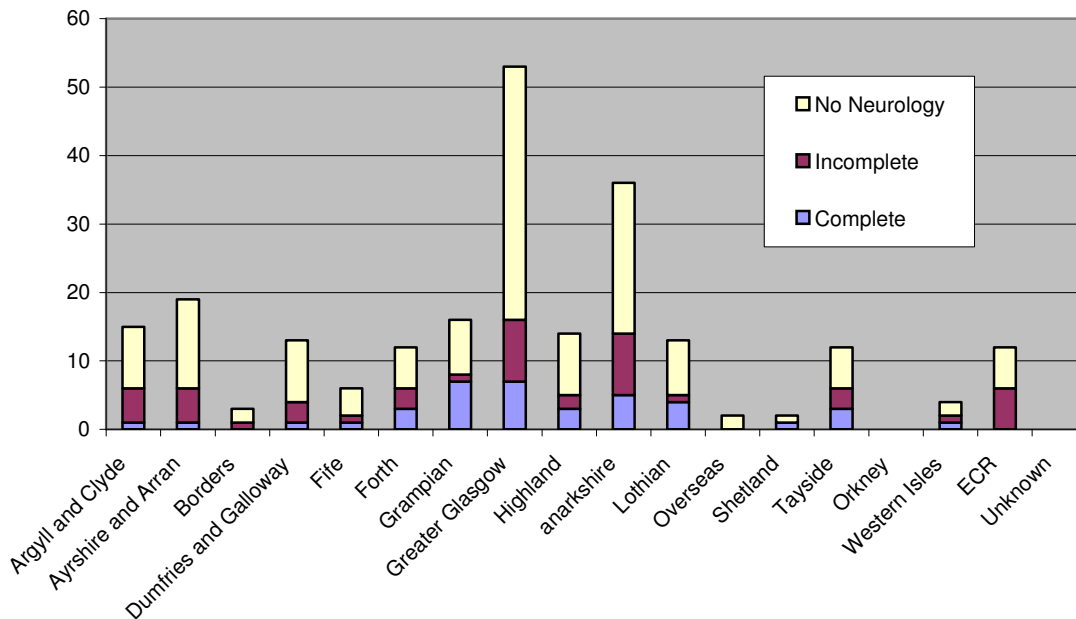
2.1.4 New Admissions by ASIA Impairment Level & Health Board

2004/2005	A	B	C	D	E	Total
Argyll & Clyde	1	2	1	2	3	9
Ayrshire & Arran	1	2	2	1	7	13
Borders	0	1	0	0	1	2
Dumfries & Galloway	1	0	0	3	5	9
Fife	1	1	0	0	2	4
Forth Valley	3	0	2	1	0	6
Grampian	7	0	1	0	0	8
Greater Glasgow	7	1	1	7	21	37
Highland	3	1	1	0	4	9
Lanarkshire	5	1	5	3	8	22
Lothian	4	0	1	0	3	8
Overseas	0	0	0	0	2	2
Shetland	1	0	0	0	0	1
Tayside	3	0	3	0	0	6
Orkney	0	0	0	0	0	0
Western Isles	1	0	0	0	1	2
ECR	0	0	0	2	4	6
Unknown	0	0	0	0	0	0
TOTAL	38	9	17	19	61	144

ASIA Impairment Scale

A	Complete: No motor or sensory function
B	Incomplete: Sensory but not motor function is preserved below the neurological level and includes S4-5
C	Incomplete: Motor function is preserved below the neurological level, and more than half of key muscles below the neurological level have a motor grade less than three
D	Incomplete: Motor function is preserved below the neurological level, and at least half of the key muscles below the neurological level have a grade more than three
E	Normal: Motor and sensory function is normal

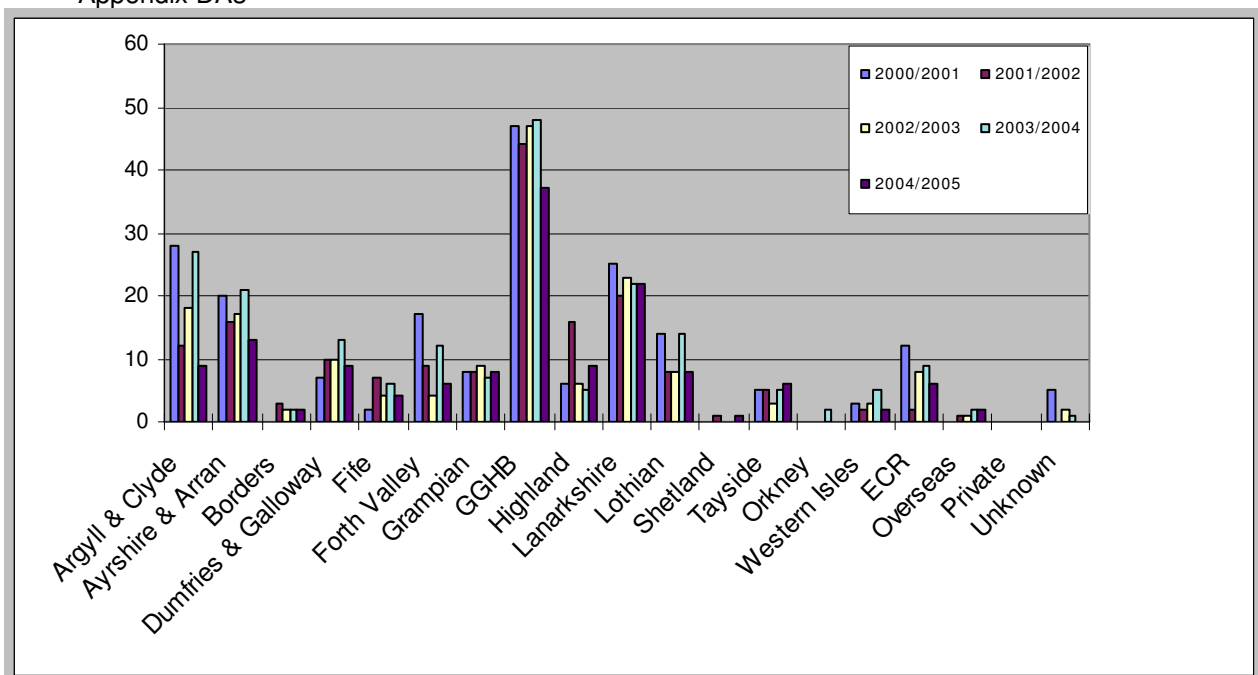
2.1.41 Admissions by neurological Deficit and Health Board



GGHB is responsible for the largest number of complete and incomplete spinal cord injuries. The number of non-neurological injuries admitted from all regions has reduced. The distribution of complete and incomplete injuries varies by year. Complete injuries were admitted from both the Western Isles and Shetland. All boards except Borders referred one or more complete injuries. The distribution of admissions and the annual variation since the unit opened justifies the economic benefits of an national service.

2.1.5 New Admissions by Health Board Of Residence

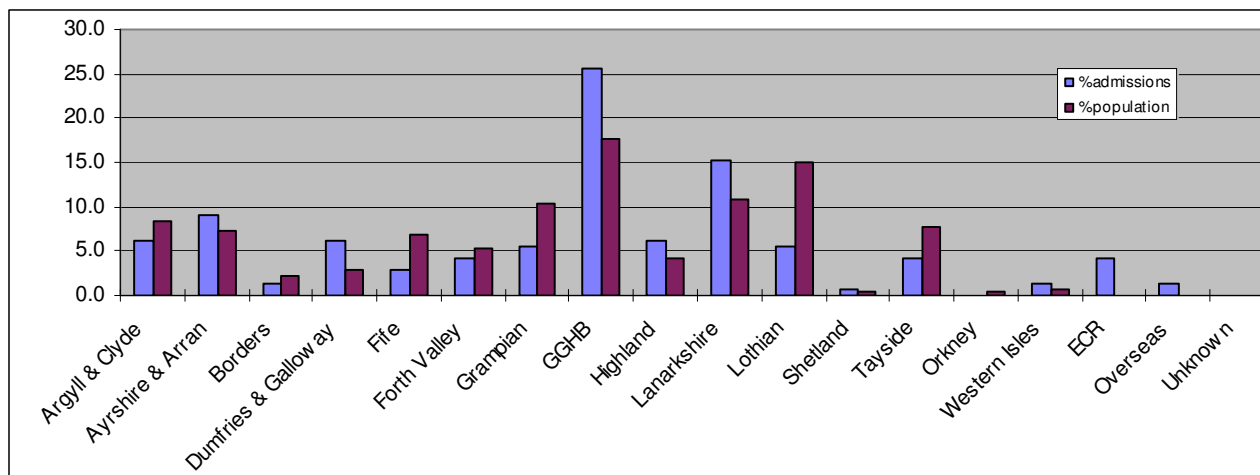
Appendix DA3



An increased referral pattern from some health boards reflects leisure-related accidents. Patients domiciled in Scotland but who are injured abroad are repatriated when clinically indicated and then recorded under their own health board.

2.1.6 Admissions by Health Board compared with Population Size

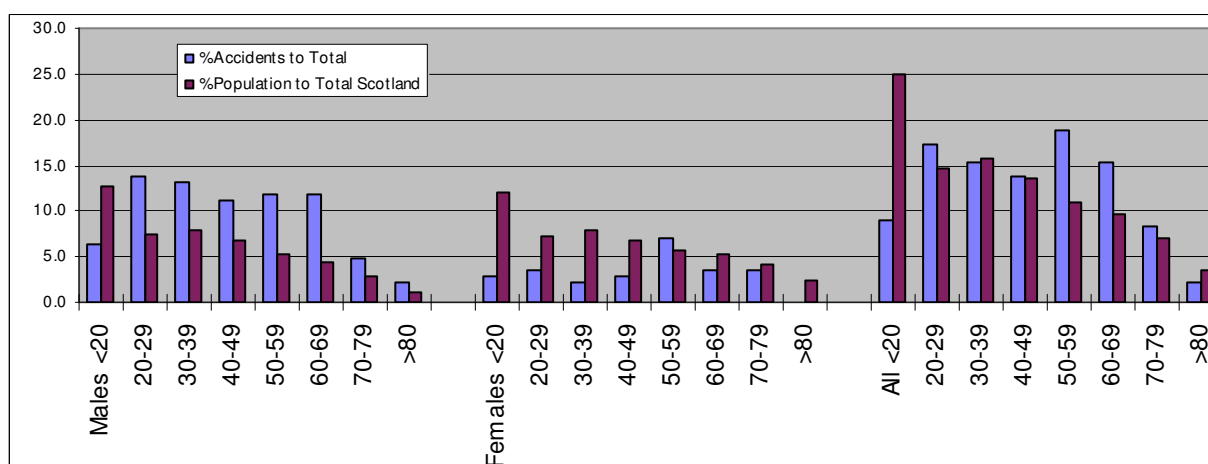
Appendix DA4



There continues to be a preponderance of referrals from the adjacent Health Authorities of Greater Glasgow Health Board, Argyll & Clyde, Lanarkshire and Ayrshire and Arran. This reflects an increased incidence of neurological injury from these regions and patients with fractures requiring surgical fixation. There is an increasing demand for care of non-neurological injured patients. Neurological injured patients remain the priority.

There has been positive encouragement for consultant medical staff in Lothian, Tayside and Grampian to develop services for those patients with no neurological injury. Support is always available from the unit in the management of these patients. This has significant benefits for both patients and relatives.

2.1.7 New Admissions by Age Group



The age distribution is as expected. There is a preponderance of males disproportionate to the population. The number of injuries in those under twenty remains low. The increase in age-related degenerative spinal fractures continues. The management of an increasing

number of elderly patients with cervical injuries managed, as outpatients, are not reflected in these figures.

2.1.8 Length of Stay for Traumatic Injury by Level of Spinal Cord Lesion

Case mix	No. of patients	Mean L.O.S. (days)	Range of L.O.S.
I	5	229	181 - 313
II	28	207	33 - 617
III	30	138	0 - 319
IV	78	24	2 - 257
All	141	92	0 - 617

Throughout the last ten years there has been significant effort spent on reducing the length of stay within the unit. Improvements in surgical intervention and rehabilitation strategies have resulted in better patient outcomes and earlier discharge. The wide variation of length of stay within each classification is indicative of the variation in the rehabilitation needs within each group.

The low median length of stay of Group IV is indicative of the efficient management of such patients by appropriate surgical stabilisation or use of halo jackets or thoraco-lumbar spinal supports.

The total number recorded in this section is lower than the total number of admissions because not all patients are discharged within the calendar year.

2.2 In-patient Procedures

The acute management and rehabilitation of the spinal injured patient can involve a significant number of in-patient surgical procedures. This section outlines the major surgical procedures carried out during the year.

2.2.1 Surgical Stabilisation

Surgical stabilisation of spinal fractures is carried out to prevent further neurological damage, aid early rehabilitation and to promote good long-term function. Rarely late surgery is indicated to reduce pain and deformity or to deal with neurological complications. Failure of orthotic management is a further indication for surgery. A team approach to decision making is used to optimise patient outcome.

There has been continued Orthopaedic and Neuro-surgical development of internal fixation devices. A pro-active approach to cervical and thoraco-lumbar surgery is followed to permit early rehabilitation, a reduced length of stay and better functional outcome. It is probable that there is a higher rate of intervention than in other UK units. To date no comparable data is available.

Over the year the orthopaedic team carried out twenty-four thoraco-lumbar fixations and the neuro-surgical teams fourteen cervical fixations.

2.2.2 Spinal Injury Specific Surgery

A wide range of procedures, involving orthopaedics, plastic surgery, urology, general surgery, ENT and neurosurgery, are required for acute and long-term patients. The spinal unit staff and appropriate specialists from the Southern General Hospital provide this service. Over thirty-six spinal injury theatre lists were carried out over the course of the year involving fifty-two individual procedures and seven surgical specialities. Additional upper limb and orthopaedic trauma cases were performed in the orthopaedic theatre. Day Case procedures carried out within the unit are recorded in a later section.

2.2.3 Implanted Pain Control

Over the year two new pumps were implanted to control pain and spasticity. Chronic pain is a significant problem for patients with a spinal cord injury. An increasingly sophisticated approach is taken to its management. One approach is the surgical implantation of reservoirs of analgesic drugs.

In January 2004 a dedicated intrathecal pump clinic was set up. The two clinic staff are fully trained in routine pump refills and have access to senior medical staff at all times.

Patients attend with varying frequency to have pumps refilled and have the pump reprogrammed. Between five and twelve patients attend each clinic.

At present thirty-three pumps are implanted and operational. Twenty-two patients attend the QENSIU for refills and eleven attend local hospitals.

Pumps Active 04-05	
Isomed	15
Synchromed	13
Archimedes	5

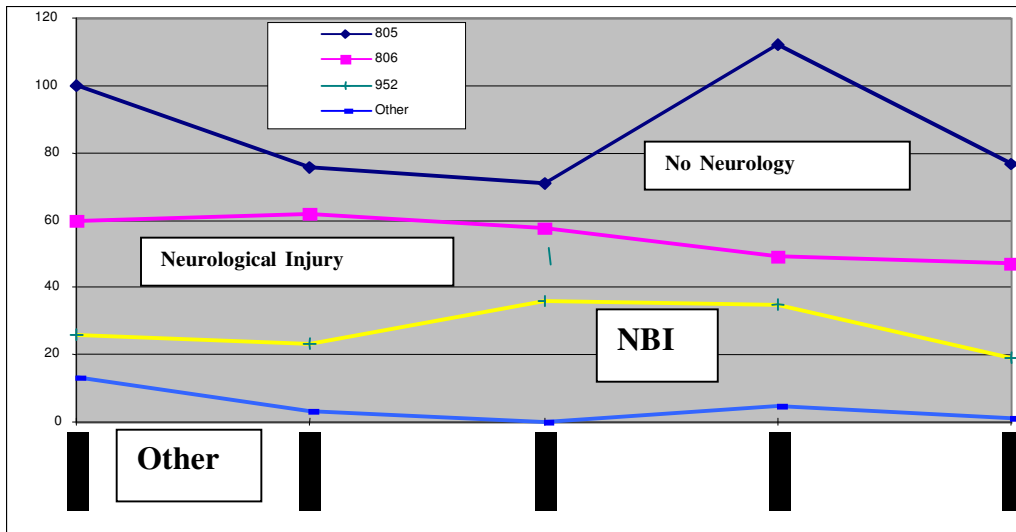
2.3 Admissions and Discharges by Degree of Injury

The degree of injury is dependent on the type and effect of the injury. A non-traumatic spinal cord injury may be more serious in terms of outcome and dependency than a traumatic lesion with a major neurological deficit. The spectrum of activity in the unit is shown by the appropriate ICD9 codes.

The ICD9 codes are as follows

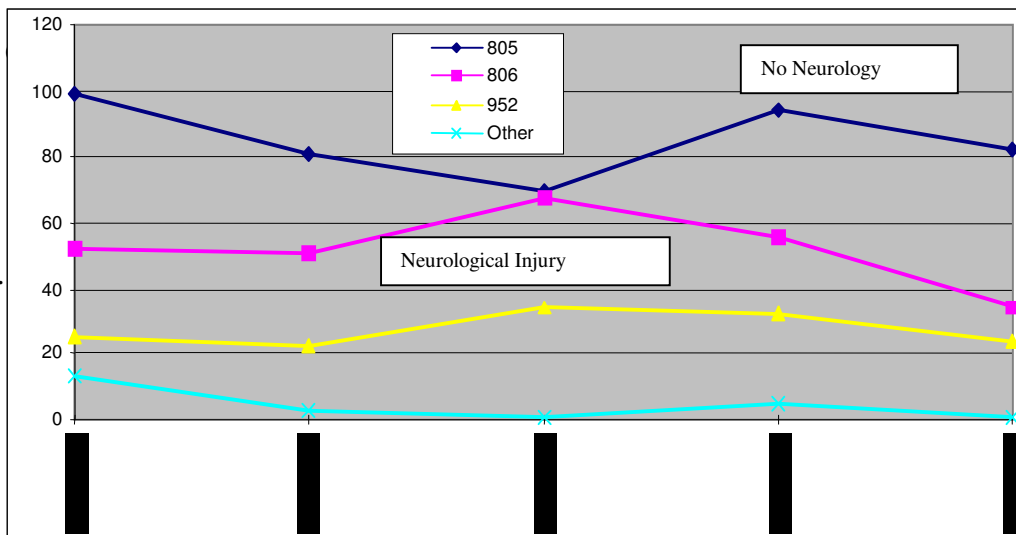
- 805** Fracture of vertebral column without mention of spinal cord injury
- 806** Fracture of vertebral column with mention of spinal column injury
- 952** Spinal Cord Lesion without evidence of spinal bony injury
- OTHER** Other Spinal Cord Related Conditions

2.3.1 Admissions by Degree of Injury



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2.3.2 Discharges by Degree of Injury



Appendix DA6

It is predicted that there will be around eighty new spinal cord injuries per year for a population the size of Scotland (5.5 million). The exact nature will vary from year to year but all are admitted for treatment and rehabilitation.

Overall there are approximately five hundred spinal fractures a year, the majority having no neurological injury, being managed by orthopaedic surgeons in local hospitals. There is an increasing demand for advice and admission for such fractures. This is related to a reduction in the number of surgeons having an interest in spinal work and pressure on beds to cope with elective orthopaedic surgery. The unit is anxious to be of assistance wherever possible and sees it having an important role in the management of the more complex fractures and providing advice at all times.

2.3.3 Admissions and Discharges for Non Traumatic Spinal Cord Injury (ICD 9 Code 952)

2004/2005	Admissions	Discharges
Central Cord Lesion	12	18
Infection	1	1
Vascular		2
Tumour		
Surgical	3	2
Non-specific Lumbar Lesions		
Penetrating Wounds gun/stab		1
Other	3	
Total	19	24

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NOTE: Non-traumatic spinal cord injury is misleading as it includes Central Cord Syndrome that is traumatic in origin but does not involve significant bony damage. Central Cord Syndrome often results in major paralysis. It usually occurs in the elderly population who have osteoarthritic changes in the cervical spine and results in a severe disability with a predominantly upper limb paralysis with high dependency. It is anticipated that this type of injury will continue to increase in line with demographic changes.

