Queen Elizabeth National Spinal Injuries Unit

ANNUAL REPORT

2006-07

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Main Report

Appendices

Acknowledgements:

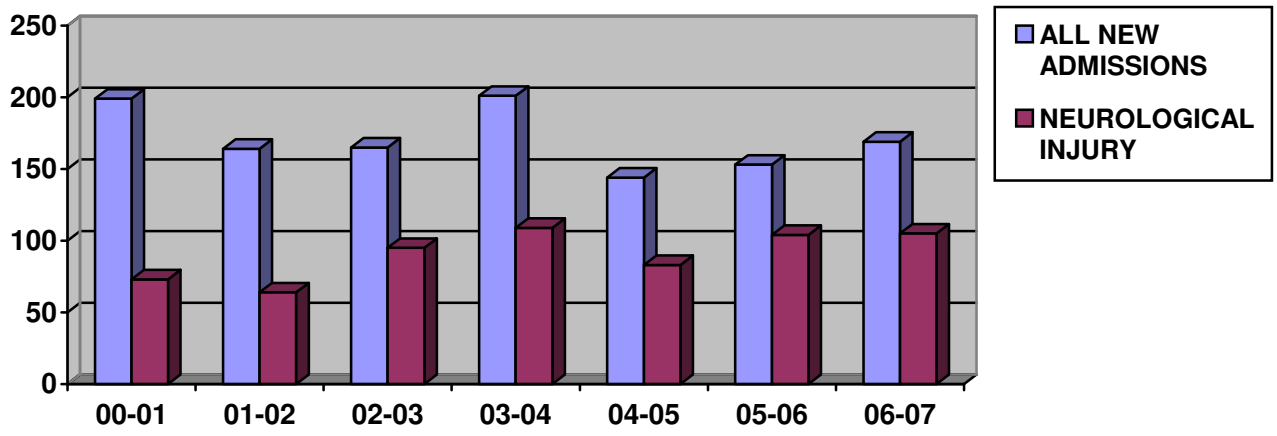
This report is based on information gathered and analysed throughout the year by many members of staff.

Special thanks to Ana Bewick for the analysis and Irene Clark for the final production.

1.0 Introduction

The Queen Elizabeth National Spinal Injuries Unit is responsible for the management of all patients in Scotland who have a traumatic injury to the spinal cord. Since commissioning in 1992 it has continued to develop the management of the acute injury and long term care of its patients to maximise function and to prevent the complications of paralysis.
The Unit also supports hospitals in Scotland who admit fractures of the spinal column. This support varies, from simple advice, to local visits and consultations. Complex fractures, without neurological injury, requiring surgery or specialised rehabilitation are admitted where necessary.

The year saw the completion of the upgrade in Edanhall Ward and the commencement of the building of the Step-Down unit and the Research mezzanine.



The total number of admissions increased slightly over the year. The number of neurological injured patients (105) remains stable and is consistent with the population size. There was an increase in the number of non-neurological injured spinal fractures (169). A total of 351 patients were referred for advice but not admitted and managed in the referral hospital.

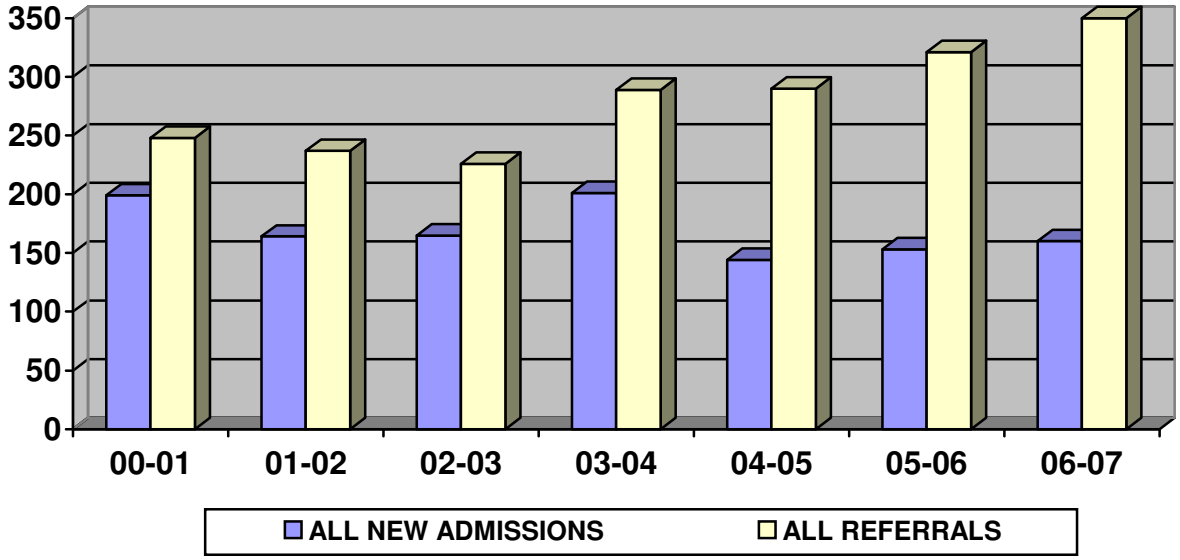
2.0 Activity

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

All known patients with a neurological injury in Scotland were managed in the unit.

	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	TOTAL 1992-2007
NEW ADMISSIONS	164	165	201	144	153	169	2343
Neurological	64	95	109	83	104	105	1106
Non-neurological	100	70	92	61	49	64	1237



The number of patients referred to the unit continues to grow. The number with a neurological deficit has been fairly constant with the increase being related to spinal fractures without neurology. These patients are referred because of the severity of the fracture or seeking admission for conservative care. Opportunity to admit a broad spectrum of fractures is limited because of the number of available beds and the varying case-mix amongst the neurological injuries. Referral of such patients varies between regions and wherever possible preference is given to areas without spinal surgical support. Orthopaedic consultants or neuro-surgeons managed over fifty patients without neurological deficit in the referral hospital with advice. The consultant staff or liaison nurses continued to support the management of a number of other cases in the referral hospital. The increasing number of elderly patients with cervical injuries necessitated halo fixation or specialised orthosis in the referral hospital with outpatient follow up in the unit continued. 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.

2.1.2. New Admissions: Case Mix Complexity

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

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

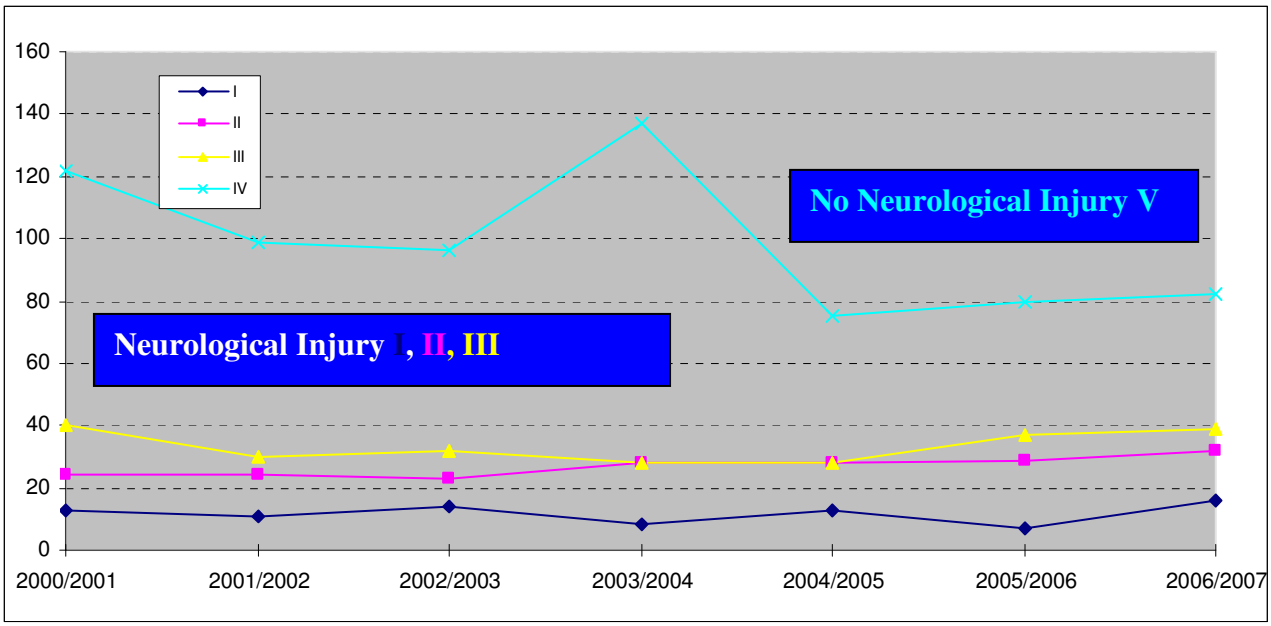
Group I Patients with the most severe neurological injuries. They are the most dependant. The numbers are expected to vary considerably each year.

Group II and Group III Patients with a significant neurological loss and high dependency. They require the longest period of rehabilitation.

Group IV Includes all patients with spinal fractures and incomplete or no paralysis. Many require significant input during their rehabilitation.

2.1.3 New Admissions by Case-Mix Complexity

Appendix DA2



GROUP	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	Total 1992/ 2007
I	13	11	14	8	13	7	16	158
II	24	24	23	28	28	29	32	378
III	40	30	32	28	28	37	39	521
IV	122	99	96	137	75	80	82	1286
Total	199	164	165	201	144	153	169	2343

There was a significant increase in the number of highly dependant Group I patients compared with the previous year. A smaller increase was seen in the dependant groups II and III. The number of patients admitted with no neurology stabilised. This is related to a reduction in incidence and the opportunity for management at the primary referral hospital. The variation in complexity in Group IV is better demonstrated by ASIA grades. The rate of throughput appears higher than any other spinal injury unit in the UK.

2.1.4 New Admissions by ASIA Impairment Level & Health Board

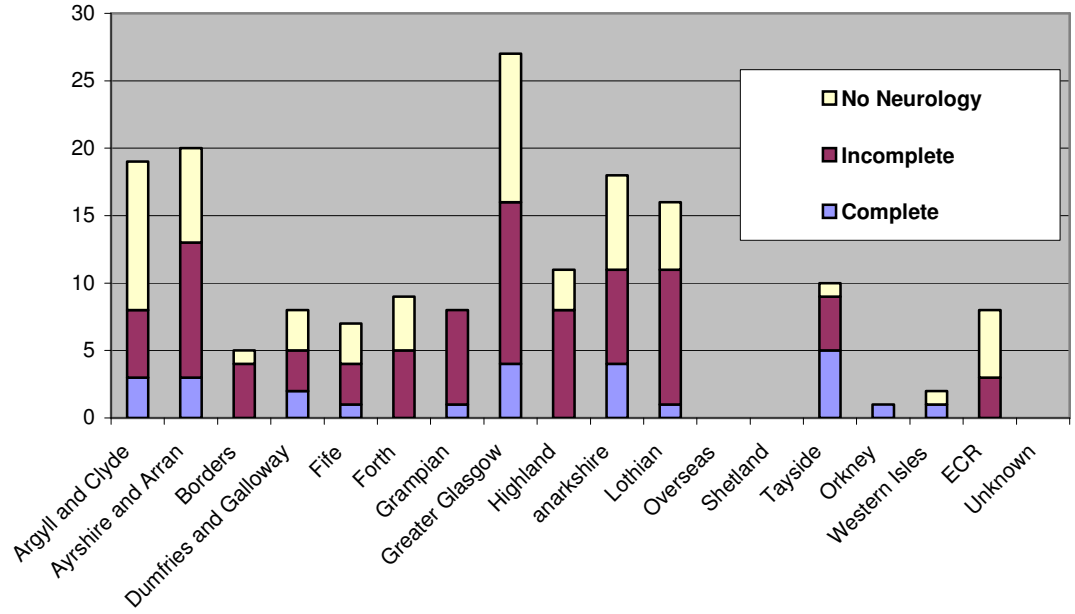
The ASIA grading system is recognise internationally as a measure of dependency and can be used to classify improvements over time.

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

2006/2007	A	B	C	D	E	Total
Argyll & Clyde	3	0	1	4	11	**19**
Ayrshire & Arran	3	3	3	4	7	**20**
Borders	0	0	1	3	1	**5**
Dumfries & Galloway	2	1	0	2	3	**8**
Fife	1	1	1	1	3	**7**
Forth Valley	0	0	2	3	4	**9**
Grampian	1	1	5	1	0	**8**
Greater Glasgow	4	1	5	6	11	**27**
Highland	0	5	1	2	3	**11**
Lanarkshire	4	2	3	2	7	**18**
Lothian	1	2	5	3	5	**16**
Overseas	0	0	0	0	0	**0**
Shetland	0	0	0	0	0	**0**
Tayside	5	1	3	0	1	**10**
Orkney	1	0	0	0	0	**1**
Western Isles	1	0	0	0	1	**2**
ECR	0	0	1	2	5	**8**
Unknown	0	0	0	0	0	**0**
TOTAL	**26**	**17**	**31**	**33**	**62**	**169**

The distribution of high dependency patients is as expected. The pattern is dependant on the population and the activities of each area. Groups A and B, with the highest level of dependency and which require the most specialist care are relatively uncommon.

