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**Acknowledgements:**

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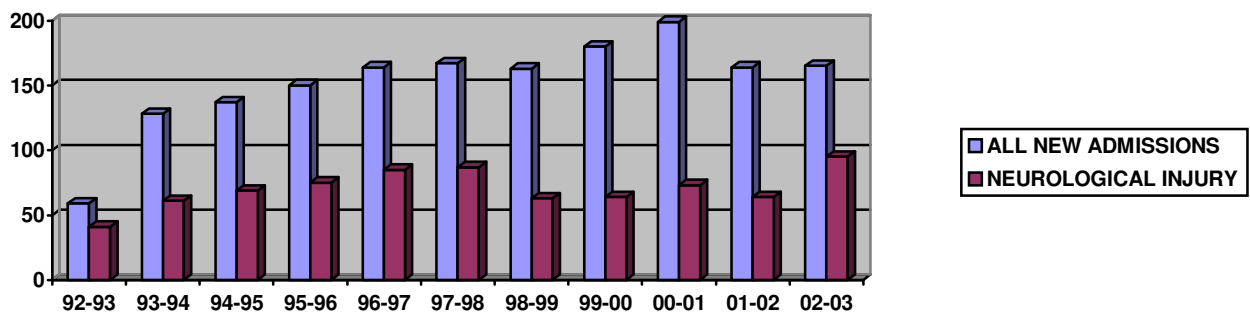
## Introduction

Throughout Scotland, there are over four hundred spinal fractures a year, the majority being dealt with by orthopaedic surgeons in the local hospital. Approximately fifty percent of patients are referred to the national unit for advice regarding management. Patients with a neurological injury or complex fractures are transferred to the unit for tertiary care. This includes immediate medical management followed by rehabilitation and ultimate discharge. Less severely injured are managed locally with in many cases support from medical or nursing staff from the unit.

In addition to managing the acute injury, the unit is also responsible for the life long care of anyone who has sustained a neurological injury from a variety of causes. They are at risk of developing medical and surgical complications. With appropriate medical management life expectancy is normal and quality of life enhanced.

In the past year the unit has continued to develop services and respond to the needs of patients and the referring hospitals. The ultimate aim being a seamless pathway of care from the time of the accident to eventual return to a home environment.

The unit admits all patients in Scotland who sustain a neurological injury. The year saw the highest number admitted since the unit opened.



In 2000 a national meeting and poster campaign clarified protocols for treatment and referral to the spinal injuries unit. This has reduced the number of non-neurological spinal injuries being admitted to the unit. During the last year a total of one hundred and sixty five patients were admitted to the unit. There were ninety-five patients who had sustained neurological injury.

The core activity of the unit remains those patients whose spinal fracture is complicated by a neurological injury. They 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 are long averaging one year for tetraplegics and six months for paraplegics. The increased numbers of patients with neurological injury has had a significant impact on the workload of the unit

## 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

The number of new admissions stabilised in 2002/2003 after rising each year since the unit opened. An increasing number of patients are treated by outreach medical services or as outpatients. There was a significant increase in the number of patients with a neurological injury.

	1997/8	1998/9	1999/00	2000/01	2001/02	2002/03	TOTAL 1992-2003
<b>NEW ADMISSIONS</b>	167	163	180	199	164	165	<b>1676</b>

Appendix DA1

Over 230 patients were referred to the unit during 2002-2003. Local medical staff managed a number of cases under advice. The Units consultant medical staff or Liaison nursing staff managed others in the referral hospital. An increasing number of elderly patients with cervical injuries involved 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.

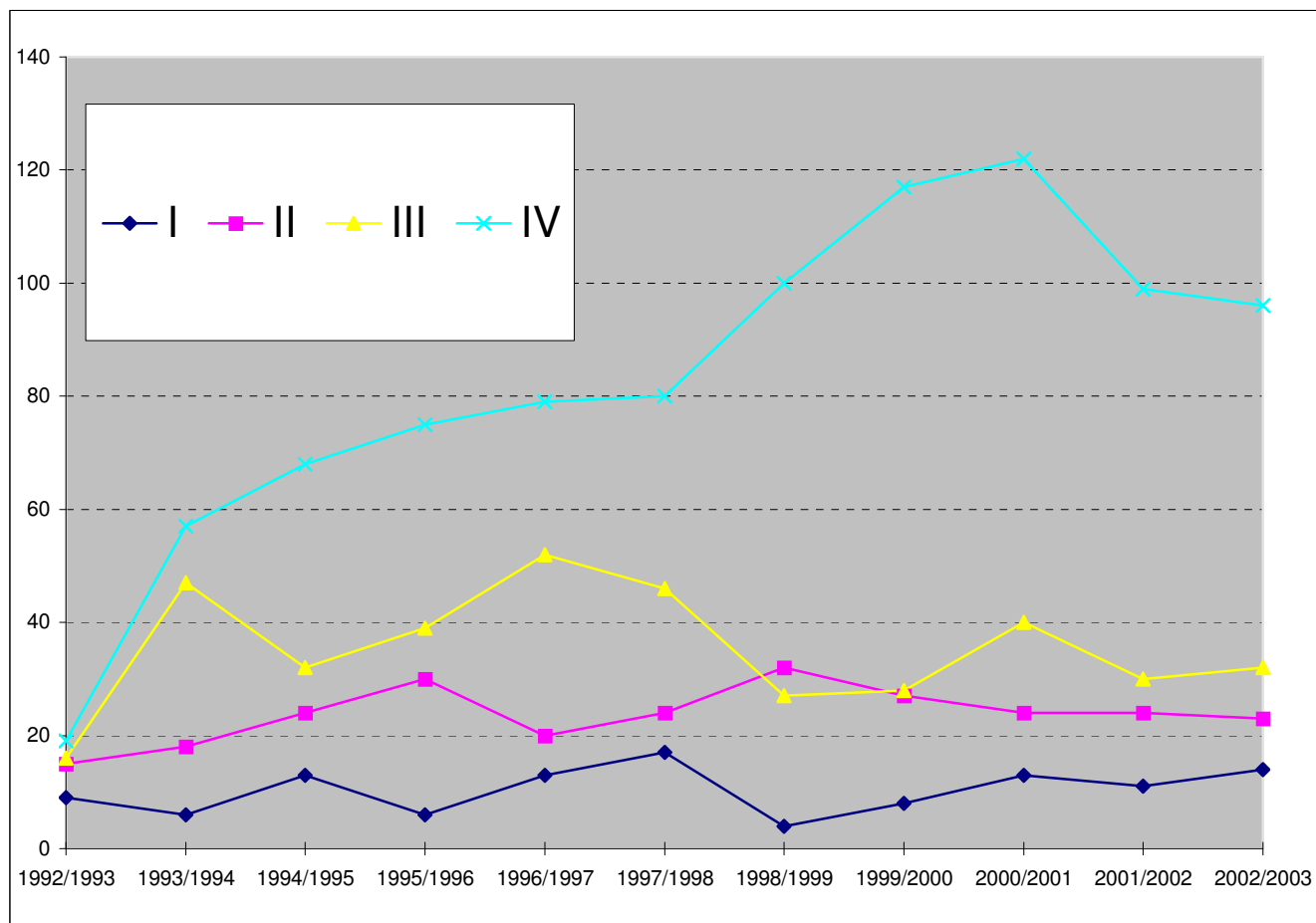
### 2.1.2. New Admissions: Case mix Complexity

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.

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

Group I patients have the most severe neurological injuries and the numbers are expected to vary considerably each year. Groups II and III are the next most dependant and require significant periods of rehabilitation and long term follow-up. Group IV includes all patients with spinal fractures and incomplete or no paralysis. This group has increased consistently since the Unit opened. In general this group can be managed conservatively or by surgical stabilisation. Conservative management requires prolonged bed rest and an increased risk of deformity or chronic mechanical back pain. The increased demand for surgical stabilisation and the increased awareness of the Unit has resulted in an increased referral pattern. Quality of care issues regarding stabilisation surgery, early mobilisation and specialised rehabilitation along with the continued development of a clinical network and the measurement of outcome indicators is likely to lead to a continued increase in the referral of Group IV patients.

### 2.1.3 New Admissions by Case-Mix Complexity



Appendix DA2

<b>GROUP</b>	<b>1997/ 1998</b>	<b>1998/ 1999</b>	<b>1999/ 2000</b>	<b>2000/ 2001</b>	<b>2001/ 2002</b>	<b>2002/ 2003</b>	<b>Total 1992/2003</b>
<b>I</b>	17	4	8	13	11	14	<b>114</b>
<b>II</b>	24	32	27	24	24	23	<b>261</b>
<b>III</b>	46	27	28	40	30	32	<b>389</b>
<b>IV</b>	80	100	117	122	99	96	<b>912</b>
<b>Total</b>	<b>167</b>	<b>163</b>	<b>180</b>	<b>199</b>	<b>164</b>	<b>165</b>	<b>1676</b>

The number of high dependency Group I and Group II cases remains high. The number of patients referred with a spinal fracture but no neurological injury has stabilised. The throughput is significantly higher than other spinal injury units in the UK.

## 2.1.4 New Admissions by ASIA Impairment Level & Health Board

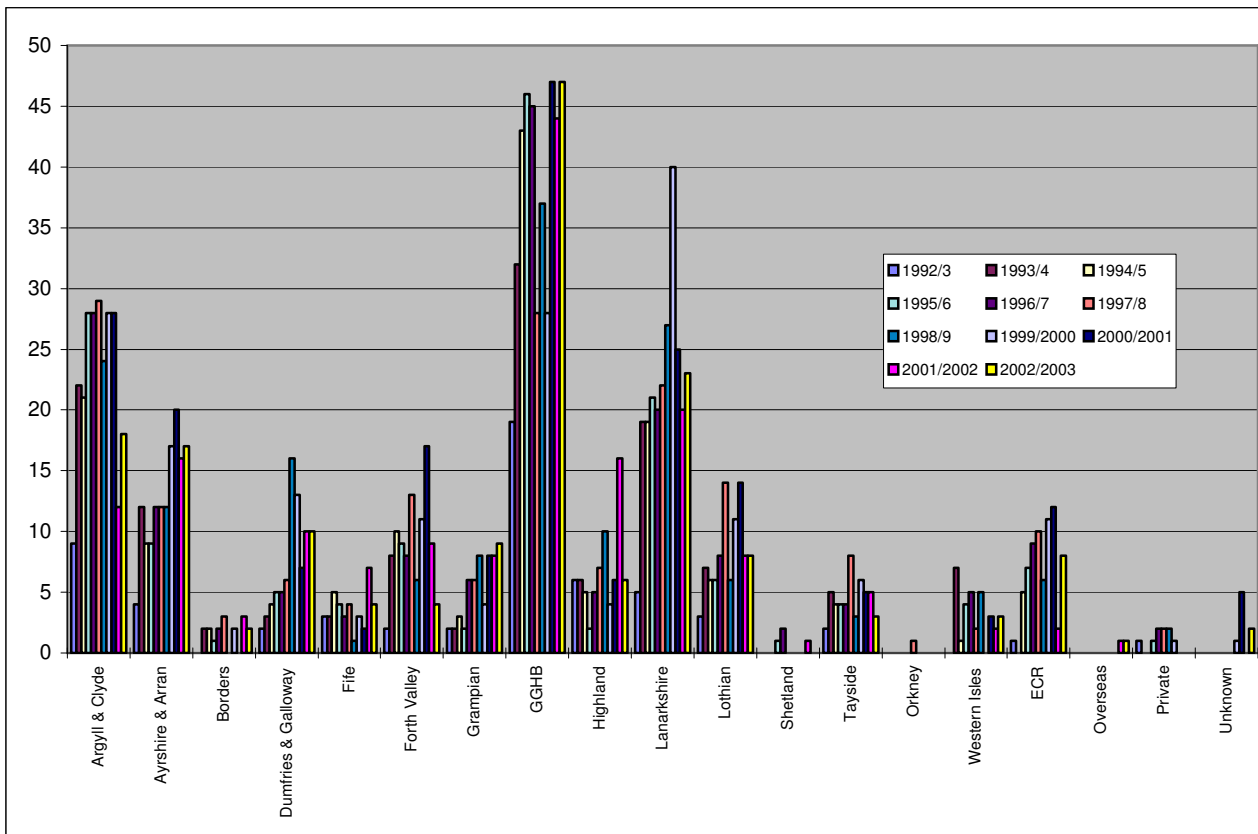
2002/2003	A	B	C	D	E	Total
Argyll & Clyde	3	2	3	4	6	18
Ayrshire & Arran	3	2	0	1	11	17
Borders	2	0	0	0	0	2
Dumfries & Galloway	0	1	1	4	4	10
Fife	0	1	0	0	3	4
Forth Valley	0	0	0	3	1	4
Grampian	1	1	3	1	3	9
Greater Glasgow	8	2	3	9	25	47
Highland	0	1	1	1	3	6
Lanarkshire	1	4	4	6	8	23
Lothian	1	1	3	2	1	8
Overseas	0	1	0	0	0	1
Shetland	0	0	0	0	0	0
Tayside	0	1	2	0	0	3
Orkney	0	0	0	0	0	0
Western Isles	0	0	0	1	2	3
ECR	0	0	2	3	3	8
Private	0	0	0	0	0	0
Unknown	0	1	0	1	0	2
<b>TOTAL</b>	<b>19</b>	<b>18</b>	<b>22</b>	<b>36</b>	<b>70</b>	<b>165</b>

### ASIA Impairment Scale

<b>A</b>	Complete: No motor or sensory function
<b>B</b>	Incomplete: Sensory but not motor function is preserved below the neurological level and includes S4-5
<b>C</b>	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
<b>D</b>	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
<b>E</b>	Normal: Motor and sensory function is normal

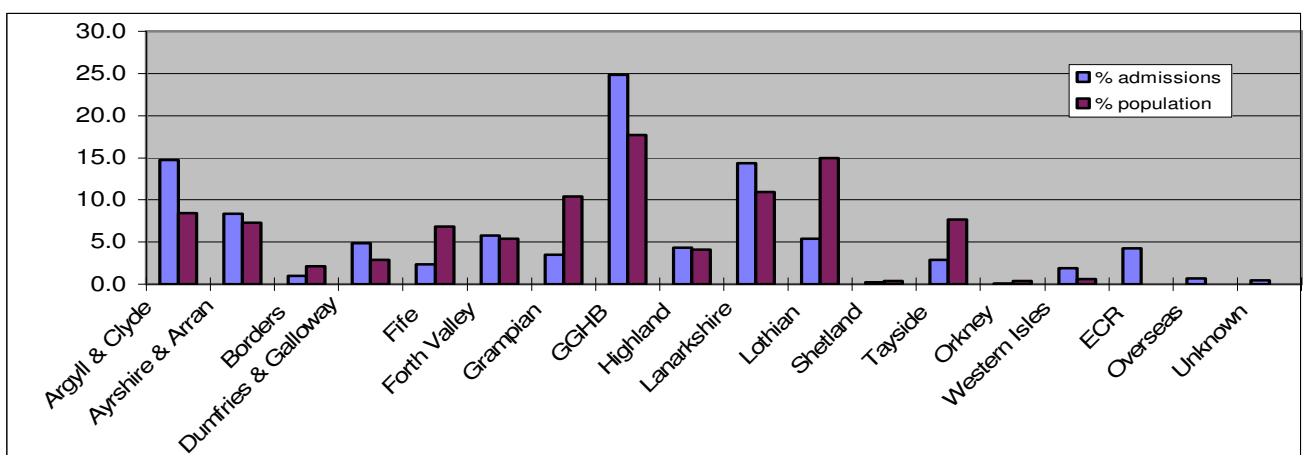
## 2.1.5 New Admissions by Health Board Of Residence

Appendix DA3



The Unit accepts patients from throughout Scotland. 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 recorded under their own health board.