2.3.4 In-patient Bed Days

2004/2005	Edenhall (HDU)	RCU	Philipshill (Rehab)	TOTAL
Beds	12	4	32	48
Actual -TOBD				
Available				
Bed Occupancy %				
ALOS				

The unit operates an acute admission system to Edenhall Ward based on clinical priority. Philipshill Ward admits from Edenhall Ward and an elective waiting list or planned transfer. It continues to be impossible to obtain complete occupancy figures for the unit from the HIS/PAS systems.

There has been a continued reduction in the overall length of stay for the majority of patients during the year. This has been achieved by reduction in the delay between actual and intended date of discharge.

2.3.5 Delay Between Actual and Intended Date of Discharge

	No. of patients discharged	No. of Patients Delayed	Mean delay (days)	Range of Delay (days)	NO DELAY
2000/2001	189	27	68	1 - 877	85%
2001/2002	157	11	19	1 - 107	92%
2002/2003	173	8	46	2 - 212	95%
2003/2004	187	7	52	1 - 188	96%
2004/2005	141	0	0	0	100%

There were no patients who had an identifiable delay to discharge during the year. This is slightly misleading as there are patients who remain in the unit awaiting discharge beyond their intended date. The principal reasons for delay remain problems with housing and or difficulties in placement in long-term nursing homes especially for those with severe disability including ventilator dependency. The appointment of a discharge co-ordinator has contributed to the progress in this area but there remains a need for a step down facility to maintain progress in rehabilitation. Discussions have taken place with a private charity that is interested in providing temporary placement in specially adapted housing. The significant improvement over the last five years is due to considerable efforts by the unit staff and social work services throughout Scotland.

2.3.6 Re-admissions to the unit

The majority of neurologically injured patients discharged from the unit never require re-admission. They attend annually or bi-annually as out patients for lifelong follow up. In some ways readmission at any time must be regarded as a failure. Some re-admissions are inevitable and cannot be prevented by greater education or increased care in the community.

There were thirty-six readmissions to the unit during the year. This is a further reduction on previous years and significant shortfall on the contract estimate of 200.

Case-mix complexity and individual patient circumstances are out with the control of the unit. A continued emphasis on discharge at the appropriate level of rehabilitation and education should ensure that the number of re-admissions remains at a satisfactorily low level.

2.4 Out patient Activity

The out patient activity of the unit is focused on the post discharge management of acute injuries and the long term follow up including the management of complications. Dedicated clinics in Orthopaedics, Neurosurgery, Urology, Rehabilitation and Pain Management supplement the nurse led annual review clinics for those patients with a

substantial neurological deficit. Early discharge of patients, with no neurological injury and no expectation of future disability, to their General Practitioner is encouraged.

New patients are referred to the out patient clinic for consultant opinions regarding chronic neurological dysfunction secondary to spinal cord injury, pain, deformity, and bladder or bowel disturbance.

The unit strives to provide a service for the whole of Scotland. It is self-evident that it is often easier for a multi-disciplinary team to travel rather than a number of patients. Out reach clinics are held in Raigmore Hospital (Inverness), Edenhall Hospital Edinburgh, Foresterhill Hospital (Aberdeen), Dumfries and Galloway Royal Infirmary, The Borders Hospital and Arbroath. This service is dependant on local hospitals and their staff for facilities and resources. Their help has been essential in the setting up and continued success of the clinics.

2.4.1 Summary of Out-patient activity

	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005
Return	2074	2229	2228	2412	2205
New	139	90	88	93	121

The number of return and new outpatients has stabilised. The majority of new patients are tertiary referrals involving complex medical investigation and assessment.

2.4.2 New Out-Patient Activity by Health Board

	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005
Argyll & Clyde	32	25	19	22	26
Ayrshire & Arran	4	7	5	8	8
Borders	1	0	0	0	1
Dumfries & Galloway	2	2	1	10	2
Fife	1	0	1	2	2
Forth Valley	15	3	4	7	4
Grampian	0	4	1	2	1
Greater Glasgow	45	29	32	22	41
Highland	0	1	1	1	0
Lanarkshire	29	16	20	15	27
Lothian	6	2	3	3	4
Shetland	0	0	0	0	1
Tayside	1	1	0	1	1
Orkney	0	0	0	0	0
Western Isles	2	0	1	0	2
ECR	1	0	0	0	1
Total	139	90	88	93	121

2.4.3 Out -Patient Activity by Centre

	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	CHANGE PREVIOUS YEAR	TOTAL 1992- 2005
New QENSIU	139	90	88	93	121	+ 30%	774
Return QENSIU	1729	1934	1880	2090	1851	-11%	17204
Edinburgh Edenhall	255	171	189	189	192	+2%	1924
Raigmore Inverness	51	55	47	28	57	+104%	401
Aberdeen	46	51	65	55	51	- 9%	281
Dumfries	18	18	24	19	15	- 21%	94
Borders	0	0	23	14	16	+ 14%	53
Arbroath	0	0	0	17	23	+35%	40
	2238	2319	2316	2505	2326	- 7%	20771

The outpatient service continues to respond to the variable demand throughout the regions. The aim is to provide as local a service as practical and in line with need. The outreach clinics are designed to provide the same level of multidisciplinary care that is available in the parent unit. The unit has hosted a number of visitors from other units interested in introducing similar services in other regions of the UK.

Frequency	Location		
Weekly	QENSIU NEW	QENSIU RETURN	Edinburgh
Three Monthly	Aberdeen	Inverness	
Six Monthly	Dumfries	Borders	Arbroath

2.4.4 Outpatient Activity by Specialty at QENSIU

		2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005
Orthopaedics	DBA	123	97	114	136	143
Neurosurgery	RAJ	86	133	126	108	57
Neurosurgery	JB	0	0	0	0	64
Urology	GC	370	356	287	267	256
Skin Care		200	145	115	187	111
Pain / Acupuncture		96	57	191	295	222
Neuroprosthetics	TH/MF	13	42	22	29	19
Sexual Dysfunction		27	45	41	47	18
Spinal Injury	TOTAL	953	1059	984	1021	961
Annual Review						
	MEDICAL		639	603	681	569
	NURSING		420	381	343	392
Total		1868	1934	1880	2090	1851

There has been a further increase in the number of patients seen at the Consultant Specialist Clinics. A number of patients previously seen at the Neurosurgical Clinic are now followed up at the Halo Clinic as day cases. Urodynamics and halo fixation are now designated as day case procedures.

The appointment of two consultant anaesthetic sessions in pain control has significantly improved the service to patients and resulted in an increased activity in this area.

Spinal Injury Annual Review clinics are a large component of the commitment to life long care. These are nurse led with only sixty percent of patients requiring medical input. The upper limb neuro-prosthetic service continues to be developed. This is extremely time-consuming despite the small number of patients attending.

Measurement of activity at clinic level indicates that there is a continued underreporting of activity by 10%. The system failing to capture referrals from the wards, informal "drop in" consultations and some follow up appointments. The recent introduction of a HIS system within the trust should remedy this anomaly.

2.5 Day Case Activity

Day case activity continues to offer an important service for minor surgical procedures, medical interventions and nursing care. The new developments in spinal fracture management, pain control and sexual dysfunction are expected to maintain this activity. The introduction of pain control sessions in 2002 has increased activity. The level of Day Case activity exceeds the contracted activity but will be self limited due to the finite population of spinal injured patients.

2.5.1 Day Case Attendances by Reason For Admission

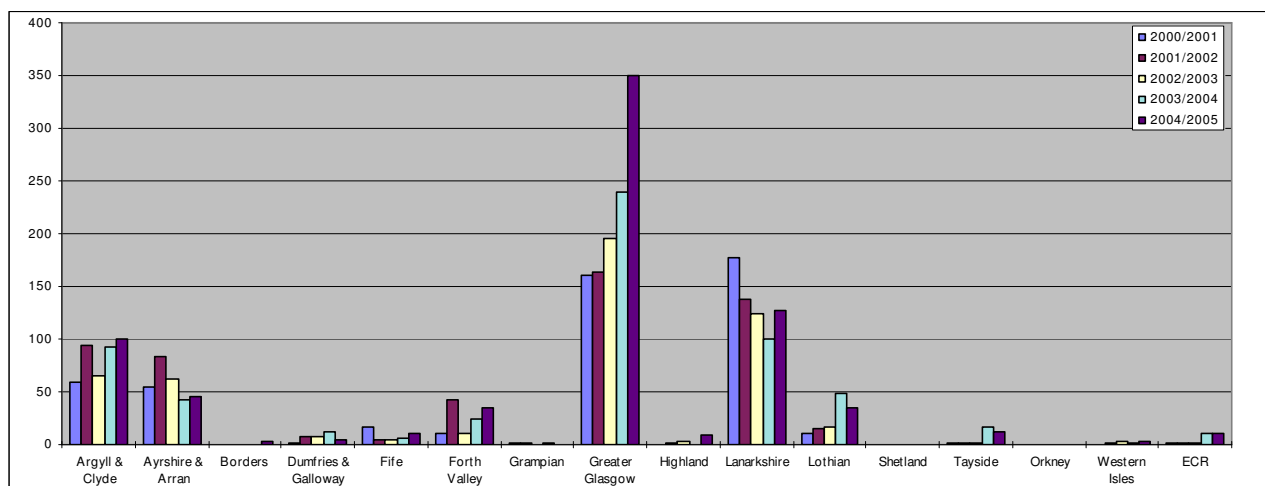
	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005
Urology /Urodynamics	15	31	21	21	24
Halo Fixation	234	346	242	226	220
Skin	7	5	5	20	21
Orthopaedic/Neurosurgery	1	0	1	0	0
Pain/Acupuncture	231	160	203	292	461
Sexual Dysfunction	11	12	21	33	17
Other	0	2	2	5	3
Total	499	556	495	597	746

The activity remains stable over the last few years except for a significant increase in pain and acupuncture interventions.

2.5.2 Day Case Attendances by Health Board

As a national service Day Case activity is limited by geographical constraints. Many patients who could be managed as a day-case require in-patient stay due to difficulties in travelling. If indicated some procedures are arranged to be done in the patients locality

either by staff from the unit or appropriate specialists. One bed in Philipshill Ward is designated as an intervention bed so that patients who have to travel long distances are not disadvantaged.



Appendix DA8

3.0 Waiting Times

3.1 Waiting Times Outpatient Clinics

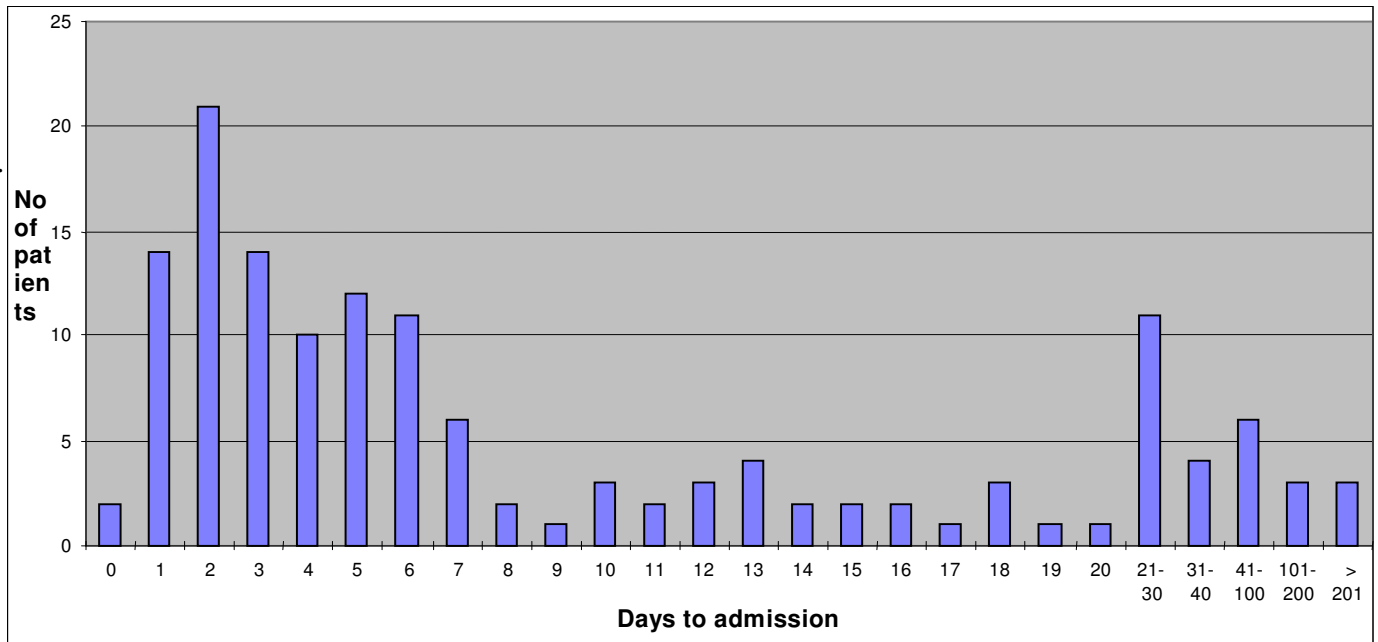
There is an open door policy to the Nurse Led Spinal Injury Clinics. Medical advice is always available and is requested in sixty per cent of patients. Patient satisfaction remains high with this team approach. The maximum waiting time for new elective outpatient appointments is four weeks.

3.2 Waiting Times Acute Admissions

Acute referrals are admitted as soon as appropriate on clinical grounds. It is unit policy to admit all patients with neurological injury within twenty-four hours as long as there are no concomitant medical problems. Patients requiring specialised Neurosurgical or orthopaedic care are managed in the appropriate ITU or ward prior to transfer.

3.3 Time from Injury to Admission

Early admission to the Spinal Injury Unit provides immediate support to the patient and family. In 2004-05 eleven per cent of patients were admitted within twenty-four hours. Twenty five per cent were admitted within forty-eight hours and forty two per cent within four days. Seventy two percent were admitted within two weeks. These figures are at variance with previous years due to the bed closures related to the painting contract. The effect of the EWTD has also had an impact due to lack of suitable overnight cover. There was a policy of early admission for neurological injury with non-neurological injury admitted as beds became available.



The pattern of early admission, that we aspire to, is not being achieved in other Spinal Injury Units in the United Kingdom. Early admission to the unit continues to be a priority. It may become of increasing relevance if early intervention strategies become available.

Co-operation between the staff in the Unit and the referral hospital ensures immediate admission if clinically indicated. Telephone advice is always available for those patients who are not immediately transferred. Direct admission to orthopaedic or neurosurgical wards for surgical stabilisation may increase the time to admission but is appropriate to minimise transfers of potentially unstable patients.

Approximately twenty-percent of patients have associated orthopaedic injuries. Co-operation between Surgical Intensive Therapy (SGH), the referring hospital and other specialised units is often required. (Plastic Surgery, Burns Unit, Maxilla-Facial, Renal etc.)

Most patients admitted after five days have conditions that do not require immediate treatment or have additional co-morbidities that require medical intervention in the referring hospital prior to transfer. A few new patients have undergone rehabilitation in another centre and are admitted to the unit for reassessment or treatment of complications.

	No. of Patients	Mean Time (Days)	Range of Time
2000-2001	199	163.3	0 - 12575
2001-2002	164	103	0 - 12012
2002-2003	165	62	0 - 4948
2003-2004	201	83	0 - 6596
2004-2005	144	231	0 - 11237

The effects of bed closures related to the painting contract have influenced the figures. The mean is particularly distorted as non-urgent cases, normally admitted late, were disproportionately delayed to admit urgent cases. Eighty eight percent of patients were admitted within one month of injury.

This analysis includes all patients admitted. Some patients have an acute injury on top of a pre-existing injury, which explains the prolonged delay.

Six patients were admitted after one hundred days. These patients had been initially cared for in other centres or had developed a secondary complication due to a further insult at a previous fracture.

4. Quality of Care Issues:

4.1 Charter Mark

The unit was awarded the Charter Mark for the third time in 2004. This is a reflection of the excellent work done by all members of staff in maintaining and developing the service in the past three years. A special thanks goes to the senior nurse manager and her team for preparing and carrying out the presentations to the adjudicating team.

4.2.1 National Service Division Visit

Close co-operation between the staff of the unit and NSD has an important role in maintaining the service and permitting service development. It also ensures that there is an early response to increased or changing clinical needs.

The Annual and six-monthly report acts as a focus to continually evolve and evaluate the service. A review by NSD of the service and its financing has been carried out over the year. It is expected that the report will be published soon and be the basis for future planning.

4.2.2 Formal Complaints

A formal complaint/suggestion system is in place at both unit and trust level. This has proved invaluable in monitoring quality and modifying the service.

The trust records one formal complaint regarding the delay in providing information regarding housing needs. The matter was resolved. At unit level a number of useful suggestions have been made regarding catering, parking and the ambulance service. This has resulted in a number of meetings with the relevant bodies to review areas of service. The future of parking in the vicinity of the unit is of concern especially with the introduction of parking charges. This will have a significant impact for visitors and out-patients. It is of particular concern due to the length of stay and domicile of some patients.

4.2.3 Relatives & Patients Meetings

Regular contacts are maintained with relatives and carers throughout a patient's stay. Carers are actively involved with the discharge process. All staff are encouraged to attend patient social activities and events. Formal discussion groups with patients and relatives are organised. The medical staff encourages an open dialogue with patients and relatives regarding treatment and progress. Consent issues are in constant review and the

implications of the Incapacity Act in the management of the acutely injured are being implemented.

4.2.4 Benchmarking

There have been continued attempts to develop benchmarking with other UK units. Some figures are now available from other units. Comparisons are difficult due the varying remits of each unit. The core management in the Scottish unit tends towards a European or North American Model. There has been national support for each spinal unit to produce annual reports on the Scottish model, which would make comparisons easier. The unit staff has visited spinal units in the UK and Switzerland to assess best practice. Management teams from other units have been to Glasgow seeking advice regarding activity and developments.

4.3 Education

The unit has an important role in education. This extends to prevention of the initial accident, management of the early stages and the avoidance of subsequent complications in the early or late stage of rehabilitation.

The Director gave Post-Graduate Medical lectures at Edinburgh, and Glasgow. The Consultant medical staff lectured in Edinburgh, Glasgow University, and Fort William. Medical students attend for clinical practice in 2nd, 4th and 5th year. Third years can attend for the spinal injury special study module. The Director gives a plenary lecture to the medical school.

The Senior Nurse Manager has lectured at Ayr, Paisley and Caledonian Universities.

Meetings were organised with GPs and District Nurses by the Liaison Nursing staff. The Education Sister co-ordinated Study Days for nurses from Aberdeen, Dublin, Paisley and Caledonian Universities.

Out-reach study days for carers and patients held in Aberdeen in 2003 where run in Inverness in 2004. Further educational days will be organised for Dumfries and the Borders. The Out-Patient Sister provided training and education for University students and District Nurses at Paisley and Caledonian Universities.

The Unit has been fortunate in receiving a number of UK and overseas visitors at Medical and Paramedical level.

4.4 Hospital Acquired Infection

Hospital acquired infection continues to be a problem within the Unit mirroring the experience throughout the hospital population.

The problem of MRSA continues to be monitored within the Unit and every effort is made to try and reduce the periods in isolation. Periods in isolation significantly affect the rehabilitation timetable and every attempt is made to reduce this to a minimum.