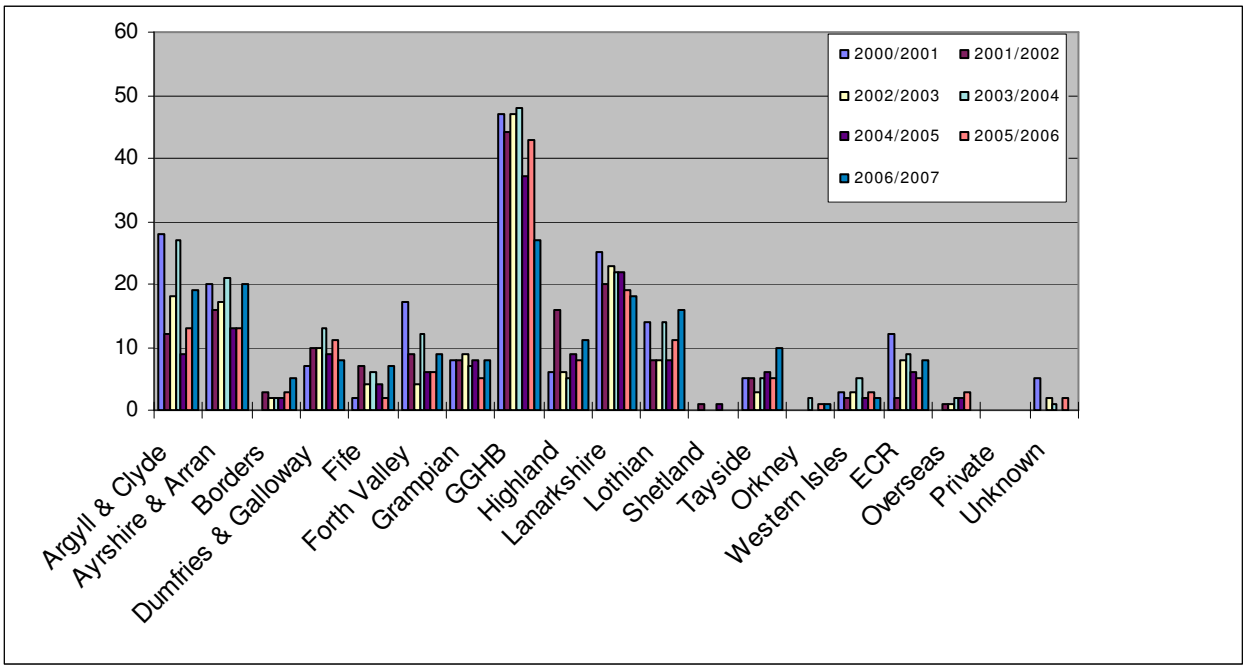
2.1.41 Admissions by Neurological Deficit and Health Board



GGHB is responsible for the largest number of complete and incomplete spinal cord injuries. The number of non-neurological injuries admitted from all regions and particularly from GGHB has stabilised. The distribution of complete and incomplete injuries varies by year. All boards except Shetland referred one or more patients with a neurological deficit. The distribution of admissions and the annual variation since the unit opened justifies the economic benefits of a national service.

2.1.5 New Admissions by Health Board Of Residence 2000-2007

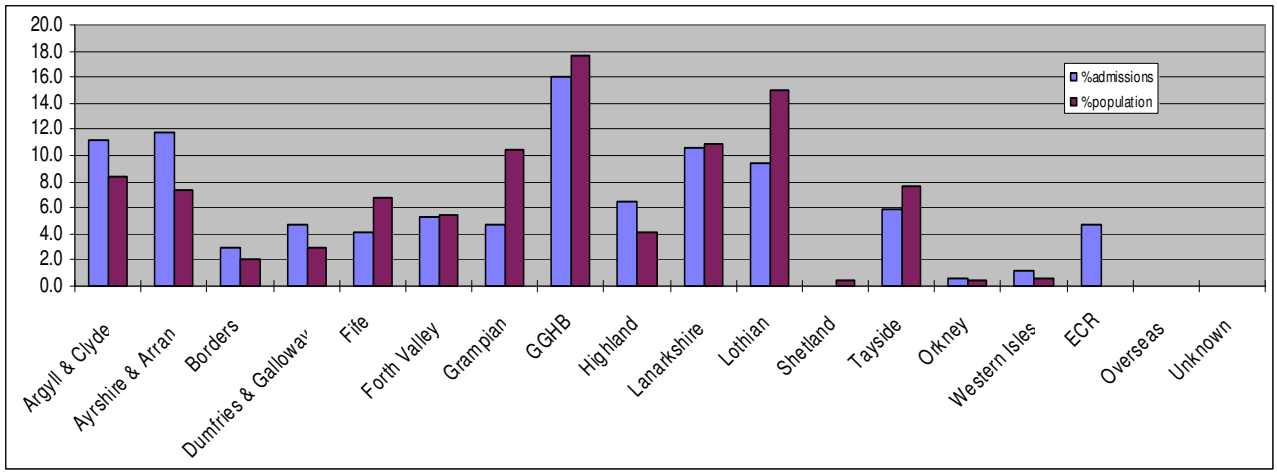
Appendix DA3



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

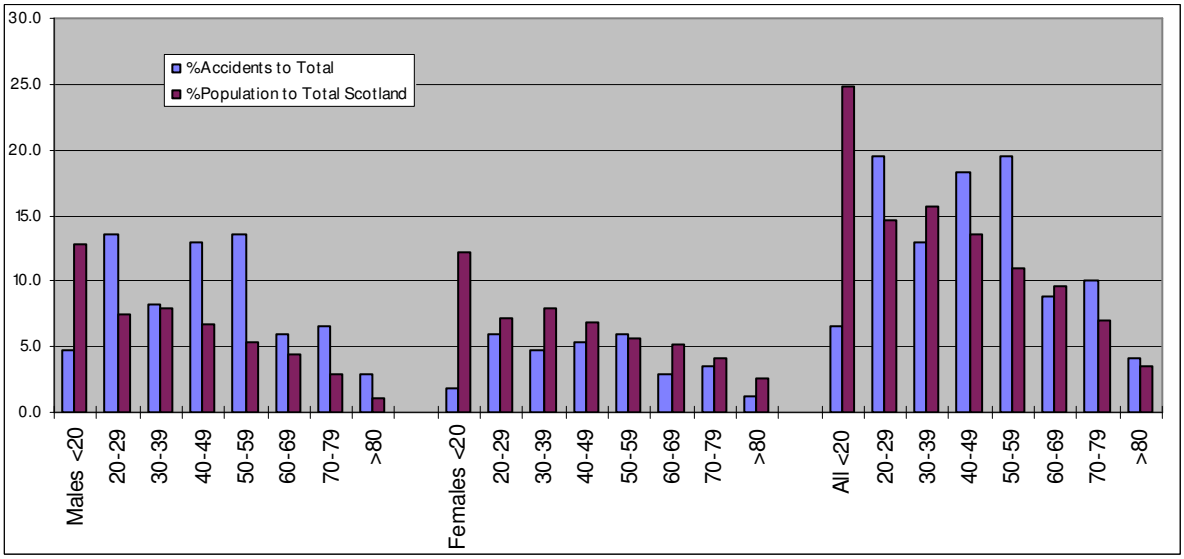
2.1.6 Admissions by Health Board compared with Population Size

Appendix DA4



There has been positive encouragement for consultant medical staff in Lothian, Tayside and Grampian to develop services for those patients with no neurological injury. This leads to a dis-proportionate number of admissions compared with population size Support is always available from the unit in the management of these patients. Regions with higher than expected admissions are centres for farming and outdoor pursuits as well as B roads.

2.1.7 New Admissions by Age Group



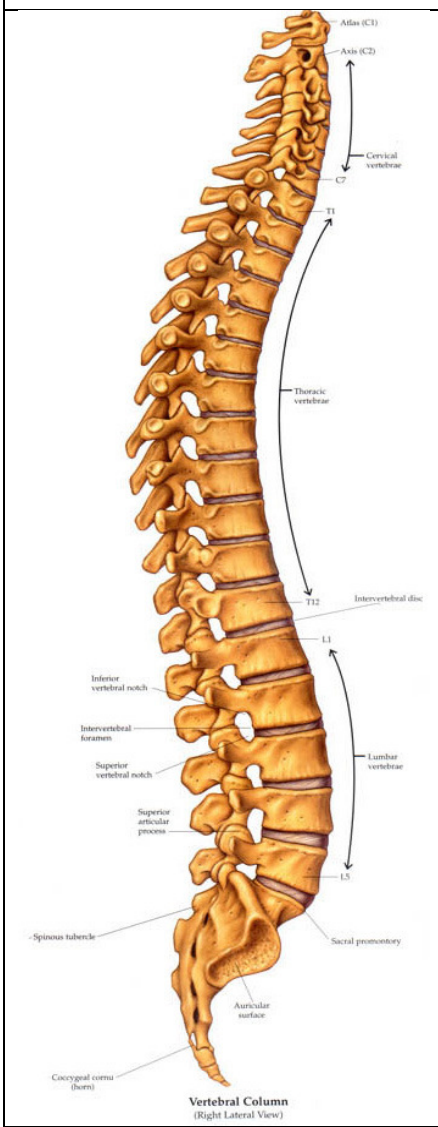
The age distribution is as expected. There is a disproportionate preponderance of males in all age groups. The number of injuries in those under twenty remains low. The increase in age-related degenerative spinal fractures continues. The management of an increasing number of elderly patients with cervical injuries with no neurological deficit are managed as outpatients, and not reflected in these figures.

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

Case mix	No. of patients	Mean L.O.S. (days)	Range of L.O.S.
I	19	201	10-710
II	32	167	7- 480
III	36	117	5- 259
IV	80	23	1- 245
AII	167	91	1- 710

Throughout the last ten years there has been significant effort spent on reducing the length of stay within the unit. The wide variation of length of stay within each classification is indicative of the variation in the rehabilitation needs within each group.
There is a significant variation in the resources used by each group as has previously been demonstrated. The non-neurological group having a significant lower length of stay and impact on the service.

2.19 Admissions by Anatomical Level and Severity



	Level	Complete	Incomplete	No Neurology	Total
	C 1	1	2	5	8
	2		2	13	15
	3		2	3	5
	4	4	11	2	17
	5	6	18	5	29
	6	3	6	4	13
	7	1	3	3	7
		15	45	35	95
	T 1	1	2		3
	2				
	3		1		1
	4	3	1		4
	5	1		2	3
	6	1	1	1	3
	7		1		1
	8	2	1	1	4
	9			1	1
	10	1	1	1	3
	11	1	2	1	4
	12	2	5	3	10
		12	15	10	37
	L 1	2	8	10	20
	2		2	1	3
	3		3	2	5
	4		1	4	5
	5	1		1	2
		3	14	18	35
	Sacral		2	1	3

Higher level counted in five multi level injuries

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.

Over the year the orthopaedic surgeon carried out twenty-six thoraco-lumbar fixations and the neuro-surgical team twenty cervical fixations on the spinal injury lists. Futher stabilisation surgery and other procedures were carried out on other surgical lists. Seventeen patients were treated with Halo immobilisation.

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 forty spinal injury theatre lists were carried out over the course of the year involving sixty individual procedures and seven surgical specialities. This included twenty-seven major skin procedures. 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

Chronic pain and spasms are a significant problem for patients with a spinal cord injury. One approach is the surgical implantation of reservoirs of analgesic drugs or anti-spasmodic drugs. One new pump, wo replacement pumps and three revisions were carried out in the year.
Patients attend outpatient clinics with varying frequency to have pumps refilled or reprogrammed. Between five and twelve patients attend each clinic.
At present thirty-four pumps are implanted and operational. Twenty-one patients attend the QENSIU for refills and eleven attend local hospitals.

Pumps Active 06 - 07	
Isomed	**11**
Synchromed	**19**
Archimedes	**4**

The overall programme is very successful but there are some concerns regarding technical failure and infection. (Appendix A)

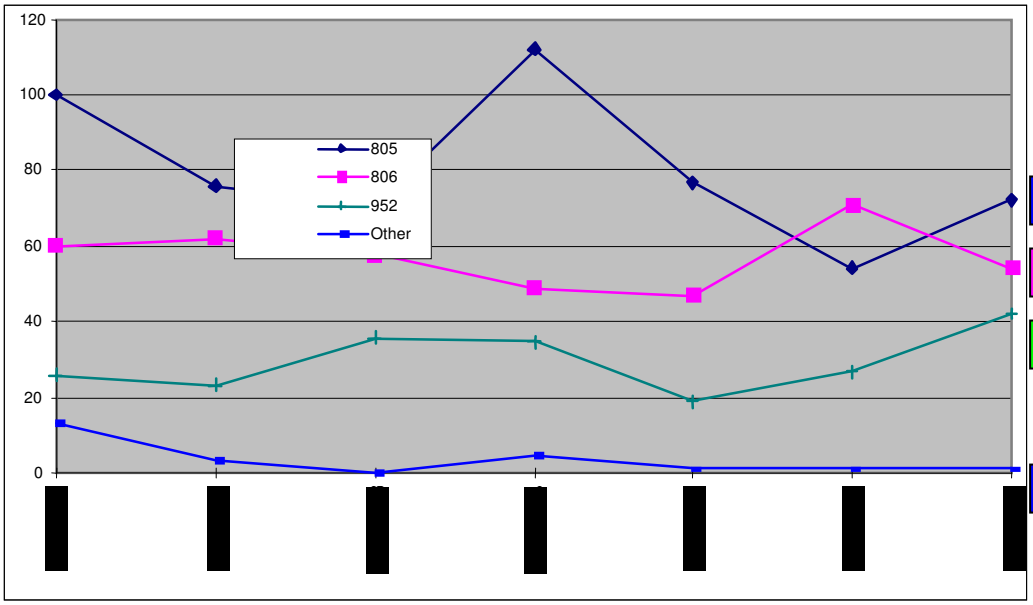
2.3 Admissions and Discharges by Degree of Injury

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.