## 2.1.6 Admissions by Health Board compared with Population Size



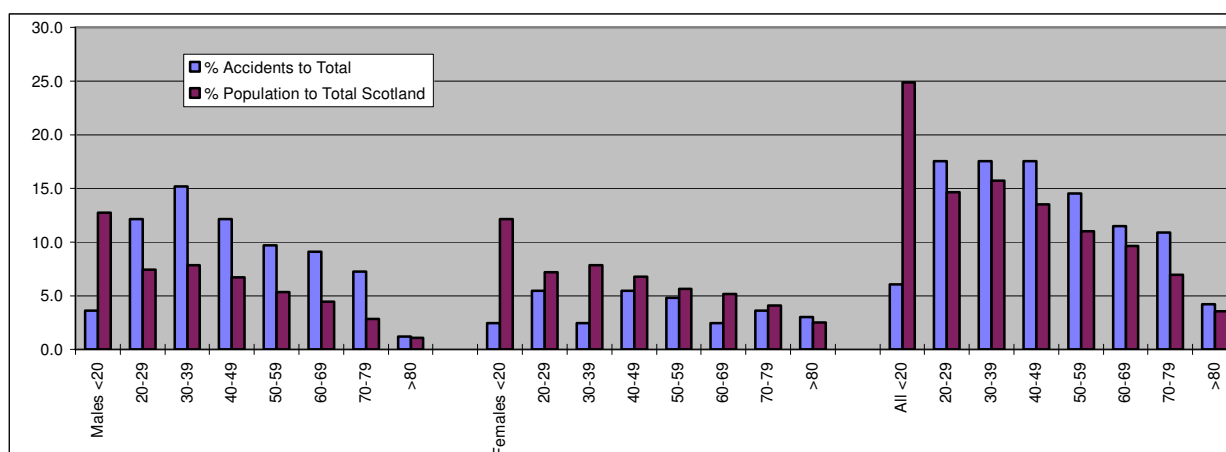
Appendix DA4

There continues to be a slight preponderance of referrals from the adjacent Health Authority 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 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 young males disproportionate to the population. 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.
<b>I</b>	18	222	12 - 497
<b>II</b>	28	172	4 - 428
<b>III</b>	31	166	16 - 886
<b>IV</b>	96	19	0 - 99
<b>All</b>	<b>173</b>	<b>91</b>	<b>0 - 886</b>

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. The wide variation of length of stay within each classification is indicative of the variation in the rehabilitation needs within each group. Benchmarking with other units in the United Kingdom continues to be developed but comparable figures remain unavailable.

The 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 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 and neuro-surgical teams carried out twenty-two thoracolumbar fixations and fifteen 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 twenty-eight spinal injury theatre lists were carried out over the course of the year involving forty-six individual procedures and eight 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 five 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. There is a continued demand for such procedures in the long-term management of patients. There is continued discussion regarding funding of such implants. At present the spinal unit provides the assessment and surgical service but the cost of the implant is charged to the relevant health authority. This has worked well in the past but a number of health boards have asked that the cost should be included in the core funding. A report on the use of pumps over the last five years was prepared and submitted to NSD.

Appendix ISD



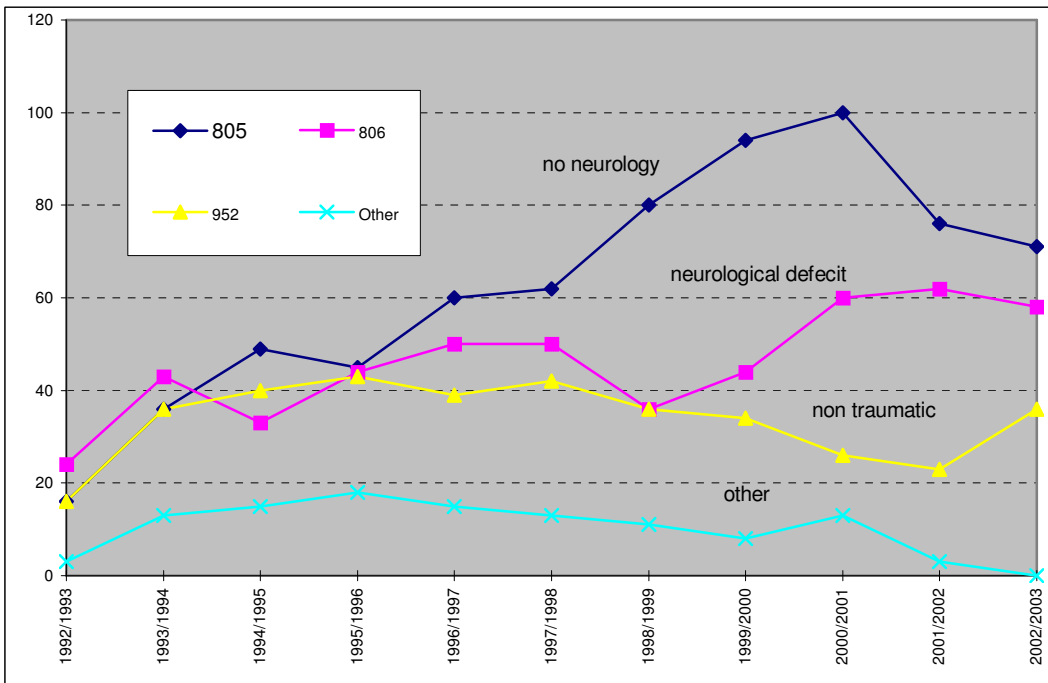
## 2.3 Admissions and Discharges by Degree of Injury

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

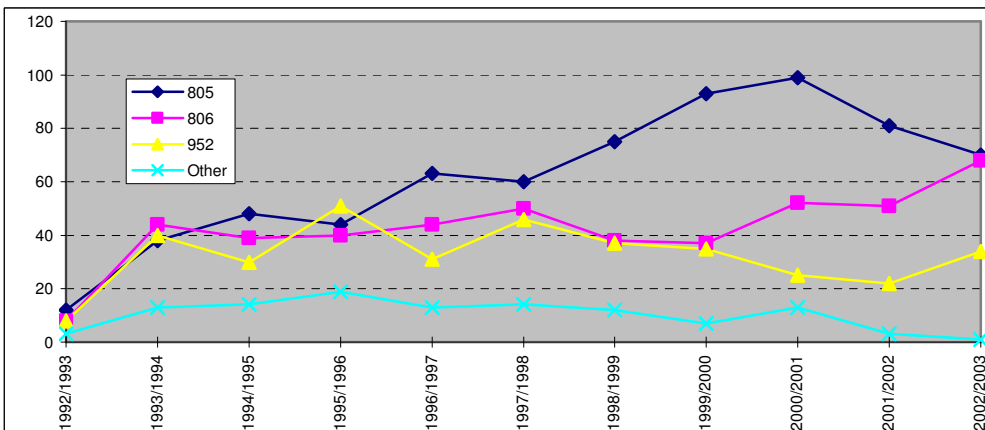
- 805 Fracture of vertebral column without mention of spinal cord injury
- 806 Fracture of vertebral column with mention of spinal column injury
- 952 Spinal Cord Lesion without evidence of spinal bony injury
- OTHER Other Spinal Cord Related Conditions

### 2.3.1 Admissions by Degree of Injury



Appendix DA5

### 2.3.2 Discharges by Degree of Injury



Appendix DA6

The institution of admission guidelines and the improved surgical services throughout Scotland has resulted in a fall in the number of non-neurological patients admitted. There was however an increase in the number of patients with significant neurological deficit during the year.

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

2002/2003	Admissions	Discharges
Central Cord Lesion	23	23
Infection	1	2
Vascular	4	4
Tumour	1	1
Intra medullary Cyst	0	0
Non-specific Lumbar Lesions	3	0
Stab Wounds	4	4
Other	0	0
<b>Total</b>	<b>36</b>	<b>34</b>

Appendix DA7

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

2002/2003	Edenhall (HDU)	RCU	Philipshill (Rehab)	TOTAL
<b>Beds</b>	12	4	32	48
<b>Actual -TOBD</b>				16334
<b>Available</b>				
<b>Bed Occupancy %</b>				92.6%
<b>ALOS</b>				62.2

It is impossible to obtain complete occupancy figures for the unit. from the recently introduced HIS/PAS hospitals systems. It is hoped that these will be available next year. 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.

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

	<b>No. of patients discharged</b>	<b>No. of Patients Delayed</b>	<b>Mean delay (days)</b>	<b>Range of Delay (days)</b>	<b>NO DELAY</b>
<b>1999/2000</b>	172	21	122	22 -410	87%
<b>2000/2001</b>	189	27	68	1 - 877	85%
<b>2001/2002</b>	157	11	19	1 -107	92%
<b>2002/2003</b>	173	8	46	2 - 12	95%

The vast majority of patients were discharged on their intended date (95%).

The figures show a continued improvement. There was a decrease in the number of patients (8) who had an identifiable delay between the actual and intended date of discharge but not in the mean delay.

There continued to be a small group of patients who had significantly delayed discharge due to difficulties with housing or finding appropriate long-term nursing care. There is an identified need for some type of step-down unit to allow continued progress in rehabilitation at a lower level of supervision than is available within the unit. Support is growing for the provision of long-term care for some highly dependant or ventilatory dependant patients.

### 2.3.6 Re-admissions to the unit

Most patients discharged from the unit never require re-admission. They are seen annually as out patients throughout their life. In some ways readmission at any time must be regarded as a failure. Some re-admissions are inevitable and have not been prevented by greater education or increased care in the community.

There were sixty-seven readmissions to the unit. This is a 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 fully treated patients with no expectation of future disability to the 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.

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.

#### 2.4.1 Summary of Out-patient activity

	<b>1997/ 1998</b>	<b>1998/ 1999</b>	<b>1999/ 2000</b>	<b>2000/ 2001</b>	<b>2001/ 2002</b>	<b>2002/ 2003</b>
<b>Return</b>	2407	2401	2017	2074	2229	2228
<b>New</b>	36	73	104	139	90	88

The number of return outpatients has risen. There was further development of follow-up protocols enabling the Liaison Nursing Service to increase its role in out patient management.

The number of new outpatients has stabilised to a manageable level over the year. The majority of these patients are tertiary referrals involving complex medical investigation and assessment. This is a significant increased workload on the part of the Out-Patient Medical and Nursing staff.

#### 2.4.2 New Out-Patient Activity by Health Board

	<b>1999/2000</b>	<b>2000/2001</b>	<b>2001/2002</b>	<b>2002/2003</b>
<b>Argyll &amp; Clyde</b>	32	32	25	19
<b>Ayrshire &amp; Arran</b>	6	4	7	5
<b>Borders</b>	0	1	0	0
<b>Dumfries &amp; Galloway</b>	2	2	2	1
<b>Fife</b>	4	1	0	1
<b>Forth Valley</b>	10	15	3	4
<b>Grampian</b>	0	0	4	1
<b>Greater Glasgow</b>	31	45	29	32
<b>Highland</b>	0	0	1	1
<b>Lanarkshire</b>	13	29	16	20
<b>Lothian</b>	2	6	2	3
<b>Shetland</b>	0	0	0	0
<b>Tayside</b>	3	1	1	0
<b>Orkney</b>	0	0	0	0
<b>Western Isles</b>	1	2	0	1
<b>ECR</b>	0	1	0	0
<b>Total</b>	<b>104</b>	<b>139</b>	<b>90</b>	<b>88</b>

### 2.4.3 Out -Patient Activity by Centre

	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	CHANGE PREVIOUS YEAR	TOTAL 1992- 2003
<b>New QENSIU</b>	73	103	139	90	88	- 2%	560
<b>Return QENSIU</b>	2083	1740	1729	1934	1880	- 3%	13263
<b>Edinburgh Edenhall</b>	279	224	255	171	189	+ 10%	1543
<b>Raigmore Inverness</b>	39	41	51	55	47	- 14%	316
<b>Aberdeen</b>	0	13	46	51	65	+ 27%	175
<b>Dumfries</b>	0	0	18	18	24	+ 33%	60
<b>Borders</b>	0	0	0	0	23	N/A	23
	<b>2474</b>	<b>2121</b>	<b>2238</b>	<b>2319</b>	<b>2316</b>	<b>No change</b>	<b>15940</b>

The development of the outreach service has significantly improved the service to patients throughout Scotland. As well as medical and nursing staff, Physiotherapy and Occupational Therapy staff are available at the clinics. Spinal Injury Scotland are often represented to give support and resource information where needed. The number of medical staff available limits further expansion of the service.

CLINIC	FREQUENCY
NEW QENSIU	WEEKLY
RETURN QENSIU	WEEKLY
EDINBURGH	WEEKLY
ABERDEEN	THREE MONTHLY
INVERNESS	THREE MONTHLY
DUMFRIES	SIX MONTHLY
BORDERS	SIX MONTHLY
ARBROATH	SIX MONTHLY

### 2.4.4 Outpatient Activity by Specialty at QENSIU

	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003
<b>DBA Orthopaedics</b>	98	150	123	97	114
<b>RAJ Neurosurgery</b>	82	109	86	133	126
<b>GC Urology</b>	159	277	370	356	287
<b>Skin Care</b>	224	199	200	145	115
<b>Pain / Acupuncture</b>	120	92	96	57	191
<b>Neuroprosthetics [Fraser/Hems]</b>	0	0	3	42	22
<b>Sexual Dysfunction</b>	53	22	27	45	41
<b>Spinal Injury Annual Review</b>	TOTAL	1007	989	953	1059
	MEDICAL		564		639
	NURSING		425		420
<b>Total</b>		<b>1767</b>	<b>1843</b>	<b>1868</b>	<b>1934</b>
					<b>1880</b>

There has been a further increase in the number of patients seen at the Consultant Specialist Clinics. Urodynamics and halo fixation are now designated as day case procedures. The numbers attending specialised clinics are stable. 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 require medical input. The Hand Out-Patient service continues to be developed. This is a specialised service, which is extremely time-consuming despite the small number of patients attending.

Measurement of activity at clinic level indicates that there is a underreporting of activity by 7%. This is accounted by the system failing to capture referrals from the wards, informal “drop in” consultations and some follow up appointments.