	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005
Total patients req. isolation	52	67	70	N/A	44
Salmonella				6	1
Clostridium Difficile	1	1	6	0	4
MRSA	48	64	64	33	39
Streptococcus pyogenes	0	1	0	2	0
Scabies	0	0	0	0	0
TB	1	1	0	0	0
Varicella Zoster	1	0	0	1	0
Patient days in isolation				N/A	3480
Ave. days in isolation	53.75	52.6	52.6	N/A	79

The unit works closely with the department of bacteriology and the Infection Control team to monitor and contain infection. The patients are of high risk of MRSA and a policy of pre-admission checks and isolation are employed. The low rates of infection are a tribute to the standard of nursing care and policies within the unit especially as regards bowel care.

A new NHS initiative regarding hand disinfection for staff and visitors has been introduced.

Three nurses within the Unit have been accepted onto the training for Control of Infection Champions.

4.5 Pressure Sore Prevention

Spinal injured patients are the most susceptible population to the development of pressure sore due to the absence of sensation and movement. The Unit continues to be at the forefront of pressure sore management with the introduction of protocols and training programmes for patients, carers and nursing staff. A digitised record for monitoring the healing and assessing the effects of treatment of pressure sores has been introduced.

4.6 Pressure Sore Prevalence

Continued education and constant vigilance is required to reduce the number of pressure sores. Monitoring of sacral splits is now included.

	No. of patients	No. of acquired sores	No. of admitted sores	Total number of sores	Point prevalence
2000/2001	42	2	4	6	15%
2001/2002	48	4	8	12	25%
2002/2003	42	1	5	6	14%
2003/2004	45	1	9	10	22%
2004/2005	43	4	4	8	19%

Patients with a spinal cord injury are at significant risk of developing pressure sores and sacral skin splits. They result in significant delays in rehabilitation and discharge from hospital. The four lesions acquired in the unit were one heel sore and three sacral splits. Two sores originated from the referring hospital and two were in patients admitted from nursing homes. Pressure sore prevention and monitoring remains a priority in the unit. A digital photographic record is available to monitor sore treatment.

4.7 Bed & Mattress Hire

The number of therapy beds per month has been reduced again and is currently four per month. There has been an decrease in the use of mattresses per month from 5.8 to 4.6.

4.8 Ventilated Bed Days

During the year twenty-one patients required ventilation during their acute care. There is a close working relationship with the neuro-anaesthetists to monitor progress and reduce ventilation times. Fifty percent of patients with a C5/C6 complete lesion require acute ventilation but only ten percent will require long-term ventilatory support. Patients with higher lesions will normally require life long ventilation either at home or within a care setting.

Appendix DA20

		No. Patients	Ave. Ventilated Days	Total Ventilated Days
2004/2005	Edenhall	21	39	814
	RCU	4	142	567

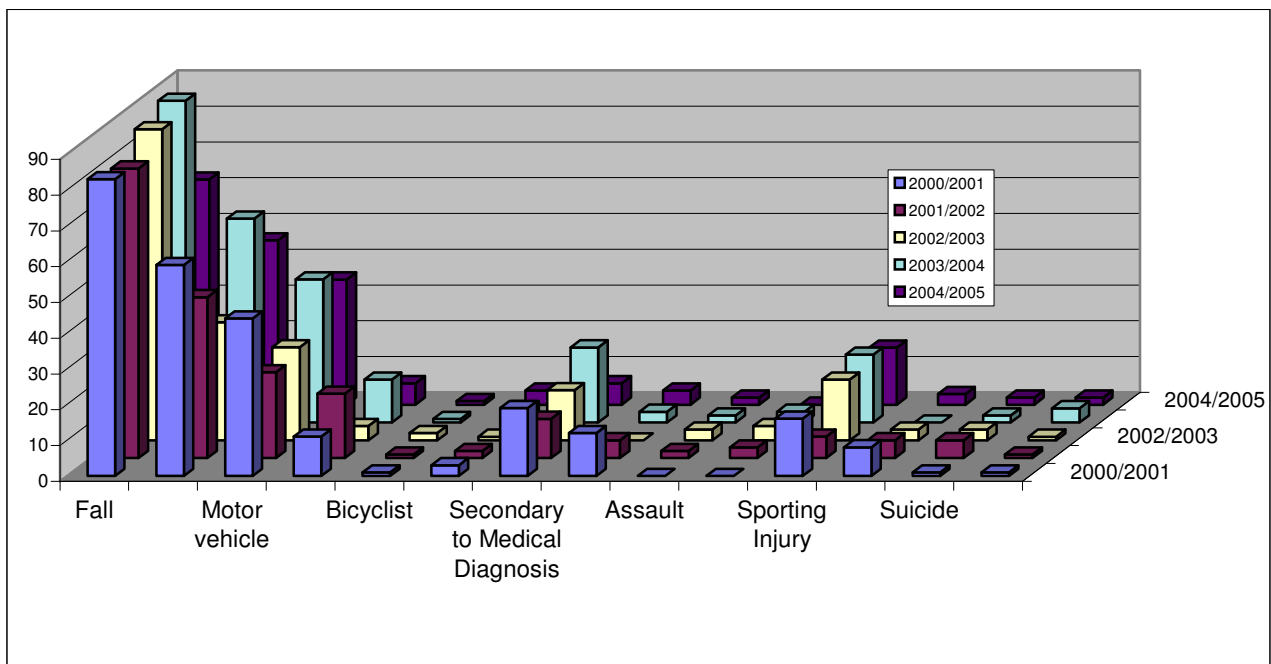
Protocols have been developed for the maintenance and weaning of low tetraplegic ventilator dependent patients. Changes in protocols have resulted in a reduction in the number of ventilated days. Continued developments are expected in this area over the next five years.

5.0 Mechanism of Injury

The reduction in non-neurological cases has resulted in a decrease in the number of low velocity falls admitted. The number of high velocity RTA admissions has not changed significantly. Sporting injuries remain high and are of concern. They often occur in young patients and tend to be associated with significant neurological injuries. The number of cases clearly identified as attempted suicide probably under represents the problem.

	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005
Fall	83	81	87	90	63
RTA	59	45	33	57	46
Motor vehicle	44	24	26	40	35
Motorcyclist	11	18	4	12	6
Bicyclist	1	1	2	1	1
Pedestrian	3	2	1	4	4
Secondary to Medical Diagnosis	19	11	14	21	6
Industrial Injury	12	5	0	3	4
Assault	0	2	3	2	2
Penetrating Injuries	0	3	4	3	0
Sporting Injury	16	6	17	19	16
Domestic Injury	8	5	3	0	3
Suicide	1	5	3	2	2
Other	1	1	1	4	2
Total	199	164	165	201	144

5.1 Mechanism of injury by year



Overall the pattern mirrors social trend within the population. Alcohol continues to be implicated in the aetiology of many spinal injuries. The causes of injury are important as a guide to the development and promotion of prevention programmes. Falls from a height remain the most common cause in Scotland. In most units throughout the world Road Traffic Accidents are the commonest.

6.0 Financial Report 12 Months ending 31.03.05

<u>Dedicated Staff Costs</u>	2004/05		YTD	
	Annual Budget	Budget	Actual	Variance
Medical	£821,844	£821,844	£818,322	£3,522
Nursing	£2,505,995	£2,505,995	£2,481,625	£24,371
Paramedical	£430,213	£430,213	£406,376	£23,837
Administrative	£136,388	£136,388	£138,556	(£2,169)
Total Staff	£3,894,440	£3,894,440	£3,844,879	£49,560
<u>Supplies Costs</u>				
Medical	£3,668	£3,668	£4,862	(£1,194)
Nursing	£10,430	£10,430	£6,533	£3,897
Paramedical	£16,659	£16,659	£13,529	£3,130
Administrative	£96,104	£125,640	£122,432	£3,208
Pharmacy	£538,595	£538,595	£568,790	(£30,195)
Surgical Appliances	£92,628	£92,628	£74,316	£18,312
Direct Supplies	£758,084	£787,620	£790,462	(£2,842)
<u>Allocated Costs</u>				
Medical Records	£89,938	£89,938	£89,938	£0
Building Costs	£175,640	£175,640	£175,640	£0
Domesic Services	£58,805	£58,805	£58,805	£0
Catering	£161,792	£161,792	£161,792	£0
Laundry	£57,834	£57,834	£57,834	£0
Neuroradiology	£67,370	£67,370	£67,370	£0
Laboratories	£77,689	£77,689	£77,689	£0
Anaesthetics	£32,163	£32,163	£32,163	£0
Portering	£62,632	£62,632	£62,632	£0
Phones	£42,457	£42,457	£42,457	£0
Scottish Ambulance Service	£7,884	£7,884	£7,884	£0
General Services	£24,315	£24,315	£24,315	£0
Allocated Costs	£858,519	£858,519	£858,519	£0
Total Supplies	£1,616,602	£1,646,138	£1,648,981	(£2,842)
<u>Overhead Costs</u>				
Fixed costs :-				
Rates	£51,609	£51,609	£51,609	£0
Capital Charge	£550,978	£550,978	£550,978	£0
Trust Overheads	£131,600	£131,600	£131,600	£0
Total Overheads	£734,187	£734,187	£734,187	£0
Total Expenditure	£6,245,229	£6,274,765	£6,228,047	£46,718
Post Graduate Dean Funding	(£130,487)	(£130,487)	(£94,619)	(£35,868)
Superannuation Uplift	(£194,134)	(£194,134)	(£194,134)	£0
Total Expenditure net of Post Graduate				
Dean Funding & Superann. uplift	£5,920,608	£5,950,144	£5,939,294	£10,850
Notes:				
Budget figure is based on the 2004/05 income requested from NSD for Spinal Unit.				
Medical staffing includes 03/04 & 04/05 Consultant's Contract costs				
2004/05 Superannuation Uplift has been funded by GGNHSB.				

7.0 Service Developments and Future Plans

7.1 Respiratory Care

The general concept of the Respiratory Care unit has been a great success. The nature of the work and the varying pattern of care required has necessitated continual change as to how this care is provided. The location within the unit has again been changed to reflect on how the service is provided. It is important that the need of the patients is monitored and an appropriate level of care provided. The medical and nursing staff plan to review the service in the coming year to investigate and plan for the needs of the next five years. It is perceived that there is a need to investigate re-instating a Respiratory Care Staff Nurse to provide help and support for patients in the hospital and Community who have specialist respiratory needs. This would cover ventilator dependant patients and others who experience difficulties with increasing age.

7.11 Phrenic Nerve Stimulators

Patients with high-level neurological injuries have loss of diaphragmatic function resulting in impaired respiratory status. Options for treatment include permanent ventilation, assisted ventilation or pulsed stimulation of the phrenic nerve, which supplies the diaphragm. No Phrenic Nerve stimulators have been required in the last year. The unit is involved in investigating alternatives to the currently available systems as part of the research programme.

7.12 Non-invasive ventilation and assisted ventilation

Avoidance of ventilation in acute cases or in respiratory decompensation is beneficial. Methods of assistive non-invasive ventilation have been developed with the neuro-anaesthetists to reduce rehabilitation times.

Functional Electrical Stimulation of the abdominal muscles has been used to assist breathing and coughing in tetraplegics as part of a research programme. A clinical trial protocol is being developed.

7.13 Night Time Ventilatory Support

A number of high tetraplegics require night time ventilatory support. This is likely to increase in the next five years with a greater number of these patients surviving to old age. Protocols are being developed to support patients at home or in nursing care.

7.2 General Clinical Services

7.2.1 Outreach Clinics

As a national service we feel that it is important to provide out patient and consultation services throughout Scotland. This has resulted in the development of out-reach clinics in areas identified on our database as having a concentration of patients. Medical, Nursing,

and Occupational Therapy staff attend outreach clinics as required. Volunteers from SIS also attend to see and advise patients and carers. The increasing demand places a strain on the core service in the Unit as senior Medical Staff are required to be present at outreach clinics. No further expansion is possible within the current staffing structure. In conjunction with the clinics, teaching sessions for patients and carers have been developed. These have been held in Aberdeen and Inverness and were great successes.

7.2.2 Out-Patient Department

The out-patient department has a key role in the management of the acute injuries and in preventing long term complications. The newly introduced Pain and Intrathecal pump clinics have proved very successful in helping those patients who experience difficulties with pain control. It is hoped to develop this further in the coming year

The move towards a greater emphasis on cardiovascular fitness and general health is being investigated. A clinic specialising in the nutritional aspects of paralysis would be an important part of this policy. For some time it has been recognised that optimum nutrition can reduce skin and bowel complications and it is also known that maintaining a reasonable Body Mass Index (BMI) can minimise difficulties with transfers and seating problems. In the year ahead this will be pursued with the Dietetics Department in the hospital.

7.2.3 Spinal Nurse Specialists

There is a continued demand for nurse specialist visits for patients in their home or care placement. This prevents unnecessary visits to the unit and supports patients and carers. During the year the four nurse specialists travelled over twenty thousand miles by car and carried out three hundred and four visits. This included outreach clinic, catheter changes, post discharge visits and education.

7.2.4 Assistive Technology

There is an increasing demand for technology in the management of the paralysed patient. The ultimate aim is to promote independence, assist in activities of daily living and to improve work opportunities. The additional occupational therapist has been able to plan for developments in this area. Environmental control, communication and computer skills are all being investigated. This development is fully integrated with the work done in the unit by Momentum (formerly Rehab Scotland) and SPIN.

Momentum has appointed an outreach worker to bring adaptive or assistive technology to outpatients throughout Scotland.

SPIN supported by Strathclyde University has introduced computer skill classes for inpatients.

7.2.5 Training & Development Post

The Nurse Training and Development post continues to be extremely successful. Following the success of the HNC Advanced Training for Auxiliaries, one nursing auxiliary has completed the training and has gone onto Paisley University to train as a trained nurse. This year we will release a further auxiliary to undertake the initial training ultimately leading to qualification as a Staff Nurse.

7.2.6 Further Developments within Multi-Disciplinary Team

This year has seen considerable pressures within nursing in relation to Agenda for Change, job descriptions and extended annual leave. Nursing recruitment has also proved to be an issue again this year with the loss of trained nurses going for promoted posts within other areas. The two overseas nurses recruited for adaptation were successful in their training and have been placed on the NMC register. Both nurses are now permanent within the Unit.

It is proposed within 2005/2006 we will introduce a new role within Spinal Injuries that will include front of house services. This post will incorporate the housekeeper role and that of control of infection champion in relation to ensuring that the procedures in place with regard to Spirigel and hand washing are implemented at reception and front of house services. They will also be responsible for keeping the area tidy and presentable to the public. We will meet this from within existing budget and review the post after 6-9 months. It is anticipated this would be at auxiliary level.

A multidisciplinary approach to education for patients, family and carers is followed in the unit. It is recognised that there is a need for continued education and an outreach service for patients discharged before the introduction of modern practice. Following the success of the educational "Road Show" a similar event was held in Inverness in April 2004. The format gives an opportunity for patients, carers and nursing staff who are distant from Glasgow to review their care and experiences. There will be continued development of the lectures and literature for these courses in the coming year.

7.2.7 Flexible Outpatient Department Development –Discharge Co-ordinator

The Discharge Co-ordinator has worked hard with other staff to improve the discharge of patients from Philipshill Ward. All patients with a neurological injury have several goal planning meetings before a formal multi-disciplinary discharge plan is discussed. The co-ordinator has responsibility for immediate post-discharge care with on-going problems reported directly to the Liaison Sisters. The reduction in bed blocking is directly related to this post and improvements in the social work service.

7.3 Nursing Recruitment

Nursing recruitment continues to be recognised as a national problem. The unit has been able to attract excellent applicants from new and established nurses for basic and promoted posts. The senior nurse manager and educational sister have made considerable efforts to raise the profile of the unit among the university nursing departments and in recruitment drives. Nursing staff within the Unit is pro-active in developing training objectives and orientation programmes for all students. The unit is actively involved in conversion courses and seeking support for refugee placements.

The continual education policy within the unit however makes staff attractive applicants for promoted posts out with the service.

7.4 Medical Recruitment

The complement of core medical staffing has reduced since the unit opened. This is due to the loss of one training grade secondary to changes in General Rehabilitation and the absence of a training scheme for spinal cord injury. The European Working Time Directive has had a disproportionate effect on spinal injuries at SHO level. For a significant part of the day there is only one SHO available to cover the unit. The effects of the new consultant contract are now being felt. Unfortunately it is impossible to cover the on-call commitment and comply with the regulations. In the immediate term two additional SHO posts are required with the eventual appointment of another rehabilitation consultant. Recruitment has been a problem due to the changes in training but a number of potential applicants have been identified.

7.5 Medical Records

It is now thirteen years since the unit opened. During that time over two thousand new patients have joined the patients inherited from Edanhall and Philipshill Spinal units. There resulted in an increasing problem with record storage. An initial attempt to solve the problem failed and so it was decided to use endowment money to install a new sliding shelving system, which has doubled the space available in a similar space. It is hoped that this move along with the digitising of radiographs will ensure that the record system will cope with the increasing demands made on it. The unit now has access to the general radiology digitised system but there remains a problem with neuroradiology.

7.6 Implanted Electrodes for Upper Limb Function

A separate report on the Freehand system has been prepared. The unit is involved with research proposals for the introduction of a new type of implantable electrode for stimulation of paralysed limbs. The new system offers significant benefits over the Freehand system and will overcome some of the problems encountered in the long term use of that implant.

(Appendix)

7.7 Capital Development and Equipment Replacement

The unit was commissioned in 1992. Despite appropriate support from NSD it is inevitable that there are now issues with refurbishment and capital equipment. There has been a policy of prudent replacement of essential resources from NSD or increasingly from charitable sources. The trust allocated money for a re-painting programme, which has been very successful. The major issues over the next twelve months will be renewal of the ventilators and monitors in Edanhall ward. These are now obsolete twice over and are the oldest identifiable in Scotland. Discussions have been initiated as to how these can be re-placed in keeping with the increasing dependency of certain patients.

7.8 Charitable Funding

There has been an increasing dependency on charitable funding for capital expenditure and costs of certain staff. In the last year physiotherapy and occupational therapy equipment, medical record storage, computer equipment, shower chairs and travel costs have been sourced from endowment monies. Individual patient donations have paid for specialised equipment and staff costs. Research grants have provided equipment and partial staff costs. There have been significant donations in time and equipment from the Clydesdale Bank, Momentum SPIN and SIS. All sporting activities are supported by an independent Charity - Options.

This has all been done without any concerted fund raising activity but has been dependant on individual patient and carers. The contribution made by all these individuals is gratefully acknowledged.

7.9 Clinical Networking and National Guidelines

Admission guidelines were issued to all hospitals in Scotland during 2002. This was of great benefit standardising the immediate management of patients and their subsequent referral. Standard referral proformas, transfer guidelines and admission proformas are now in place. An audit of 100 consecutive admissions indicates that compliance with the transfer protocols was approaching 90%. Of concern was the association between a high incidence of skin damage without the use of a vacuum mattress. Discussions with the Scottish Ambulance Service have resulted in a planned target of having all transfers complying with the protocols within two years. Consultations with the ambulance service have taken place regarding the use of cervical collars and neck immobilisation protocols. The guidelines will be reissued during 2005.

7.0 Digital Radiology

Digital radiology links have been established with general radiology. It is hoped that a formal link will be established with neuro-radiology to permit access to scanning and image transfer from other hospitals.

7.11 Clinical Governance

Multi-disciplinary clinical governance meetings are held within the unit monthly. Separate medical audit meetings are held with the department of rehabilitation. Each department has separate governance meetings. The Director, Senior Nurse Manager and the Business Manager meet weekly. Consultant clinical meetings are held twice a week.

Consultant portfolios have been introduced and appraisal started. SHO teaching and training is closely scrutinised with introductory interviews, educational contracts and regular reviews culminating in the RITA process. The SHO will be incorporated into the Foundation Training Programme.

A formal Critical Incident Reporting system is in place. No incidents occurred during the year. The formal Clinical Incident reporting system is well established.

A Clinical Incident is defined as a potential or actual danger to patients, which could have been prevented by a change in practice. Staff are encouraged to report incidents which are then investigated by senior medical and nursing staff.

In the past year staff reported ten incidents. None was life threatening or potentially life threatening and no patient came to harm.