ICD805	**Fracture of vertebral column without mention of spinal cord injury**
ICD806	**Fracture of vertebral column with mention of spinal column injury**
ICD952	**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



Fracture with no Neurology

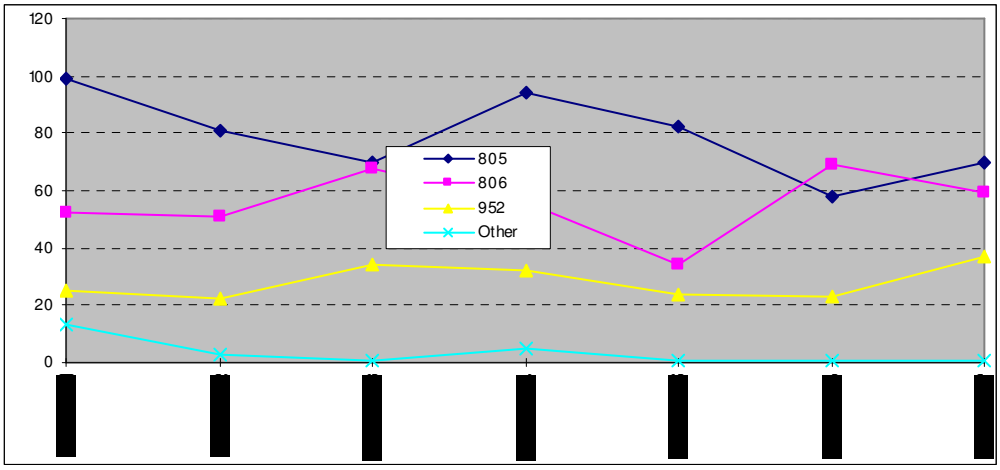
SCI with fracture

SCI no bony Injury

Other

2.3.2 Discharges by Degree of Injury

Appendix DA6



Fracture with no neurology

SCI with fracture

SCI no bony injury

Other

It is predicted that there will be around 80-90 spinal cord injuries per year for a population the size of Scotland (5.5 million). The exact nature will vary from year to year but all are admitted for treatment and rehabilitation.

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

2006/2007	Admissions	Discharges
Central Cord Lesion	**24**	**25**
Infection	**1**	**2**
Vascular	**6**	**5**
Tumour	**2**	**1**
Surgical	**8**	**2**
Non-specific Lumbar Lesions	**0**	**0**
Penetrating Wounds gun/stab	**1**	**2**
Other	**0**	**0**
Total	**42**	**37**

Appendix DA7

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 and 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.

2.3.4 In-patient Bed Days

2006/2007	Edenhall (HDU)	RCU	Philipshill (Rehab)	TOTAL
Beds	12	4	32	**48**
Actual –TOBD				**14942**
Available				**17553**
Bed Occupancy %				**85.1%**
ALOS				**57**

Patients are admitted on a basis of clinical need. The majority of new injuries are admitted to Edenhall Ward for acute assessment. A few patients are admitted to Philipshill if they have had stabilisation in their referral hospital or have been treated conservatively and have entered the rehabilitation phase. It remains impossible to obtain separate ward occupancy figures for the unit from the HIS/PAS systems.
There has been a continued reduction in the overall length of stay for the majority of patients during the year. This has been achieved by reduction in the delay between actual and intended date of discharge.

2.3.5 Delay Between Actual and Intended Date of Discharge

	No. of Patients Discharged	No. of Patients Delayed	Mean delay (days)	Range of Delay (days)	NO DELAY
2000/2001	189	27	68	1 – 877	85%
2001/2002	157	11	19	1 – 107	92%
2002/2003	173	8	46	2 – 212	95%
2003/2004	187	7	52	1 – 188	96%
2004/2005	141	0	0	0	100%
2005/2006	**151**	**9**	**65**	**7-174**	**94%**
2006/2007	**167**	**9**	**54**	**14-141**	**95%**

The philosophy of the unit is to set, as early as possible, realistic targets for each patient in their rehabilitation. One such target is a discharge date. This marks a point in but not the end of rehabilitation. Over the last five years there has been reduction in the number and length of delay but there are recurrent problem issues. Housing adaptation and nursing home placements are often delayed by factors out with the control of staff. This has implications beyond the convenience of patients. Delays in moving onto the next stage of rehabilitation, such as discharge from the unit, can be demoralising and demotivating for everyone particularly the patient.

2.3.6 Re-admissions to the unit

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

There were fifty-three readmissions to the unit during the year. This is an increase on previous years but a significant shortfall on the contract estimate of 200. 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 long term follow. Dedicated clinics in Orthopaedics, Neurosurgery, Urology, Rehabilitation and Pain Management supplement the nurse led Annual Review Clinics for those patients with a neurological deficit. Early discharge of patients, with no neurological injury and no expectation of future disability, is encouraged.

New patients are referred for consultant opinions regarding a wide range of associated conditions.

2.4.1 Summary of Out-patient activity

	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Return	2228	2412	2205	2235	**2042**
New	88	93	121	122	**122**

The number of return outpatients is stable and reflects the prevalence of the spinal cord injured population in Scotland. The majority of the new patients are tertiary referrals involving complex medical investigation and assessment. They are generally managed as outpatients and are separate from acute new admissions.

2.4.2 New Out-Patient Activity by Health Board

	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Argyll & Clyde	25	19	22	26	**27**	**21**
Ayrshire & Arran	7	5	8	8	**7**	**8**
Borders	0	0	0	1	**0**	**1**
Dumfries & Galloway	2	1	10	2	**4**	**6**
Fife	0	1	2	2	**2**	**3**
Forth Valley	3	4	7	4	**11**	**9**
Grampian	4	1	2	1	**2**	**3**
Greater Glasgow	29	32	22	41	**26**	**37**
Highland	1	1	1	0	**14**	**4**
Lanarkshire	16	20	15	27	**19**	**19**
Lothian	2	3	3	4	**3**	**8**
Shetland	0	0	0	1	**0**	**0**
Tayside	1	0	1	1	**3**	**2**
Orkney	0	0	0	0	**0**	**0**
Western Isles	0	1	0	2	**2**	**0**
ECR	0	0	0	1	**2**	**1**
Total	**90**	**88**	**93**	**121**	**122**	**122**

2.4.3 Clinic Location and Frequency

Frequency	**Location**		
Weekly	QENSIU New	QENSIU Return	Edinburgh
Three Monthly	Aberdeen	Inverness	
Six Monthly	Dumfries	Borders	Arbroath

2.4.3 Out -Patient Activity by Centre

	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	CHANGE PREVIOUS YEAR	TOTAL 1992-2007
New QENSIU	88	93	121	122	**122**	**No Change**	1018
Return QENSIU	1880	2090	1851	1868	**1690**	**- 9.5%**	20762
Edinburgh Edenhall	189	189	192	193	**187**	**- 4%**	2304
Raigmore Inverness	47	28	57	54	**55**	**+ 2%**	510
Aberdeen	65	55	51	63	**63**	**No Change**	407
Dumfries	24	19	15	19	**16**	**- 16%**	129
Borders	23	14	16	17	**17**	**No Change**	87
Arbroath		17	23	21	**14**	**- 33%**	75
	2316	**2505**	**2326**	**2357**	**2164**	**- 8%**	**25292**

The outpatient service continues to respond to the variable demand throughout the regions. The aim is to provide as local a service as practical and in line with need. The outreach clinics are designed to provide the same level of multidisciplinary care that is available in the parent unit. All outreach clinics are consultant led with the appointment of a further rehabilitation consultant.

2.4.5 Outpatient Activity by Specialty at QENSIU

		2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Orthopaedics	**DBA**	114	136	143	139	**99**
Neurosurgery	**RAJ**	126	108	57	88	**60**
Neurosurgery	**JB**	0	0	64	51	**50**
Urology	**GC/ VG**	287	267	256	292	**336**
Skin Care		115	187	111	107	**57**
Pain		191	295	222	190	**138**
Neuroprosthetics	**TH/MF**	22	29	19	29	**20**
Sexual Dysfunction		41	47	18	23	**10**
Spinal Injury Annual Review	TOTAL	984	1021	961	949	**920**
	MEDICAL	603	681	569	526	**581**
	NURSING	381	343	392	423	**339**
Total		**1880**	**2090**	**1851**	**1868**	**1690**

The Consultant Clinics in Orthopaedics and Neurosurgery see new and return patients until they can be discharged or referred to the annual review clinics. Urology clinics are available to investigate or treat bladder dysfunction at any stage. The provision of anaesthetic consultant pain sessions was successful in introducing new techniques and drugs into patient management. The loss of the consultant anaesthetic input in November 2006 has been problematic but is being addressed. Neuroprosthetics includes assessment and surgery for upper limb problems principally in tetraplegics.
The Spinal Injury Annual Review clinics are a large component of the commitment to life long care. These are nurse led with only fifty-five percent of patients requiring medical input. A new Respiratory Care Clinic will commence in 2007.
There is an open door policy for patients and inevitable some activity remains under-reported. The numbers exclude visit to hospitals and homes by medical staff and the Liaison Sisters.

2.5 Day Case Activity

Day case activity continues to offer an important service for minor surgical procedures, medical interventions and nursing care. 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

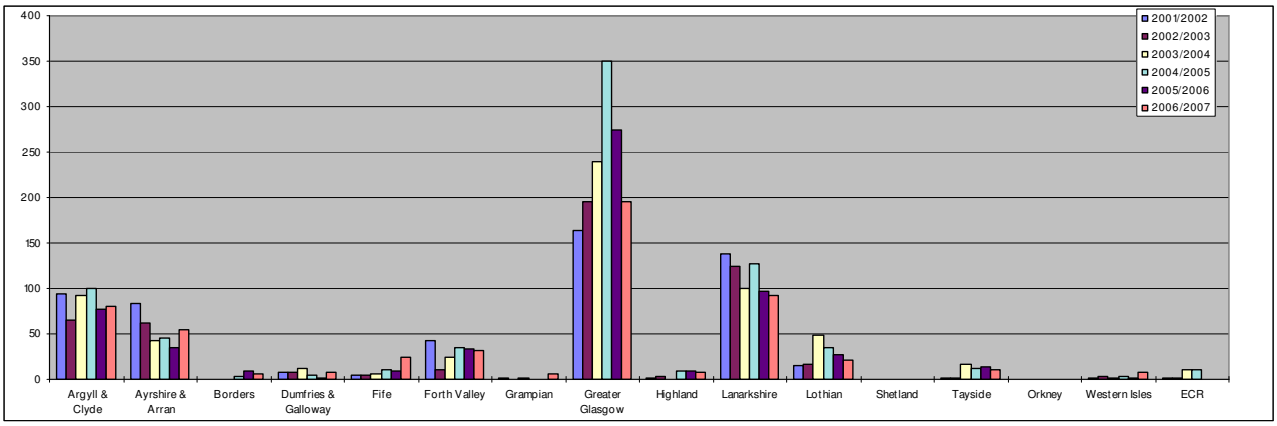
	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Urology /Urodynamics	21	21	24	18	**18**
Halo Fixation	242	226	220	182	**129**
Skin	5	20	21	12	**18**
Orthopaedic/Neurosurgery	1	0	0	0	**1**
Acupuncture	203	292	461	365	**375**
Sexual Dysfunction	21	33	17	8	**4**
Other	2	5	3	5	**0**
Total	**495**	**597**	**746**	**590**	**545**

The activity remains stable over the last few years except for a significant increase in pain and acupuncture interventions. It is appreciated that sexual dysfunction remains a under resourced area and suitable for development.

2.5.2 Day Case Attendances by Health Board

Day Case activity remains limited by geographical constraints. Some patients who could be managed as a day-case require in-patient stay due to difficulties in travelling. If indicated procedures are arranged in the patients locality either by staff from the unit or appropriate specialists. One bed in Philipshill Ward is designated as an intervention bed so that patients who have to travel long distances are not disadvantaged.