## 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

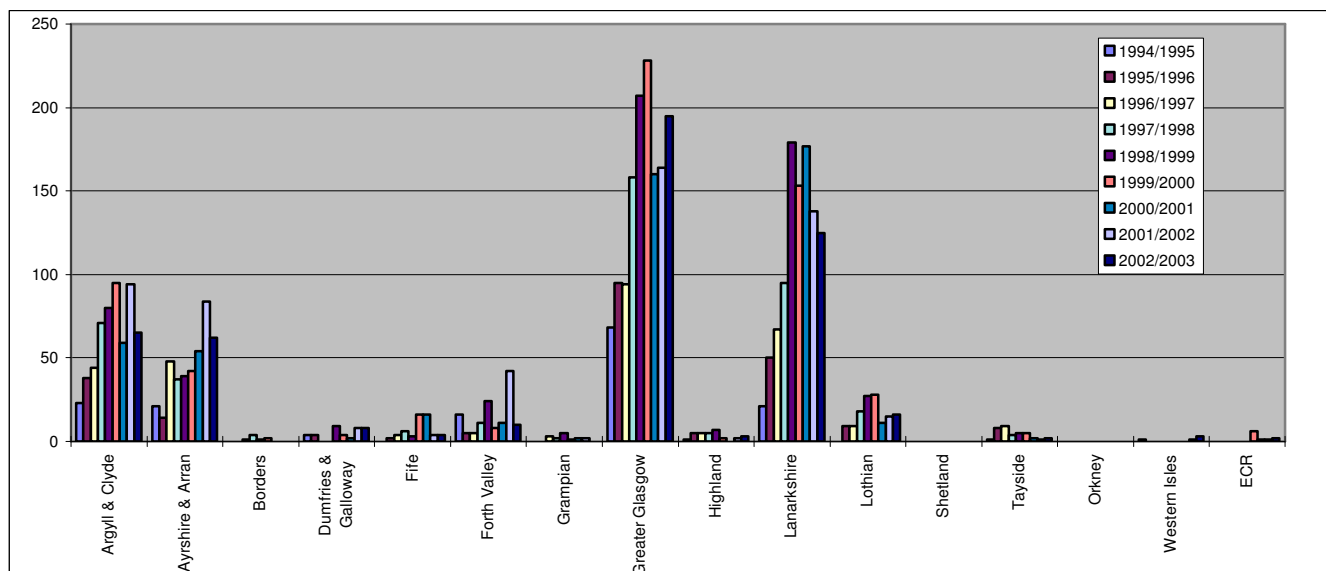
	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003
Urology –urodynamics	44	42	15	31	21
Halo Fixation	133	169	234	346	242
Skin	6	8	7	5	5
Orthopaedic/Neurosurgery	60	7	1	0	1
Pain/Acupuncture	294	350	231	160	203
Sexual Dysfunction	21	14	11	12	21
Other	0	0	0	2	2
<b>Total</b>	<b>558</b>	<b>590</b>	<b>499</b>	<b>556</b>	<b>495</b>

The major developments in the year have been the additional two sessions available from consultant anaesthetist specialising in pain control and the demand for Botox therapy for spasticity. Greater experience in managing Halo fixation has resulted in a decreased number of clinic attendances.

All day case procedures involve a formal intervention carried out by medical or specially trained nursing staff. Overall there continues to be a 12% under reporting of activity. This is due to the systems currently in place to formally monitor activity.

## 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.



Appendix DA8

## 3. 0 Waiting Times

### 3.1 Waiting Times Outpatient Clinics

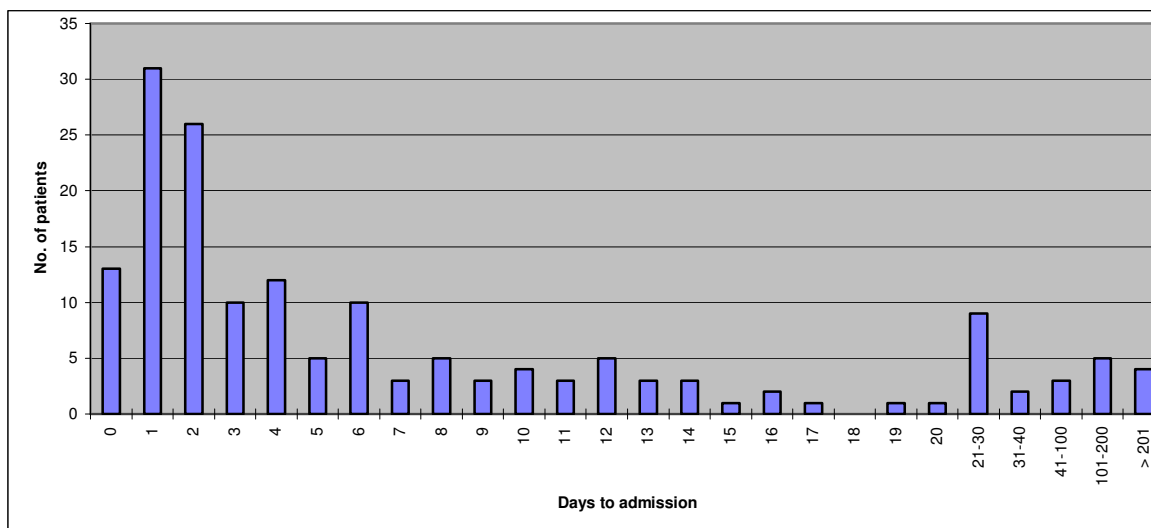
There is an open door policy to the Nurse Led Spinal Injury Clinics. Medical advice is always available and is required in sixty per cent of patients. Patient satisfaction remains high with this team approach. The maximum waiting time for elective outpatient appointments is four weeks.

### 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.

### 3.3 Time from Injury to Admission

Early admission to the Spinal Injury Unit provides immediate support to the patient and family. In 2003 twenty seven per cent of patients were admitted within twenty-four hours. Forty two per cent were admitted within forty-eight hours and fifty five per cent within four days. This is a significant improvement over the previous year when there were problems due to bed closures and nursing shortages.



The pattern of early admission is not being achieved in other Spinal Injury Units in the United Kingdom due to similar if not worse problems. Early admission continues to be a priority as it is seen as an advantage to the patient and relatives.

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

	<b>No. of Patients</b>	<b>Mean Time (Days)</b>	<b>Range of Time</b>
<b>2000-2001</b>	199	163.3	0 - 12575
<b>2001-2002</b>	164	103	0 - 12012
<b>2002-2003</b>	165	62	0 – 4948

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



Five patients were admitted after 200 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 Charter Mark was renewed in June 2000. The Charter Office has launched the new Charter Mark criteria. The Spinal Injuries Unit will re-apply for Charter Mark in 2004.

##### **4.2.1 National Service Division Visit**

Staff from NSD regularly visit or are in touch with the Unit throughout the year. Continued close co-operation has ensured that standards are maintained and there is an early response to increased or changing clinical needs. The Annual and six-monthly report acts as a focus to continually evolve the service.

##### **4.2.2 Formal Complaints**

No formal complaints were received during the year. An informal complaint/suggestion system is in place. This has proved invaluable in monitoring quality and modifying the service. The major concern for relatives and carers was the ambulance service. The dedicated ambulance service was withdrawn by the ambulance service due to operational reasons. The replacement system has proved less flexible to the considerable demands of the service. At times patients have suffered unacceptable delays or cancellations. Considerable effort was spent in explaining the situation to any patient affected. As a group they were very sympathetic to the difficulties that the Ambulance service experiences.

Some concerns have been raised regarding parking in the vicinity of the unit. There was a number of disabled parking bays lost in the redevelopment of the Institute. These concerns have been raised with the trust but there limited opportunities at present to increase the available parking.

There is some interest in outpatients having access to the games hall and pool facilities in the evening. Problems exist over security, support staff and supervision. In principle the unit is keen to develop this service and is seeking support from the voluntary sector.

##### **4.2.3 Relatives & Patients Meetings**

Regular contacts are maintained with relatives and carers throughout a patients 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 Benchmarking**

There have been continued attempts to develop benchmarking with other UK units. Figures are now being made available for other units and are being analysed. There has been national support for each spinal unit to produce annual reports on the Scottish model.

## **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 second meeting on "The First Forty Eight Hours" was held in May 2003. The meeting attracted over one hundred and forty health professionals. The faculty includes the Scottish Ambulance Service, Strathclyde Fire Service, Paramedical Staff, Consultant Surgeons, Nursing, and Spinal Injury Unit Staff.

The Director gave Post-Graduate Medical lectures at Edinburgh, Aberdeen, Dundee, and Glasgow. The Consultant medical staff lectured in Edinburgh, Aberdeen, Glasgow University and Fort William.

The Senior Nurse Manager has lectured at Ayr, Paisley and Caledonian Universities. Bell College has made a formal application to the Senior Nurse Manager for placements of their students within the unit. The Unit also continues to welcome Irish Enrolled Nurses who wish to convert to the Register.

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 were organised at Aberdeen and are planned for Dumfries

The Out-Patient Sister provided training and education for University students and District Nurses at Paisley and Caledonian Universities.

Six nurses attended the Guttman Meeting at Stoke Mandeville Hospital. A liaison nurse gave a paper entitled Reaching Out Around Scotland.

Glasgow University Medical students continue to attend the unit as part of the Year Three study module and on placement.

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.

#### 4.41 Hospital Acquired Infection

	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003
Total patients req. isolation	31	45	52	67	70
Clostridium Difficile	1	1	1	1	6
MRSA	25	42	48	64	64
Streptococcus pyogenes	5	1	0	1	0
Scabies	0	1	0	0	0
TB			1	1	0
Varicella Zoster			1	0	0
Patient days in isolation	1 – 82 days	-			
Ave. days in isolation	-	55.8	53.75	52.6	52.6

#### 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.

#### 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
1999/2000	38	3	3	6	16%
2000/2001	42	2	4	6	15%
2001/2002	48	4	8	12	25%
2002/2003	42	1	5	6	14. %

There has been a decrease in the number of sores identified. The figures have returned to what was the historical figure. This is almost certainly due to the improvement in the admission times due to a decrease in nursing shortages and bed blocking.

#### 4.7 Bed & Mattress Hire

The Therapy Bed Contract has significantly reduced the cost of hire. Eight beds were hired for an average of twenty-four days. Three mattresses were hired for an average of fifteen days.

## 4.8 Ventilated Bed Days

The number of ventilated bed days will be dependent on the case mix presenting to the unit. Improvements in ventilation protocols continue to be developed by the respiratory care team to reduce the total time on a ventilator.

### 4.81 Ventilated Bed Days

		<b>No. Patients</b>	<b>Ave. Ventilated Days</b>	<b>Total Ventilated Days</b>
<b>2002/2003</b>	Edenhall	11	28	304
	RCU	4	102	408

At the beginning of the year it was decided to relocate RCU to the central room in Philipshill Ward. This was to facilitate the care of patients with a higher degree of dependency and to develop nursing services. This has given greater flexibility in managing admissions to Edenhall and all ventilated patients in the unit.

Appendix DA20

### 4.9 Respiratory Care: Ventilation Needs of Low Tetraplegic Patients

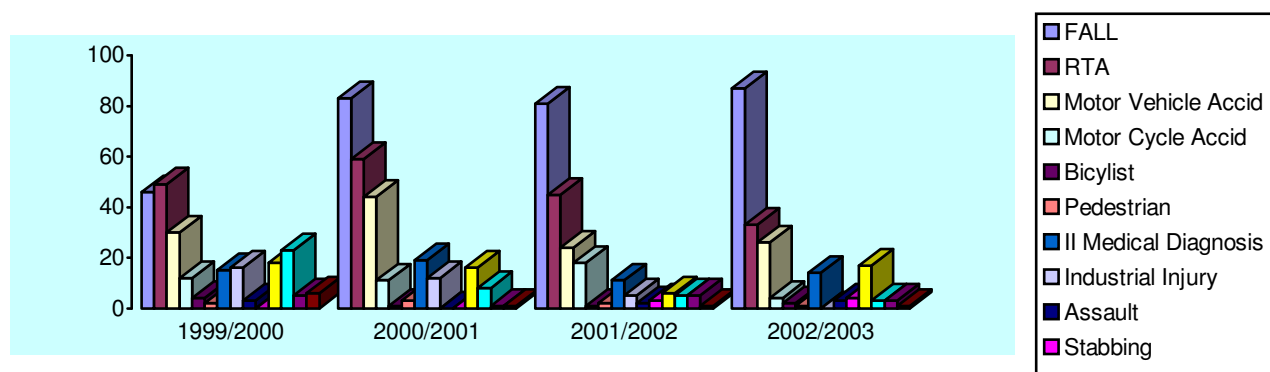
Protocols have been developed for the maintenance and weaning of low tetraplegic ventilator dependent patients. Changes in protocols have resulted in a reduction in the number of ventilated days. Continued developments are expected in this area over the next five years

## 5.0 Mechanism of Injury

Road traffic and industrial accidents again fell during the year, which mirrors the annual fatal accident figures. This comes after a significant rise in the RTA figures the previous year. Assault and stabbing are again a cause of significant disability. The number of falls including Para suicide remains high compared with UK figures. Sporting injury was a cause of a smaller number of injuries but they were commonly severe.

	1997/ 1998	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003
<b>Fall</b>	<b>62</b>	<b>52</b>	<b>46</b>	<b>83</b>	<b>81</b>	<b>87</b>
<b>RTA</b>	<b>52</b>	<b>47</b>	<b>48</b>	<b>59</b>	<b>45</b>	<b>33</b>
Motor vehicle	42	38	30	44	24	26
Motorcyclist	3	2	12	11	18	4
Bicyclist	4	4	4	1	1	2
Pedestrian	3	3	2	3	2	1
<b>Secondary to Medical Diagnosis</b>	<b>22</b>	<b>16</b>	<b>15</b>	<b>19</b>	<b>11</b>	<b>14</b>
<b>Industrial Injury</b>	<b>8</b>	<b>10</b>	<b>16</b>	<b>12</b>	<b>5</b>	
<b>Assault</b>	<b>8</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>3</b>
<b>Stabbing</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>
<b>Sporting Injury</b>	<b>6</b>	<b>11</b>	<b>18</b>	<b>16</b>	<b>6</b>	<b>17</b>
<b>Domestic Injury</b>	<b>4</b>	<b>15</b>	<b>23</b>	<b>8</b>	<b>5</b>	<b>3</b>
<b>Suicide</b>		<b>3</b>	<b>5</b>	<b>1</b>	<b>5</b>	<b>3</b>
<b>Other</b>	<b>6</b>	<b>7</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Total</b>	<b>168</b>	<b>163</b>	<b>180</b>	<b>199</b>	<b>164</b>	<b>165</b>

### 5.1 Mechanism of injury by year



Overall the pattern generally 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.