7.12 Medical Research

Morbidity and mortality following spinal cord injury was reduced dramatically following the introduction of specialised spinal cord injury units. Life expectancy has been increased from a few years to approaching normal and the complications of injury are routinely monitored for, treated or prevented.

Three areas remain of concern. Mortality secondary to cardiovascular disease and suicide is unchanged and there has been no progress in developing primary treatments for spinal cord injury.

A meeting called "Recovery and Repair" was held in October 2004 which resulted in the development of a network of basic and clinical scientists to pursue an integrated research programme to advance our understanding and treatment of spinal cord injury. Teams from Glasgow, Strathclyde, Caledonian and Stirling Universities are now working within or in close co-operation with the unit. The themes addressed include assessment of cardiovascular status post injury, the development of treadmill or hand cranking fitness training, assessment of neurological recovery, psychological response to injury and the introduction of stem cell implantation.

The unit now jointly funds a clinical scientist from charitable funding and provides substantial support to the research programme. Currently funding is being sought for the provision of research accommodation within the campus to facilitate further development. A collaborative research meeting "The Spinal Frontier" is planned for next year with all research partners to progress the integration of stem cell research and clinical assessment into general practice.

Medical Research Partners

Glasgow University Centre for Rehabilitation Engineering

Professor Ken Hunt	Wylie Professor of Mechanical Engineering - Director
Dr Henrik Gollee	Lecturer
Dr Sylvie Coupaud	Clinical Scientist QENSIU
Dr Ben Saunders	FES Cycling
Georg Worms	Unsupported paraplegic standing
PhD Students	
Helen Berry	FES cycling
Emily Black	Unsupported paraplegic standing
Chiara Ferrario	FES Cycling
Calum McRae	FES-cycling paediatric
Andrew Pennycott	FES cycling engineering
Lindsay Jamieson	Treadmill Walking

Strathclyde University Bio-engineering Unit

Dr Bernie Conway	Lecturer
Dr Izzy Izzeldin	PhD
Research Bioengineer	tba

Caledonian University School of Health and Social Care

Professor Malcolm Granat	Treadmill Training
Research post	tba
Research Scientist	tba

Stirling University Department of Psychology

Professor Ronan O'Carrol	Emotional Experience following Spinal Cord Injury
Dr Adele Dickson	Lecturer

Glasgow University Biosciences

Dr John Riddell FBLS	Stem Cell research
Dr Sue Barnett Beatson Institute	Olfactory Epithelial Cells

Proneuron Biotechnologies

Chaim Sheba Medical Centre Israel	Macrophage Stem Cell Implants
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7.12.1 Grants and Grant Applications - Cumulative Index

The following have been granted or applied for to allow work to be done in the unit..

Functional electrical stimulation augmented treadmill training for incomplete spinal cord injured patients Pilot study MH Granat J Hasler DB Allan Scottish Executive £77,709 completed

A pilot study of lower limb FES cycling in paraplegia Prof K Hunt	Inspire £8,886 completed
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Royal Academy of Engineering Secondment Scheme Prof K. Hunt – Six-month secondment 2003-4	RAE £13,000 completed
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Development of Systems for tetraplegic Arm Cranking using Functional Electrical Stimulation: a pilot study K Hunt H Gollee S.Coupaud DB Allan	EPSRC £122,403 completed
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Development of Systems for Paraplegic Cycling. Prof K Hunt Dr N Donaldson
EPSRC £244,137

Upper Limb Arm Cranking using FES Dr H. Gollee Prof.K. Hunt
European Commission: £68,719 completed

Control strategies for integrating motor power with leg power in paraplegic cycling
Prof K Hunt et al EPSRC £77,573 completed

Integrated Voluntary Control of Unsupported Paraplegic Standing.
Prof K Hunt Dr H Gollee EPSRC £219,402

Practical systems for balance control
Prof K Hunt Dr H Gollee Neopraxis £38,000

Comparative Study of walking and cycling
Prof K Hunt Prof M Granat Dr B Conway Synergy Initiative £35,000

Equipment for Paraplegic Exercise Studies
Prof K Hunt Dr H.Gollee Scottish Higher Education Funding Council SRIF 2 £156,000

Electrophysiological Assessment of Central Nervous System Organisation following Spinal
Cord Injury B Conway, I Izzeldin, D B Allan ISRT Grant £120,000

Molecular Analysis of the total microflora on the surface of prosthetic hip joints removed
during Revision Arthroplasty Riggio M, Bagg J, Allan DB, Ramage G
Arthritis Rheumatism Council £117,763

Evaluation of the physiological and functional adaptations induced by locomotor training in
incomplete spinal cord injured subjects
B Conway, M Granat, D B Allan J Hasler KJ Hunt ISRT Grant £235,986

7.12.2 Student Projects

Non-invasive electrophysiological assessment of cortical spinal pathways in subjects with
spinal cord injury
Gillian McColl Mres student completed

Development and testing of a visual feedback system for the Freehand upper limb
Prosthesis
S. Coupaud Mres student completed

Reflex Modulation during sitting and walking
T.Eldho

The Suitability of a ten-week circuit class to increase physical capacity
And activity levels in paraplegics
K.Cunningham MSc student completed

7.12.3 Journal Publications

- 1 Granat MH, Edmond P. The application of air bag technology: an objective clinical measure of involuntary muscle spasm. *Spinal Cord*. 1999 Jul;37(7):501-7
- 2 Greene PJ, Granat MH. "The effects of knee and ankle flexion on ground clearance in paraplegic gait." *Clin Biomech* (Bristol, Avon). 2000 Aug;15(7):536-40.
- 3 Deep K, Jigajinni MV, McLean AN, Fraser MH. Prophylaxis of thromboembolism in spinal injuries--results of enoxaparin used in 276 patients. *Spinal Cord* 2001 Feb;39(2):88-91
- 4 Deep K, Jigajinni MV, Fraser MH, McLean AN. Prophylaxis of thromboembolism in spinal injuries--survey of practice in spinal units in the British Isles. *Injury* 2002 May;33(4):353-5
- 5 T. Schauer, K. J. Hunt, N.-O. Negård, M. H. Fraser, and W. Stewart, "Regelung der Trittggeschwindigkeit beim Liegedreiradfahren von Querschnittsgelähmten (Cadence control for recumbent cycling of paraplegics)," *Automatisierungstechnik*, vol. 50, no. 6, pp. 271-278, 2002. In German.
- 6 K. J. Hunt and A. N. McLean, "New developments in engineering for spinal cord injury rehabilitation," *Ingenia (The Royal Academy of Engineering)*, pp. 29-34, November 2002. *
- 7 RC Prempeh JC Gibson JJ Bhattacharya "Midline clefts of the axis; a diagnostic dilemma" *Spinal Cord* (2002)40,92-93
- 8 H. Gollee, K. J. Hunt, S. Coupaud, A. N. McLean, and M. H. Fraser "An apparatus for FES-assisted arm-cranking exercise in tetraplegia," *Neuromodulation*, 2002. Submitted for publication.
- 9 K.J .Hunt, A.N. McLean, S. Coupaud, and H. Gollee, "Upper-limb exercise in tetraplegia using functional electrical stimulation," *Advances Clin. Neurosci. Rehab.*, vol. 3, pp. 24-25, Nov/Dec 2003.
- 10 Postans NJ, Hasler JP, Granat MH, Maxwell DJ. Functional electric stimulation to augment partial weight-bearing supported treadmill training for patients with acute incomplete spinal cord injury: A pilot study. *Arch Phys Med Rehabil*. 2004 Apr;85(4):604-10.
- 11 Prasad RS, Fraser MH, Urquhart GD, McLean AN. Rupture of tuberculous spinal abscess resulting in tuberculous empyema and chylothorax. *Spinal Cord*. 2003 Jul;41(7):410-2.
- 12 K. J. Hunt, B. Stone, N.-O. Negård, T. Schauer, M. H. Fraser, A. J. Cathcart, C. Ferrario, S. A. Ward, and S. Grant, "Control strategies for integration of electric motor assist and functional electrical stimulation in paraplegic cycling: utility for exercise testing and mobile cycling," *IEEE Trans. Neural Sys. Rehab. Eng.*, vol 12 pp.89-101, March 2004.
- 13 Gollee H. Hunt KJ, Wood D. New results in feedback control of unsupported standing in paraplegia. *IEEE Trans. Neural Sys. Rehab. Eng.*, vol. 12, pp. 73-80, March 2004.

- 14 M. Hossain, A.N. McLean M.H. Fraser "Outcome of Halo Immobilisation in 104 Cases of Cervical Spine Injury" *Scot Med J.* 2004 Aug; 49(3):90-2
- 15 A. Oliver, D. B. Allan, "Lateral Flexion Distraction Injury of the Spine" *Injury, Int. J. Care Injured* (2005) 36, 222-225
- 16 Hossain M, Brown J, McLean AN, Fraser MH. Delayed presentation of post-traumatic aneurysm of the posterior inferior cerebellar artery in a patient with spinal cord injury. *Spinal Cord* 2002 Jun; 40(6):307-9.
- 17 Prasad RS, Fraser MH, Urquhart GD, McLean AN. Rupture of tuberculous spinal abscess resulting in tuberculous empyema and chylothorax. *Spinal Cord* 2003 Jul; 41(7):410-12
- 18 Joseph G, Santosh C, Marimuthu R, Fraser MH, McLean AN. Spinal cord infarction due to a self-inflicted needle stick injury. *Spinal Cord* 2004 in press
- 19 Joseph G, Johnston RA, Fraser MH, McLean AN. Delayed hydrocephalus as an unusual complication of a stab injury to the spine. *Spinal Cord* 2004 In press
- 20 MT McCormick, I Bone A MacLean, DB Allan "Blunt cervical trauma as a cause of Spinal Cord Injury and Delayed Cortical Blindness" submitted to Journal of Neurology Neurosurgery and Psychiatry
- 21 Hearn ST, Fraser MH, Allan DB, McLean AN "Spinal injuries in Scottish mountaineers".. Submitted to Environmental and Wilderness Medical Journal.
- 22 Ferario C, Hunt KJ, Grant S, Maclean AN, Fraser M, Allan DB Novel protocols for high sensitivity cardio-pulmonary exercise testing during Functional Electrical Stimulation cycle ergometry in spinal cord injured subjects to be submitted

7.12.4 Conference Papers

- 1 T. Schauer, K. J. Hunt, A. Ronchi, M. H. Fraser, and W. Stewart, "Robust Control of Knee-Joint Motion," in *Proc. 6th Annual Conference of the International Functional Electrical Stimulation Society*, (Cleveland, USA), pp. 232-234, 2001.
- 2 T. Schauer, K. J. Hunt, M. H. Fraser, W. Stewart, and F. Previdi, "Identification of a Biomechanical System using Neural Networks," in *Proc. of the IFAC Workshop on Adaptation and Learning in Control and Signal Processing 2001*, (Como, Italy), August 2001.
- 3 T. Schauer, K. J. Hunt, N.-O. Negård, M. H. Fraser, and W. Stewart, "Regelung der Trittggeschwindigkeit beim Liegedreiradfahren von Querschnittsgelähmten," in *Proc. Automed'01*, (Bochum, Germany), September 2001.

- 4 H. Gollee, K. J. Hunt, S. Coupaud, A. N. McLean, and M. H. Fraser, "An apparatus for FES-assisted arm-cranking exercise in tetraplegia," in *Proc. 7th Annual Conference of the International Functional Electrical Stimulation Society*, (Ljubljana, Slovenia), 2002.
- 5 K. J. Hunt, T. Schauer, N.-O. Negård, W. Stewart, and M. H. Fraser, "A pilot study of lower-limb FES cycling in paraplegia," in *Proc. 7th Ann. Conf. Int. Functional Electrical Stimulation Society*, (Ljubljana, Slovenia), 2002.
- 6 K. J. Hunt, B. Stone, N. Negård, T. Schauer, and M. H. Fraser, "FES cycling with electric motor assist," in *Proc. 1st FESnet Conference* (K. J. Hunt and M. Granat, eds.), (Glasgow, UK), pp. 7-9, September 2002. *
- 7 S. Coupaud, H. Gollee, K. J. Hunt, A. N. McLean, and M. H. Fraser, "Physiological assessment of FES-assisted arm cranking exercise," in *Proc. 1st FESnet Conference* (K. J. Hunt and M. Granat, eds.), (Glasgow, UK), September 2002.
- 8 K. J. Hunt, A. J. Cathcart, C. Ferrario, B. Stone, S. Grant, S. A. Ward, and M. H. Fraser, "Workrate and cadence control for exercise testing in FES cycling," in *Proc. 8th Ann. Conf. Int. Functional Electrical Stimulation Society*, (Queensland, Australia), 2003.
- 9 K. J. Hunt, A. J. Cathcart, C. Ferrario, B. Stone, S. Grant, S. A. Ward, and M. H. Fraser, "Workrate and cadence control for exercise testing in FES cycling," in *Proc. 8th Ann. Conf. Int. Functional Electrical Stimulation Society*, (Queensland, Australia), 2003.
- 10 K. J. Hunt, A. N. McLean, and M. H. Fraser, "The health benefits of cycling exercise in paraplegia using functional electrical stimulation," in *Proc. 42nd Ann. Sci. Mtg. Int. Spinal Cord Soc.*, (Beijing, China), 2003.
- 11 S. Coupaud, H. Gollee, K. J. Hunt, S. A. Ward, A. N. McLean, and M. H. Fraser, "Development of methods for arm-cranking exercise using functional electrical stimulation (FES) in tetraplegia," in *Proc. 2nd IEEE EMBSS UKRI PG Conf. Biomed. Eng. Med. Phys.*, (Birmingham, U.K.), pp. 41-42, 2003
- 12 B. Stone, C. Ferrario, K. J. Hunt, and M. H. Fraser, "An overview of functional electrical stimulation (FES) induced cycling," in *Proc. 2nd IEEE EMBSS UKRI PG Conf. Biomed. Eng. Med. Phys.*, (Birmingham, U.K.), pp. 43-44, 2003.
- 13 Ferrario C, Stone B, Hunt KJ, Ward SA, McLean AN, Fraser MH. Oxygen cost of different stimulation patterns for FES cycling. *Proc. 9th Ann. Conf. Int. Functional Electrical Stimulation Society*, (Bournemouth, England), 2004.
- 14 J. Hunt, B. A. Saunders, R. Sutherland, S. Grant, A. N. McLean, and M. H. Fraser, "Mobile cycling for people with spinal cord injury using functional electrical stimulation: a case study," in *3rd Int. Congress on Restoration of (wheeled) Mobility in SCI Rehabilitation*, (Amsterdam, the Netherlands), April 2004.
- 15 S Coupaud, H Gollee KJ Hunt, DB Allan, MH Fraser, AN Mclean "Benefits of arm-cranking exercise assisted by functional electrical stimulation in tetraplegia." *NHS Research Day Edinburgh Jan 2005*

- 16 A. Oliver, D. B. Allan “Tibial Compartment Pressures in Spinal Cord “Injured Patients” *Scottish Orthopaedic Meeting Stirling May 2004*
- 17 H. Gollee, S.Coupaud, KJ Hunt, DB Allan, MH Fraser, AN McLean
“A feedback system for autonomic electrical stimulation of abdominal muscles to assist respiratory function in tetraplegia” *8th Vienna Int. Workshop on Functional Electrical Stimulation* Sept 2004
- 18 H.Gollee, S.Coupaud, KJ Hunt, DB Allan, MH Fraser, AN McLean
“Autonomic electrical stimulation of abdominal muscles to increase tidal volume and cough peak flow rates in tetraplegia” *43rd Annual Scientific Meeting ISCoS Athens Sept 2004*
- 19 Gollee H, Coupaud S, Hunt KJ, Fraser MH, Allan DB, McLean AN. Potential cardiopulmonary benefits of functional electrical stimulation (FES) assisted arm-cranking exercise in tetraplegia. *Proc. 43rd Annual Scientific Meeting, Int. Spinal Cord Soc.*, (Athens, Greece), 2004.
- 20 S Coupad, H Gollee. KJ Hunt, AN McLean, MH Fraser. “FES-assisted exercise as a rehabilitation option in tetraplegia”. Presented at the FES-Userday, Birmingham (UK), December 2003. In *Salisbury FES Newsletter*, 2004 April, pp20-21.
- 21 Seenan P, McLean AN, Jackson S, Fraser MH, Allan DB Outcome in ventilated older patients with spinal injury: a twelve year review. *Proc. 43rd Annual Scientific Meeting, Int. Spinal Cord Soc.*, (Athens, Greece), 2004.
- 22 Gollee H, Coupaud S, Hunt KJ, Fraser MH, McLean AN. “Electrical stimulation of abdominal muscles increases tidal volume and cough peak flow rates in tetraplegia”.*Scottish Thoracic Society, Winter Meeting 2003*
- 23 Joseph G, Jigajinni MV, Johnston RA, Fraser MH, McLean AN. “Delayed presentation and diagnosis of cervical; injuries in ankylosing spondylitis”. *Britspine April 2004* Nottingham, UK.
- 24 Hunt KJ, Gollee H, Coupaud S, McLean AN, Fraser MF, Allan DB.”A research programme for function restoration, exercise, fitness and health in spinal cord injury”. Poster presented at NHS Research Day, Edinburgh, March 2005.
- 25 Oliver A, Allan D. B “Anterior Tibial Compartment Pressures in Spinal Cord Injured Patients”
EFFORT June 2005 Lisbon
- 26 Hems T, Wallace L Hobby J “Experience with the Freehand Functional Electrical Stimulating Implant in Scotland” *FESSH Gothenburg May 2005*

7.13 Pain Management

The introduction of two consultant anaesthetist has resulted in a review of pain management within the unit. This has included immediate care, postoperative issues and neuropathic pain. A multidisciplinary Pain Interest Group has been set up to coordinate changes in current systems.

Activity is now being monitored. In-patient and outpatient consultations are steadily increasing. There is an increasing demand for interventional procedures and analgesic pump implantations. An outcome assessment is planned to measure the efficacy of new treatments.

7.1 Paramedical staffing

A clinical scientist has been appointed to support research with FES and exercise training. This is funded from grants and charitable donations.

Charitable donations are also being used to pay for a remedial masseuse. This service was introduced on a voluntary basis but proved so successful it was thought important to include it as part of general rehabilitation.

Support for the Physiotherapy staff has been sought in the form of a technical instructor although this has had general approval no funding is currently available.

Some consideration will need to be given as to how the unit can support recreational and sporting activities for in and out patients and the development of the outreach service. A senior physiotherapist with a remit nationally to develop sporting excellence could be considered, other options include a sports physiologist or trainer/nutritionist. At present there are excellent facilities within Glasgow for para-sports but the opportunities are less well developed elsewhere.

8.0 Summary and Conclusions

The unit has continued to provide a comprehensive service to the spinal cord injured of Scotland during the year. This has been maintained during, bed closures due to re-painting and the introduction of EWTD and the new consultant contract regulations. Innovations have been made in the facilities and the way we provide the service.

During the year significant progress was made in establishing an international research profile and a network of basic and clinical scientists to drive this forward.

In the coming year similar challenges are expected. In particular we will face issues over medical staffing and equipment replacement in Edanhall Ward. Measures are already in place to address these and to ensure that the service continues to develop.

The standard of care continues to improve to minimise the level of disability and maximise the lifestyle of the patients post discharge. This has only been achieved by the dedication and effort of all staff. This has been recognised by the award of an MBE to our senior nurse manager Margaret McKillop for her services to rehabilitation. An honour thoroughly deserved.

The Charter Mark has also been renewed and our research work continues to attract significant financial support.

Appropriate thanks must be given to the National Services Division and the South Glasgow University Hospitals NHS Trust for their help and support in delivering the service.