Appendix DA8



3. 0 Waiting Times

3.1 Waiting Times Outpatient Clinics

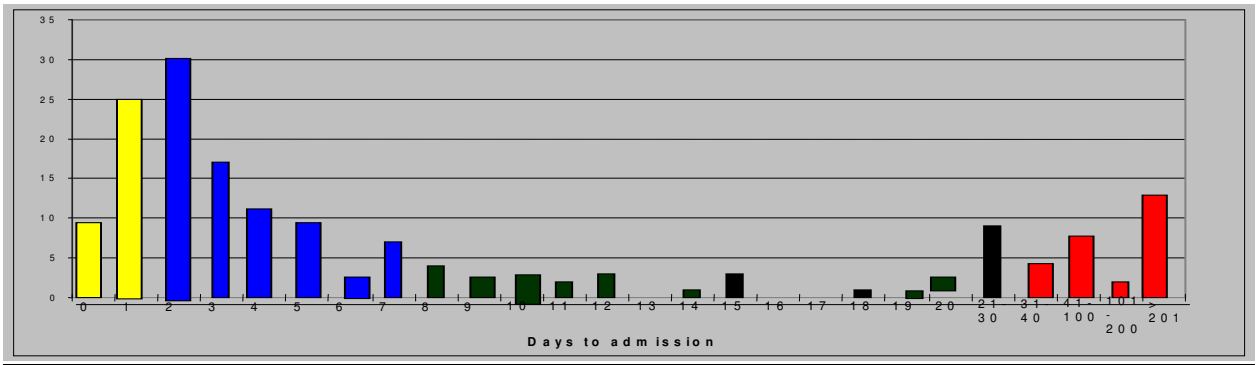
There is an open door policy to the Nurse Led Spinal Injury Clinics. Medical advice is always available and is requested in fifty five per cent of patients. Patient satisfaction remains high with this team approach. The maximum waiting time for new elective outpatient appointments is four weeks.

3. 2 Waiting Times Acute Admissions

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

3.3 Time from Injury to Admission

The policy is of early admission for neurological injury with non-neurological injury admitted as beds became available.
In 2006-07 twenty per cent of patients were admitted within twenty-four hours of referral. Thirty-seven per cent were admitted within forty-eight hours and fifty-three per cent within four days. Sixty-four percent were admitted within one week. Early admission to the Spinal Injury Unit provides immediate support to the patient and family. A audit of acute admissions indicated that only one third were due to bed issues with the rest related to severity of injury, transport difficulties or delay in diagnosis or presentation.



Early admission to the unit continues to be a priority. It may become of increasing relevance if early intervention strategies become available.

Early referral and 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. The referral proforma, transfer documentation and admission form continues to be successful in facilitating and auditing the process. It has been internationally recognised and copied.
Direct admission to orthopaedic or neurosurgical wards for surgical stabilisation may increase the time to admission but may be appropriate to reduce 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 can be 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 initial rehabilitation in another centre and are admitted to the unit for reassessment or treatment of complications.

	No. of Patients	**Mean Time (Days)**	**Range of Time**
2000-2001	199	163.3	0 – 12575
2001-2002	164	103	0 – 12012
2002-2003	165	62	0 - 4948
2003-2004	201	83	0 - 6596
2004-2005	**144**	**231**	**0 – 11237**
2005-2006	**153**	**518**	**0-21075**
2006-2007	**169**	**815**	**0-17416**

In the current year the mean is particularly distorted as non-urgent cases were disproportionately delayed to admit urgent cases. Eighty three percent of patients were admitted within one month of injury. The number of old recurrent injuries skew the table.
This analysis includes all patients admitted. Some patients have an acute injury or medical condition on top of a pre-existing injury, which explains the prolonged delay.
Eight patients were admitted after one hundred days. These patients had been initially cared for in other centres or had developed a secondary complication due to a further insult at a previous fracture. This data will be presented more constructively next year.

4. Quality of Care Issues

4.2.1 National Service Division Visit

Close co-operation between the staff of the unit and National Services Division has an important role in maintaining the service and permitting service development. It also ensures that there is an early response to increased or changing clinical needs.
The Annual and six-monthly report acts as a focus to continually evolve and evaluate the service.

4.2.2 Formal Complaints

A formal complaint/suggestion system is in place at both unit and hospital level. This has proved invaluable in monitoring quality and modifying the service. Increasing standards set within the unit, increased security and the smoking ban have all created new challenges in obtaining patient and family trust and support.
One formal complaint was recorded regarding placement following discharge. It has been subject to a full investigation by management.
At unit level a number of useful suggestions have been made regarding catering, parking and the ambulance service. This has resulted in a number of meetings with the relevant bodies to review areas of service. The future of parking in the vicinity of the unit is of concern especially with the introduction of parking charges. This will have a significant impact for visitors and out-patients. It is of particular concern due to the length of stay and of some patients or carers travelling long distances.

4.2.3 Relatives & Patients Meetings

Regular contacts are maintained with relatives and carers throughout a patients stay. Significant input to the organisation and running of the unit has been obtained from the informal meetings arranged within the unit and by SIS. All staff are encouraged to attend patient social activities and events. The medical staff encourages an open dialogue with patients and relatives regarding treatment and progress. Consent issues remain in constant review and the implications of the Incapacity Act in the management of the acutely injured have been implemented.

4.2.4 Benchmarking

There have been continued attempts to develop benchmarking with other UK units. Some figures are now available from other units but comparisons are difficult due the varying remits of each unit. One other spinal unit is producing a annual report. International comparisons are available from Nottweil (Switzerland) and Clevland (USA). Continued efforts are being made to ensure a modern and efficient service.

4.3 Education

The unit places great emphasis on education of all agencies and staff that come into contact with the spinal cord injured. 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 Consultant Medical staff gave lectures at Edinburgh, and Glasgow and Fort William to paramedical and medical groups. Medical students attend for clinical practice in 2nd, 4th and 5th year. Third years also attended the spinal injury special study module. The Senior Nurse Manager lectured at Ayr, Paisley and Caledonian Universities.

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

Out-reach study days for carers and patients were held in Aberdeen (2006), Inverness (2007). Further educational days will be organised for Dumfries and the Borders. The Out-Patient Sister provided training and education for University students and District Nurses at Paisley and Caledonian Universities.

The Unit received a number of UK and overseas Medical and Paramedical visitors.

4.4 Hospital Acquired Infection

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

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

	2000/ 2001	**2001/ 2002**	**2002/ 2003**	**2003/ 2004**	**2004/ 2005**	**2005/ 2006**	**2006/ 2007**
Total patients req. isolation	52	67	70	N/A	44	N/A	**12**
Salmonella				6	1	0	**0**
Clostridium Difficile	1	1	6	0	4	0	**2**
MRSA	48	64	64	33	39	38	**31**
Streptococcus pyogenes	0	1	0	2	0	0	**0**
Scabies	0	0	0	0	0	0	**0**
TB	1	1	0	0	0	0	**0**
Varicella Zoster	1	0	0	1	0	0	**0**
Patient days in isolation				N/A	3480	3160	**339**
Ave. days in isolation	53.75	52.6	52.6	N/A	79	83	**28**

The patients are at high risk of MRSA and a policy of pre-admission checks and isolation are employed. The low rates of infection are a tribute to the standard of nursing care and policies within the unit especially as regards bowel care.

4.5 Pressure Sore Prevention

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

4.6 Pressure Sore Prevalence

	No. of patients	No. of acquired sores	No. of admitted sores	Total number of sores	Point prevalence
2000/2001	42	2	4	6	15%
2001/2002	48	4	8	12	25%
2002/2003	42	1	5	6	14%
2003/2004	45	1	9	10	22%
2004/2005	43	4	4	8	19%
2005/2006	40	3	5	8	20%
2006/2007	**39**	**0**	**7**	**7**	**18%**

Patients with a spinal cord injury are at significant risk of developing pressure sores and sacral skin splits. They result in significant delays in rehabilitation and discharge from hospital. Overall the number of sores remains low and the majority are present on admission or are revealed soon afterwards. A number of sores are inevitable in early rehabilitation and education. The endowment funds purchased a digital record system that is used to monitor treatment.

4.7 Therapy Beds

	Number	Ave Units per period	Days
Mattress Units	114	7.59	2772
Core Frame Units	38	2.56	937

4.8 Ventilated Bed Days

During the year ten patients required ventilation during their acute care. There is a close working relationship with the neuro-anaesthetists to monitor progress and reduce ventilation times. This was a significant but fortuitous reduction due to the reduction in the number of acute beds. Normal variation in case-mix should result in an increased activity in the coming year.

Appendix DA20

		No. Patients	Ave. Ventilated Days	Total Ventilated Days
2006/2007	**Edenhall**	**16**	**29**	**469**
	RCU	**1**	**365**	**365**

There have been further developments in protocols for the maintenance and weaning of low tetraplegic ventilator dependent patients. Changes have resulted in a reduction in the number of ventilated days.

5.0 Mechanism of Injury

The reduction in non-neurological cases had resulted in a decrease in the number of low velocity falls admitted. The figure is now stable and likely to remain at the current level. The number of high velocity RTA admissions has not changed significantly. The continued high proportion of motorcycle and bicyclist injuries, compared with usage continues. Sporting injuries have decreased slightly after causing some concern. They occur in young patients and tend to be associated with significant neurological injuries. The number of cases clearly identified as attempted suicide has increased, but probably under represents the problem.

5.1 Mechanism of Injury

	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Fall	**83**	**81**	**87**	**90**	**63**	**70**	**68**
RTA	**59**	**45**	**33**	**57**	**46**	**49**	**55**
Motor vehicle	44	24	26	40	35	40	35
Motorcyclist	11	18	4	12	6	5	8
Bicyclist	1	1	2	1	1	3	10
Pedestrian	3	2	1	4	4	1	2
Secondary to Medical Diagnosis	**19**	**11**	**14**	**21**	**6**	**10**	**17**
Industrial Injury	**12**	**5**	**0**	**3**	**4**	**1**	**3**
Assault	**0**	**2**	**3**	**2**	**2**	**3**	**4**
Penetrating Injuries	**0**	**3**	**4**	**3**	**0**	**0**	**3**
Sporting Injury	**16**	**6**	**17**	**19**	**16**	**10**	**12**
Domestic Injury	**8**	**5**	**3**	**0**	**3**	**1**	**1**
Suicide	**1**	**5**	**3**	**2**	**2**	**6**	**4**
Other	**1**	**1**	**1**	**4**	**2**	**3**	**2**
Total	**199**	**164**	**165**	**201**	**144**	**153**	**169**

6.0 Financial Report 12 Months ending 31.03.07

		Outturn	Contract Value	Developments*	Revised Contract Value	Contract Value	Contract Value
		2006/07	2006/07	2007/08	2006/07	2007/08	2009/10
	WTE	£	£	£	£	£	£
Dedicated Staff Costs							
Administrative	7.67	163,388	144,658		144,658	148,636	156,923
Medical	8.19	751,123	755,993	130,000	885,993	910,358	961,116
Nursing	92.34	2,452,031	2,657,951		2,657,951	2,731,045	2,883,318
Paramedical	13.26	473,350	456,299		456,299	468,847	494,988
Total Staff	**121.46**	**£3,839,892**	**£4,014,901**	**£130,000**	**£4,144,901**	**£4,258,886**	**£4,496,345**
Supplies Costs							
Administrative		79,469	100,722		100,722	103,492	109,262
Medical		3,277	3,844		3,844	3,950	4,171
Nursing		21,375	10,931		10,931	11,232	11,858
Paramedical		17,188	17,459		17,459	17,939	18,939
Pharmacy		557,216	564,475		564,475	579,998	612,337
Surgical Appliances		119,641	97,079		97,079	99,749	105,311
Direct Supplies		**£798,166**	**£794,510**	**£0**	**£794,510**	**£816,360**	**£861,878**
Allocated Costs							
Medical Records		94,260	94,260		94,260	96,852	102,252
Building Costs		184,080	184,080		184,080	189,142	199,687
Domesic Services		61,630	61,630		61,630	63,325	66,855
Catering		169,566	169,566		169,566	174,229	183,943
Laundry		60,613	60,613		60,613	62,280	65,753
Neuroradiology		70,607	70,607		70,607	72,549	76,594
Laboratories		81,422	81,422		81,422	83,661	88,326
Anaesthetics		33,708	33,708		33,708	34,635	36,566
Portering		65,641	65,641		65,641	67,446	71,207
Phones		44,497	44,497		44,497	45,721	48,270
Scottish Ambulance Service		8,263	8,263		8,263	8,490	8,963
General Services		25,483	25,483		25,483	26,184	27,644
Allocated Costs		**£899,770**	**£899,770**	**£0**	**£899,770**	**£924,514**	**£976,060**
Total Supplies		**£1,697,936**	**£1,694,280**	**£0**	**£1,694,280**	**£1,740,874**	**£1,837,938**
Overhead Costs							
Fixed costs							
Rates		54,089	54,089		54,089	55,576	58,674
Capital Charge		550,978	550,978		550,978	566,130	597,696
Trust Overheads		137,923	137,923		137,923	141,716	149,617
Total Overheads		**£742,990**	**£742,990**	**£0**	**£742,990**	**£763,422**	**£805,987**
Total Expenditure		**£6,280,818**	**£6,452,171**	**£130,000**	**£6,582,171**	**£6,763,182**	**£7,140,270**
Post Graduate Dean Funding		-110,637	-110,637		-110,637	-113,680	-120,018
Total Expenditure net of Postgraduate Dean Funding		**£6,170,181**	**£6,341,534**	**£130,000**	**£6,471,534**	**£6,649,502**	**£7,020,252**

*Developments

7.0 Service Developments and Future Plans

7.1 Family Unit

The major developments planned for the SGH campus has resulted in the loss of the Halfway House where patients and their families could experience independent living prior to discharge. A rehabilitation complex with an integrated self-contained flat and facilities for self-rehabilitation and communal activities is replacing this. The foundations are laid and completion is expected in Nov 2007. Total funding from GGCHB is £1.1million.