## 6. Financial Report

### SOUTHERN GENERAL HOSPITAL

#### SPINAL INJURIES UNIT

#### FINANCIAL REPORT FOR 12 MONTHS ENDED 31st MARCH 2003

	Budget £'000s	Actual £'000s	Variance £'000s
<u>Dedicated Staff Costs</u>			
Medical	571,198	583,585	(12,387)
Nursing	2,137,348	2,028,711	108,637
Paramedical	374,501	345,265	29,236
Administrative	94,290	110,616	(16,326)
Total Staff	<b>3,177,337</b>	<b>3,068,177</b>	<b>109,160</b>
<u>Supplies Costs</u>			
Medical	14,384	6,607	7,777
Nursing	21,563	7,648	13,915
Paramedical	14,442	14,382	60
Administrative	52,913	62,967	(10,054)
Pharmacy	581,985	562,877	19,108
<u>Allocated Costs</u>			
Medical Records	15,783	15,783	0
Building Costs	156,243	156,243	0
Domestic Services	61,699	61,699	0
Catering	176,436	176,436	0
Laundry	42,215	42,215	0
Neuroradiology	57,369	57,369	0
Radiology	18,943	18,943	0
Laboratories	59,534	59,534	0
Other Diagnostic Services	5,412	5,412	0
Anesthetics	30,308	30,308	0
Equipment	11,907	11,907	0
Portering	37,885	37,885	0
Phones	23,814	23,814	0
Surgical Appliances	50,874	50,874	0
Scottish Ambulance Service	7,577	7,577	0
General Services	27,061	27,061	0
Allocated Costs	783,058	783,058	0
Total Supplies	<b>1,468,345</b>	<b>1,437,539</b>	<b>30,806</b>
<u>Overhead Costs</u>			
Fixed costs: -			
Rates	230,396	230,396	0
Capital Charge	639,658	639,658	0
Trust Overheads	151,431	151,431	0
Total Overheads	<b>1,021,485</b>	<b>1,021,485</b>	<b>0</b>
Total Expenditure	<b>5,667,167</b>	<b>5,527,202</b>	<b>139,966</b>
Post Graduate Dean Funding	<b>113,733</b>	<b>113,733</b>	<b>0</b>
Total Expenditure net of Post Graduate Dean Funding	<b>5,553,434</b>	<b>5,413,469</b>	<b>139,966</b>

## Service Developments and Future Plans

### 7.1 Respiratory Care Unit

In the beginning of the year the RCU was relocated to the central room in Philipshill Ward. This has allowed more dependant patients to be transferred there from Edenhall Ward. It now serves three major functions within the unit: -

1. Management of long term or permanently ventilated patients.
2. In-patient care of ventilated patients or high tetraplegics requiring admission for elective investigation or review
3. Management of patients transferred from Edenhall Ward with significant airway or respiratory problems.

Patients have been admitted for Phrenic nerve assessments, abdominal electrical stimulation, overnight sleep monitoring and ventilator adjustment.

The incorporation of RCU into the nursing management structure of Philipshill ward has improved nurse retention and improved training in respiratory care.

#### 7.2.1 Outreach Clinics

Medical, Nursing, Occupational Therapy and Physiotherapy staff attends outreach clinics. 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. Additional clinics were held in Aberdeen and Inverness during the year.

#### The planned programme for Outreach clinics in 2002/2003

CLINIC	FREQUENCY
NEW QENSIU	WEEKLY
RETURN QENSIU	WEEKLY
EDINBURGH	WEEKLY
ABERDEEN	THREE MONTHLY
INVERNESS	THREE MONTHLY
DUMFRIES	SIX MONTHLY
BORDERS	SIX MONTHLY
ARBROATH	SIX MONTHLY

#### 7.2.2 Out-Patient Department

Two pain clinics have been introduced this year under the supervision of two Consultant Anaesthetists. These are attended by patients with neuropathic pain not controlled by routine management. The clinics offer specialist drug therapy, acupuncture and T.E.N.S/T.S.E. Due to nurse vacancies, nursing input has been minimal but this has now been resolved. The nursing staff will provide acupuncture sessions and training in the use of T.E.N.S/T.S.E therapy. Funding has recently been obtained for the purchase of T.E.N.S/T.S.E units.

A special clinic session has been started due to increased demand for the refilling of intrathecal pumps. This clinic runs each Wednesday afternoon with 2 - 6 patients. The nurse is responsible for the routine refills, any changes to medication or problems are referred to the medical staff.

The possibility of the nursing staff refilling the routine pump patients in the ward has been discussed but not yet agreed or acted on.

### **7.3 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. An additional occupational therapist has been appointed to drive forward developments in this area. Environmental control, communication and computer skills will all be investigated. This development will be integrated with the work already done in the unit by Momentum (formerly Rehab Scotland) and SPIN. Additional support will be available from an outreach worker appointed by Momentum to work with the unit bringing adaptive or assistive technology to outpatients throughout Scotland. SPIN supported by Strathclyde University has introduced computer skill classes for inpatients.

### **7.3 Training & Development Post**

The Nurse Training and Development post continues to be extremely successful. A training package for nursing auxiliaries has been developed and discussions continue with Cardonald College about the advancement of SVQ training for auxiliaries.

It is anticipated that all auxiliary nurses within the Unit will have completed the basic competency package by midyear 2004.

### **7.4 Further Developments within Multi-Disciplinary Team**

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. An educational package (The Road Show) has been developed that is used to run an outreach service. A successful trial was held in Aberdeen in April. It is hoped to develop a rolling programme of meetings throughout Scotland to support patients and carers. A pattern similar to the outreach clinics is planned.

### **7.5 Flexible Outpatient Department Development – Liaison Nurses**

The Discharge Co-ordinator has taken responsibility for discharges from Edenhall Ward with an increasing emphasis on formal discharge planning. They will have responsibility for immediate post-discharge care with on-going problems reported directly to the Liaison Sisters.

### **7.6 Nursing Recruitment**

Nursing recruitment is recognised as a national problem. The unit has continued to attract excellent applicants from new and established nurses. The senior nurse manager has made considerable effort and the educational sister to raise the profile of the unit among the university nursing departments and in recruitment drives. Nursing staff within the Unit



are 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 outwith the service.

## **7.7 Medical Recruitment**

The appointment of two anaesthetic consultant sessions in Pain Management has significantly improved the overall service to patients. The neuroanaesthetic service (nine sessions) has been invaluable to supporting the management of respiratory compromised patients. There is unfortunately increasing pressure on the neuro-anaesthetic service and this is being closely monitored.

The unit continues to attract high quality applicants for the three SHO positions. The posts are designed to give comprehensive training and are suitable for candidates who wish to progress to medical or surgical specialities. The Intercollegiate Board for SHO training inspected the unit and approval for a further five years has been granted. It is hoped that that approval will also be granted for GP training.

There remains concern regarding middle grade support. At present there is funding for one unfilled post. Separate funding is available for rehabilitation medicine trainees from The Department of Post-Graduate Medicine. Rehabilitation trainees have to spend up to six months working in a spinal injuries unit but there is no significant service component.

Of national concern is the training of future consultants in spinal cord injury. European legislation was unable to recognise such a small speciality and training was combined with general rehabilitation. This has been unable to produce enough suitable candidates for the spinal injury rehabilitation posts available. The system is currently under review.

Consideration is being given to investigate the use of the middle grade salary to contribute towards a consultant in spinal cord rehabilitation or alternatively a staff grade position.

## **7.8 Security**

Security within the unit is a high priority due to the vulnerability of the patients. The CCTV system installed in 2002 has been very successful in decreasing incidents and has led to police action in a number of cases. It is disappointing that there has to be a lock down of the unit in the evenings and weekends. This does impact on rehabilitation opportunities but does contribute to the safety of all patients.

## **7.9 Implanted Electrodes for Upper Limb Function**

There is a desperate need to facilitate upper limb function in patients with tetraplegia. The programme for implantation is currently suspended due to potential changes in the commercial development of the system. The unit is involved with the development of improved software to control stimulation with partners in the USA and Australia. The results of previously implanted systems have been gratifying and the potential benefits are significant.

## **7.10 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.

A phrenic nerve stimulator is planned to be implanted in a fifteen-year-old patient in June 2003 in conjunction with the Cardiothoracic department at the Western Infirmary.

Assessment and postoperative training will be done in the unit. The patient's health board is funding the stimulator.

## **7.11 Integrated Care Pathways**

The first ICP for complete C5 cervical fractures has been completed and printed. It is currently being piloted in the unit.

## **7.12 Clinical Networking and National Guidelines**

The issuing of admission guidelines to all hospitals in Scotland has been of great benefit in the immediate management of patients and their subsequent referral. Standard referral proformas, transfer guidelines and admission proformas are 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.

The second bi-annual meeting of "Spinal Injuries – the first 48 hours" was held in May 2003. This was attended by 140 health professional from throughout Scotland. Speakers were invited from senior trainers, the Ambulance Service, the Fire Brigade, Mountain Rescue and A & E Departments. This has helped to strengthen relationships with these groups. The medical staff have contributed to Ambulance and Fire Service guidelines of spinal injury management.

## **7.13 Telemedicine**

The development of telemedicine and teleradiology continues in Scotland. So far the unit has been unsuccessful in obtaining funding to complete the route to the tertiary referral centre and the relevant clinicians. It is anticipated that X-ray transfers will continue over the Internet and further developments in digital x-ray facilities in Scotland will increase this referral pattern. Support is being sought for linking outreach clinics and the unit for consultations and recording of data

## **7.14 Clinical Governance**

Multi-disciplinary clinical governance meetings are held monthly. Separate monthly audit meetings are held in conjunction with the department of rehabilitation. Weekly consultant clinical meetings are held. The Director, Senior Nurse Manager and the Business manager meet weekly

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.

A formal Critical Incident Reporting system is in place. No incidents occurred during the year.

## **7.15 Medical Research**

Progress in the management and prognosis of spinal cord injury is dependant on an active policy of research.

The unit has developed a network of scientists and clinicians that are interested in areas pertinent to spinal cord injury. This has resulted in continued collaboration with the Universities of Glasgow, Strathclyde, Caledonian and Edinburgh.

All research to date has been clinical but we hope to provide a focus and impetus to develop basic research programmes.

### **7.15.1 Grants and Grant Applications**

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

Functional electrical stimulation augmented treadmill training for incomplete spinal cord injured patients Dr MH Granat  
Scottish Executive £77,709 in progress

A pilot study of lower limb FES cycling in paraplegia Prof K Hunt  
Inspire £3,886 completed

An Open long-term study to evaluate the efficacy and safety of Tamsulosin in the treatment of neurogenic voiding dysfunction in patients with supra-sacral spinal cord lesions Mr. M.H. Fraser  
Yamanouchi £10,000 completed

A randomised double-blind placebo-controlled study to evaluate the efficacy and safety of Tamsulosin against placebo in the treatment of neurogenic voiding dysfunction in patients with supra-sacral spinal cord lesions Mr. M.H. Fraser  
Yamanouchi £10,000 completed

A multi-centre Phase III, Double blind placebo controlled flexible dose study to evaluate the efficacy and safety of Silfandil in women who have female sexual dysfunction resulting from spinal cord injury. D.B.Allan etc in progress  
Pfizer £ 20,000

Prof K.Hunt Six month secondment  
Royal Academy of Engineering Secondment Scheme

Development of Systems for tetraplegic Arm Cranking using Functional Electrical Stimulation: a pilot study Prof K Hunt  
ROPA completed

FES cycling systems for paraplegic people Prof K Hunt Dr N Donaldson  
EPSRC completed

Upper Llimb Arm Cranking using FES Dr H. Gollee  
European Commission: two year funding in progress

Neurocontrol Implants for the upper and lower limbs Dr M.Granat  
Scottish Executive grant applied for

### 7.15.2 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

B, Conway T.Eldho

The Suitability of a ten-week circuit class to increase physical capacity  
And activity levels in paraplegics

K.Cunningham MSc student completed

### 7.15.3 Publications

Journal Papers

[1]

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.

[2]

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. \*

[3]

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.

[4]

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.*, 2003. Submitted for publication.

### 7.15.4

Conference Papers

[5]

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.

[6]

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.

[7]

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.

[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," in *Proc. 7th Annual Conference of the International Functional Electrical Stimulation Society*, (Ljubljana, Slovenia), 2002.

[9]

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.

[10]

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. \*

[11]

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.

[12]

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.

## 7.16 Pain Management

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

## 7.17 Paramedical staffing

The particular needs of a spinal rehabilitation unit require a flexible approach to planning paramedical staff based on the needs of the patients.

It is planned to support research and service within the physiotherapy unit by appointing a clinical scientist studying for a higher degree. This will be funded from research monies. Various models have been investigated to support the Physiotherapy service. The generic worker model and auxiliary support is seen as insufficient for the demands of the service. It is proposed to develop a business case for funding a physiotherapy technical instructor in the coming year.

Consideration needs to be given as to how the unit can support recreational and sporting activities for both in and out patients. At present there are excellent facilities within

Glasgow but the opportunities are less well developed elsewhere. Close collaboration with national coordinators of Para sports is being investigated.

## **7. Summary and Conclusions**

In the past year the spinal unit has continued to evolve to provide a service for all people in Scotland who suffer a spinal cord injury or spinal fracture. Spinal Cord Injury remains one of the most devastating injuries that can be sustained. Untreated it is invariably fatal within a short period of time. With appropriate medical and nursing care life expectancy is near normal. Spinal fractures without neurological damage can be a source of disability and deformity. Appropriate treatment minimises both and allows early return to work and family. It remains the aim of the unit to seek out the best methods of providing the best possible care for all that require it.

Since commissioning in 1992 the success of the unit is a testament to the original design and funding as a national service. Inevitably significant changes have been made in the way that the service is delivered both within the unit and as an outreach service. There is a constant attempt to investigate better methods of assessing, transferring and managing the acute injury. Many of the changes made have been with the help and advice of staff in hospitals throughout Scotland and the Para-medical services. Reducing the time to admission and the input from anaesthetist and emergency medical staff has enhanced immediate hospital care. The sophisticated early care has only been possible by the increased expertise of the nursing staff especially in dealing with respiratory care and ventilation. Rehabilitation has seen similar changes with improved techniques in early mobilisation, physical training and fitness to promote early discharge. Long-term follow up is essential and has made improvements in the way and what is provided throughout Scotland.

No one can be satisfied with the ultimate outcome in most traumatic paralysis. Many research initiatives at the basic science and applied science level are being carried out. The Unit is fully committed to participating in these projects.

The Unit is completely dependant on the staff, voluntary bodies and the wider community to deliver a service. The contribution of all is gratefully acknowledged.

An outline of the achievements of each of the departments in the unit is given in the Head of Department reports in the Appendices

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**  
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## Appendix A: Physiotherapy Report

### Introduction.

The physiotherapy service to the Q.E.N.S.I.U. is provided by the Physiotherapy Department of the South Glasgow University Hospital NHS Trust.

### Staffing Levels:

1 Superintendent Lead Clinical Specialist.

2 Permanent Senior 1 posts.

1 Permanent Senior 11 post.

1 Nine month rotating Senior 11 post.

2 Four month rotating Staff grade posts.

(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 worst patient to physiotherapist ratio of all the units at 6.8 patients/physiotherapist [range 4.2/physio- 6.8/physio].

Between April 2002 and November 2002 we continued the fixed term contract half time Senior 1 physiotherapist to staff the joint Physiotherapy Department/University of Strathclyde Bioengineering research project "FES Augmented Partial Bodyweight support treadmill training".