Mr. D.B. Allan FRCS
Consultant Orthopaedic Surgeon
Director, National Spinal Injuries Unit

Appendix A	Physiotherapy Report
Appendix B	Occupational Therapy Report
Appendix C	Momentum Report
Appendix D	Spinal Injuries Scotland Report
Appendix E	Report on the Freehand System
Appendix F	Psychology Report
Appendix G	Social Work Report

Appendix H	Raw Data
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DA1	New Admissions
DA2	New Admissions by Case mix Complexity
DA3	New Admissions by Health Board of Residence
DA4	New Admissions by Health Board compared with Population Size
DA5	New Admissions by Degree of Injury
DA6	Discharges by Degree of Injury
DA7	Admissions and Discharges for Non Traumatic Spinal Cord Injury (ICD 9 Code 952) by aetiology
DA8	Day case Attendances by Health Board
DA9	New Admissions by Age Group
DA10	Age & Sex of New Patients by Category of Injury Female Patients 1999/2000
DA11	Age & Sex of New Patients by Category of Injury Male Patients 1999/2000
DA12	Age & Sex of New Patients by Category of Injury All Patients 1999/2000
DA13	Length of Stay for Traumatic Injury by level of Spinal Cord Lesion
DA14	All Discharges
DA15	Discharges by Case mix Complexity
DA16	Discharges by ASIA Impairment Level & Health Board
DA17	Discharges by ASIA impairment Level and Health Board
DA18	Delay between actual and intended date of discharge
DA19	Time to admission
DA20	Ventilated bed days

APPENDIX A PHYSIOTHERAPY

Service Aim

The QENSIU is the only specialist spinal injuries unit in Scotland. As a national service it is funded directly by the Scottish Executive.

Staffing:

Jon Hasler MPhil MCSP Superintendent Lead Clinical Specialist.
Vivien Smillie MCSP and William Stewart MCSP Permanent Senior 1 posts.
Sandra Forrest MCSP. Permanent Senior 11 post.

Nine month rotating Senior 11 post:
Melanie Fraser MCSP (April 04 to July 04)
Anne Watson MCSP (Aug 04 to present)

Four month rotating Staff grade posts:
Claire Griffen MCSP and Nicola Bentley MCSP (Feb 04 to May 04).
Lynn Russel MCSP and Alan Craig MCSP. (June 04 to Sept 04).
Angela Davis MCSP and Careen Toms MCSP. (Oct 04 to Jan 05).
Julie McGuckin MCSP and Kate Wilson MCSP[long term sick] (Feb 05 to present).

When comparing this level of staffing, for 48 beds, with the other eleven British spinal injuries units it is seen that we currently hold the lowest patient to physiotherapist ratio at 6.8 patients/physiotherapist [range 4.2/physio- 6.8/physio].
Our four permanent physiotherapists provide an excellent base of experience and expertise having accumulated a combined total of 76 years spinal cord injury rehabilitation. This demonstrates stability, reliability and dedication.

Service Access.

- Weekday Service Hours: 8.30am- 4.30 Mon-Thurs and 8.30-4.15 Fri.
- Weekend Service Hours: One of the SIU physiotherapists covers any work that is needed at the weekends. Once this work is completed they leave the hospital and the emergency call-out system is reverted to.
- Emergency cover:
Mon-Fri 4.30pm-8.30am via the hospital wide on-call physiotherapy service. Weekends once the SIU physiotherapist has left the hospital, usually from midday onwards until 8.30 the following morning.

Service Activity.

Breakdown of patient groups treated.

New admissions: 01/02. 02/03. 03/04.
04/05.

	Total (%)	Total (%)	Total (%)	Total (%)
Neurological Deficit				
Incomplete Quadraplegia	28 (31)	37 (40)	25 (25.5)	23 (28%)
Incomplete Paraplegia	14 (15)	19 (20)	16 (16.3)	12 (14.4%)
Cauda Equina lesions	12 (13)	9 (10)	7 (7.2)	2 (2.4%)
Complete Quadraplegia	14 (15)	11 (12)	14 (14.3)	22 (26.4%)
Complete Paraplegia	15 (17)	12 (13)	21 (21.4)	18 (22%)
Monoplegia	5 (6)	3 (3)	4 (4)	4 (5%)
Incomplete Others	2 (2)	2 (2)	11 (11.2)	0
<u>Neuro deficits Total:</u>	<u>90 (100)</u>	<u>93 (100)</u>	<u>98 (100)</u>	81 (100%)

<u>No deficit/ Intact.</u>			74	72
103	63			
Total:	<u>164</u>	<u>165</u>	<u>201</u>	<u>144</u>

All patients was assessed by the physiotherapy department. The incomplete tetraplegic patients take the most time.

Re-admitted patients.

All patients who are readmitted receive physiotherapy input if appropriate. This would be a number of times per day, in the case of a chest infection, to twice per week to maintain the range of movement in paralysed joints while the patient is on bed rest to heal a pressure sore.

Inpatient attendance's and direct patient contact treatment units.(15 minute units)

April-March	01/02.	02/03.		04/05.
Attendance's	12760	12359	12599	11573
Units.	29272	27753	29981	27416
New patients	164	165	201	144
Combined indirect patient contact and non patient contact units.(15 minute units).				
	01/02 : 10830	02/03: 10269	03/04: 11093	04/05: 10144

Weekend cover.

To ensure the highest level of care, the spinal injury trained physiotherapists cover all the weekend work on the spinal unit. This year the work-load has been as follows:

Year.	<u>01/02.</u>	<u>02/03.</u>	<u>03/04.</u>	<u>04/05.</u>
Attendance	1006	717	765	778

Direct units:	2039	1511	1625	1920
Indirect units:	754	559	601	710.4
Ave hours/wkd:	13	10	11	13

The increase in the number of attendances and units for this years weekend cover may reflect the acute nature and respiratory instability of some of the patients. This is relevant if one considers the reduced number of patients admitted this year.

On call after 5pm.

This service is provided by the on call physiotherapists for the whole of the Southern General Hospital, and is provided as pre arranged treatments for patients with chest complaints that will deteriorate if not treated at night, and emergency call outs from a Registrar or Consultant.

During the past 2 years the figures were:

Year:	<u>03/04.</u>	<u>04/05.</u>
Attendance	<u>96</u>	<u>70</u>
Direct units	303	166
Total hours	76hrs	41.5 hrs

During this past year there has been a 31.5% reduction in out of hours work as compared to last year. This may well be due to the reduction in-patients admitted to the unit. It may also be due to the call-out criteria being tightened up at the beginning of the year.

The monthly breakdown of these figure's for 03/04 and 04/05 were as follows :

Weeknights.
Pre- arranged.

Weeknights.
Emergency call out.

	<u>Attendance(A)</u>		<u>Units(U)</u>		<u>Attendance</u>		<u>Units.</u>	
	03/04	04/05	03/04	04/05	03/04	04/05		
April	6	4	16	8	4	1	9	2
May	6	4	15	8	2	4	6	9
June	4	13	8	31	3	5	9	14
July	6	6	19	13	7	3	19	10
Aug	2	0	6	0	8	1	21	2
Sept	4	2	13	5	5	3	15	8
Oct	8	10	18	18	4	1	17	4
Nov	1	2	2	4	0	2	0	5
Dec	0	1	0	2	2	2	6	5
Jan	0	2	0	6	1	4	3	12
Feb	0	0	0	0	0	0	0	0
Mar	1	0	2	0	3	0	5	0
<u>Total.</u>	38	44	99	95	39	26	110	71

Out Patients.

There are four types of out patient seen by the physiotherapy department. Firstly those patients continuing their rehabilitation having had an early discharge, secondly those patients returning for further rehabilitation having made some form of recovery, or deterioration. Thirdly, patients requiring pain management, predominantly with acupuncture, and finally, those patients requiring a one off assessment.

Outpatients:

The figure's were as follows:

Year:	<u>01/02</u>	<u>02/03.</u>	<u>03/04.</u>	<u>04/05.</u>
Attendance	256	90	196	90
Direct units	611	195	648	778
New patients	28	31	52	41

The increase in outpatient activity (units) has continued to rise (20% as compared to last year).

We remain understaffed to treat outpatients as thoroughly as we would like to.

Education/ Training.

For most physiotherapists learning about and gaining experience in Spinal Cord Injury rehabilitation is undertaken as a postgraduate.

However to enable students to have an experience of this specialist area all the Scottish training establishments send their students to us to gain an overview of this work.

During the year we ran 3 courses here in the unit for the physiotherapy students of the following universities:

Caledonian University. Glasgow. (BSc and MSc)

Queen Margaret University. Edinburgh.

Robert Gordon University. Aberdeen did not attend this year.

We also gave clinical supervision placements to 11 students from these universities. We also had 3 students on elective placements from a variety of other universities. These placements varied in length from 4 weeks to 8 weeks. In all a total of 66 weeks of student supervision were given in 2004/05 then more than last year.

All new key workers within the unit and all new SHO's were trained in the use of the Functional Independence Measure (FIM) enabling them to understand the use of this internationally recognised outcome measure and therefore to be able to participate in the units recording of our patient's FIM scores.

SHO's received lectures on the role of physiotherapy within QENSIU and on sport/recreation for SCI individuals.

Lectures were presented to the visiting Bioengineers and Prosthetics students from The University Of Strathclyde.

Our staff also lecture to patients/relatives/carers within the patient education programme on the following topics:

- ◆ Anatomy of the spinal column/spinal cord.
- ◆ Spasm/spasticity.
- ◆ Neurogenic pain.
- ◆ Wheelchairs.
- ◆ Sport and recreation.

We also present lectures/talks to other multi-disciplinary staff and student groups on the role of physiotherapy in SCI rehabilitation, patient potentials and limitations, physiotherapy techniques in the management of domiciliary ventilated patients.

Finally our commitment to training our own staff continued with regular in service training both for physiotherapy staff, the multidisciplinary team, and staff from other hospitals within Scotland.

Clinical Governance Framework.

- Clinical effectiveness (04/5).
 - Biannually the Superintendent attends the Inter-SIU Superintendent Physiotherapists meeting where exchange of current clinical effectiveness issues is undertaken. Clinical speciality standards for the management of SCI individuals are also reviewed and a number of clinical guidelines have been written and agreed across all twelve UK units. This year the meetings were in Dublin and Oswestry.
 - Current research/development papers are sometimes reviewed during in-service training and by attending specialist conferences.
 - Individual Case Studies have been presented as part of our in-service training programme.
 - Each patient has outcome measures using the Functional Independence Measure (FIM) set at the beginning of their rehabilitation and these are monitored especially pre discharge.
- Those physiotherapists within the Southern General Hospital who use acupuncture as a treatment modality have formed an Acupuncture interest group and are reviewing practice, standards etc.

- Audit of our success in achieving the CSP Cord Standards was undertaken with our 97% compliance rate being maintained.
- All staff have access to the library and the internet.
- Clinical Risk Management:
 - This is also discussed between the SIU's and resulted in some of the agreed guidelines.
 - Each individual physiotherapist assesses their abilities and those of their patients. This alters as the rehabilitation process continues. This however is not formally recorded at present.
 - CPD.
 - Weekly in-service training within the SIU.
 - SGH Physiotherapy Department in-service training monthly:
 - Courses attended by staff:
 - Moving and Handling.
 - Fire lectures.
 - CPR.
 - Conduct and Capability.
 - Repair and Recovery. A Spinal Cord Injury Research Conference.
 - MASCIP annual conference
 - Gutmann Annual lectures.
 - Enabling exercise post SCI with FES.

Developments in 04/05.

New wheelchair accessible multi-gym equipment was purchased to replace some of the 12 year old equipment that was worn out .

The Inter Spinal Injury Unit Games were hosted at the Ludwig Gutmann stadium in Stoke Manderville during April. The team from QENSIU produced our second best ever result with a 4th place, ahead of larger units such as Stoke Manderville and Sheffield.

Patient Sport/Recreation and Community Reintegration.

Each Wednesday afternoon a senior and junior physiotherapist has run a rolling programme of sport. This contributed to the improved success at the inter-unit games. Sports have ranged from archery, table tennis, basketball through to fencing for which we organised an external coach to supervise the sessions.

Our links with local/national sports/recreational resources run by both council and private/charitable organisations has continued. This can be seen through the following activities:

- ❖ The physiotherapy staff introduced a number of patients to disability sailing with weekly midweek sailing with a local sailing club. This was only possible due to staff voluntarily giving of their own time on Wednesday evenings through the summer.
- ❖ We invited the charity Back-Up to present quarterly talks to the patients about their outward bound and skiing activity courses. These were met with great interest by most patients.
- ❖ In partnership with Back-Up we ran a very successful advanced wheelchair skills workshop here in the unit where long individuals with long standing paraplegia demonstrated and tutored 15 patients in the advanced use of their wheelchairs.
- ❖ A junior member of staff has continued to gathered the names and telephone numbers of all of Scotland's disability sports and recreation development officers to enable us to contact patients own local officer alerting them of patients needs and getting information for our patients as to what is available in their location on discharge. We hope this will involve the discharged patient in activity out-with their home that will also contribute to both their future physical and emotional rehabilitation/reintegration.
- ❖ We have taken patients to the Braehead curling rink on five occasions where they have received expert coaching from no other than one of the current wheelchair curling world champion team members. Patients were also taken to watch and support the Scottish wheelchair curing team as the participated in the World Wheelchair Curing championships. For the second year running the Scottish team became World Champions.
- ❖ We have informed patients of the charity Walking on Air who aim to introduce disabled individuals to the sport of gliding.

We would have liked to enable our patients to undertake more of these recreational/sporting activities through the year but have found it problematic to undertake a regular programme of "out of unit" activities due to the increased staffing implication trips out of the unit necessitate.

Research (04/05):

The following research projects/grant applications have received physiotherapy input/advice during the year:

- ◆ Advise/mentoring input into Glasgow Universities pilot project looking into the cardiovascular and muscle power outcomes with incomplete paraplegic subjects walking on a treadmill.
- ◆ In conjunction with Professor Malcolm Granet of Caledonian University an grant application, to the Scottish Chief Scientists Office, has been resubmitted fro the following project:
 - ◆ "FES Augmented Partial Bodyweight Support Treadmill Gait Training with Incomplete SCI Patients". This will be a 3 year project. All future funding would be for staffing as all the equipment is already in place.

Areas for Development(05/06):

Rehabilitation teams within spinal cord injury units have long believed that a sport, recreation and community re-entry programme is a vital part of the rehabilitation process. Assisting spinal cord injured patients to learn to deal with social and environmental barriers through excursions into the community, including sporting, recreational and social

activities should be fully incorporated into our programme of rehabilitation. As in other SIU's this should be a part of the rehabilitation therapy team role.

The unit has access to suitable transport allowing access to the wider community but has found it problematic to undertake a regular programme due to the increased staffing implication trips out of the unit necessitate.

For the patients pathway through rehabilitation to be successfully completed efforts should be made to continue the process in their own local community. There is therefore a role for the team to be contacting local sports/recreational resources both council/privately run to try and involve the discharged patient in activity out with their home that will also contribute to both their future physical and emotional rehabilitation/reintegration. This will be assisted by completion of the compilation of names and telephone numbers of all of Scotland's disability sports and recreation development officers. We will then put into practice the linking of our patients to their local council resources.

Moving research into clinical practice.

❖ Partial Body Weight Treadmill Gait Training.

As reported last year we still remain unable to integrate this treatment approach into everyday rehabilitation. For each patient session, of approx 1 hour, to be successfully and safely undertaken it required dedicated input from at least 2 physiotherapy team members.

This would require a staffing increase to enable us to integrate this into the rehabilitation programme of all the incomplete SCI patients. This therefore remains an area for service development.

❖ Upper and lower limb FES cycling programmes.

If final published results are favourable for these projects this work would become integrated into the physiotherapy rehabilitation programmes of both paraplegic and tetraplegic patients.

Meanwhile more emphasis on non-FES cardiopulmonary fitness programmes could be developed along side the development of sport/recreation/reintegration programmes.

❖ Equipment requirements.

As each year passes our aging stock/loan wheelchairs become more decrepit and out dated. This year two of our powered wheelchairs broke down and were found to be obsolete by our repair agencies.

We therefore wish to replace these powered wheelchairs with up to date versions similar to those issued by the wheelchair services to our individual patients on their discharge.

We also wish to modernise our stock of manual attendant wheelchairs for our ultra high injury patients. The development of and provision by wheelchair services of "Tilt in Space" wheelchairs with supportive seating systems and head support has recently enabled two of our patients to access these chairs. However assessment and therefore provision was greatly delayed as we only had the old design semi-reclining wheelchairs. This showed a gap in our ability to provide appropriate modern wheelchairs for assessment and initial mobilisation of this patient group.

Future Staffing Requirements/Developments:

Technical grade:

We continue to look forward to the promised funding being release for this proposed new member of staff.

The reason for seeking technical instructors over assistants is due to the need to seek individuals with HNC/SVQ qualifications in the areas of exercise/sport/recreation sciences. These individuals would then be able to work with a higher level of independence than an assistant would be able to in the areas identified as needing increased input.

The pay scale of technical grade 2 (lowest band) is £13,310 rising to £13,710 for a grade 3 (prior to AfC). Assimilation into AfC pay bands has not taken place as yet.

Such appointees would also be able to assist with the following activities enable current qualified staff to increase their time spent with one on one patient session, clinics, small research projects, audit etc:

- With the increasing number of incomplete patients we see, who are requiring pre-gait and gait training, there is an increasing need for the assistance of another person to be involved per treatment session. The technical instructor could be this person.
- In taking group sessions.
- Clerical administrative activities.
- Maintenance/cleaning of equipment.
- Accompanying out of hospital activities.
- Assisting in the hydrotherapy pool(in the water) thereby enabling an increase in usage.
- Undertaking maintenance stretches/exercises for long term and re-admission bed patients.

All of these activities would give the current staff more time to develop input to specific projects such as spasticity management via Botox and physiotherapy, recreational out of unit activities, collaborative and within department research projects etc.

Senior physiotherapist:

To develop the service to patients attending the Out-Reach Clinic's across Scotland including those clinics held at QENSIU.

With the increased number of regional out-reach clinics there have been an increasing number of physiotherapy related issues coming to our attention that need to be dealt with after the team return from the clinics and request our input. This inherently means the issue takes longer to deal with than it would do if the patient had actually been seen by a physiotherapist at the clinic. The fact that there is no physiotherapy input at the clinics also means that there is now less and less follow-up, within the first year of discharge, of patients than was the case when they came to the QENSIU for their 6 week/6 month follow-up appointments.

Since the introduction of the Functional Independence Measure (FIM), as the units primary outcome measure, we have never managed to follow up our patients progress/deterioration in function post discharge. This could clearly be a role for a clinic physiotherapist.

With the increasing SCI population growing older each year the number of spinal/limb degenerative wear and tear problems that patients are reporting at reviews is increasing.

The out-patient Occupational Therapist has specifically identified this as an issues. She is regularly asked, by patients, to help them with such problems, but feels these are issues a physiotherapist should deal with. This certainly would improve the quality of care provided. This will continue to be a gap in the service we provide unless time/resources can be allocated to address these issues.

Such a physiotherapist would develop the role to meet the following needs:

- ❖ *Discuss/guide local physiotherapists in continued physiotherapy input for recently d/c patients.*
- ❖ *START collecting follow-up FIM scores for patients thus identifying improvements/deterioration's in function and with local resources devising possible ways of optimising function.*
- ❖ *There is little emphasis, in the current clinics, on assessing neurological changes, joint range of motion/contracture development, physical methods of managing spasticity and preventative interventions to minimise future problems. Such assessments of patients developing problems could allow appropriate interventions to be devised and discuss with local teams. This could reduce/minimise future problems. These issues could be taken on by a physiotherapist.*
- ❖ *Assessment of our growing number of incomplete patients could well assist in maximising continued recovery post discharge. It could also draw the teams attention to deterioration in function in the longer standing individuals. This is particularly true in the area of gait pattern changes. This was highlighted at the Inverness clinic in April this year where three of the patients were incomplete walkers all of whom had gait problems all relating to orthotic problems and two also to tone with the development of bad gait habits. Immediate discussion, by the physiotherapist, with the on site orthotist will have moved reviews closer much more quickly for the patients.*
- ❖ *Liasing with local council sport/recreation officers to encourage discharged patients to continue rehabilitation/reintegration following discharge but out with the NHS.*
- ❖ *Respiratory function reviews in long standing high level tetraplegic patients to try and prevent/minimise respiratory problems.*

Respiratory Physiotherapist

As the role of Dr A McLean our Consultant, and his interest in the respiratory management of high tetraplegic patient develops, and the Domiciliary Ventilation Service continues to develop, we need to increase/review our respiratory skills. This would ensure that the breadth of physiotherapy input these patients could benefit from is achieved. This would also be true of the increasing number of short-term ventilated patients, and tracheostomy patients that the unit is now treating.