7.2 Research Mezzanine

The success of the unit's research programme has been acknowledged by the funding of a research mezzanine to house The Centre for Rehabilitation Engineering and the units associated research partners. Plans and the preparatory works have been completed and a novel agreement reached regarding use of the building is nearing finalisation. The facilities will be based in the redundant Games Hall without encroaching on the existing facilities. Total funding from Glasgow University SRIF 3 £ 500,000.

7.3 Physiotherapy Assistant

The appointment of a Physiotherapy Assistant has allowed a greater flexibility in the functioning of the Physiotherapy Department. This is dealt with in the Physiotherapy Report along with the potential areas of expansion. The key areas of respiratory support and exercise physiology are constantly under review and will be addressed once the impact of the Respiratory Support Nurse is understood.

7.4 Respiratory Care

Many acute patients experience respiratory difficulties during their initial treatment. A small number of high lesions have persisting or permanent difficulties. This is anticipated to increase with the improvements in life expectancy of the spinal injured population. Currently there are twelve patients on domiciliary ventilation, three of whom have been ventilated for ten years or more. These patients are distributed across Scotland and ultimately could act as a basis for a managed clinically network along with the growing number of patients ventilated for other reasons. In an attempt to further improve our current service a seconded nursing post has been created to assess the problem and provide ongoing care.

7.5 Implantable Electrical Devices

Patients with neurological injuries can benefit from implantable stimulators in a number of sites. These include the upper limb, diaphragm and bladder. The unit is involved in the development of surface and implantable electrodes to assist breathing and walking. No Phrenic Nerve stimulators have been required in the last year but some diaphragm and upper limb implantable systems remain functioning. The unit is involved in investigating alternatives to the currently available systems as part of the research programme.

7.6 Non-invasive ventilation and assisted ventilation

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

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

8.0 General Clinical Services

8.1 Outreach Clinics

As a national service we feel that it is important to provide out patient and consultation services throughout Scotland. This has resulted in the development of out-reach clinics in areas identified on our database as having a concentration of patients. Medical, Nursing, and Occupational Therapy staff attend outreach clinics as required. Volunteers from SIS also attend to see and advise patients and carers. It is planned to develop a outreach clinic in Dundee in the coming year as well as strengthening the support in Edinburgh.

8.2 Out-Patient Department

The out-patient department has a key role in the management of the acute injuries and in preventing long term complications. The provision of ready access and the varieties of specialist clinics are fundamental to the service.

The move towards a greater emphasis on cardiovascular fitness and general health has been investigated. A clinic specialising in the nutritional aspects of paralysis has been discussed and research is proposed. A new Respiratory Care Clinic will operate weekly from mid 2007.

8.3 Spinal Nurse Specialists Liaison Sisters

There is a continued demand for nurse specialist visits for patients in their home or care placement. This prevents unnecessary visits to the unit and supports patients and carers. During the year staff travelled over 21,364 thousand miles by car and carried out two hundred and forty three visits.

8.4 Assistive Technology

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

This work is seen as fundamental to the rehabilitation process and the service developed principally by Geoff Orry has been replicated in many other units. The service is currently being reviewed by both QENSIU and Momentum to ensure that the service continues to develop when Geoff Orry reduces his hours on retirement.

8.5 Training & Development Post

The Nurse Training and Development post continues to be extremely successful. It has enabled the entry of new staff and the development of in-house course for patients and staff.

8.6 Further Developments within Multi-Disciplinary Team

In 2006 a housekeeper was appointed to support the unit in its aim to provide the highest standards of care, security and patient service. This has been an unqualified success for patients, staff and visitors. Consideration is being given to expand the concept on the opening of the Family Unit

.

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

8.7 Nursing Recruitment

Nurse recruitment remains a national problem. The unit has been fortunate in attracting excellent staff to fill last year's vacancies. A pro-active approach is taken by all staff to make a placement in the unit an important part of career development.

The quality and nature of the training available makes it inevitable that there will be a steady turnover of certain grades of staff.

8.8 Medical Recruitment

The changes caused by the European Working Time Directive, Modernising Medical Careers and the New Consultant Contract has placed additional burdens on the current medical staff. The unit will be recognised for Foundation Training but this will further limit the amount of time each trainee will spend in the unit. The appointment of a new rehabilitation consultant in Jan 2007 has helped in service re-design and the management of both in and out patients.

8.9 Pain Management

The introduction of two consultant anaesthetists (four clinical sessions) in 2005 had an initial impact on the demand for specialist help in managing refractory pain in a small sub group of patients. A number of novel interventions and drug regimes were introduced. The model was less satisfactory in managing in-patients and providing continuity of care for all patients. The reassignment of sessions following the new consultant contract resulted in these sessions being withdrawn. A new model is proposed with one consultant having two

sessions assisted by a senior nurse providing in and out-patient support. This is currently being costed prior to implementation.
.

8.10 Paramedical staffing

The clinical scientist appointed from endowment funds and research monies was very successful in raising the awareness and quality of studies performed in the unit. They have now been appointed to a research post within the Centre for Rehabilitation Engineering and will play a pivotal role in developing the Research Mezzanine
Some consideration has been given as to how the unit can support recreational and sporting activities for in and out patients. A senior physiotherapist or Sports Medicine graduate with a remit to develop sporting excellence is favoured.

9.0 Capital Development and Equipment Replacement

The unit was commissioned in 1992 and despite regular maintenance it has now reached the stage of requiring significant refurbishment. With the support of the hospital management a programme has been developed following the major painting programme. This commenced in February 2006 with the replacement of lighting, flooring and the bed heads in Edenhall Ward. Further work is being carried out in Philipshill Ward in the coming year in the toilet and shower areas. The major concerns regarding ventilators are being addressed and it is anticipated that there will be further investment in the coming year.

Shower Chairs 4/06	£3348	Toilets P/Hill	£100,000
Dragar Ventilator 4/06	£35,279	RCU Ventilator 4/06	£7,931
Mattresses (12) 4/06	£4,539	Drug Fridge X2	
Trolleys 4/06	£2248	Dishwasher	

9.1 Charitable Funding - Endowment Funds

The unit is very fortunate in attracting significant donations from patients, relatives, friends, individuals and corporate bodies. These are used to provide facilities and services, which cannot be reasonable expected from central funding. Specialised physiotherapy stations, occupational therapy equipment, medical record storage, televisions, computer equipment, shower chairs and travel costs have been sourced from endowment monies. Individual patient donations have paid for specialised equipment and the employment of a massage therapist.
Research grants have provided equipment and partial staff costs. There have been significant donations in time and equipment from Celtic FC, The Murrayfield Trust, the Clydesdale Bank, Momentum, SPIN and SIS.
This has occurred without any concerted fund raising activity but has been dependant on individuals. The contribution made by these individuals is gratefully acknowledged.
All sporting activities are supported by an independent Charity – Options

Endowment Purchases

Weight Training 4/06	£5220	Day Room Furniture 5/06	£1956
Shelving 5/06	£350	Training Modules 5/06	£700
Domestic 5/06	£222	Shredders 6/06	£400
ATV Modules TBA	£45,000	Trolleys 5/06	£5000
Pressure Xsensor 05/07	£12,500	Computer 7/08	£500
Ergometer Bike 2/07	£4,500	FES Cycle	£3,500

A Lokomat has been placed in the Unit courtesy of CRE (£150,00) and a Erigo System(£45,000) has been applied for. Sky Television is paid for by endowment funds.

10.0 Clinical Networking and National Guidelines

Admission guidelines were issued to all hospitals in Scotland during 2002. This was of great benefit standardising the immediate management of patients and their subsequent referral. Standard referral proformas, transfer guidelines and admission proformas are now in place.
The guidelines were reissued during 2006 and continue to be available to hospitals on request.

11.0 Clinical Governance

Multi-disciplinary clinical governance meetings are held within the unit monthly. Separate medical audit meetings are held with the Department of Rehabilitation. Each department has separate governance meetings. The Director and Clinical Services Manager meet weekly. Consultant clinical meetings are held twice a week. Regular meetings will be held with the new Health Board management structure.

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

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

In the past year staff reported two formal incidents. All were fully investigated. One concerned a chair malfunction and the other an ambulance issue.

12.0 Medical Research

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

Three areas remain of concern. Mortality secondary to cardiovascular disease and suicide is unchanged and there has been no progress in developing primary treatments for spinal cord injury. The unit is involved in key research projects in all these areas

In 2006-07 the unit team published nine papers and gave twenty-one presentations. The subjects included anatomy, psychology, bioengineering, neuro-physiology and clinical issues. A cumulative index is included in Appendix B.

Funding is available for a Research Mezzanine (SRIF 3) with Glasgow University. In the coming year a collaborative project harvesting Olfactory Epithelial Cells will commence and further work will be carried in psychology. The collaboration with the Centre for Rehabilitation Engineering at Glasgow University and Strathclyde University continues with a number of new projects starting.
In November 2007 the CRE installed in the unit the first Lokomat in the UK. This is a device to allow partial weight bearing assisted walking for research and clinical use.

A collaborative meeting "The Spinal Frontier" is planned for 2007 to review new strategies in research.

12.1 Medical Research Partners

Glasgow University Centre for Rehabilitation Engineering (CRE)

Professor Ken Hunt BSc,PhD,DSc	Wylie Professor of Mechanical Engineer
Dr Aleksandra Vuckovic PhD	Lecturer- Project Leader
Dr Henrik Gollee Dip Ing,PhD	Lecturer - Project Leader
Dr Sylvie Coupaud BA.Mres,PhD	Research Assistant – Project leader
Lindsay Jamieson BSc PhD	Research Assistant

PhD Students

Helen Berry BSc	FES cycling
Andrew Pennycott MEng	FES cycling engineering
Caroline Findlay BSc	

Strathclyde University Bio-engineering Unit

Professor Bernie Conway BSc,PhD

Dr Sujay S Galen BSc,PhD	Research Fellow
Ms Celia Catton BSc,Mres	Research Associate

Caledonian University School of Health and Social Care

Professor Malcolm Granat Treadmill Training

Stirling University Department of Psychology
Herriot Watt University

Professor Ronan O'Carrol PhD

Dr Adele Dickson PhD	Lecturer

Glasgow University Biosciences

Dr John Riddell BSc PhD	Stem Cell research
Professor Sue Barnett BSc PhD	Olfactory Epithelial Cell Research

Scottish National Brachial Plexus Service

Mr Tim Hems MD FRCS	Upper Limb Tetraplegia Service

University of Essex

Dr Heba Lakany BSc PhD	Artificial Intelligence

Apatech Ltd	Bone Graft Substitute

13.0 Summary

The year has seen continued development of the service provided to patients with spinal cord injury in Scotland. There have been significant improvements to the infrastructure and staffing as part of a development plan. The anticipated completion of the Family Unit and the Research Mezzanine will enable the team to provide a higher level of care and introduce new themes in rehabilitation.

Although the unit is available to provide the highest standard of care we are aware that there are many issues in spinal cord care, which require improvement to realise the potential of all the patients. We are committed to drive forward initiatives that will facilitate an early return to the community with additional skills to maximise everybody's potential.

The success of the unit is entirely dependant on the excellence of the team and the multidisciplinary approach to the rehabilitation of the patient. Special thanks this year to Geoff Orry who moves into semi-retirement. His pioneering work on Adaptive Technology has had an impact not only in the unit but also throughout the UK. Many past patients will remember him fondly and are grateful for all his work.

The year ahead will pose many challenges and hopefully lead to continued success.

Appropriate thanks must be given to the National Services Division, The Regional Services Directorate, and NHS Greater Glasgow and Clyde for their help and support in delivering the service.

Mr. D.B. Allan FRCS
Consultant Orthopaedic Surgeon
Director,
Queen Elizabeth National Spinal Injuries Unit for Scotland

Appendices Index

Raw Data

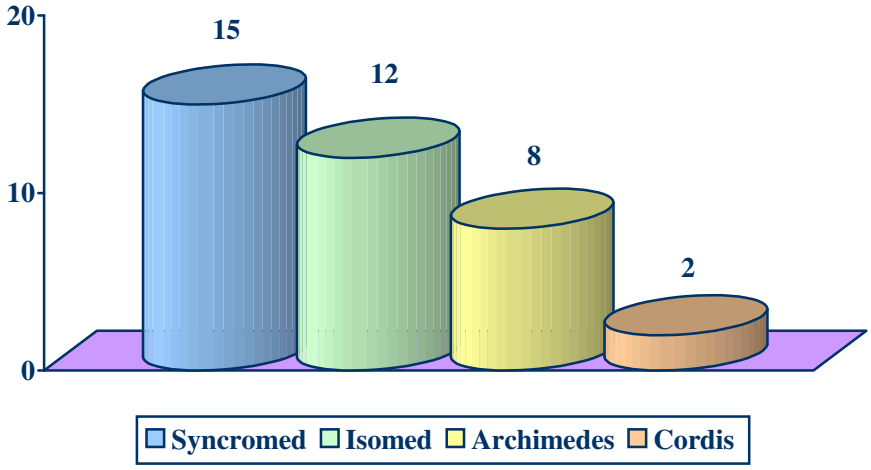
APPENDIX A

Overview of Implantable Pumps for the control of Pain and Spasticity

Programmable implantable drug infusion systems for the control of pain and spasticity in a wide range of conditions are becoming increasingly popular. The development of a pattern of clinical practice has not been supported by research evidence. The cost, co-morbidity and complications are recognised but are perceived to be out weighed by the advantages. The technique and process is complicated and involves a number of events, all which are subject to variation and error. Each patients problem is individual, implantation is subject to operative and anaesthetic complications, the device may fail to work, the intrathecal catheter is at risk of displacement, the pump has to be programmed individually resulting in possible under and over-dosage errors, titration of individual dosage may vary throughout the life of a pump and invasive refills are required at regular intervals. The pumps themselves are of a limited life span whereas the conditions tend to be life long. In the absence of satisfactory long term reviews in a clinical setting it is appropriate the experience at the QENSIU is reviewed.