Our four permanent physiotherapists provide an excellent base of experience and expertise totalling 68 years of spinal cord injury rehabilitation demonstrating 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:	00 /01.	01/02.	02/03.
Neurological Deficit	Total	Total (%)	Total (%)
Incomplete Quadraplegia	29	28 (31)	37 (40)
Incomplete Paraplegia	14	14 (15)	19 (20)
Cauda Equina lesions	3	12 (13)	9 (10)
Complete Quadraplegia	17	14 (15)	11 (12)



Complete Paraplegia	22	15 (17)	<b>12 (13)</b>
Monoplegia	4	5 (6)	<b>3 (3)</b>
Incomplete Others	4	2 (2)	<b>2 (2)</b>
Neuro deficits Total:	<u>93</u>	<u>90 (100)</u>	<u><b>93 (100)</b></u>
No deficit/ Intact	106	74	<b>72</b>
Total:	<u>199</u>	<u>164</u>	<u><b>165</b></u>

All patients are assessed by the physiotherapy department. The incomplete tetraplegic patients taking the most time. The intact patients, who are seen as appropriate are usually only on the unit for about two weeks.

#### Re-admitted patients.

All patients who are readmitted receive physiotherapy input if appropriate. This varies from a number of times per day, in the case of a chest infection, to twice per week 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	<u>00/01.</u>	<u>01/02.</u>	<u><b>02/03.</b></u>
Attendance's	11592	12760	<b>12359</b>
Units.	27470	29272	<b>27753</b>
New patients	190	164	<b>16</b>

Combined indirect patient contact and non patient contact units.( 15 minute units).

00/01: 10164      01/02 : 10830      **02/03: 10269**

#### 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>00/01.</u>	<u>01/02.</u>	<u><b>02/03.</b></u>
Attendan	903	1006	<b>717</b>
Direct units:	1839	2039	<b>1511</b>
Indirect units:	680	754	<b>559</b>
Ave hours/wkd:	12	13	<b>10</b>

#### 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>01/02.</u>	<u>02/03.</u>
Attendance	74	<b>54</b>
Direct units	158	<b>158</b>
Total hours	40	<b>40</b>

The monthly breakdown of these figure's for 00/02 and 01/03 were as follows\_:

<u>Weeknights.</u>				<u>Weeknights.</u>				<u>Weekends. (02/03)</u>					
<u>Pre- arranged.</u>				<u>Emergency call out.</u>				<u>Emergency call out.</u>					
<u>Attendance(A)</u>				<u>Units(U)</u>				<u>Day.</u>		<u>Night.</u>			
<u>A.</u>	<u>U.</u>	<u>A.</u>	<u>U.</u>	<u>A.</u>	<u>U.</u>	<u>A.</u>	<u>U.</u>	<u>Attendance</u>	<u>Units.</u>				
	01/02	02/03		01/02	02/03	01/02	02/03	01/02	02/03	01/02	02/03		
April	3	<b>7</b>	6	<b>21</b>	0	<b>0</b>	0	<b>0</b>	0	0	0	0	0
May	4	<b>3</b>	7	<b>7</b>	5	<b>1</b>	10	<b>2</b>	0	0	1	4	
June	1	<b>3</b>	1	<b>6</b>	1	<b>1</b>	2	<b>2</b>	0	0	0	0	
July	10	<b>0</b>	14	<b>0</b>	2	<b>0</b>	4	<b>0</b>	0	0	0	0	
Aug	1	<b>0</b>	1	<b>0</b>	3	<b>0</b>	5	<b>0</b>	0	0	0	0	
Sept	5	<b>1</b>	9	<b>4</b>	2	<b>1</b>	5	<b>2</b>	0	0	0	0	
Oct	9	<b>0</b>	18	<b>0</b>	2	<b>0</b>	4	<b>0</b>	0	0	0	0	
Nov	1	<b>0</b>	2	<b>0</b>	2	<b>3</b>	4	<b>6</b>	0	0	0	0	
Dec	6	<b>1</b>	13	<b>2</b>	1	<b>3</b>	2	<b>7</b>	0	0	1	3	
Jan	0	<b>3</b>	0	<b>6</b>	3	<b>8</b>	10	<b>25</b>	0	0	1	2	
Feb	3	<b>0</b>	6	<b>0</b>	2	<b>0</b>	4	<b>0</b>	0	0	0	0	
Mar	1	<b>3</b>	3	<b>6</b>	1	<b>6</b>	4	<b>27</b>	0	0	7	26	

### 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>00/01</u>	<u>01/02</u>	<u>02/03.</u>
Attendance	209	256	<b>90</b>
Direct units	535	611	<b>195</b>
New patients	54	28	<b>31</b>

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

### Education/ Training.

As in years past we have been very active in the education of Physiotherapy students. Learning about, and gaining experience in, the management of the patient with a spinal

cord lesion is undertaken as a post graduate, but 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 4 courses here in the unit for the physiotherapy students of the following universities:

Caledonian University. Glasgow. (BSc and MSc)

Robert Gordon University. Aberdeen

Queen Margaret University. Edinburgh.

We also gave clinical supervision placements to 11 students from these universities. This was down from last year mainly due to the Glasgow increasing their placements from 3 to 4 weeks. These placements vary in length from 4 weeks to 8 weeks. In all a total of 42 weeks of student supervision were given in 2002/03.

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.

The Superintendent attended the FESnet conference at the University of Strathclyde where he presented the preliminary outcomes and progress of the FES Augmented Partial Bodyweight support treadmill training research project.

This work was also presented, in poster form, at the Multidisciplinary Association of Spinal Cord Injury Professionals (MASCIP) annual conference.

Our staff also lecture to patients within the patient education programme.

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.

Courses attended by staff this year have included the following:

- Computer skills Word Basic/Access/Excel.
- MASCIP annual conference.
- Disability Equality Training.
- CPR.
- The Bobath Concept in the treatment of Incomplete Spinal Cord Injured Individuals.

### **Service Clinical Governance Framework.**

- Clinical effectiveness.
  - 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.
  - Current research/development papers are sometimes reviewed during in-service training and by attending specialist conferences.
  - 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. Newly commenced for 2003 is the use of gait outcomes for our

incomplete injuries. These are 6-metre walk test for walking speed, 6-minute walking test for stamina and observational gait assessment.

- One of our Senior 1 physiotherapists is an active member of the newly formed Multi-disciplinary Pain Interest Group within the QENSIU. She has been involved with the development of the pain assessment tool.
- 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 an 89% (up from 82%) documented compliance rate being achieved. The main areas of weakness were mainly due to the necessary information not having been documented (ie tel no). To aid in the audit of these standards our physiotherapy assessment sheets have been reviewed and revised.
- All staff have access to the library.
- 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.

The following research projects have been undertaken:

- The joint Physiotherapy Department/Bioengineering Department Strathclyde University pilot project to investigate the effects of FES Augmented Partial Bodyweight Support Treadmill Gait Training with Incomplete SCI patients was successfully completed. This one year pilot study was funded by the Chief Scientists Office and was the first such research project to be undertaken with this subject group any where in the world.

The final report to the Chief Scientists Office was very well reviewed receiving an “Excellent” which we are told is reserved only for the top 10% of projects. See Appendix 1 for a project progress report.

- Finally we assisted in a questionnaire study entitled “Correlation between quality of life, sport/recreation and education/employment in spinal cord injured people”. This has been a joint project with Stoke Mandeville Hospital and the physiotherapy department here.

### **Developments in 02/03.**

The new agreement with WESTMARC for repairing/servicing our variety of assessment wheelchairs, numbering 28 in all, is working well. To date we have not needed to request the replacement of any chairs. It still stands that if any of the wheelchairs are deemed irreparable they will be condemned and scrapped. They will not be replaced by WESTMARC. This will necessitate replacement of such a wheelchair by the QENSIU itself.

This year the Inter Spinal Injury Unit Games were again held away from the home of wheelchair sport (The Guttman sports centre at Stoke Manderville). This was due to the facilities redevelopment taking a year longer than expected. The British Wheelchair Sports Association chose Glasgow as the new venue for 2002 as the previous year had been such a success, and the event so well received and hosted here in Glasgow. All the teams stayed at the Erskine Bridge Hotel and the sports events were held at Scotston sports centre.

The team from QENSIU performed well being placed mid-table.

The games will be returning to Stoke Manderville in 2003 as the new stadium and accommodation is now open.

### **Future Research.**

In light of the success of the joint Physiotherapy Department/Bioengineering Department project further funding is being sought to extend the research project “FES Augmented Partial Bodyweight Support Treadmill Gait Training with Incomplete SCI Patients”. We wish to extend it over a longer period. All future funding would be for staffing as all the equipment is already in place.

### **Publications (joint authorship):**

#### **Journal Papers:**

##### **2003.**

- Neil J Postans PhD, Jon P Hasler MPhil, Malcolm H Granat PhD, Douglas J Maxwell BSc. Functional Electrical Stimulation Augmented Partial Weight Bearing Support Treadmill Training for Acute Incomplete Spinal Cord Injured Patients – A pilot Study. Archives of Physical Medicine and Rehabilitation (Submitted 2003).

##### **2002.**

- Victoria L. Hood, MSc, Malcolm H. Granat, PhD, Douglas J. Maxwell, BSc, John P. Hasler, MPhil. A new method of using heart rate to represent energy expenditure: The Total Heart Beat Index. A new method of using heart rate to represent energy expenditure. *September 2002 • Volume 83 • Number 9 • p1266 to p1273*
- Thomaz Tasiemski et.al. Correlation between quality of life, sports/recreation and education/employment in spinal cord injured people. Archives of Physical Medicine and Rehabilitation (Submitted 2002).

Areas for Development( 2003/04):

### Patient Sport/Recreation and Community Reintegration.

Rehabilitation teams within spinal cord injury units have long believed that a sport, recreation and community re entry programmes are 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.

In the year ahead we will make a concerted effort to reinstate a full programme of sporting activity within the physiotherapy departments activities.

### Moving research into clinical practice.

- Partial Body Weight Treadmill Gait Training.  
As reported this has been a highly successful area of research. For each patient session, of approx 1 hour, to be successfully and safely undertaken it requires dedicated input from at least 2 physiotherapy team members.  
With the increasing number of incomplete SCI individuals coming through the unit each year, a 14% increase in 2002/03, it would require a staffing increase to enable us to integrate this into the rehabilitation programme of all the incomplete SCI patients.
- Upper and lower limb FES cycling programmes.  
Currently these 2 research projects are on going but it is proposed that if the results are favourable that 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.

The staffing required to undertake these developments could be addressed by the appointment of physiotherapy technical instructors. 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 3 (lowest band) starts at a total cost of £13,534 rising to £15,201 over 5 increments.

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.

### Out Patients.

With the increased number of regional out-reach clinics there have been a 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.

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.

Having technical grade assistants would enable a physiotherapy team member to more easily allocate their in-patients for short periods of time enabling them to attend the regional clinics/out patient clinics here and deal with follow-up issues more effectively and promptly.

### Respiratory Physiotherapist

As the role of Dr A McLean our new 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: Occupational Therapy Report**

### **SERVICE AIM STATEMENT**

To provide a quality 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.

### **SERVICE FUNCTION STATEMENT**

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.

Individual 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 training/follow-up
- \* Tendon transfer post-of training
- \* Mouthstick training
- \* Environmental Control Unit training
- \* Adaptation of equipment
- \* Prescription/recommendation of aids and equipment

## **EVALUATION**

- \* FIM scale
- \* Ongoing functional evaluation

## **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
- 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
- Mouthstick training
- Home assessment training and 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, 6 are within the Respiratory Care Unit and 30 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

The service is staffed by 3.75 WTE –

Head 111 Occupational Therapist x 1. Average caseload 20 patients, ward based  
Senior 1 x 0.75 WTE. Out-patient service 8 sessions per week plus 5 in-patients  
Senior 1 Hand Therapist x 0.5 WTE. In-patient hand service, average 15 pts plus follow up.

Senior 11 x 1 (rotational) Average 22 patients

Occupational Therapy Assistant x 0.5

The Head Occupational Therapist is responsible for

- \* the day to day management of the National Spinal Service
- \* co-ordination of service development within what was the Rehabilitation Directorate
- \* staff supervision and development
- \* a full caseload that typically comprises 20 spinal injured patients of whom 5 are in the High Dependency Ward
- \* 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
- \* Patients contacting the service on the open door policy
- \* development of and administration of out-patient service

Senior 1 x 0/5 WTE - (Hand Therapist) - is responsible for,

- \* co-ordination of the all spinal unit upper limb assessment and treatment service
- \* identification of patients who would benefit from or be suitable candidates for
  - \* tendon transfer surgery
  - \* neuromotor control implantation
- \* Hand Service development
- \* Out-patient follow-up as appropriate
- \* Supervision of the Occupational Therapy Assistant

Senior 11 is responsible for,

- \* assessment, treatment and rehabilitation of newly injured patients. Average caseload 22.
- \* Fieldwork educator
- \* 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 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

## SERVICE ACTIVITY

### IN-PATIENTS

	<u>98/99</u>	<u>99/00</u>	<u>00/01</u>	<u>01/02</u>
Patient contacts	3279	3719	3568	4201
Patient units	9136	9224	7580	9986
Home visits	100	69	72	70
Home visit units	971	713	659	608
Total direct contacts	3519	3788	3640	4271
Total direct units	10107	9937	8239	10594
Total indirect contacts	2644	2704	2460	2828
Total indirect units	3809	3650	2991	3419
Total patient units	13916	13587	11230	14013

### OUT-PATIENTS

	<u>98/99</u>	<u>99/00</u>	<u>00/01</u>	<u>01/02</u>
Patient contacts	644	707	774	870
Patient units	1504	1755	1394	1432
Home visits	78	66	103	91
Home visit units	500	508	881	709
Total direct contacts	722	773	877	961
Total direct units	2004	2263	2275	2141
Total indirect contacts	1022	1101	1445	1476
Total indirect units	1471	1566	1787	1863
Total patient units	3475	3829	4062	4004

<b>TOTAL COMBINED UNITS</b>	<b>17391</b>	<b>17416</b>	<b>15292</b>	<b>18017</b>
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Following guidelines the system of statistic collation changed in July 2002. Therefore the statistics are not comparable with the previous year.

STATISTICS FOR July 2002 to April 2003

Units	New	Returns
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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

The total sickness absence for the year was 21 days. This is equal to 2% 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. In addition the Head OT and Senior 11 are fieldwork educators.

Lectures/presentations this year

- Scottish Seating and Wheelchair Group – Organised and chaired workshop on “carers perspective on postural provision/management”
- 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

### **COURSES ATTENDED BY STAFF**

- All staff have attended a variety of in-Trust courses on IT skills, eg Powerpoint, Access, Word Basic, Use of internet.
- All staff attended the Disability Equality training day
- Specialist Splinting Class for Tetraplegia
- Clinical Risk assessment
- AHP White paper – study day
- MASCIP
- Mobile arm support workshop
- Critical Appraisal course
- Intranet development
- Information Technology in support of Clinical Effectiveness seminar

### **CLINICAL GOVERNANCE ACTIVITY**

- OT is represented at each spinal unit Clinical Governance meeting
- The OT Journal Club is now well established and is now initiating a series of systematic reviews in an effort to develop and evidence base

- 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. Subject covered to date include:
  - Portfolio Development
  - Evidence based practice study day
  - How to do systematic reviews
  - Primary research
  - CRAG
  - Trial design Presentation
- Within the Spinal Unit there are monthly audit meetings where staff present projects they are working on. 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.