Most spinal injuries units within the UK that treat ventilated/tracheotomy patients now have a physiotherapist leading the work with this group of patients.

It is true that we have increased the number of anaesthetic sessions but more time could be spent with patients, one on one, to wean them off the ventilator or from their tracheotomy. In many other speciality areas speech and language therapists and physiotherapists work together to increase time spent with patients easing the weaning process along more quickly. This could again be addressed by current physiotherapist having more time to give the one on one time required. By allocating patient input to the technical assistants, when necessary, this time could be found.

APPENDIX B DEPARTMENT OF OCCUPATIONAL THERAPY

SERVICE AIM

To provide an effective Occupational Therapy service that will minimise disability, maximise independence and maintain health in the Spinal Injured of Scotland.

This is achieved through assessment, treatment and evaluation.

Occupational Therapy aims to

- assist the recovery or rehabilitation of
 - Functional skills
 - Educational skills
 - Vocational skills
 - Social skills

This is to enable the individual to be maintained in the community or care environment at their maximum potential.

- provide advice and support to carers and other agencies supporting the spinal injured.

The team of Occupational Therapists strive to:

- achieve the maximum level of service within allocated resources
- maintain a sound level of clinical expertise and excellence through skill sharing and education.

ASSESSMENT

- Activities of Daily Living
- Hand Function
- Seating
- Home Environment
- Work Environment
- School
- Community Skills
- Lifestyle/Leisure
- Keyworker/Needs assessment
- Driving assessment screening (informal)
- Power wheelchair control needs
- Pre and post-op assessment in tendon transfer surgery

TREATMENT

- Self-care skills
- Domestic skills
- Vocational skills
- Hand and upper limb function/remedial activity
- Orthotics
- Communication skills
- Functional mobility
- Family/carer training
- Education

- Neuro-control follow-up
- Tendon transfer post-op training
- Mouthstick training
- Environmental Control Unit training
- Assistive technology advice
- Adaptation of equipment
- Prescription/recommendation of aids and equipment

EVALUATION

- FIM scale
- Ongoing functional evaluation
- Standardised patient focused outcome measure for occupational therapy currently being piloted

SERVICE SPECIALITIES

- Seating assessment with specific attention to the special needs of the spinal injured. This includes posture control in high level tetraplegia and pressure sore prevention with the use of a pressure reading monitor. Joint sessions with bio-engineers are arranged when necessary.
- Splinting the tetraplegic hand and fabrication of splints to aid specific functions e.g. writing, shaving.
- Patient Education:
 - Skin care/pressure sore prevention in ADL
 - Community resources
 - Cushion care
 - Recreation and leisure
- Environmental control unit and assessment for switch selection/position
- Mouthstick training
- Home assessment with recommendations for alteration to home or for rehousing, depending on the needs of patients and family
- Equipment: assessment of patients needs with regard to specialist aids and equipment required to aid function
- Adaptation of equipment and aids
- Workplace and work skills assessment
- Unique information service for patient, carers and staff
- Pre and post-op assessment and treatment in tendon transfer surgery.

SERVICE ACCESS

Service hours: Monday - Friday , 8.30 - 16.30 (Fri 16.15)

System of referral: Blanket

Location: Based within the Queen Elizabeth National Spinal Injury Unit, a comprehensive Occupational Therapy Service is provided to the Spinal Injured of Scotland.

Within the unit there are 48 beds, 12 of which are designated High Dependency, 4 are within the Respiratory Care Unit and 32 are rehabilitation beds.

In keeping with the Spinal Unit's life-long care policy, the Occupational Therapy Service is extended to outpatients and home follow-up. The unit open door policy is also adhered to.

A holistic, multi-disciplinary team approach is adopted by the QENSIU

STAFFING

All staff are well motivated, cohesive and committed to high quality patient care

Advice and expertise is often called upon by other Occupational Therapists and health care workers based in both hospitals and in the community

The service is staffed by 4.75 WTE –

The Head Occupational Therapist is responsible for

- the day to day management of the National Spinal Service
- development of the Assistive Technology Service
- staff supervision and development
- clinical caseload
- caseload allocation
- administration and statistical collation
- fieldwork Educator
- line management of the Senior 1 staff within the Rehabilitation Directorate
- The Head OT is responsible to the:
 - Clinical Director of the Spinal Injury Unit
 - OT Manager

Senior 1 x 0.75 WTE - out-patient service - is responsible for,

- assessment and treatment to the out-patient population of spinal cord injured. This service includes follow-up, annual review of needs and function and care for those re-admitted to the unit with complications associated with SCI
- overseeing OT input to satellite clinics
- Patients contacting the service on the open door policy
- development and administration of out-patient service

Senior 1 x 0.5 WTE - (Hand Therapist) - is responsible for,

- co-ordination of all spinal unit upper limb assessment and treatment
- identification of patients who would benefit from or be suitable candidates for tendon transfer surgery
- Hand Service development
- Supervision of the Occupational Therapy Assistant

Senior 1 (in-patients) is responsible for,

- assessment, treatment and rehabilitation of newly injured patients.
- Supervision of Senior II
- Fieldwork educator
- Other duties as assigned by the Head OT

Senior 11 is responsible for,

- Assessment, treatment and rehabilitation of newly injured patients.
- Other duties as assigned by the Head OT

Occupational Therapy Assistance x 0.5 WTE is responsible for

- carrying out assigned patient treatment under the direction of a qualified member of staff
- various clerical, administration and other duties as assigned

All team members provide training for professional under-graduate and post graduate training to students from various health care professions

STATISTICS FOR July 2002 to April 2003

	Units	New	Returns
In-patients	6421	168	2203
Out-patients	1344	289	160
Hands (In- pt)	2662		2178
Hands (Out-pt)	278	5	151
Home visits	301	17	13
Total	11006	479	4705

STATISTICS FOR April 2003 – Mar 2004

	Units	New	Returns
In-patients	8159	201	3386
Out-patients	2016	495	192
Hands (In- pt)	3942	N/A	2952
Hands (Out-pt)	339	3	142
Home visits	784	N/A	99
Total	15240	699	6771

STATISTICS FOR April 2004 – Mar 2005

	Units	New	Returns
In-patients	9355	168	2961
Out-patients	1852	374	353
Hands (In- pt)	4114	N/A	3107
Hands (Out-pt)	444	17	157
Home visits	951	N/A	126
Total	16716	559	6704

Each unit relates to 15 minutes of time staff spend in patient related activity.

The total sickness absence for the year was 57 days. This figure is primarily related to a member of staff being on long-term sick leave. This is equal to 4.6% sickness absence.

TEACHING AND TRAINING ACTIVITY

At the National Spinal Injury Unit all qualified staff are heavily involved in education and training of patients, relatives, carers, other health care professionals, lecturing at workshops/courses and to OT and PT students at the universities

Lectures/presentations this year:

- Bio-engineering students
- Edinburgh therapy students
- Prosthetic students
- SHO – FIM training, posture and seating, role of OT with Spinal Injured, splinting
- New nursing staff – outcome potentials

- Co-ordination of OT in-house in-service training sessions on various topics
- Organised Health and Social Care Records on Trial workshop – a multidisciplinary course on issues to consider re: documentation and legal issues
- Patient/relatives education programme
- Talk to local primary school – role of OT
- Visit by Russian OT tutors who are establishing training programme in Russia

Courses attended by staff:

- All staff have attended a variety of in-Trust courses including Deaf Awareness, Conflict management and Supervision.
- Guttman Lectures
- Cochrane reviewer course
- Practice based learning study day
- Environmental control unit study day
- Service redesign course

CLINICAL GOVERNANCE ACTIVITY

- OT is represented at each spinal unit Clinical Governance meeting. Presented outcome on initial Westcotes Outcome Measure pilot to OT service clinical effectiveness group
- The OT Journal Club is now well established and has developed into a Research and Development group, giving the opportunity for each of the OT spinal unit staff to feedback on research/audit or other clinical effectiveness projects they are involved in. This offers peer support and opportunity for brain-storming and developing ideas.
- Literature review on use of upper limb FES with incomplete spinal injured. Now formulating outline for case study for both complete and incomplete injured
- As with all OT departments all staff have annual review of their Personal/Professional Development Plan. This reviews their strengths, objectives and training needs.
- All staff have full access to the library facilities here and at GCU.
- All are encouraged to attend the OT in-service programme.
- The Occupational Therapy Department within the Trust now has regular Clinical Effectiveness Meetings at which the Spinal Unit staff play an active part
- Also all staff have access to the training budget as per department policy.
- There are bi-annual Spinal Unit OT and PT Heads of Department meetings where the Heads of the UK Spinal Units meet to discuss issues related to service provision and development. Every attempt is made to attend these.
- Staff are encouraged to attend the annual MASCIP and Guttman lectures which are held in one of the spinal units, on rotation. Due to staffing levels only one member of staff can attend and this depends on costs.

- Further clinical governance activity is noted under the heading of “achievements and developments”

ACHEIVEMENTS/DEVELOPMENTS

- Involved in Glasgow Best Value Review for Equipment and Adaptations
- Project with Scottish Wheelchair and seating group continues investigating the effectiveness of a Visual Analogue Scale as a clinical tool in posture and seating
- Senior I OT became a recognized Cochrane reviewer
- Attended prescribers meeting to review accredited suppliers of cushions
- Co-ordinated use of FSA pressure monitor with research project through Glasgow University and London College
- Involved in establishing use of LUTM programme for use in developing a data base for recording and analysis of pressure sores
- Currently completing audit of pressure sore occurrence within the unit
- Organised first meeting of Occupational Therapists with special interest in Hand Therapy in Spinal Cord Injury Rehabilitation. 9 therapists from the UK attended. The aim is to focus skills, share and evaluate practice and establish training programme.
- Contributed to organization of the patient’s refresher day in Inverness
- Supported 9 patient team to inter-spinal unit games at Stoke Mandeville
- Patients taken to both Independent Living exhibition and Mobility roadshow
- OT policies and procedures manual revised and completely updated. Review due September 2005
- Involved in development of national OT guidelines for practice in Spinal Cord Injury. Currently devising audit proforma to allow review standards. This is a collaborative project with other spinal units in the UK
- Active member of Scottish Occupational Therapy Special Interest Group in Employment Issues
- Outcome measure for OT in spinal cord injury - pilot initiated Westcotes Outcome Measure. Following initial pilot, development of outcome guidelines for goal setting has been initiated and is in process. Once established a pilot of the Westcotes Outcome measure will resume
- 2005 Occupational Therapy Documentation standards show a 89% compliance rate.

- Following the splint use audit last year a photographic system of communication has been implemented, nursing re-training programme is now planned, following which the audit will be repeated.
- A comprehensive demonstration and training room for use of environmental control units has been established. Following negotiation, equipment was provided by charitable donation or longterm loan from the prime suppliers in the UK. The room includes automatic door opener, integrated hands free telephone, electronic page turner as well as TV, DVD, CD, lamp and fan. A variety of switch and mounting systems are available for assessment and training purposes. Equipment for programming systems that can be used in the ward has now been received and it is anticipated that ECU use on the ward can be established imminently. This will allow increased independence and quality of life for patients with the highest level of injury
- Collation of literature related to ECU/assistive technology and outcome measures is ongoing with new publications and developments
- Collated information on nationwide network of medical officers responsible for ECU provision.
- Collation of data related to AT sources available via retail outlets is ongoing with new publications and developments

OCCUPATIONAL THERAPY FUTURE PLAN 2005-2006

- Audit incidence of return to work post spinal cord Injury and identify limiting factors.
- Complete project with Scottish Wheelchair and Seating Group which is investigating the effectiveness of a Visual Analogue Scale as a clinical tool in posture and seating
- First audit of national OT guidelines for practice in Spinal Cord Injury
- Splinting – a considerable amount of staff time is spent on manufacturing splints. It is proposed that a trial of pre-fabricated splints be carried out. This potentially will ease the pressure of work on the hand therapist. This has a cost implication for the appliances budget
- Application submitted to GGNHS Staff Lottery for voice operated environmental control unit and electronic pageturner

PROPOSED DEVELOPMENTS

Out patient service

As the out-patient numbers continue to grow along with the number of out-reach clinics, the demand on the out-patient services have increased. Interventions are reactive and little time can be invested in re-evaluating the aging population in a planned way in an attempt to prevent deterioration in function and enhance quality of life. A reduced amount of time is also being spent on individuals as they attend the out-patient clinic.

Due to demand there is an inconsistency of service provision between patients that are seen here and at outreach clinics which the OT, currently cannot always

attend. Conversely, when the therapist is at outreach clinics or on visits, patients are not seen at the unit's out-patient clinic at the time of attendance. They therefore do not receive the standard review. If they require the input of an OT, they either need to return to the clinic again, or a home visit may be required. This creates a backlog. Statistics over the years continue to show an increase in the number of new patients to the service. Figures have risen from approximately 25 – 30 new episodes of OT intervention per month to 41 this last year. To maintain a quality and nationally consistent service consideration should be given to the staffing level

It should also be noted that, as the therapist's expertise is increasingly acknowledged, demands for input into various projects continue to increase

The use of the specialist pressure mapping equipment is also in demand, eg. The department has been approached by Kings College re: a research project in which involvement would be advantageous to the service in marketing our expertise and providing cross service research

Momentum



Input to the Queen Elizabeth National Spinal Injury Unit Annual Report

Period: April 2004 to March 2005

The aims of the Momentum service at the National Spinal Injuries Unit are: -

- To work with the Spinal Injury Unit therapy and nursing departments in promoting independence and inclusion for all spinal cord injury patients.
- To introduce computers and their possibilities to patients for use in leisure, communication, training, education and employment.
- To encourage and develop patient skills and initiatives in using assistive computer technology for independent participation in social and occupational rehabilitation programmes.
- To provide a technical assessment service for patients to use assistive technology (A/T) to interact with computer and act as a conduit to training facilities after discharge.

Early in recovery, patients are able to gain an insight into their potential for employment or other constructive activities within their own community.

Introduction

This service is funded by Glasgow City Social Work Department under a Section 10 Grant to voluntary organisations. It is person centred and has a number of underlying principles; needs led, flexible and holistic which integrate with the multi-disciplinary rehabilitation approach of the unit.

We provide a service that delivers a menu of options delivered within a Best Value framework. The key elements include:

- 1) Starting with an initial consultation and assessment to appreciate the patient's physical capabilities. The objective is to identify appropriate A/T to meet the patient's needs and determine the optimum location for switches, should they be required.
- 2) Primary goals are exploration and rehabilitation based on A/T activities. Therapy and pre-vocational goals are set in conjunction with the unit multidisciplinary approach under the auspices of the Goal Planning Programme.
- 3) Some patients are uninformed about the value of computers in rebuilding their lives! Part of the service includes exploratory sessions, designed to discover how using assistive

technology can make access to home computing possible and open up a whole new world of independent communication and information.

- 4) For those patients using speech recognition, training will consist of reading into the computer passages of text so that the computer can “understand” how they pronounce words. Patients have also to learn the appropriate computer instructions so they can have complete command and control of their application programmes.
- 5) For those patients using headset technology, in conjunction with keyboard emulation programs, (icons on the monitor screen) practice in accurate head movement to select icons by dwelling, or activating single or multiple switches is needed.
- 6) Patients whose dependency for command and control rests with single switch A/T in conjunction with a scanning software the training element will concentrate on fine tuning the computer scan rate to obtain the best scan rate and switch delay combination. This is called input filtering and can take several sessions before the most suitable blend of adjustments are found.
- 7) E-Mail communication and Internet exploration are popular items on our agenda and is particularly important to improve social inclusion for patients from the more remote areas of Scotland, enabling them to keep in touch with family, employers and relatives back home.
- 8) For people retaining employment or university courses the project works closely with employers and other agencies to ensure the correct assistive technology devices are prescribed. Carers and family are also given much needed support
- 9) The tangible results for patients participating in the service are: -
 - a. More constructive use of leisure time, vocational independence and social integration to prevent social exclusion.
 - b. Improved competency and confidence in using technology to reduce barriers and increase flexibility and adaptability, thereby reducing discrimination.
 - c. As a result of working with computers and assistive technology, Momentum makes a significant contribution to improve patient work tolerance, volition, general endurance, self esteem and self worth of patients.

Developments during 2004 / 2005

Outreach Programme

During 2004 Momentum’s Outreach Programme was awarded Section 16b funding to extend our service to meet the needs of patients after discharge. This programme places on a more positive footing a vital service to people discharged back into the community.

Mr Garry Ryan is the Outreach Worker and is located our Head Office at Intercity House 80 Oswald Street, Glasgow. During the period of this report Mr Ryan has seen 48 patients and has instigated regular home visits for assessment and training purposes.

Patient Internet and E Mail Wireless Network

The unit is equipped with a patient dedicated Wireless (802.11b) Network covering most of Philipshill Ward and the Day Room. It is available 24 hours a day, 7 days a week.

Current transmission power levels restrict its use to Rooms 5 to 10, and the Dayroom. Plans are in hand to extend the service to the remaining rooms. However at this time, technical problems such as shielding by the internal walls of the unit prevent a feasible solution being found.

This year has seen an increased number of patients with their own Laptops use this facility. In fact, some patients have purchased their own laptops with the express purpose of accessing the Internet and sending E Mails from their bedside. On average about six patients access this Internet and E Mail facility each day.

We believe this service to be unique in a UK Spinal Injury Unit and shows innovation in the use and application of standard technology.

Conferences Attended 2004 / 2005

- December 2004, the Assistive Technology Conference at the Central Remedial Clinic, Clondarf, Dublin, Ireland under the European Platform for Rehabilitation

Technology for Living Conference

In April 2005 a conference was held at the unit in conjunction with Momentum Scotland, the Spinal Injury Unit and MASCIP. It was aimed at getting Spinal Unit professionals involved in assistive technology.

Key presentations were: -

- An outline of the Joint European venture COGAIN, a five year research and development project aimed harnessing eye movement to improve the life of those with motor control disorders. The principle is that eye pupil movement is tracked by an array of CCD cameras. The location is then converted into pixel addresses to move the mouse cursor around the screen
- An overview on “Smart” Housing highlighting the emerging technologies in this field of independent living.
- Speech recognition and word predictive software are major devices in spinal injury rehabilitation. Leading experts gave an overview of their experiences and how to get the best from this technology.
- The conclusions from the conference were: -
 - The dedicated A/T service at the Queen Elizabeth National Spinal Injury Unit is unique in the United Kingdom.
 - The speed of technology development is such that a unique profession with Assistive Technology skills is emerging.
 - Other users and experts support our technical judgements, evaluations and reservations about certain technologies.
 - In the field of research not a great deal of creditable data exists on measuring positive Outcomes for people using A/T in a hospital environment. (This is a subject

Momentum will follow up on with the intention of publishing the results of 12 years activity in this field)

- There is a need for A/T practitioners in all the UK spinal Injury Units to meet regularly and discuss common problems and share new ideas. (The “wheel” must get re-invented several times as each unit faces the same A/T issues.)
- That the specialists in environmental controls across Scotland should be more involved and work closer with the Spinal Injuries Unit. To this end the Unit has been invited to the next meeting of Scottish ECU specialists.
- An invitation has been received from Glasgow University to discuss the potential for partnership in future projects involving employment.
- Our own website will be the vehicle to help keep Spinal Injury specialists informed of relevant developments in Assistive Technology.