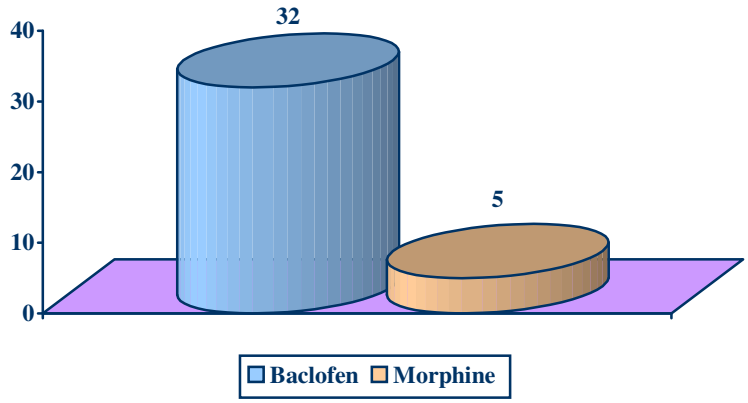
Gulati and Jigajinni in 2006 carried out a review of the outcome of intrathecal pumps in spinal cord injured patients attending QENSIU. Total of thirty patients were identified who underwent thirty-seven implant procedures involving four different types of implantable pumps. The majority were for the administration of baclofen with five used for intrathecal morphine.

Fig One: Number and Type of Implantable Pumps



Implantable Pumps were used for the delivery of drugs to control spasticity (Baclofen) and pain (Morphine)

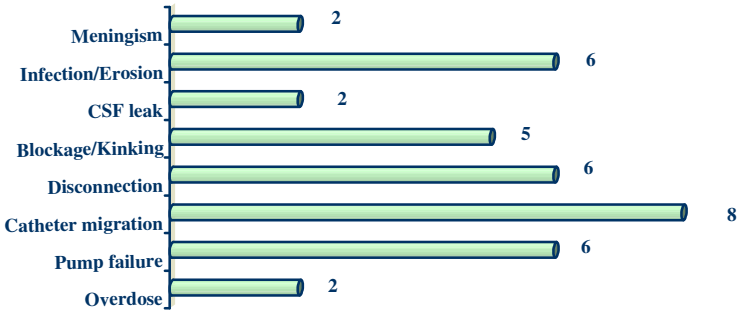
Fig Two: Drugs Administered



Unfortunately certain difficulties were experienced in both the implantation and operation of the pumps used.

There were thirty-six problems affecting twenty-seven pumps. (37 pumps in 30 patients)

Fig Three: Complications



The rate of infection was disappointing and usually results in pump removal. This has remained high. Laminar flow theatres are not available in the neuro-surgical suite. This situation continues to be monitored.

Variation was noted in the performance of the different pumps used. These included pump failure and overdoseage but were overshadowed by technical problems with catheter function.

Fig Four: Pump Failure by Pump Type

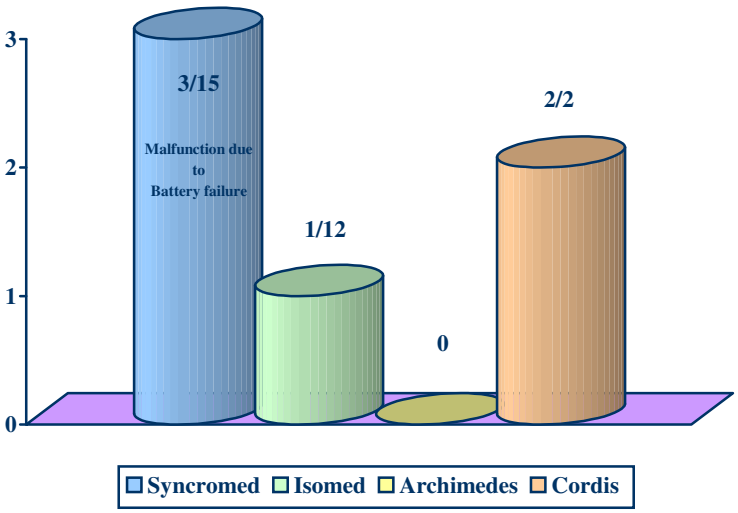
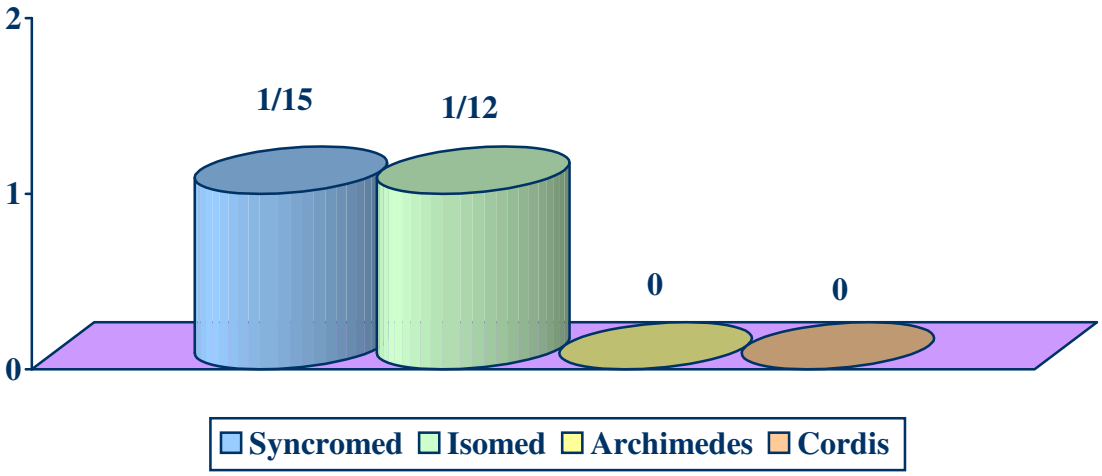
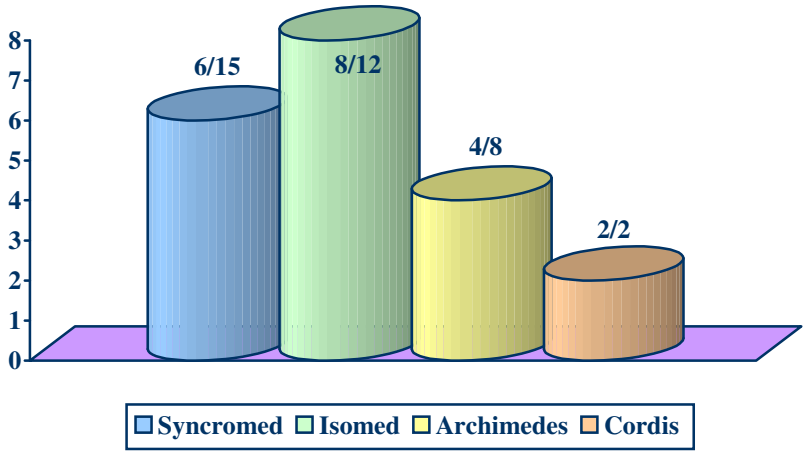


Fig Five: Drug Overdose



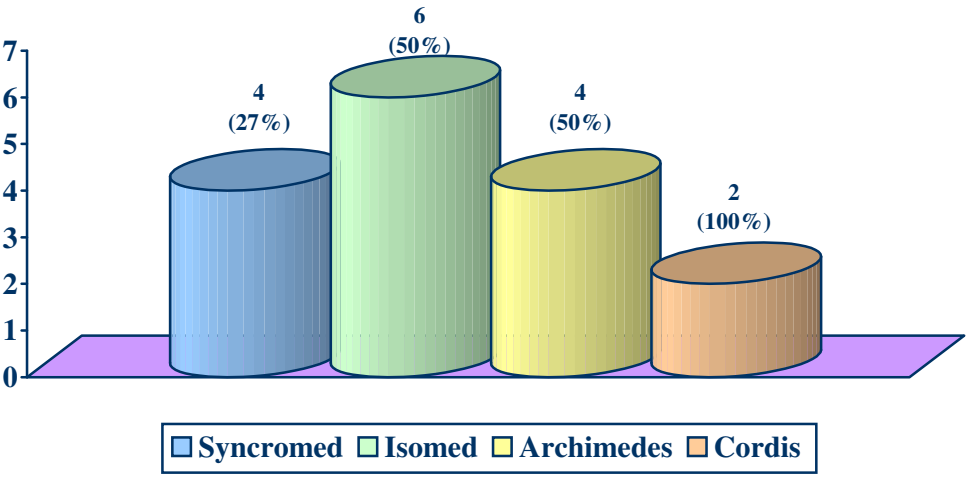
No patient experience harm as a result of temporary overdoseage.
The most common form of Failure was elated to the Catheters difficulties. This included blocking ,kinking, migration and disconnection.

Fig Five: Catheter Complications By Pump Type



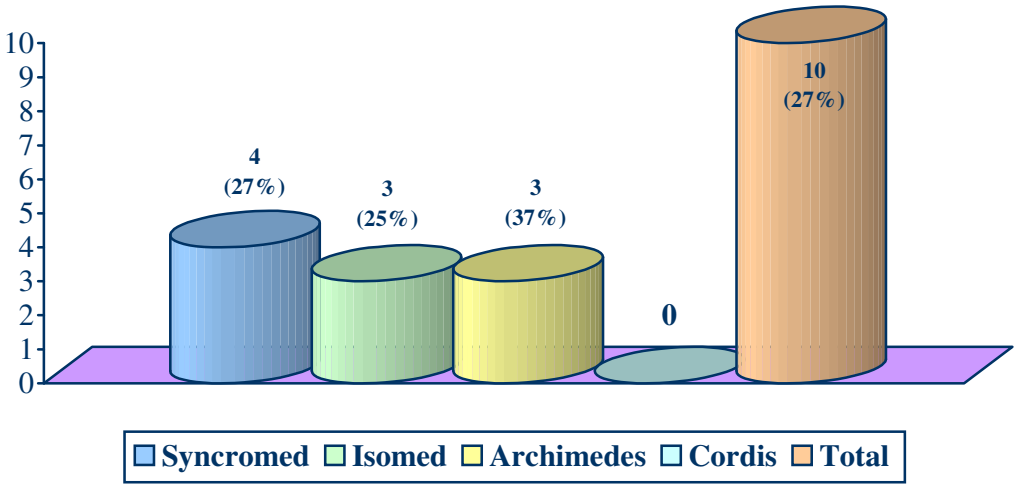
Ultimate failure can be indicated by re-operation for removal, replacement or repositioning of the pump or catheter.

Fig Six: Pumps requiring Surgical Re-intervention



Overall only 27% of pumps were free of complications.

Fig Seven: Pumps that remained Free of Complications



Conclusion

Spasticity and chronic pain are common and significant problems in the spinal injured population. There is a need and a demand for effective therapies across the spectrum of difficulties experienced. Although the majority of patients can manage taking oral preparations there is a subsection that appear resistant and have been identified as being suitable for more invasive therapy.

The Cochrane Collaboration reviewed all pharmacological interventions for spasticity following spinal cord injury (1). Of the fifty-five studies reviewed only nine met the inclusion criteria. There appeared to be supporting evidence for intrathecal baclofen if patients are non-responders to less invasive methods. There was little evidence to support the current " decision tree approach" to more complex treatments and none to support the commonly used gabapentine, clonidine, diazepam, amytal and oral baclofen. There was evidence in favour of oral tizanidine but at a high cost of side effects.

Implantable pumps for pain relief have been used for over twenty years and usually use an opiod with or without other agents. Their use is principally restricted to Pain
Clinics but utilise the same technology and experience similar problems.

Concerns about the process and surgical outcome prompted this study and no patient satisfaction or formal outcome measures were used. This audit confirmed the concerns that the clinical staff had regarding the success of the overall pump programme. Although not quantified during the study there remained a clinical perception that there was significant patient benefit in initially or latterly successful pumps.

A further audit on the success of implantable pumps in multiple sclerosis has been completed with similar results.

This Cochrane Collaboration questioned the currently used approach to simply escalate the intervention depending on the previous response. It may be than non-responders to the oral medication are the same group that fails to respond to implantable pumps. This will be incorporated into clinical practice and reviewed.

Implantation will continue and undergo continuous review. Outcome measures, patient satisfaction and longevity will be studied.

A number of positive feature were noted. First in successful implantations there was a significant success rate in controlling patients symptoms and the pumps continue in use. Secondly the pump refill clinic and system in place to deal with problems functioned well .

Acknowledgements to Dr Jigiajinni and Dr Gulati for completing and presenting the audit.