## **ACHIEVEMENTS/DEVELOPMENTS**

- ❖ Housing Adaptations satisfaction survey – following an initial study last year where the response was insufficient to allow conclusive evaluation, the study was repeated. Although, on the whole the feedback was positive, again response numbers were statistically inadequate.
- ❖ MDT literature review completed with Scottish Wheelchair and Seating Group looking at evidence for postural management in SCI, paediatrics and elderly. The final report has been submitted for publication to the British Journal of Therapy and Rehabilitation
- ❖ Involved in organisation of the Inter-spinal Unit Seating Forum, Feb 2003
- ❖ Initiated MDT audit into pressure sores incidence on the wards. This has included liaison with the Clinical Effectiveness dept and development on an Access program to meet the needs of the audit.
- ❖ Trial of E-link under discussion with Mr Hems
- ❖ Initiated review of Cochrane reports looking at the use of splinting
- ❖ Established mini heavy workshop. There are now two sessions per week when we have the use of a grade 1 technical Instructor
- ❖ In-house review of splinting materials used.

## **ASSISTIVE TECHNOLOGY SERVICE DEVELOPMENT**

Following funding granted for a Senior 1 Occupational Therapist for the development of assistive technology, the following is proposed for the coming year

### Responsibility of post holder

- Patients with higher level spinal cord injury (C5 and above) will be made aware of assistive technology devices that are available both through NHS and retail sources.
- Establish SMART room comprising technology available both through NHS and commercially.
- Introduce patients to ECU in OT and, when appropriate, on ward
- Set up ECU configuration according to individual persons need
- Tracking of equipment on ward
- Training nursing staff re: use of any equipment on the ward
- Investigate early integration of powerchair and ECU controls in liaison with WESTMARC and other wheelchair services
- Computer access technology - investigate funding & training?
- Identification of switches for use with ECU, powerchair and computers
- Positioning of switches for use from chair and bed
- Use of mobile arm supports in powerchair control and feeding etc
- Funding of MAS?
- Development of documentation system
- Development of review system for outcome measurement/patient satisfaction
- Liaison with employment and educational authorities as appropriate

In order to effectively establish this service the postholder must have a good working knowledge of the

- (i) client group and their needs
- (ii) current services and their strengths and weaknesses
- (iii) potential areas for improvement/development

### Resource implications/considerations

- Training of new post holder
- Space
- Finance for equipment
- Time to identify resources available commercially
- Time to establish service and to liaise with WESTMARC re service development/integration
- Division of case load
- Education of staff/ skill sharing
- Seating
- Powerchairs

**To effectively evaluate the efficacy of the new service the following will be required:-**

- Clarify current provision –
  - what is provided,
  - timescales to provision of ECU & powerwheelchair
  - what do patients use, what don't they use,
  - what would they like,
  - are they aware of what is commercially available
  - are the various pieces of AT they use compatible with each other?

**In addition to those responsibilities listed above the postholder will:-**

- Establish what is available internationally
  - What are current developments/services
  - Are there established outcome measures?
- Establish links with wheelchair and ECU services with a view to aiming to streamline the provision of a compatible ECU and power wheelchair that will also be compatible with the patients computer system.
- Follow up established links and develop new liaison with commercial agencies currently involved in development of AT/ECU
- Identify research/development project with lit review etc. Write research proposal for submission with appropriate body. (It is likely that this will be a joint submission with a technical university course)

## Appendix C: Momentum Report (Formerly Rehab Scotland)

### April 2002 to March 2003

This year saw the organisation change its name from Rehab Scotland to Momentum Scotland. The re-branding has led to a broader more positive perception about the national services the organisation offer.

This year also saw the celebration of the 10<sup>th</sup> Anniversary of Momentum Scotland supporting the Queen Elizabeth National Spinal Injuries Unit

April 2002 to March 2003 saw the following performance: -

#### Referrals:

New Patients:	50
Returning Patients:	19
<b>Total:</b>	<b><u>68 Patients</u></b>

#### **Patient Achievements:\***

Exploration:	25
Therapy/ Leisure	5
Assistive Technology Training	** 6
Family Support	19
Onward Referral	6
Support for Continuing Education	3
Support for Employment	5

**69 Total**

\* These measurements are subjective only

\*\* Training in Head Set Technology and Speech Recognition only. Use of other assistive technology devices is not measured.

#### **AAATE:**

Momentum Scotland (Spinal Injury Service) are members of the Association for the Advancement of Assistive Technology in Europe (AAATE). This association is the interdisciplinary pan-European organisation concerned with all aspects of assistive technology. This includes the use, research, development, manufacture, supply and provision of assistive technology. As a member, Momentum's objective is to influence future technology for the benefit of spinal cord injured people.

#### **FAST:**

We are also members of the Foundation for Assistive Technology. This is an organisation dedicated to the development of assistive technology and provides an information resource and exchange platform.



## **Assistive Technology:**

Undoubtedly the most significant event centred around the purchase of new computer systems. Using a grant from the Gordon Fraser Trust, Momentum Scotland have purchased two high specification computers that will be dedicated to meet the needs of high level injury patients in a proposed new Computer Room.

**Speech Recognition:** Dragon Naturally Speaking Professional Version 6.

Also significant was the purchase of Dragon Naturally Speaking Professional Version 6. This version is a quantum leap for patients who are dependent on speech recognition. Improvements include: -

Reduced training time.

Accuracy claimed to be 99%

Faster Response time

Section 508 Approved (US Government Standard to make software accessible for people with special needs.)

Command and control of the mouse by speech

Navigate by voice Internet Explorer.

Filter out unwanted sounds, “uhms” & “ahs”

By far the most useful improvement is the ability to successfully perform speech recognition training using single words or short phrases. This is a quantum leap in assistive technology for people who are ventilator dependent

An example of this can be illustrated by highlighting one patient who made more progress with speech recognition in the space of twenty minutes use of Version 6, than they did in three years of using an older version of speech recognition.

## **Headset Technology:**

The service is now equipped with Tracker 2000, the state of art in headset technology

Tracker 2000 is a hand's free device that translates head movements into direct movement of the computer's mouse cursor. A control box holds a sensor that tracks a tiny dot placed on the patient's forehead. When they move their head, the mouse cursor moves. Its ability to track accurately mouse movement is the best yet seen in our eight years of experience of using this kind of technology.

Working in conjunction with Tracker is WISP (Wireless Integrated Switch Platform), it is a wireless platform that uses breath or any other switch action to replace the "click" features of a standard mouse device.

## **ScreenDoors 2000**

ScreenDoors 2000 is an on-screen keyboard that works in the same way as a standard keyboard. Selection of a key with the mouse cursor causes a character to be typed. A built-in word predictor tries to guess the complete word and anticipate the next word to assist patient productivity.

Also, available with Tracker is Magic Cursor 2000. This software utility eliminates the need for mouse clicks. By dwelling over icons, scroll bars, menus or ScreenDoor keys left or right mouse click operations can be emulated.

## Plans for 2003 / 2004:

Planned areas for service expansion include: -

- 1) Experience in house over the past ten years has highlighted the need for continuity in assistive technology support after discharge from the unit. Additional funding from the Scottish Executive has been granted under Section 16b to provide an Outreach service.

Plans are currently being generated to initiate this service as soon as possible. It is anticipated this service will start 3<sup>rd</sup> Quarter 2003 for an initial one year run.

Continuity of service after the first year is dependent upon further funds being made available, either through Health Boards, on an individual basis, or central funds granted under Section 16b.

- 2) Plans are taking place to use funds, from a sponsored Ten Kilometres run, for a Wireless (802.11b) network enabling patients, who are on bed-rest, access to the Internet and an E-Mail facility. This network will be dedicated to patient rehabilitation needs and not linked in any way to the existing SGH network. The facility would cater for the increasing number of paraplegic patients who are computer literate, do not need elaborate assistive technology devices and can work on their own. With funding now in place it is hoped to inaugurate this development early third quarter 2003.
- 3) A request to the National Spinal Injury Unit Management Team for more space has been viewed favourably. The proposal is to create a second Computer Room dedicated to people who are dependent upon sophisticated assistive technology devices for computer access. The existing doors on the allocated room are wide enough to allow beds through. This makes it especially useful in meeting the needs of ventilator dependent patients. New computer equipment and assistive technology devices are available and have been allocated to equip this new room.

To meet the differing needs of Paraplegia and Tetraplegia patients, the existing Computer Room will be reconfigured, at no cost, with relatively unsophisticated devices such as large tracker ball, joysticks and large keyboards. Implementation is dependent upon unit funds and SGH Estates Dept priorities.

### **Future Technologies:**

There are a number of assistive technology devices coming onto the market that makes use of two CCD cameras, one for head movement, and one for eye movement. These devices replace the standard mouse and keyboard, and utilize eye movement to actuate switches. Thus eye blink or eye gaze will control and input information to a computer. There is no physical link from the person to the computer; the user merely looks at characters on a virtual keyboard

Our policy is to use only well tried and tested devices in our service it is likely to be sometime yet before a UK agent is appointed. However, when established as viable products they will prove invaluable to patients in traction.

## **Appendix D            Spinal Injuries Scotland (SIS)**

Report on the work of SIS at the QENSIU from 1<sup>st</sup> April 2002 to 31<sup>st</sup> March 2003.

SIS has been delighted to continue their voluntary presence working both in and with the spinal unit. Within the unit we have continued our twice-monthly patient visiting scheme and have worked as part of the joint volunteers group. We have also increased the amount of community work we have done with the unit in order to raise awareness of Spinal Injury and assisted the unit staff & Coloplast in the launch of SpinalNet. On top of this we have provided speakers and display boards for two case study days for professionals and have given student doctors from the unit a day of "life outside" with an SCI person.

Out and about, we have attended Outreach clinics in Inverness, Aberdeen, Borders General and Dumfries and have taken part in the first unit Roadshow, which took place in Aberdeen.

### **Patient Visiting**

SIS endeavour to visit the unit on the first and third Wednesdays of the months on an evening and in mid-afternoon respectively.

88% of the possible visits have been attended, the others were cancelled due to staff or volunteer shortages.

Wherever possible, visits are undertaken by one able-bodied and one spinal cord injured representative. This provides support for both patients and relatives and we are able to answer questions on all non-medical aspects of the injury. The most frequent questions remain on housing, benefits etc but many people, family members in particular just want a bit of reassurance. We will also arrange visits outwith these times on request.

All volunteers representing SIS at the QENSIU are fully trained and have their training updated regularly to ensure their skills are appropriate and that they have more than sufficient knowledge of the injury and its implications.

It is our aim to encourage as many SCI people as possible to join SIS while they are still in the unit, primarily because it gives them access to all our services as early as possible but also because reaching people after they leave the unit is infinitely more difficult.

### **Community Awareness**

We have been delighted to develop the three-way bond between SIS, QENSIU and St Constantine's Children's Liturgy Group or "the Connie's Kids" as they are more fondly known. This local parish group of 4-14 year old children are regular visitors to the "Nights-in" providing entertainment and lifting everyone's spirits. On top of this they have raised thousands of pounds for spinal injuries and are fantastic ambassadors for both the unit and SIS.

For the first time this year, we ran an awareness programme for older children. With the help of various departments within the unit, fourteen sixth year pupils from a local secondary school successfully completed a ten week programme covering life with and the treatment of SCI.

### **Outreach Clinics, Education and Roadshows**

We continue to have representatives at as many outreach clinics as our severe staff shortages will allow and are grateful to the QENSIU for the opportunity to be part of these and meet patients we who might otherwise never know about. These give us an opportunity to gain more members and also to become more aware of the geographical problems that people outwith the central belt face when coping with their injury.

SIS gave a talk at the first Roadshow, held in Aberdeen earlier this year, on top of this, we have given talks and presentations at courses for patients families, medics from across Scotland and the patients themselves.

It has now become an annual event that we will take any medical students on placement in the unit over the summer 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.

It was with great pride that SIS brought the other members of SIT (Spinal Injuries Together) to the unit for an afternoon presentation. SIT are the five main charities for SCI in the UK, SIS, SIA, Aspire, Spinal Research and Backup and work together to ensure that SCI people receive the best possible services from each charity without reciprocation.

#### Joint Volunteer Group

SIS, as part of the joint volunteers group (JVG), which is the umbrella of all the voluntary groups in the unit. The group aim to ensure that voluntary services within the QENSIU are relevant to the patients themselves rather than to the volunteers involved, which is often a problem. SIS is currently striving to improve the services provided by the group so that together the JVG can provide a varied, appropriate and attractive programme of evenings to encourage patients to interact socially with each other and their friends and families post injury.

#### In conclusion

Spinal Injuries Scotland continues to maintain and develop it's work both in and with the QENSIU. The relationship we have with the unit is quite unique not enjoyed by any organisations in the English units. It is through this that we enjoy events such as the launch of Spinalnet, the Coloplast website for SCI people across the UK. The Scottish launch was the most successful and well attended of all the Spinal Units across the UK and ensure therefore that patients in Scotland were provided with a top quality service.

## Appendix E: Nurse Training and Education

### In-House Teaching Sessions *Commencing Jan 2003*

Dates	Topic	Speaker	No.s attended
14th Jan	Overview of Spinal Cord Injury Management - Social Workers	Michele Paterson	12
22nd Jan	Auxiliary Competency Day	Michele Paterson & Janice Elliott	4
29th Jan	Auxiliary Competency Day	Michele Paterson & Janice Elliott	4
30th Jan	Auxiliary Competency Day	Michele Paterson & Janice Elliott	6
5th Feb	Auxiliary Competency Day	Michele Paterson & Janice Elliott	3
6th Feb	Auxiliary Competency Day	Michele Paterson & Janice Elliott	4
12th Feb	Auxiliary Competency Day	Michele Paterson & Janice Elliott	4
20th Feb	Patients Outcomes Day - For New Staff	Michele Paterson	4
14th March	Auxiliary Competency Day	Michele Paterson & Janice Elliott	5
26th March	Auxiliary Competency Day	Michele Paterson & Janice Elliott	5
30th April	Relatives Information Day	Michele Paterson & multi-dis team	15
4th June	Auxiliary Trust Orientation - practical	Michele Paterson & Kathy Mulloy	10
17th June	Update - Management of Neuropathic Bowel	Michele Paterson	2
19th June	Update - Management of Neuropathic Bowel	Michele Paterson	3
27th June	Update - Management of Neuropathic Bowel	Michele Paterson	5
30th June	Update - Management of Neuropathic Bowel	Michele Paterson	4
1st July	Basic Life Support Update - PDRU	Michele Paterson	4
2nd July	Basic Life Support Update - Philipshill Ward	Michele Paterson	4
4th July	Basic Life Support Update - Ward 53	Michele Paterson	3

Teaching Sessions For External Professionals  
Commencing January 2003.