<http://www.show.scot.nhs.uk/spinalunit>)

- Judging by the post conference comment and the amount of national, local and technical press exposure it was deemed to be a success.

COGAIN

- Prior to the start of the conference three patients participated in the COGAIN trials by using the Eye Gaze technology for command and control of computers. Each had impressive results and with favourable reports about its usage.
- One anecdotal report from a high level injury patient, on bed rest with no head movement, was able within a few moments to interact with the computer and write his name with his eyes in a more relaxed manner than speech recognition.
- The Eye Gaze technology will be available on loan to the Unit for assessing some of our higher level dependency patients
- This equipment comprises a 17” LCD Monitor into which several LCD cameras are integrated. The MyTobii system that was demonstrated uses application software with commands as icons, thus eliminating the need for the eyes to control the mouse. The cost of such a system is approx. £15,000.

Service Performance Indicators

Inpatient Referrals: April 2004 to March 2005

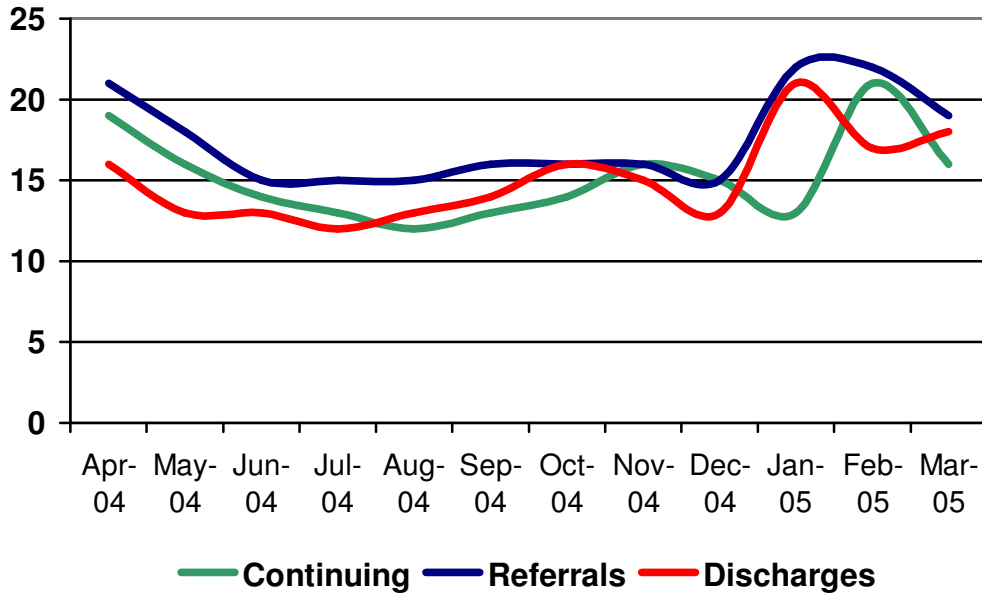
New patients	51
Carried over from 2003/2004	27
S/Total:	<u>78</u>

Representing a 2.5% decrease over the same period 2003/2004

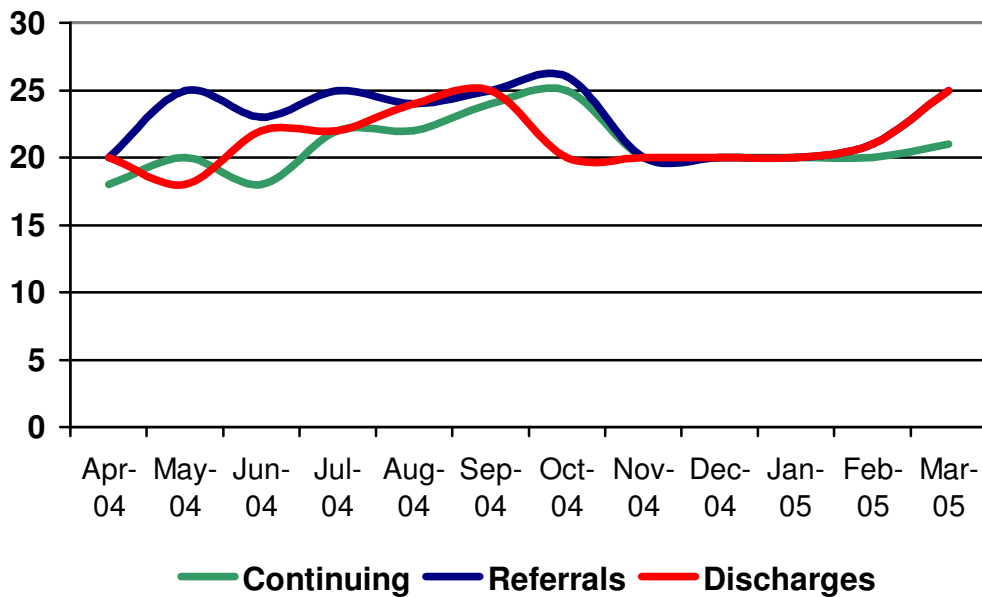
Outreach Referrals: April 2004 to March 2005

New patients	24
Carried over from 2003/2004	24
S/Total:	<u>48</u>

Referrals and Discharges 2004 / 2005 (Inpatient)



Referrals and Discharges 2004 / 2005 (Outreach)

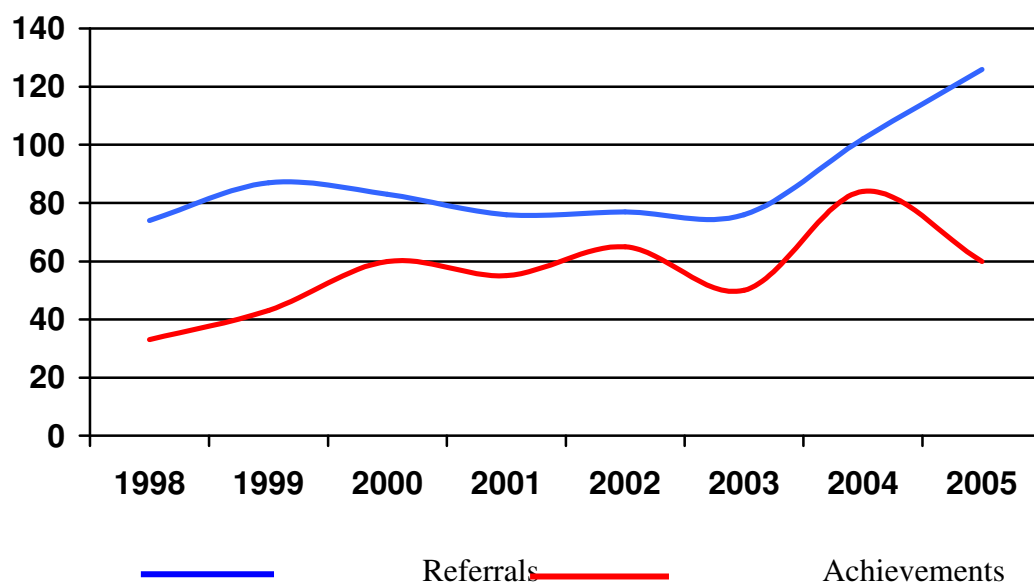


Patient Achievements 2004 / 2005 (Inpatient and Outreach)

Initial Achievement	20
Therapy / Leisure Achievement	6
Assistive Technology Achievement	9
Family / Carer Achievement	21
Onwards Referral for Vocational Activities	2
Support for Continuing Education	1
Support for Employment	<u>1</u>
S/Total:	<u>60</u>

The 24% reduction in achievements over the same period 2003/2004 has been due to higher number of ventilator dependent referrals who take longer to achieve measurable achievements.

Eight year referral Trend (Inpatient and Outreach)



Trend is a slow and gradual growth over the past eight years. The drop in referrals in 2005 was caused when the service had several high level injury, ventilator dependant patients requiring simultaneous assistive technology training. Ventilator patients require frequent training sessions and exclude others from using the facilities.

Project Highlights: April 2004 to March 2005

- Investigation into obtaining accreditation to offer patients chance to obtain ECDL (European Computer Driving Licence) concluded that due to time allocated by the BCS for patients to

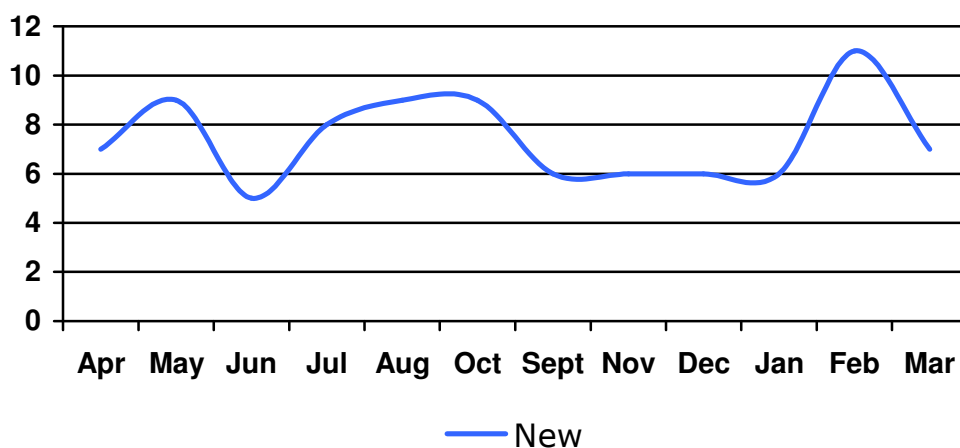
achieve the required qualification that it was not possible to achieve this in-house. However this qualification will be offered by our Outreach service

- As expected, investigation into the benefits of speech enhancers for ventilator dependant patients concluded that the cost did not justify the limited benefit it may give to patients.
- Following up on the design for a mouth operated mouse for tetraplegics revealed that a version called “”IntegraMouse”” developed by a European consortium may be a possible solution.
- Proposals have been submitted to Glasgow Social Work Dept as to how the service would dovetail into the Equal Access to Employment Strategy. We have been proactive in bringing together a strategy for this service that supports that principle and the spirit of the Equal Access to Employment Strategy.

Plans for 2005/2006

- Enhance the Wireless Network to include all Philipshill Ward
- We will continue to look at the feasibility of supporting outreach patients by the use of remote access software. With the spread of Broadband through Scotland this philosophy makes good commercial sense.
- Through membership of the AAATE (Association for the Advancement of Assistive Technology in Europe) we will monitor various projects of interest within European and follow up on technical developments likely to prove a positive improvement for the independence of spinal cord injured patients. Providing the programme is relevant and applicable, attendance at the AAATE Conference in Lille, France is planned for September 2005
- The service will become more proactive in creating links with European providers with a view of sharing ideas.
- An invitation has been received from the organisers of the Congress of European Paraplegic Associations to present a paper in October 2005 at the Swiss Paraplegic Research Institute, Nottwil.

The projected performance Targets for 2005 / 2006



Future Technologies

Developing technologies likely to have a significant impact on future devices for spinal cord injured patients are: -

Eye Gaze Technology

As previously mentioned in this report we are closely monitoring the work of the COGAIN project and hope it will eventually be successful and have a major impact on the lives of spinal cord injured people.

Improvements have dramatically the performance of this device since it was last seen in 1993 in Cardiff.

Brain Wave Technology

Control of devices by brain wave has been under development for a number of years now.

The system is controlled by electrical voltages found on the surface of the forehead. When muscles of a body contract a corresponding voltage is detected on the surface of the skin. In a similar fashion the actions of the brain result in the production of voltages that migrate to the surface of the skin.

Three different types of control signals are derived: -

ElectroOculoGraphic (EOG) signals are typically used to detect left and right cursor motion. The ElectroEncephaloGraphic (EEG) signals reflect mental/brainwave activity and is typically used for vertical cursor movement. Switch activation or keyboard commands use ElectroMyoGraphic (EMG) signals.

This technology will revolutionise the way we all interface with computers. Once fully developed, the spinal cord injury sector will find this technology a quantum leap in obtaining access to a whole range of domestic devices as well as computers.

The most successful version requires many brain implants to obtain acceptable level of performance.

Despite previous success we believe this emergence of this technology into a commercially viable product is many years away.

Equipment Expenditure Requirements 2005 / 2006

Item	Justification	Cost	Spend
Laptop	Increase the availability of Philipshill Ward wireless network	£900	4 th Qtr 2005
CorelDraw Graphic Suite 12	Replacement Software	£420	3 th Qtr 2005
Pentium IV Desk Top	Replace Existing Pentium III	£850	4 th Qtr 2005
IntraMouse	High Level Dependency use	£1,600	4 th Qtr 2005
BigKeys Keyboard	Expand on existing equipment	£220	3 st Qtr 2005

Total equipment expenditure needs is, £3,990

Concerns and Issues

Space

A request to the Spinal Injury Unit Management team for more space has been viewed favourably. The proposal is to create a dedicated room, where high level injury patients could be taken in their beds, for computer access devices such as speech recognition, head set devices etc.

This would alleviate space in the existing Computer Room for paraplegic patients, where more space could be allocated for their less sophisticated devices such as large keyboards, tracker balls and joy sticks.

Achievement and Outcome Measurement

Two year Outlook

- To improve support to patients after discharge by installing commercial remote control software, enabling problems relating to assistive technology and training to be resolved from a central point.
- To offer training and assistive technology support service that is in synergy and supportive of Glasgow City Council's strategy of "Equal Access for Employment".
- To be considered a Centre of Competence within the UK Spinal Injury Units for trials of new and emerging assistive technology.

Five year Outlook

- Offer an in-house service over a more flexible operating period than at present, for example, opening at weekends and evenings using volunteers, when times are less busy for patients
- Introduce inpatients to a wider variety of leisure / recreational devices that can be "driven" by computer technology, such as cross stitching by sewing machine or the introduction of a Microsoft XP Windows based Media Centre PC. (Assuming European availability)
- Under the auspices of the AAATE, lead a pro-active role in defining relevant specifications for the design and development of new assistive technology devices.
- To build on the experiences and infra-structure developed for Glasgow City Council's "Equal Access for Employment" initiative, enabling similar benefits to be laid across other parts of the country for the benefit of spinal cord injured people requiring access to employment.

APPENDIX D Spinal Injuries Scotland

The already well-established presence of SIS at both the QENSIU and at outreach clinics has been maintained and expanded where possible. This includes the regular twice-monthly unit visits as well as attending when requested. Increased staff numbers within the SIS office have allowed for a greater presence at the outreach clinics.

The organisation remains an integral part of the Joint Volunteer Group, which operates in the QENSIU. The group co-ordinates the popular 'nights in' at the unit, which go a long way to re-socialising the current in-patients and provide a much-needed break in the routine of hospital life.

Education days have taken place on three occasions in this year, which were aimed at relatives of newly injured patients, junior doctors and medical students.

Patient Visiting

SIS continues with its policy of regular patient visiting times and will be looking to increase these from twice monthly to a weekly input. To this end further volunteers (both spinally injured and able bodied) have been recruited and trained to undertake these duties.

The essence of the organisation is to encourage people back into as active a lifestyle as possible post-accident. Seeing other people with SCI who have returned to work, continued with or begun a family, or those who have sought to gain further education qualifications, allows the newly-injured patient to be aware that although their life has altered, they can still achieve many things.

The presence of a member of SIS ruling council within the staff of the unit has led to an improvement of response to patient needs from the SIS staff. This presence has also led to a marked increase in recruitment of in-patients.

The increased presence at outreach clinics has also afforded SIS the opportunity of a greater contact with existing members and of attracting new members.

Over the past year we have had a greater involvement in Patient education days. Complementing the input of the medical staff, SIS has presented an insight into daily life following discharge and the importance of personal management of the injury. We have also given various presentations at the Unit over the course of the year both to medical professionals and other agencies. Evenings, specifically tailored for relatives are planned for the coming year.

Further involvement

It has now become an annual event that we take medical students, who are on placement in the Unit, for a day. The students are sent out with a SIS volunteer to discover for themselves what life is really like with SCI and the barriers met on a daily basis. Four students were each given the opportunity to spend a day with one of our members this year and also learn a little about the services that SIS provide.

The five main charities for SCI in the UK; SIS, SIA, Aspire, Spinal Research and Back-Up held one of their meetings at the Unit this year. Working together to ensure that SCI people receive the best possible service from each charity without reciprocation, SIT [Spinal Injuries Together] appreciated the opportunity of again visiting the Scottish Unit. It is hoped that the presence of SIS within SIT might facilitate further opportunities for spinal cord injured people living in Scotland.

Community Awareness

A link between SIS, the QENSIU and the local parish of St Constantine's children's liturgy group has been in place for some years now and continues to be successful. The children aged 4-14 are regularly to be found at the 'night's in' providing entertainment for the patients. Their efforts over the years have included raising many thousands of pounds for SIS and a positive spin-off for the

children is that they, despite their tender years, have become very aware of disability generally and spinal injury in particular.

Functional Electrical Stimulation (FES)

This is a study being undertaken jointly between the QENSIU, Glasgow University and a spinal injuries unit in Switzerland. It is being carried out to illustrate the positive benefits of people with SCI using recumbent cycles and being able to propel the cycle by means of their leg muscles being stimulated by carefully co-ordinated electrical impulses. SIS has assisted in recruiting volunteers for the project via advertising in our quarterly "Newslines" magazine. Also, one of the SIS members who by profession is a film and documentary maker, has been commissioned to produce the accompanying educational DVD of the project.

In Conclusion

The unique relationship between Spinal Injuries Scotland and the QENSIU continues to flourish, with the organisation responding to requests made for our input into the service provision to the patients of the spinal injuries unit. This relationship extends to the wider spinal injured community across Scotland. It is hoped that SIS will continue to respond to the needs of both in-patients at the QENSIU and our members countrywide, making real our promise of **"helping people with SCI to maintain as full, active and independent a lifestyle, post injury, as is possible."**

APPENDIX E

REPORT ON EXPERIENCE WITH THE FREEHAND FUNCTIONAL ELECTRICAL STIMULATING IMPLANT IN SCOTLAND

The Queen Elizabeth National Spinal injuries unit is committed to investigate all developing technologies to minimise disability in patients with a spinal cord injury. The problem is particularly difficult in low cervical paraplegia where there is loss of hand function and total dependency for activities of daily living. Within this group there are a few patients who retain some hand or upper limb function which although present has no functional benefit. In these cases muscle transfers and finger joint stabilisation procedures have been of some benefit but can only work in the presence of a contracting muscle.

Artificial electrical muscle stimulation of muscle has been identified as a potential way of producing or improving motor activity in those patients to give a functional response.

The basic principle is to utilise a functioning muscle, often in the shoulder area to trigger a unit, which stimulates paralysed muscle in the opposite arm into contraction producing a specific movement. Much of the work has been to investigate the possibility of producing a pinch grip response.

Recent advances in electrical controls and implantable electrodes resulted in the commercial development of the Freehand System which offered some potential for developing upper limb functioning in a paralysed arm. Following appropriate approval and financial support from The National Services Division a small cohort of patients have now completed an initial assessment.

THE SYSTEM

The Freehand system consists of an 8 channel implanted stimulator activated by a external switch on the opposite shoulder girdle. The electrodes are placed on muscles in the forearm and hand in order to create a pinch grip. Tendon transfer procedures or finger joint stabilisation may be carried out at the same time.

PATIENTS

Five patients in Scotland with tetraplegia resulting from cervical level spinal cord injury have had a Freehand system implanted. Four had the procedure while under the care of the Queen Elizabeth Spinal Injury Unit, the other moved to Scotland after having the procedure when living in England. The mean age of the patients was 33 years (Range 21 to 45 years). Tendon transfer procedures were carried out at the same time in all cases.

RESULTS

There were no operative complications or infections. Four of the five patients required further surgery for fusion of thumb joints, further tendon transfers or revision of electrodes. The system was technically successful in providing a lateral pinch in 4 of the 5 cases.