DBA/MP 05/07

APPENDIX B Cumulative Publications

Journal Publications

1999

Granat MH, Edmond P. The application of air bag technology: an objective clinical measure of involuntary muscle spasm. *Spinal Cord* 1999 Jul;37(7):501-7

Hunt KJ, Gollee H, R-P Jaime, Donaldson N. Feedback control of unsupported standing. *Technology and Health Care*, 1999, Vol 7, No 6, pp443-447.

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Schauer T, Hunt KJ, Negård N-O, Fraser MH, Stewart W. "Regelung der Trittgeschwindigkeit beim Liegedreiradfahren von Querschnittsgelähmten (Cadence control for recumbent cycling of paraplegics)," *Automatisierungstechnik*. 2001;50(6):227-278. In German.

Knikou M, Conway BA. Modulation of soleus H-reflex following ipsilateral mechanical loading of the sole of the foot in normal and complete spinal cord injured humans. *Neuroscience Letters* 2001;303:107-110

Hunt KJ, Gollee, Jaime R-P. Control of paraplegic ankle joint stiffness using FES while standing. *Medical Engineering and Physics*, 2001:23;541-555.

Hunt KJ, Gollee H, Jaime R-P, Donaldson N. Design of feedback controllers for paraplegic standing. *Proc of IEE on Control Theory and Applications*, 2001:148;97-108. ***This paper was awarded the IEE Coales Premium, 2002***.

Hunt KJ, Jaime R-P, Gollee H. Robust control of electrically-stimulated muscle using polynomial H-infinity design. *Control Engineering Practice* 2001: **9**; 3;313-328

2002

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Hunt KJ and McLean AN. New developments in engineering for spinal cord injury rehabilitation *Ingenia (The Royal Academy of Engineering)* November 2002:29-34.

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Knikou M, Conway, BA. Reflex effects of induced muscle contraction in normal and spinal cord injured subjects. *Muscle & Nerve* 2002;**26**:374-382.

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Hunt KJ, McLean AN, Coupaud S, H. Gollee. Upper-limb exercise in tetraplegia using functional electrical stimulation. *Advances Clin. Neurosci. Rehab.* 2003;3:24-25

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Gollee H. Hunt KJ, Wood D. New results in feedback control of unsupported standing in paraplegia. *IEEE Trans Neural Sys Rehab. Eng* 2004;**12**:73-80

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Meek RM, Allan DB, McPhilips G, Kerr L, Howie C. Epidemiology of dislocation after total hip arthroplasty. *Clin Orthop Relat Res* 2006;**447:**9-18

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McCormick MT, Robinson HK, Bone I, McLean AN, Allan DB. Blunt cervical spine trauma as a cause of spinal cord injury and delayed cortical blindness. *Spinal Cord* 2007: *In press*

Dickson A, Allan DB, O'Carroll RE. Biographical disruption and the experience of loss following a spinal cord injury: an interpretative and phenomonological analysis. *Psychology and Health* 2007 *In press*

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Joseph G, Johnston RA, Fraser MH, Mclean AN Delayed presentation and diagnosis of cervical fractures in patients with long-standing anklosing spondylitis *Proc. 44th Annual Scientific Meeting, Int. Spinal Cord Soc* (Munich, Germany) 2005

Joseph G, Allan DB, Fraser MH Philip D, Jigiajini MV, Mclean AN Audit on the use of a structured transfer guidelines for inter-hospital transfer of patients with spinal cord injuries *Proc. 44th Annual Scientific Meeting, Int. Spinal Cord Soc.* (Munich, Germany) 2005

Joseph G, Jigajini MV, Philip D, Raja M, McLean AN, Fraser MH, Allan DB Use of a structured referral protocol for the safe inter-hospital transfer of patients with spinal injury *British Orthopaedic Association* 2005

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APPENDIX C PHYSIOTHERAPY

Service Aim.
The QENSIU is the only specialist Spinal Injuries Unit in Scotland and as such serves the entire population of Scotland. As a national service it is funded directly by the Scottish Executive.
The unit consists of three ward areas: Edenhall the acute admitting ward with 12 high dependency beds, Respiratory Care Unit with 4 beds for domiciliary ventilator dependent patients, and Philipshill ward with 32 beds for rehabilitation patients. Occasionally a few of these beds are used to readmit patients with post discharge complications.
The Rehabilitation and Assessment Directorate of Greater Glasgow and Clyde Health Board provide the physiotherapy service to the Q.E.N.S.I.U..

Staffing Levels:
Jon Hasler MPhil MCSP Superintendent Lead Clinical Specialist.
Sandra Forrest MCSP and William Stewart MCSP Permanent Senior 1 posts.
Claire Griffin MCSP Permanent Senior 2 post.
Deborah Anderson Permanent Physiotherapy Assistant.

Eight month rotating Senior 11 post:
Cathel McCrae MCSP (April to Sept)
Craig Barry MCSP (Oct 06 to present)

Four month rotating Staff grade posts:
Mairi Doyle MCSP and Lisa Donnachy MCSP (April 06 to May 06).
Jodie Rogers MCSP and Elaine Hutchison MCSP. (June 06 to Sept 06).
Clare Rogers MCSP and Denise McKenzie MCSP. (Oct 06 to Jan 07).
Sarah Murdin MCSP and Lizzie McDermott MCSP (Feb 07 to present)

When comparing these staffing levels with the recently published “Review of SCI Services for Health Authorities in South West, South East London and Eastern Regions”,the staffing we have for 48 acute/intensive rehabilitation beds, we see that we don’t meet their standards of 1 physiotherapist to 4-6 patients.
Our four permanent physiotherapists provide an excellent base of experience and expertise. Vivian Smillie Senior 1 retired this year. Vivian has faithfully served the spinal cord injured population of Scotland since 1976 for which we and many SCI individuals are extremely grateful. We wish her well in all her future ventures and wish her health and happiness.
Fortunately we were able to recruit Sandra Forrest into her post and Claire Griffin into Sandra Forrests post. Claire has worked with us as a junior Physiotherapist and in the SCI unit in Auchland New Zealand.
We still continue, however to demonstrates stability, reliability and dedication.

<u>Service Access.</u>

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.

New admissions	03/04.	04/05.	05/06.	06/07
Neurological Deficit	Total (%)	Total (%)	Total (%)	Total (%)
Incomplete Quad	25 (25.5)	23 (28%)	44(42%)	31(43%)
Incomplete Para	16 (16.3)	12 (14.4%)	16(15%)	*4(5%)*
Cauda Equina	7 (7.2)	2 (2.4%)	18(17%)	14(19%)
Complete Quad	14 (14.3)	22 (26.4%)	9(8.5%)	6(8%)
Complete Para	21 (21.4)	18 (22%)	17(16%)	10(14%)
Monoplegia	4 (4)	4 (5%)	1(1.5%)	6(8%)
Incomplete Others	11 (11.2)	0	0	2(3%)
Neuro deficits Total	98 (100)	81 (100%)	105(100%)	73(100%)
No deficit/ Intact.	103	63	49	67
Readmissions.		16		
Total:	201	144	154	140

Every one of these patients was seen by the physiotherapy department, the incomplete tetraplegic patients taking the most time, through to the intact patients, who are seen as appropriate, but are usually only on the unit for approximately two weeks.

Re-admitted patients.

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

Inpatient attendance's and direct patient contact treatment units:

2005/6	In-Patients				Out-patients			
Month	Totals	N.P	Atendances	Units	Totals	N.P	Attendances	Units
April	48	10	744	1799	3	2	3	12
May	55	20	967	2363	4	3	5	22

June	56	17	939	3066	5	3	15	36
July	54	20	905	2165	2	0	22	41
August	55	14	932	2551	3	2	3	10
Sept	49	10	780	2368	1	1	1	2
Oct	50	12	1017	2820	9	8	9	23
Nov	53	15	1056	2312	4	4	4	12
Dec	57	14	725	2100	3	3	3	10
Jan	52	18	864	2541	2	2	2	8
Feb	50	14	821	2321	6	6	6	18
March	52	20	804	2197	5	5	8	23
Totals	631	184	10554	28603	47	39	81	217

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

April-March	03/04.	04/05.	05/06.	06/07.
Attendance's	12599	11573	11903	10554
Units.	29981	27416	29297	28603
New patients	*201*	*144*	*159*	*184*

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

03/04: 11093 04/05: 10144 05/06: 10840 06/07: 10583

Weekend cover:

	I/P Weekends		
Month	Att	Units	No.Pts
April	73	156	16
May	43	105	10
June	46	74	16
July	95	209	24
August	36	87	11
Sept	35	72	16
Oct	49	103	13
Nov	52	119	12
Dec	61	145	15
Jan	61	151	9
Feb	44	93	8
March	45	102	9
Totals	640	1416	159

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.	03/04.	04/05.	05/06.	06/07.
Attendance	765	778	600	640
Direct units:	1625	1920	1298	1416
Indirect units:	601	710.4	480	524
Ave hours/wkd:	11	13	8.6	9.3

Out-Patients.

There are four types of out patient seen by the physiotherapy department. Firstly those patients continuing their rehabilitation have 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.

Year:	03/04.	04/05.	05/06.	06/07.
Attendance	196	90	78	81
Direct units	648	778	207	127
New patients	52	41	38	39

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

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 3 years the figures were:

Year:	04/05.	05/06.	06/07.
Attendance	70	86	32
Direct units	166	226	79
Total hours	41.5 hrs	56.5hrs	20hrs

DEPARTMENT	ARRANGED			CALL-OUT		
SPINAL 2006/07	TOTAL Pt's	attendances	units	TOTAL Pt's	attendances	units
APRIL				2	2	4
MAY	6	6	13	2	3	7
JUNE	2	2	5			
JULY				2	2	5
AUGUST				4	4	10
SEPT	3	3	8	1	1	3
OCT	1	1	2			
NOV	2	2	4			
DEC				1	1	4
JAN				1	1	2
FEB				1	1	2
MARCH				3	3	10
TOTALS	14	14	32	17	18	47

	TP's	Attendances	units
ON-CALL TOTALS	31	32	79

Education/ Training.

For most physiotherapists learning about and gaining experience in Spinal Cord Injury rehabilitation is undertaken as a postgraduate. However to enable students to have an experience of this specialist area all the Scottish training establishments send their students to us to gain an overview of this work.
During the year we ran 2 courses in the unit for the physiotherapy students from the following universities:
Caledonian University. Glasgow. (BSc and MSc)
Queen Margaret University. Edinburgh.
Robert Gordon University. Aberdeen did not attend this year.
We also gave clinical supervision placements to 8 students from these universities. We also had 3 students on elective placements from a variety of other universities. These placements varied in length from 4 weeks to 8 weeks. In all a total of 63 weeks of student supervision were given in 2006/07.
All new key workers within the unit and all new SHO's were trained in the use of the Functional Independence Measure (FIM) enabling them to understand the use of this internationally recognised outcome measure and therefore to be able to participate in the units recording of our patient's FIM scores.
SHO's received lectures on the role of physiotherapy within QENSIU and on sport/recreation for SCI individuals.
Lectures were presented to the visiting Bioengineers and Prosthetics students from The University Of Strathclyde.

Our staff also lecture to patients within the patient education programme on the following topics:
Anatomy of the spinal column/spinal cord.
Spasm/spasticity.
Neurogenic pain.
Wheelchairs.
Sport and recreation.
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:

Service Clinical Governance Framework.

Clinical effectiveness (06/07).
Biannually the Superintendent attends the Inter-SIU Superintendent Physiotherapists meeting where exchange of current clinical effectiveness issues is undertaken. Clinical speciality standards for the management of SCI individuals are also reviewed and a number of clinical guidelines have been written and agreed across all twelve UK units. This year the meetings were in Southport and Stanmore (London).

Current research/development papers are sometimes reviewed during in-service training and by attending specialist conferences.

Individual Case Studies have been presented as part of our in-service training programme.

Each patient has outcome measures using the Functional Independence Measure (FIM) set at the beginning of their rehabilitation and these are monitored especially pre discharge.

Those physiotherapists within the Southern General Hospital who use acupuncture as a treatment modality have formed an Acupuncture interest group and are reviewing practice, standards etc.
Audit of our success in achieving the CSP Cord Standards was undertaken every 4 months. Our 98% compliance rate continued this year.
All staff have access to the library and the internet.
Clinical Risk Management:

- This is also discussed between the SIU's and resulted in some of the agreed guidelines.
- Each individual physiotherapist assesses their abilities and those of their patients. This alters as the rehabilitation process continues. This however is not formally recorded at present.
- CPD.
- Weekly in-service training within the SIU.
- SGH Physiotherapy Department in-service training monthly:

- Courses attended by staff:

Moving and Handling.
Fire lectures.
CPR.
MASCIP annual conference.
Gutmann Annual lectures.

<u>Developments in 06/07.</u>

As usual the Inter Spinal Injury Unit Games were hosted at the Ludwic Gutmann stadium in Stoke Manderville and were held during April. The team from QENSIU came FOURTH, our second best result ever. It is noted that the only reason we were able to send a team was due in no small measure to the fact that staff attending with the patients were willing to *volunteer* to give many hours of their own off duty time to make it all possible.

This year the Strathclyde Police Force training department placed 2 more Police Cadets with us, to work in a voluntary capacity for a 3 month period, as part of their community placement training. The aim is to provide the cadets with an understanding of equal opportunities issues and to develop an awareness of the diversity of needs within the community.