Date	Hours study	Location	For whom	No's attended
26th Feb	1 hour	Monklands General Hospital - A&E Dept.	Nursing & Medical staff within A&E Dept	14 <b>MP</b>
14th April	2 hours	Caledonian University	District Nurses - Community Nursing Course	17 MP/LW
16th April	1/2 hour	Ebenezer Duncan - VI	As part of Nursing Auxiliary Conference	95 <b>MP/LC</b>
23rd April	1 hour	Hampden Park - SMILE event	For GP's, D/N's and practise nurses	6 <b>MP</b>
22nd May	Full day ½ hr as part of a team	Walton Conference Centre	Spinal Injuries the first 48 hours	<b>120 MP /</b> Multi-disciplinary.
1st July	1 ½ hours	Gartnavel Royal Hospital	Management of Neuropathic Bowel / AD	<b>4</b> <b>MP/LW</b>
3rd July	1 ½ hours	Gartnavel Royal Hospital	Management of Neuropathic Bowel / AD	<b>4</b> <b>MP/LW</b>
7th July	1 ½ hours	Gartnavel Royal Hospital	Management of Neuropathic Bowel / AD	<b>6</b> <b>MP/LW</b>

### Appendix G: Psychology Report

Psychological support for patients family and staff is seen as an integral function of the unit. The psychology service within the trust is currently being reconfigured. Dr. Audrey Walker is currently on further maternity leave and will return on a part-time basis. A further part time appointment Sharon Thornhill been made and will take up post in September. The unit has benefited from the secondment of a counsellor currently studying at Strathclyde University

### Appendix H: Social work Report

Report unavailable due to sickness absence and study leave. Major issues incorporated in body of report. Of concern to all is the difficulty currently experienced with travel and living +expenses for families of long stay patients domiciled outwith GGHB.



## Appendix ISD

### Queen Elizabeth National Spinal Injuries Unit Report Regarding Implantable Pumps

#### 1.1 Implantable Analgesic /Anti-spasticity Pumps

It is increasingly recognised that implantable pumps can be used for the long term pharmaceutical management of chronic pain syndromes or spasticity in a wide range of conditions. They are particularly relevant in patients with significant spinal cord injury.

The pumps contain a reservoir of drug that can be replenished. The drug release is controlled and the slow release produces low but therapeutic blood levels. This is safer for the patient and produces less side effects. The dosage of the drug can either be pre-programmed prior to implantation or in some models be programmed once implantation has occurred. Various models are available depending on the type of programming and the volume of drug used. The choice of pump is tailored to suit the patient's needs. There is an increasing demand for programmable pumps. In these the dose schedule can be altered once implantation has taken place. This allows fine tuning of the therapeutic dose to the patient's needs.

Pumps are commonly used in spinal cord injury to administer Baclofen to control spasticity or morphine for pain control.

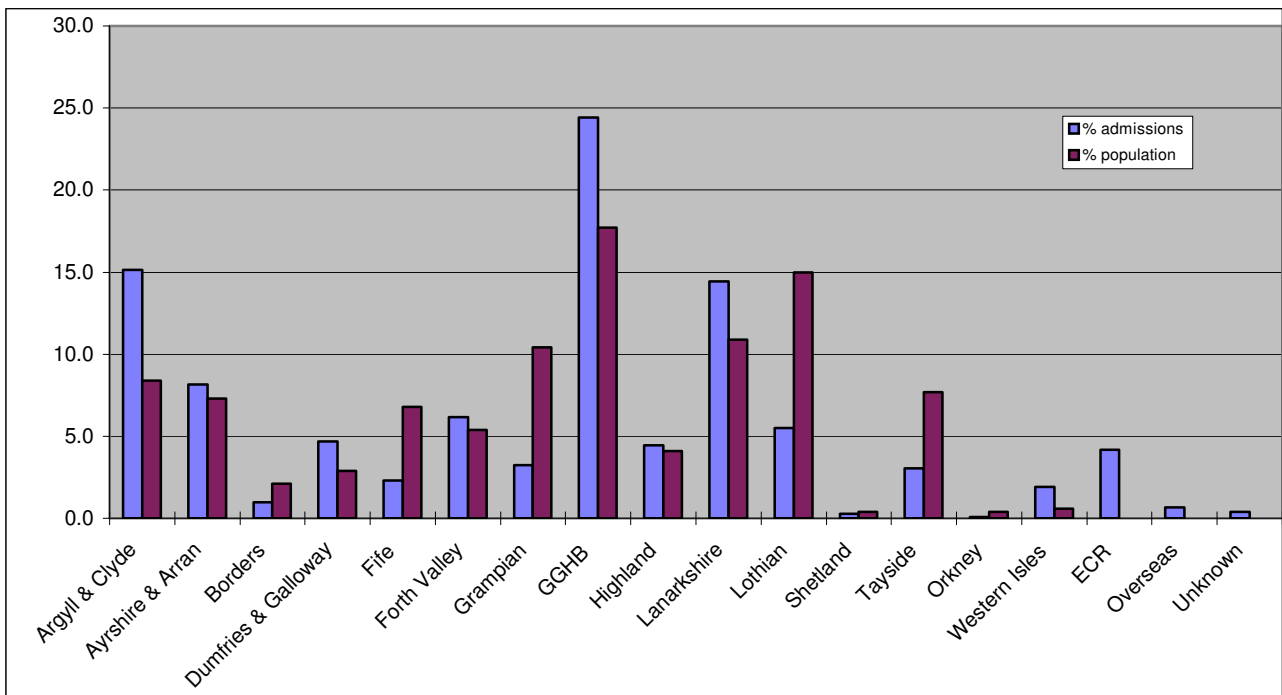
#### 2.0 Numbers and Type of Pump supplied 1997-2002

	NAME	COST (approx)	Number
<u>ANTISPASTICITY</u>	SYNCHROMED	£6048	15
	ISOMED	£3518	22
	ARCHIMEDES	£3448	3
<u>ANALGESIC</u>	SYNCHROMED	£6048	5
	ARCHIMEDES	£3518	1
	ALGOMED	no longer available	3
<u>TOTAL</u>			49

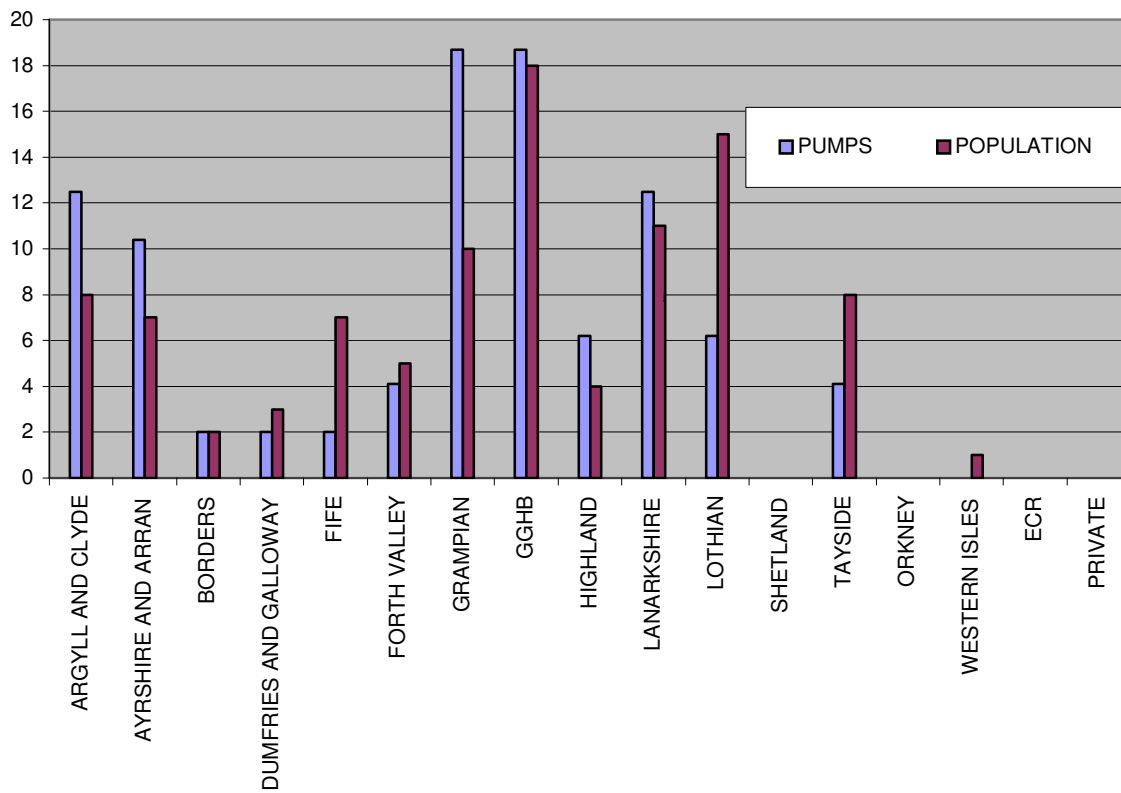
#### **3.0 Number of Pumps supplied by Health Board 1997 – 2002/3**

HB	No	HB	Number
GRAMPIAN	9	GGHB	9
ARGYL AND CLYDE	6	LANARKSHIRE	6
AYRSHIRE AND ARRAN	5	HIGHLAND	3
LOTHIAN	3	FORTH VALLEY	2
TAYSIDE	3	BORDERS	1
DUMFRIES AND GALLOWAY	1	FIFE	1
<b>TOTAL</b>	<b>1997 - 02</b>		<b>49</b>

#### 4.0 Spinal Unit Admission versus Scottish Population 1997-2002



#### 5.0 Pump implantation versus Scottish Population 1997-2002



pppp

There is a reasonable correlation with pump implantation and population over five years.

## **5.0 Current Funding for Implantable Pumps in Spinal Cord Injury**

At present implantable pumps are outwith the NSD contract with the South Glasgow University Hospitals NHS Trust. Funding for each pump is sought by the spinal unit from the Health Board in which the patient is normally resident. Once permission is granted the pump is implanted.

Some concern has been expressed by individual Health Boards regarding this additional charge.

Within Greater Glasgow Health Board the cost is deemed the responsibility of the South Glasgow University Hospitals NHS Trust as part of their block contract with the board..

Each year discussions have taken place whether it would be appropriate to include the cost of pumps within the core funding by NSD.

There is concern that the number of pumps required each year varies and is difficult to predict. There is also concern that the increasing use of programmable pumps (eg Synchronomed) which are more expensive, make financial predictions difficult.

## **6.0 Future Funding**

It is accepted that there are difficulties for the spinal unit and individual health boards with the current system. It is however robust and accountable. It works for the patient and minimises cost. It may be appropriate to support South Glasgow Trust in obtaining appropriate funding from GGHB for their own patients.

The unit would favour retention of the current system.

D B ALLAN FRCS 04 04 03

**APPENDIX I:  
Raw Data**

**DA1: New Admissions**

	<b>Admissions</b>
<b>1992/1993</b>	59
<b>1993/1994</b>	128
<b>1994/1995</b>	137
<b>1995/1996</b>	150
<b>1996/1997</b>	164
<b>1997/1998</b>	167
<b>1998/1999</b>	163
<b>1999/2000</b>	180
<b>2000/2001</b>	199
<b>2001/2002</b>	164
<b>2002/2003</b>	165
<b>Total</b>	<b>1676</b>

**DA2: New Admissions by Case-mix Complexity**

<b>Admissions</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>Total</b>
<b>1992/1993</b>	9	15	16	19	<b>59</b>
<b>1993/1994</b>	6	18	47	57	<b>128</b>
<b>1994/1995</b>	13	24	32	68	<b>137</b>
<b>1995/1996</b>	6	30	39	75	<b>150</b>
<b>1996/1997</b>	13	20	52	79	<b>164</b>
<b>1997/1998</b>	17	24	46	80	<b>167</b>
<b>1998/1999</b>	4	32	27	100	<b>163</b>
<b>1999/2000</b>	8	27	28	117	<b>180</b>
<b>2000/2001</b>	13	24	40	122	<b>199</b>
<b>2001/2002</b>	11	24	30	99	<b>164</b>
<b>2002/2003</b>	14	23	32	96	<b>165</b>
<b>Total</b>	<b>114</b>	<b>261</b>	<b>389</b>	<b>912</b>	<b>1676</b>

### 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	Total
<b>Argyll &amp; Clyde</b>	9	22	21	28	28	29	24	28	28	12	18	<b>247</b>
<b>Ayrshire &amp; Arran</b>	4	12	9	9	12	12	12	17	20	16	17	<b>140</b>
<b>Borders</b>	0	2	2	1	2	3	0	2	0	3	2	<b>17</b>
<b>Dumfries &amp; Galloway</b>	2	3	4	5	5	6	16	13	7	10	10	<b>81</b>
<b>Fife</b>	3	3	5	4	3	4	1	3	2	7	4	<b>39</b>
<b>Forth Valley</b>	2	8	10	9	8	13	6	11	17	9	4	<b>97</b>
<b>Grampian</b>	2	2	3	2	6	6	8	4	8	8	9	<b>58</b>
<b>GGHB</b>	19	32	43	46	45	28	37	28	47	44	47	<b>416</b>
<b>Highland</b>	6	6	5	2	5	7	10	4	6	16	6	<b>73</b>
<b>Lanarkshire</b>	5	19	19	21	20	22	27	40	25	20	23	<b>241</b>
<b>Lothian</b>	3	7	6	6	8	14	6	11	14	8	8	<b>91</b>
<b>Shetland</b>	0	0	0	1	2	0	0	0	0	1	0	<b>4</b>
<b>Tayside</b>	2	5	4	4	4	8	3	6	5	5	3	<b>49</b>
<b>Orkney</b>	0	0	0	0	0	1	0	0	0	0	0	<b>1</b>
<b>Western Isles</b>	0	7	1	4	5	2	5	0	3	2	3	<b>32</b>
<b>ECR</b>	1	0	5	7	9	10	6	11	12	2	8	<b>71</b>
<b>Private</b>	1	0	0	1	2	2	2	1	0	1	0	<b>10</b>
<b>Unknown</b>	0	0	0	0	0	0	0	1	5	0	2	<b>8</b>
<b>Overseas</b>	0	0	0	0	0	0	0	0	0	0	1	<b>1</b>
<b>TOTAL</b>	<b>59</b>	<b>128</b>	<b>137</b>	<b>150</b>	<b>164</b>	<b>167</b>	<b>163</b>	<b>180</b>	<b>199</b>	<b>164</b>	<b>165</b>	<b>1676</b>