The Freehand system was shown to function in four of the patients. In the early stages there was great enthusiasm but ultimately only one patient continues to use it regularly. In this patient there has been a clear improvement in the tasks, which can be performed independently, and in the Grasp-Release test.

Restricted use of the Freehand implant appears to result from:

1. The large size of the external controller and difficulties setting this up by carers and patients.
2. Difficulties learning the new motor skills needed to control pinch with the opposite shoulder girdle.
3. Co-morbidities including health and psychosocial problems compromising patients commitment to use of the system.

CONCLUSION

The experience with the Freehand System in Scotland confirms that the procedure is safe and the electrical technology is reliable. The concept has been proven to work.

It and other Functional Electrical Stimulation (FES) devices have the potential to restore some hand function in patients with cervical spinal cord injury. There are severe limitations on their long-term use because of the size and limitations of the hardware and the need for a considerable time commitment and perseverance from the patients and carers.

The Freehand system is no longer being marketed because of its expense, limited long-term usefulness and its dated hardware.

For some time it has been realised that the concept to a fully functioning system will need to use some current and future developments in electronics and software. Many of these are now moving into commercial development and are available for development trials.

1. Implanted Electrodes, which have radio-frequency wireless control.
2. Miniaturisation of all components suitable for minimally invasive implantation surgery.
3. Improved and implantable control systems obviating the need for external controls.
4. Induction battery charging of all implantable components.

The Spinal Injury Unit and its research group involving the Universities of Glasgow, Strathclyde and Caledonian are actively involved with a number of academic and commercial partners to continue development in this area. A Pilot study of surface electrodes in assisted coughing is being developed which will lead to the implantation of wireless rechargeable implanted electrodes. This is seen as a precursor for the development of a wireless upper limb, lower limb, bladder /bowel stimulator.

APPENDIX F Clinical Psychology Services

The purpose of the Clinical Psychology Service in the National Spinal Injuries Unit is to provide a service to patients, families and staff, to reduce psychological distress following spinal cord injury and help promote psychological well-being by the systematic application of knowledge derived from psychological theory and data.

The Clinical Psychologist aims to help service users identify problems and source coping strategies to maximise mental and physical well-being. This is done by employing four core skills: assessment, formulation, intervention and evaluation. Collectively these skills provide a psychological framework for understanding the problem faced by the service user and provide intervention strategies to begin to treat the problem. The types of problems faced by patients include, issues of adjustment to diagnosis and prognosis, mood problems including anxiety, depression and anger, relationship issues, family issues, realistic and unrealistic goal setting, drug and alcohol problems, issues of motivation, post traumatic stress disorder and pain management.

In November 2004 the two part-time psychologists left for promoted posts. The trust has recently re-organised the hospital service and appointed a head of department. A new appointment to the spinal unit is expected by the autumn. This gap in service has resulted in a significant deficiency in the standard of service that we have been able to provide for the patients.

DBA 05

APPENDIX G SOCIAL WORK REPORT

No report received

APPENDIX I: Raw Data

DA1: New Admissions

	Admissions
1992/1993	59
1993/1994	128
1994/1995	137
1995/1996	150
1996/1997	164
1997/1998	167
1998/1999	163
1999/2000	180
2000/2001	199
2001/2002	164
2002/2003	165
2003/2004	201
2004/2005	144
Total	2021

DA2: New Admissions by Case-mix Complexity

Admissions	I	II	III	IV	Total
1992/1993	9	15	16	19	59
1993/1994	6	18	47	57	128
1994/1995	13	24	32	68	137
1995/1996	6	30	39	75	150
1996/1997	13	20	52	79	164
1997/1998	17	24	46	80	167
1998/1999	4	32	27	100	163
1999/2000	8	27	28	117	180
2000/2001	13	24	40	122	199
2001/2002	11	24	30	99	164
2002/2003	14	23	32	96	165
2003/2004	8	28	28	137	201
2004/2005	13	28	28	75	144
Total	135	317	445	1124	2021

DA3: New Admissions by Health Board of Residence

	1992/ 1993	1993/ 1994	1994/ 1995	1995/ 1996	1996/ 1997	1997/ 1998	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	Total
Argyll & Clyde	9	22	21	28	28	29	24	28	28	12	18	27	9	283
Ayrshire & Arran	4	12	9	9	12	12	12	17	20	16	17	21	13	174
Borders	0	2	2	1	2	3	0	2	0	3	2	2	2	21
Dumfries & Galloway	2	3	4	5	5	6	16	13	7	10	10	13	9	103
Fife	3	3	5	4	3	4	1	3	2	7	4	6	4	49
Forth Valley	2	8	10	9	8	13	6	11	17	9	4	12	6	115
Grampian	2	2	3	2	6	6	8	4	8	8	9	7	8	73
GreaterGlasgow	19	32	43	46	45	28	37	28	47	44	47	48	37	501
Highland	6	6	5	2	5	7	10	4	6	16	6	5	9	87
Lanarkshire	5	19	19	21	20	22	27	40	25	20	23	22	22	285
Lothian	3	7	6	6	8	14	6	11	14	8	8	14	8	113
Shetland	0	0	0	1	2	0	0	0	0	1	0	0	1	5
Tayside	2	5	4	4	4	8	3	6	5	5	3	5	6	60
Orkney	0	0	0	0	0	1	0	0	0	0	0	2	0	3
Western sles	0	7	1	4	5	2	5	0	3	2	3	5	2	39
ECR	1	0	5	7	9	10	6	11	12	2	8	9	6	86
Private	1	0	0	1	2	2	2	1	0	1	0	0	0	10
Unknown	0	0	0	0	0	0	0	1	5	0	2	1	0	9
Overseas	0	0	0	0	0	0	0	0	0	0	1	2	2	5
TOTAL	59	128	137	150	164	167	163	180	199	164	165	201	144	2021

DA4: Admissions by Health Board compared with population size

	1992/1993 - 2002/2003	2003/2004	2004/2005	Total	% to Total	Population Size	% to Total
Argyll & Clyde	247	27	9	283	6.3%	430500	8.4
Ayrshire & Arran	140	21	13	174	9%	376500	7.3
Borders	17	2	2	21	1.4%	106100	2.1
Dumfries & Galloway	81	13	9	103	6.3%	147600	2.9
Fife	39	6	4	49	2.8%	349300	6.8
Forth Valley	97	12	6	115	4.2%	274600	5.4
Grampian	58	7	8	73	5.6%	531200	10.4
GGHB	416	48	37	501	25.7%	909600	17.7
Highland	73	5	9	87	6.3%	208700	4.1
Lanarkshire	241	22	22	285	15.3%	560800	10.9
Lothian	91	14	8	113	5.6%	767800	15.0
Shetland	4	0	1	5	0.7%	23020	0.4
Tayside	49	5	6	60	4.2%	393600	7.7
Orkney	1	2	0	3	0%	19800	0.4
Western Isles	32	5	2	39	1.4%	28880	0.6
ECR	71	9	6	86	4.2%		
Overseas / Private	11	2	2	15	1.4%		
Unknown	8	1	0	9	0%		
TOTAL	1676	201	144	2021		5128000	

DA5: Admissions by Degree of Injury

	805	806	952	Other	Total
1992/1993	16	24	16	3	59
1993/1994	36	43	36	13	128
1994/1995	49	33	40	15	137
1995/1996	45	44	43	18	150
1996/1997	60	50	39	15	164
1997/1998	62	50	42	13	167
1998/1999	80	36	36	11	163
1999/2000	94	44	34	8	180
2000/2001	100	60	26	13	199
2001/2002	76	62	23	3	164
2002/2003	71	58	36	0	165
2003/2004	112	49	35	5	201
2004/2005	77	47	19	1	144
Total	878	600	425	118	2021

DA6: Discharges by Degree of Injury

Discharges	805	806	952	Other	Total
1992/1993	12	8	8	3	31
1993/1994	38	44	40	13	135
1994/1995	48	39	30	14	131
1995/1996	44	40	51	19	154
1996/1997	63	44	31	13	151
1997/1998	60	50	46	14	170
1998/1999	75	38	37	12	162
1999/2000	93	37	35	7	172
2000/2001	99	52	25	13	189
2001/2002	81	51	22	3	157
2002/2003	70	68	34	1	173
2003/2004	94	56	32	5	187
2004/2005	82	34	24	1	141
Total	859	561	415	118	1953

DA7: Admissions and Discharges for Non Traumatic Spinal Cord Injury (ICD 9 Code 952) by aetiology

<u>Admissions</u>	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005
Central Cord Lesion	22	15	12	11	23	24	12
Infection	2	2	4	4	1	2	1
Vascular	7	8	3	1	4	1	
Tumour	3	2	0	1	1	0	
Surgical	0	0	0	0	0	0	3
Non-specific Lumbar Lesions	0	0	2	0	3	3	
Penetrating Wounds gun/stab	0	0	0	2	4	3	
Other	2	7	4	4	0	2	3
Total	36	34	25	23	36	35	19

Discharges	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005
Central Cord Lesion	18	16	16	10	23	23	18
Infection	3	2	1	3	2	2	1
Vascular	9	6	5	3	4	2	2
Tumour	2	2	0	0	1	1	
Surgical	0	1	0	0	0	0	2
Non-specific Lumbar Lesions	0	3	1	0	0	3	
Penetrating Wounds gun/stab	0	3	1	2	4	1	1
Other	5	2	1	4	0	0	
Total	37	35	25	22	34	32	24

DA8: Daycase attendances by Health Board

	1994/ 1995	1995/ 1996	1996/ 1997	1997/ 1998	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	Total
Argyll & Clyde	23	38	44	71	80	95	59	94	65	93	100	762
Ayrshire & Arran	21	14	48	37	39	42	54	84	62	43	46	490
Borders	0	0	1	4	1	2	0	0	0	0	3	11
Dumfries & Galloway	4	4	0	0	9	4	2	8	8	12	4	55
Fife	0	2	4	6	3	16	16	4	4	6	11	72
Forth Valley	16	5	5	11	24	8	11	42	10	25	35	192
Grampian	0	0	3	2	5	1	2	2	0	1	0	16
Greater Glasgow	68	95	94	158	207	228	160	164	195	240	350	1959
Highland	1	5	5	5	7	2	0	2	3	0	9	39
Lanarkshire	21	50	67	95	179	153	177	138	125	100	128	1233
Lothian	0	9	9	18	27	28	11	15	16	48	35	216
Shetland	0	0	0	0	0	0	0	0	0	0	0	0
Tayside	1	8	9	4	5	5	2	1	2	17	12	66
Orkney	0	0	0	0	0	0	0	0	0	0	0	0
Western Isles	1	0	0	0	0	0	0	1	3	2	3	10
ECR	0	0	0	0	0	6	1	1	2	10	10	30
Total	156	230	289	411	586	590	495	556	495	597	746	5151

DA9 : Admissions by age group

Males										
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	>90	Total
1992/1993	9	15	9	6	3	3	4	1	0	50
1993/1994	11	24	16	9	11	10	4	4	0	89
1994/1995	8	26	17	14	17	12	4	1	0	99
1995/1996	11	19	20	19	15	6	4	0	0	94
1996/1997	12	19	19	17	20	11	9	1	0	108
1997/1998	12	22	26	23	19	11	13	3	0	129
1998/1999	9	30	21	16	18	16	4	2	0	116
1999/2000	15	26	28	16	22	11	5	0	0	123
2000/2001	17	30	23	22	18	15	9	4	0	138
2001/2002	14	22	32	20	17	19	5	2	0	131
2002/2003	6	20	25	20	16	15	12	2	0	116
2003/2004	10	20	23	16	18	26	13	0	1	127
2004/2005	9	20	19	16	17	17	7	2	1	108
Total	143	293	278	214	211	172	93	22	2	1428
Females										
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	>90	Total
1992/1993	1	1	1	2	2	2	0	0	0	9
1993/1994	11	7	6	7	1	4	2	1	0	39
1994/1995	2	6	11	3	5	4	5	2	0	38
1995/1996	6	9	11	12	6	4	3	5	0	56
1996/1997	6	7	10	7	9	8	6	3	0	56
1997/1998	5	7	9	2	5	5	3	0	2	38
1998/1999	8	8	6	4	6	3	9	3	0	47
1999/2000	8	10	9	7	8	6	5	2	2	57
2000/2001	1	13	9	11	8	6	5	7	1	61
2001/2002	4	8	5	4	0	6	1	4	1	33
2002/2003	4	9	4	9	8	4	6	4	1	49
2003/2004	3	17	10	17	6	11	7	3	0	74
2004/2005	4	5	3	4	10	5	5	0	0	36
Total	63	107	94	89	74	68	57	34	7	593
All Admissions										
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	>90	Total
1992/1993	10	16	10	8	5	5	4	1	0	59
1993/1994	22	31	22	16	12	14	6	5	0	128
1994/1995	10	32	28	17	22	16	9	3	0	137
1995/1996	17	28	31	31	21	10	7	5	0	150
1996/1997	18	26	29	24	29	19	15	4	0	164
1997/1998	17	29	35	25	24	16	16	3	2	167
1998/1999	17	38	27	20	24	19	13	5	0	163
1999/2000	23	36	37	23	30	17	10	2	2	180
2000/2001	18	43	32	33	26	21	14	11	1	199
2001/2002	18	30	37	24	17	25	6	6	1	164
2002/2003	10	29	29	29	24	19	18	6	1	165
2003/2004	13	37	33	33	24	37	20	3	1	201
2004/2005	13	25	22	20	27	22	12	2	1	144
Total	206	400	372	303	285	240	150	56	9	2021

**DA 10: Age & Sex of New Patients by Category of Injury
Female Patients 2004/2005**

Casemix	No. of patients	Mean Age	Range of Ages
I	4	49	32 – 59
II	3	51	19 – 79
III	6	49	17 – 72
IV	23	47	17 – 76
Females	36	48	17 - 79

**DA 11: Age & Sex of New Patients by Category of Injury
Male Patients 2004/2005**

Casemix	No. of patients	Mean Age	Range of Ages
I	9	47	18 – 76
II	25	48	20 – 86
III	22	44	18 – 78
IV	52	42	15 – 91
Males	108	45	15 - 91

**DA 12: Age & Sex of New Patients by Category of Injury
All Patients 2004/2005**

Casemix	No. of patients	Mean Age	Range of Ages
I	13	48	18 – 76
II	28	49	19 – 86
III	28	45	17 – 78
IV	75	44	15 - 91
All Patients	144	45	15 - 91

**DA 13: Length of Stay for Traumatic Injury by level of Spinal
Cord Lesion 2004/2005**

Casemix	No. of patients	Mean L.O.S. (days)	Range of L.O.S.
I	5	229	181 – 313
II	28	207	33 – 617
III	30	138	0 – 319
IV	78	24	2 – 257
All	141	92	0 - 617

DA 14: All Discharges

1992/1993	31
1993/1994	135
1994/1995	131
1995/1996	154
1996/1997	151
1997/1998	170
1998/1999	162
1999/2000	172
2000/2001	189
2001/2002	157
2002/2003	173
2003/2004	187
2004/2005	141
Total	1953

DA15: Discharges by Casemix Complexity

Discharges	I	II	III	IV	Total
1992/1993	2	7	8	14	31
1993/1994	9	19	47	60	135
1994/1995	10	20	33	68	131
1995/1996	11	34	38	71	154
1996/1997	7	16	49	79	151
1997/1998	19	22	46	83	170
1998/1999	7	26	33	96	162
1999/2000	5	27	22	118	172
2000/2001	10	28	34	117	189
2001/2002	6	19	29	103	157
2002/2003	18	28	31	96	173
2003/2004	6	24	30	127	187
2004/2005	5	28	30	78	141
Total	115	298	430	1110	1953

DA16: Discharges by ASIA Impairment Level & Health Board

2004/2005	A	B	C	D	E	Total
Argyll & Clyde	2	1	1	7	3	14
Ayrshire & Arran	4	0	1	4	8	17
Borders	0	0	0	0	0	0
Dumfries & Galloway	1	0	1	2	6	10
Fife	1	0	0	1	1	3
Forth Valley	0	0	1	0	2	3
Grampian	5	0	0	0	0	5
Greater Glasgow	7	1	1	6	24	39
Highland	1	0	0	0	2	3
Lanarkshire	0	1	2	9	10	22
Lothian	3	0	0	2	2	7
Overseas	1	0	0	0	2	3
Shetland	1	0	0	0	0	1
Tayside	3	0	0	2	0	5
Orkney	1	0	0	0	0	1
Western Isles	1	0	0	0	1	2
ECR	0	0	0	1	5	6
Private	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
TOTAL	31	3	7	34	66	141

DA17: Discharges by ASIA Impairment Level & Health Board

Discharges	A	B	C	D	E	Total
1999/2000	26	1	12	25	108	172
2000/2001	35	9	8	30	107	189
2001/2002	23	7	10	43	74	157
2002/2003	21	10	13	52	77	173
2003/2004	21	6	9	51	100	187
2004/2005	31	3	7	34	66	141

DA18: Delay between actual and Intended date of discharge

	No. of patients discharged	No. of patients delayed	Mean delay (days)	Range of delay (days)
1999/2000	172	21	122	22 – 410
2000/2001	189	27	68	1 – 877
2001/2002	157	11	19	1 – 107
2002/2003	173	8	46	2 - 212
2003/2004	187	7	52	1 - 188
2004/2005	141	0	0	N/A

DA19: Time between accident & admission

	No.of patients	Mean Time (Days)	Range of Time
1999-2000	180	158.3	0 - 18770
2000-2001	199	163.3	0 - 12575
2001/2002	164	103	0 - 12012
2002/2003	165	62	0 - 4948
2003/2004	201	83	0 - 6596
2004/2005	144	231	0 - 11237

DA20: Ventilated Bed Days

		No. Patients	Ave. Ventilated Days	Total Ventilated Days
1998/1999		12	121	1452
1999/2000	Edenhall	12	63.4	761
	RCU	4	187	748
2000/2001	Edenhall	12	71.5	858
	RCU	10	80.9	809
2001/2002	Edenhall	19	33	643
	RCU	2	40.5	81
2002/2003	Edenhall	11	28	304
	RCU	4	102	408
2003/2004	Edenhall	17	25	427
	RCU	3	160	481
2004/2005	Edenhall	21	39	813
	RCU	4	527	567

STAFF NAMES

2004 - 2005

Alexander, Y	Grant, E	MacKissack, D
Allan, D B	Gray, A	MacLean, L J
Armstrong, N	Green, B	McLean, A
Bardhan, S	Griffen, C	Maclennan, K
Bentley, N	Hands, L	McMahon, R C
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Brogan, T	Hasler, J	Merchant, P
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Craig, K	Johnston, R A	Pugh, A
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Crawford, W	Kemp, I	Reid, R L
Crolla, C	Kennedy, L A	Richmond, H
Currie, J	Knox, G	Robertrson, C
Daley, E	Lang, L	Rooney, B
Daley, J	Lazzerini, C	Russell, L
Dargan, H	Levy, C	Smillie, V
Darkin, J	Levy, M	Smith, L
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Davies, K	Louden, G	Stewart, W
Davis, A	Lyall, D	Thomson, C
Donnan, G	McAlister, K	Toms, C
Donnelly, S	McAloone, E	Turner, M
Dorans, L	McCarron, K	Wallace, L
Douglas, F	McCaffery, S	Watson, A
Duffy, L	McCallum, T	White, W
Duncanson, T	McCarthy, C	Wilson, K
Eden, C	McCue, K	Wilson, M
Ferry, D	MacDonald, L	Woods, L J
Fiagbedu, C	MacDonald, S	
Flannigan, E	Macdonald, J	
Foley, C	MacDougall, L	
Forrest, S	McGeehan, C	
Fraser, M	McGuckin, J	
Gilfillan, K L	MacKay, M	
Gadvi, R	McKie, S A	
Gordon, L	McKeand, A	
Govan, E M	McKillop, M	