**DA4: Admissions by Health Board compared with population size**

	1992/1993 - 2001/2002	2002/ 2003	Total	% to Total		Population Size	% to Total
<b>Argyll &amp; Clyde</b>	229	18	<b>247</b>	14.7%		<b>430500</b>	8.4
<b>Ayrshire &amp; Arran</b>	123	17	<b>140</b>	8.4%		<b>376500</b>	7.3
<b>Borders</b>	15	2	<b>17</b>	1%		<b>106100</b>	2.1
<b>Dumfries &amp; Galloway</b>	71	10	<b>81</b>	4.8%		<b>147600</b>	2.9
<b>Fife</b>	35	4	<b>39</b>	2.3%		<b>349300</b>	6.8
<b>Forth Valley</b>	93	4	<b>97</b>	5.8%		<b>274600</b>	5.4
<b>Grampian</b>	49	9	<b>58</b>	3.5%		<b>531200</b>	10.4
<b>GGHB</b>	369	47	<b>416</b>	24.8%		<b>909600</b>	17.7
<b>Highland</b>	67	6	<b>73</b>	4.4%		<b>208700</b>	4.1
<b>Lanarkshire</b>	218	23	<b>241</b>	14.4%		<b>560800</b>	10.9
<b>Lothian</b>	83	8	<b>91</b>	5.4%		<b>767800</b>	15.0
<b>Shetland</b>	4	0	<b>4</b>	0.2%		<b>23020</b>	0.4
<b>Tayside</b>	46	3	<b>49</b>	2.9%		<b>393600</b>	7.7
<b>Orkney</b>	1	0	<b>1</b>	0.1%		<b>19800</b>	0.4
<b>Western Isles</b>	29	3	<b>32</b>	1.9%		<b>28880</b>	0.6
<b>ECR</b>	63	8	<b>71</b>	4.2%			
<b>Overseas</b>	10	1	<b>11</b>	0.7%			
<b>Unknown</b>	6	2	<b>8</b>	0.5%			
<b>TOTAL</b>	<b>1511</b>	<b>165</b>	<b>1676</b>			<b>5128000</b>	

**DA5: Admissions by Degree of Injury**

	<b>805</b>	<b>806</b>	<b>952</b>	<b>Other</b>	<b>Total</b>
<b>1992/1993</b>	16	24	16	3	<b>59</b>
<b>1993/1994</b>	36	43	36	13	<b>128</b>
<b>1994/1995</b>	49	33	40	15	<b>137</b>
<b>1995/1996</b>	45	44	43	18	<b>150</b>
<b>1996/1997</b>	60	50	39	15	<b>164</b>
<b>1997/1998</b>	62	50	42	13	<b>167</b>
<b>1998/1999</b>	80	36	36	11	<b>163</b>
<b>1999/2000</b>	94	44	34	8	<b>180</b>
<b>2000/2001</b>	100	60	26	13	<b>199</b>
<b>2001/2002</b>	76	62	23	3	<b>164</b>
<b>2002/2003</b>	71	58	36	0	<b>165</b>
<b>Total</b>	<b>689</b>	<b>504</b>	<b>371</b>	<b>112</b>	<b>1676</b>

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**DA6: Discharges by Degree of Injury**

<b>Discharges</b>	<b>805</b>	<b>806</b>	<b>952</b>	<b>Other</b>	<b>Total</b>
<b>1992/1993</b>	12	8	8	3	<b>31</b>
<b>1993/1994</b>	38	44	40	13	<b>135</b>
<b>1994/1995</b>	48	39	30	14	<b>131</b>
<b>1995/1996</b>	44	40	51	19	<b>154</b>
<b>1996/1997</b>	63	44	31	13	<b>151</b>
<b>1997/1998</b>	60	50	46	14	<b>170</b>
<b>1998/1999</b>	75	38	37	12	<b>162</b>
<b>1999/2000</b>	93	37	35	7	<b>172</b>
<b>2000/2001</b>	99	52	25	13	<b>189</b>
<b>2001/2002</b>	81	51	22	3	<b>157</b>
<b>2002/2003</b>	70	68	34	1	<b>173</b>
<b>Total</b>	<b>683</b>	<b>471</b>	<b>359</b>	<b>112</b>	<b>1625</b>

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

<b><u>Admissions</u></b>	<b>1998/ 1999</b>	<b>1999/ 2000</b>	<b>2000/ 2001</b>	<b>2001/ 2002</b>	<b>2002/ 2003</b>
<b>Central Cord Lesion</b>	22	15	12	11	23
<b>Infection</b>	2	2	4	4	1
<b>Vascular</b>	7	8	3	1	4
<b>Tumour</b>	3	2	0	1	1
<b>Intra medullary Cyst</b>	0	0	0	0	0
<b>Non-specific Lumbar Lesions</b>	0	0	2	0	3
<b>Stab Wounds</b>	0	0	0	2	4
<b>Other</b>	2	7	4	4	0
<b>Total</b>	<b>36</b>	<b>34</b>	<b>25</b>	<b>23</b>	<b>36</b>

<b><u>Discharges</u></b>	<b>1998/ 1999</b>	<b>1999/ 2000</b>	<b>2000/ 2001</b>	<b>2001/ 2002</b>	<b>2002/ 2003</b>
<b>Central Cord Lesion</b>	18	16	16	10	23
<b>Infection</b>	3	2	1	3	2
<b>Vascular</b>	9	6	5	3	4
<b>Tumour</b>	2	2	0	0	1
<b>Intra medullary Cyst</b>	0	1	0	0	0
<b>Non-specific Lumbar Lesions</b>	0	3	1	0	0
<b>Stab Wounds</b>	0	3	1	2	4
<b>Other</b>	5	2	1	4	0
<b>Total</b>	<b>37</b>	<b>35</b>	<b>25</b>	<b>22</b>	<b>34</b>

**DA8: Daycase attendances by Health Board**

	1994/ 1995	1995/ 1996	1996/ 1997	1997/ 1998	1998/ 1999	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	Total
Argyll & Clyde	23	38	44	71	80	95	59	94	65	<b>569</b>
Ayrshire & Arran	21	14	48	37	39	42	54	84	62	<b>401</b>
Borders	0	0	1	4	1	2	0	0	0	<b>8</b>
Dumfries & Galloway	4	4	0	0	9	4	2	8	8	<b>39</b>
Fife	0	2	4	6	3	16	16	4	4	<b>55</b>
Forth Valley	16	5	5	11	24	8	11	42	10	<b>132</b>
Grampian	0	0	3	2	5	1	2	2	0	<b>15</b>
Greater Glasgow	68	95	94	158	207	228	160	164	195	<b>1369</b>
Highland	1	5	5	5	7	2	0	2	3	<b>30</b>
Lanarkshire	21	50	67	95	179	153	177	138	125	<b>1005</b>
Lothian	0	9	9	18	27	28	11	15	16	<b>133</b>
Shetland	0	0	0	0	0	0	0	0	0	<b>0</b>
Tayside	1	8	9	4	5	5	2	1	2	<b>37</b>
Orkney	0	0	0	0	0	0	0	0	0	<b>0</b>
Western Isles	1	0	0	0	0	0	0	1	3	<b>5</b>
ECR	0	0	0	0	0	6	1	1	2	<b>10</b>
<b>Total</b>	<b>156</b>	<b>230</b>	<b>289</b>	<b>411</b>	<b>586</b>	<b>590</b>	<b>495</b>	<b>556</b>	<b>495</b>	<b>3808</b>



**DA9 : Admissions by age group**

<b>Males</b>										
	<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
<b>Total</b>	<b>124</b>	<b>253</b>	<b>236</b>	<b>182</b>	<b>176</b>	<b>129</b>	<b>73</b>	<b>20</b>	<b>0</b>	<b>1193</b>

<b>Females</b>										
	<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
<b>Total</b>	<b>56</b>	<b>85</b>	<b>81</b>	<b>68</b>	<b>58</b>	<b>52</b>	<b>45</b>	<b>31</b>	<b>7</b>	<b>483</b>

<b>All Admissions</b>										
	<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
<b>Total</b>	<b>180</b>	<b>338</b>	<b>317</b>	<b>250</b>	<b>234</b>	<b>181</b>	<b>118</b>	<b>51</b>	<b>7</b>	<b>1676</b>

**DA 10: Age & Sex of New Patients by Category of Injury**  
**Female Patients 2002/2003**

<b>Casemix</b>	<b>No. of patients</b>	<b>Mean Age</b>	<b>Range of Ages</b>
I	2	41	37 - 45
II	5	59	36 - 82
III	6	42	14 - 72
IV	36	49	15 - 93
<b>Females</b>	<b>49</b>	<b>49</b>	<b>14 - 93</b>

**DA 11: Age & Sex of New Patients by Category of Injury**  
**Male Patients 2002/2003**

<b>Casemix</b>	<b>No. of patients</b>	<b>Mean Age</b>	<b>Range of Ages</b>
I	12	49	25 - 80
II	18	54	21 - 82
III	26	44	18 - 72
IV	60	61	16 - 83
<b>Males</b>	<b>116</b>	<b>55</b>	<b>16 - 83</b>

**DA 12: Age & Sex of New Patients by Category of Injury**  
**All Patients 2002/2003**

<b>Casemix</b>	<b>No. of patients</b>	<b>Mean Age</b>	<b>Range of Ages</b>
I	14	48	25 - 80
II	23	55	20 - 82
III	32	44	14 - 72
IV	96	43	15 - 93
<b>All Patients</b>	<b>165</b>	<b>53</b>	<b>15 - 93</b>

**DA 13: Length of Stay for Traumatic Injury by level of Spinal Cord Lesion 2002/2003**

<b>Casemix</b>	<b>No. of patients</b>	<b>Mean L.O.S. (days)</b>	<b>Range of L.O.S.</b>
<b>I</b>	18	222	12 – 497
<b>II</b>	28	172	4 – 428
<b>III</b>	31	166	16 – 886
<b>IV</b>	96	19	0 – 99
<b>All</b>	<b>173</b>	<b>91</b>	<b>0 - 886</b>

**DA 14: All Discharges**

<b>1992/1993</b>	31
<b>1993/1994</b>	135
<b>1994/1995</b>	131
<b>1995/1996</b>	154
<b>1996/1997</b>	151
<b>1997/1998</b>	170
<b>1998/1999</b>	162
<b>1999/2000</b>	172
<b>2000/2001</b>	189
<b>2001/2002</b>	157
<b>2002/2003</b>	173
<b>Total</b>	<b>1625</b>

**DA15: Discharges by Casemix Complexity**

<b>Discharges</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>Total</b>
<b>1992/1993</b>	2	7	8	14	<b>31</b>
<b>1993/1994</b>	9	19	47	60	<b>135</b>
<b>1994/1995</b>	10	20	33	68	<b>131</b>
<b>1995/1996</b>	11	34	38	71	<b>154</b>
<b>1996/1997</b>	7	16	49	79	<b>151</b>
<b>1997/1998</b>	19	22	46	83	<b>170</b>
<b>1998/1999</b>	7	26	33	96	<b>162</b>
<b>1999/2000</b>	5	27	22	118	<b>172</b>
<b>2000/2001</b>	10	28	34	117	<b>189</b>
<b>2001/2002</b>	6	19	29	103	<b>157</b>
<b>2002/2003</b>	18	28	31	96	<b>173</b>
<b>Total</b>	<b>104</b>	<b>246</b>	<b>370</b>	<b>905</b>	<b>1625</b>

**DA16: Discharges by ASIA Impairment Level & Health Board**

2002/2003	A	B	C	D	E	Total
Argyll & Clyde	3	0	1	9	7	20
Ayrshire & Arran	2	0	1	4	10	17
Borders	0	0	0	1	0	1
Dumfries & Galloway	1	0	1	5	4	11
Fife	1	0	0	1	2	4
Forth Valley	0	1	0	2	1	4
Grampian	3	0	0	2	3	8
Greater Glasgow	4	2	6	12	27	51
Highland	4	1	1	0	3	9
Lanarkshire	2	1	1	7	10	21
Lothian	1	1	2	3	2	9
Overseas	0	1	0	0	0	1
Shetland	0	0	0	0	0	0
Tayside	0	2	0	2	0	4
Orkney	0	0	0	0	0	0
Western Isles	0	1	0	1	2	4
ECR	0	0	0	3	5	8
Private	0	0	0	0	0	0
Unknown	0	0	0	0	1	1
<b>TOTAL</b>	<b>21</b>	<b>10</b>	<b>13</b>	<b>52</b>	<b>77</b>	<b>173</b>

**DA17: Discharges by ASIA Impairment Level & Health Board**

Discharges	A	B	C	D	E	Total
1999/2000	25	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

**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

**DA19: Time between accident & admission**

	<b>No.of patients</b>	<b>Mean Time (Days)</b>	<b>Range of Time</b>
<b>1999-2000</b>	180	158.3	0 - 18770
<b>2000-2001</b>	199	163.3	0 - 12575
<b>2001/2002</b>	164	103	0 - 12012
<b>2002/2003</b>	165	62	0 - 4948

**DA20: Ventilated Bed Days**

		<b>No. Patients</b>	<b>Ave. Ventilated Days</b>	<b>Total Ventilated Days</b>
<b>1998/1999</b>		12	121	1452
<b>1999/2000</b>	Edenhall	12	63.4	761
	RCU	4	187	748
<b>2000/2001</b>	Edenhall	12	71.5	858
	RCU	10	80.9	809
<b>2001/2002</b>	Edenhall	19	33	643
	RCU	2	40.5	81
<b>2002/2003</b>	Edenhall	11	28	304
	RCU	4	102	408

## STAFF LIST

ALLAN DB  
AL-HADITHI M  
ARMSTRONG N  
BERRY J  
BEWICK A  
BRADLEY C  
BRIGGS J  
BROWN FIONA  
CALDWELL M  
CAMERON S  
CAMERON S  
CAMPBELL D  
CAMPBELL K  
CASSIDY D  
CHISHOLM S  
CLARK I  
CONN G  
CRAIG K  
CRAWFORD S  
CRAWFORD W  
CURRY J  
DARGAN H  
DARKIN J  
DAVIS K  
DONNELLY S  
DOUGLAS F  
DUFF L  
DUFFY L  
DUNCANSON T  
DUNSMORE I  
EDEN C  
FARREN P  
FERRY D  
FISHER N  
FLANNIGAN E  
FOLEY C  
FORREST S  
FRASER M  
GILBRIDE A  
GOVAN E M  
GRAY A  
GRIFFIN M  
HASLER J  
HANDS L  
HANNAH M M  
HEMS T  
HENDRY EA  
HOBSON S  
HONEYMAN MA  
HOWAT A  
HUNTER S  
IRVINE G  
JIGAJINNI MV  
JOHNSON F  
JOSEPH G  
JOHNSTON RA

KELLY VA  
KENNEDY LA  
KING S  
LAIRD P  
LANG L  
LAZZERINI C  
LEVY C  
LILLEY S  
LOCHRIE T  
LOWE M  
McALLISTER K  
McALOON E  
McCARRON K  
McCUE K  
MacDONALD L  
MacDONALD S  
McFADYEN M M  
McGROARTY J  
MacKAY M  
McKEAND A  
MacLENNAN K  
MacKILLOP M  
McLEAN A  
McMAHON R C  
McMURTRIE I  
MacNEIL S  
MAGEE E  
MANN C A  
MARIMUTHU R  
MARSHALL K  
MARTIN D  
MERCHANT P  
MERRY J A  
MONTEITH M  
MOYES L A  
MULHOLLAND L  
MURPHY J  
NELSON E  
ORRY G  
PATERSON M  
PREMPEH S  
PRITCHARD L  
RANKIN M  
RENNIE K  
RICHMOND H  
ROBERTSON S  
ROBERTSON K  
ROBERTSON P  
ROONEY B  
ROONEY M  
RUSSELL E  
SHANLEY B  
SLOAN C  
SMILLIE V  
SMITH L  
SMITH M

STEWART W  
THOMSON C  
THOMSON M  
TURNER M  
WALES J  
WALLACE J B  
WATSON J B  
WATSON L  
WILSON J  
WOODS L