Physiotherapy Support Worker:

We have appointed our long awaited Physiotherapy Support Worker.
There were excellent candidates, with very good qualification. Deborah Anderson, who we appointed, has a BSc in Sports Studies meeting our requirement for someone with qualifications in the areas of exercise/sport/recreation sciences. She has already proved and excellent and invaluable new member of our team, and is working with a growing level of independence in the areas identified as needing increased input.
She is assisting with the following activities enable current qualified staff to increase their time spent with one on one patient session, clinics, small research projects, audit etc:
With the increasing number of incomplete patients we see, who are requiring pre-gait and gait training, there is an increasing need for the assistance of another person to be involved per treatment session. The technical instructor could be this person.
In taking group sessions.
Clerical administrative activities.
Maintenance/cleaning of equipment.

Accompanying out of hospital activities.
Assisting in the hydrotherapy pool(in the water) thereby enabling an increase in usage.
Undertaking maintenance stretches/exercises for long term and re-admission bed patients.

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

Patient Sport/Recreation and Community Reintegration.

This year a successful programme of sporting activity, as a part of our weekly rehabilitation programme, was continued and well attended by many patients.
Each Wednesday afternoon a senior physiotherapist along with our new physiotherapy assistant has run a rolling programme of sport. Sports tried out have ranged from archery, table tennis, basketball through to fencing for which we organised an external coach to supervise the sessions.

Our links with local/national sports/recreational resources run by both council and private/charitable organisations has continued. This can be seen through the following activities:
The physiotherapy staff introduced a number of patients to disability sailing with weekly midweek sailing with a local sailing club. This was only possible due to staff voluntarily giving of their own time on Wednesday evenings through the summer.
The charity Back-Up continued to present quarterly talks to the patients about their outward bound and skiing activity courses. These were met with great interest by most patients.
In partnership with Back-Up we ran a very successful advanced wheelchair skills workshop here in the unit where individuals with long standing paraplegia demonstrated and tutored current inpatients in the advanced use of their wheelchairs.
We have taken patients to the Braehead curling rink on four occasions where they have received expert coaching from no other than one of the Winter Paralympics Silver Medal winning team and current wheelchair curling world champions.
We have informed patients of the charity Walking on Air who aim to introduce disabled individuals to the sport of gliding.

Research (06/07):

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

A retrospective study, of our patients, looking at the functional locomotion outcomes compared to their admission ASIA impairment scales is being undertaken by Jon Hasler the physiotherapy Team Lead.
Assistance has been regularly given to the team working on the following Strathclyde University Bioengineering project:
The title of the project is: Comprehensive Evaluation of the Physiological and Functional Adaptations Induced By Locomotor Training In Incomplete SCI Subjects. D. Allan, B. Conway, M. Granat, J. Hasler, K. Hunt.

Areas for Development(06/07):

Rehabilitation teams within spinal cord injury units have long believed that a sport, recreation and community re-entry programme is a vital part of the rehabilitation process. Assisting spinal cord injured patients to learn to deal with social and environmental barriers through excursions into the community, including sporting, recreational and social activities should be fully incorporated into our programme of rehabilitation. As in other SIU's this should be a part of the rehabilitation therapy team role.

The unit has access to suitable transport allowing access to the wider community but has found it problematic to undertake a regular programme due to the increased staffing implication trips out of the unit necessitate.
For the patients pathway through rehabilitation to be successfully completed efforts should be made to continue the process in their own local community. There is therefore a role for the team to be contacting local sports/recreational resources both council/privately run to try and involve the discharged patient in activity out with their home that will also contribute to both their future physical and emotional rehabilitation/reintegration. This will be assisted by completion of the compilation of names and telephone numbers of all of Scotland's disability sports and recreation development officers. We will then put into practice the linking of our patients to their local council resources.
It was hoped that the above work would be up and running last year.
Due to various staffing issues this year (the retirement of one of our Senior 1 staff, the long time it took to appoint a successor, and an equally long appointment time for our Senior 2 replacement plus 1 long term sick leave) this work has not occurred as yet.
It is planned that the recently appointed senior 2, along with the physiotherapy assistant, will move this work to completion.

Moving research into clinical practice.

Partial Body Weight Treadmill Gait Training (Now in conjunction with the LOCOMAT).
The appointment of the physiotherapy support worker along with the 2 researchers from the Strathclyde Bioengineering department has enabled selected patients to undertake this approach to rehabilitation. However it is only patients selected for the research project who are currently using the treadmill.
We are restricted in how many patients we can put on the locomat/treadmill, out with the research project, as we don't want to restrict the number of potential subjects the research team have access to.
We will need to assess the amount of staff time required to fully integrate the locomate/treadmill training into the full rehabilitation of ALL incomplete patients once the research has been completed in over 1 years time.

Upper and lower limb FES cycling programmes.
EC certificated equipment has now been supplied to us, in the form of donated equipment from Hasomed the commercial production company.
We are currently in the process of devising protocols/guidelines for the safe and appropriate use of the Hasomed FES cycling systems with both acute/chronic SCI individuals. These will be guided to some extent by the published results of the various research projects into this work.
Once this has been done we will, where appropriate, integrated FES cycling into the physiotherapy rehabilitation programmes of initially paraplegic and then tetraplegic patients.

Along side this work one of our current Senior 2 staff is about to commence a research study in an exercise/sport related area as part of her MSc degree, and is considering looking at the FES Cycling.

Equipment requirements.
As each year passes our aging stock/loan wheelchairs become more decrepit and out dated. This year two of our powered wheelchairs broke down and were found to be obsolete by our repair agencies.
We therefore wish to replace these powered wheelchairs with up to date versions similar to those issued by the wheelchair services to our individual patients on their discharge.
We also wish to modernise our stock of manual attendant wheelchairs for our ultra high injury patients. The development of and provision by wheelchair services of "Tilt in Space" wheelchairs with supportive seating systems and head support has recently enabled two of our patients to access these chairs. However assessment and therefore provision was greatly delayed as we only had the old design semi-reclining wheelchairs. This showed a gap in our ability to provide appropriate modern wheelchairs for assessment and initial mobilisation of this patient group.
We also need to replace our Prone Trolley once a source can be found. This may need to be from the USA as no UK Company produces them.

Future Staffing Requirements/Developments: Wish List

Senior physiotherapist:

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

With the increased number of regional out-reach clinics there have been an increasing number of physiotherapy related issues coming to our attention that need to be dealt with after the team return from the clinics and request our input. This inherently means the issue takes longer to deal with than it would do if a physiotherapist at the clinic had actually seen the patient. The fact that there is no physiotherapy input at the clinics also means that there is now less and less follow-up, within the first year of discharge, of patients than was the case when they came to the QENSIU for their 6 week/6 month follow-up appointments.
Since the introduction of the Functional Independence Measure (FIM), as the units primary outcome measure, we have never managed to follow up our patients progress/deterioration in function post discharge. This could clearly be a role for a clinic physiotherapist.
With the increasing SCI population growing older each year the number of spinal/limb degenerative wear and tear problems that patients are reporting at reviews is increasing. The out-patient Occupational Therapist has specifically identified this as an issues. She is regularly asked, by patients, to help them with such problems, but feels these are issues a physiotherapist should deal with. This certainly would improve the quality of care provided. This will continue to be a gap in the service we provide unless time/resources can be allocated to address these issues.
Such a physiotherapist would develop the role to meet the following needs:
Discuss/guide local physiotherapists in continued physiotherapy input for recently d/c patients.
START collecting follow-up FIM scores for patients thus identifying improvements/deterioration's in function and with local resources devising possible ways of optimising function.

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

Respiratory Physiotherapist

As the role of Dr A McLean our Consultant, and his interest in the respiratory management of high tetraplegic patient develops, and the Domiciliary Ventilation Service continues to develop, we need to increase/review our respiratory skills. This would ensure that the breadth of physiotherapy input these patients could benefit from is achieved. This would also be true of the increasing number of short-term ventilated patients, and tracheostomy patients that the unit is now treating.
Most spinal injuries units within the UK that treat ventilated/tracheotomy patients now have a physiotherapist leading the work with this group of patients.
It is true that we have increased the number of anaesthetic sessions but more time could be spent with patients, one on one, to wean them off the ventilator or from their tracheotomy. In many other speciality areas speech and language therapists and physiotherapists work together to increase time spent with patients easing the weaning process along more quickly. This hopefully can be achieved from now onward by current physiotherapists having more time to give the one on one time required by allocating their more able patients to input from the newly appointed support worker, when necessary.

APPENDIX D OCCUPATIONAL THERAPY

SERVICE AIM

To provide an effective Occupational Therapy service that will minimise disability, maximise independence and maintain health in the spinal injured of Scotland.
This is achieved through assessment, treatment and evaluation.

SERVICE FUNCTION

Occupational Therapy aims to
Assist the recovery or rehabilitation of
Functional skills
Educational skills
Vocational skills
Social skills
This is to enable the individual to be maintained in the community or care environment at their maximum potential.

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

The team of Occupational Therapists strive to:
achieve the maximum level of service within allocated resources
maintain a sound level of clinical expertise and excellence through skill sharing and education.

ASSESSMENT

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

TREATMENT

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

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

EVALUATION
FIM scale
Ongoing functional evaluation

SERVICE SPECIALITIES

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

SERVICE ACCESS

Service hours: Monday - Friday , 8.30 - 16.30 (Fri 16.15)
System of referral: Blanket
Location: Based within the Queen Elizabeth National Spinal Injury Unit, a comprehensive Occupational Therapy Service is provided to the Spinal Injured of Scotland.
Within the unit there are 48 beds, 12 of which are designated High Dependency, 4 are within the Respiratory Care Unit and 32 are rehabilitation beds.
In keeping with the Spinal Unit's life-long care policy, the Occupational Therapy Service is extended to outpatients and home follow-up. The unit open door policy is also adhered to.

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

STAFFING

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

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

The service is staffed by 4.95 WTE. It should be noted that this remains one of the highest ratio of patients to staff in the UK. In the recently published Review of Spinal Injuries Services for Health Authorities in the South West, South East, London and Eastern Regions it is recommended the ratio is one therapist per 6 – 8 patients

The Occupational Therapist Team Lead is responsible for
the day to day management of the National Spinal Service
development of the Assistive Technology Service
staff supervision and development
clinical caseload
caseload allocation
administration and statistical collation
fieldwork Educator
line management of the Senior 1 staff within the Rehabilitation Directorate
The Head OT is responsible to the:
Clinical Director of the Spinal Injury Unit
OT Manager (the current structure is under review and this is likely to change in the coming months)

Senior 1 x 0.75 WTE - out-patient service - is responsible for,
assessment and treatment to the outpatient 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
overviewing OT input to satellite clinics
patients contacting the service on the open door policy
development and administration of out-patient service

Senior 1 x 0.7 WTE - (Hand Therapist) - is responsible for,
co-ordination of all spinal unit upper limb assessment and treatment
identification of patients who would benefit from or be suitable candidates for tendon transfer surgery
Hand Service development
supervision of the Occupational Therapy Assistant

Senior 1 (in-patients) is responsible for,
assessment, treatment and rehabilitation of newly injured patients.
supervision of Senior II
fieldwork educator
other duties as assigned by the Team Lead OT

Senior 11 is responsible for,
assessment, treatment and rehabilitation of newly injured patients.
other duties as assigned by the Team Lead OT
fieldwork educator

Occupational Therapy Assistance x 0.5 WTE is responsible for
carrying out assigned patient treatment under the direction of a qualified member of staff
various clerical, administration and other duties as assigned

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

SERVICE ACTIVITY

STATISTICS FOR April 2005 – Mar 2006

	Units	New	Returns
In-patients	9339	156	2702
Out-patients	1795	293	331
Hands (In- pt)	2578	N/A	1636
Hands (Out-pt)	425	27	132
Home visits	838	N/A	136
Total	14975	567	4886

STATISTICS FOR April 2006– Mar 2007

	Units	New	Returns
In-patients	9731	121	2898
Out-patients	2010	330	428
Hands (In- pt)	4718	N/A	3092
Hands (Out-pt)	335	17	111
Home visits	803	87	178
Total	17597	555	6707

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

The hand therapy stats are up for inpatients hand therapy. This can directly be attributed to the OT assistant post being filled for the full year whilst in 2005/06 the post holder was on long-term sick leave following which the post was vacant for several months.

Sickness absence was a total of 10 working days which equates to approximately 0.7%

TEACHING AND TRAINING ACTIVITY

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

Lectures/presentations this year:
Upper limb treatment in tetraplegia course formulated and presented jointly with the Dublin Spinal Unit
Teaching package developed for UL treatment in SCI
“Why Systematic Review” presented at HealthQwest Study Day
“Spinal Cord Injury and the role of the OT” talk to South Lanarkshire Social Work Dept
Collaborated in organizing OTWPP workshop
Case study presented at Occupational Therapy Work, Productivity and Practice workshop
Organised and hosted Seating Workshop
Presentation to Orthopaedic Occupational Therapists on OT intervention with neurologically intact spinal injured.
Edinburgh therapy students
Prosthetic students

Bio-engineering students
SHO – FIM training, posture and seating, role of OT with Spinal Injured
Splinting
New nursing staff – outcome potentials
Co-ordination of OT in-house in-service training sessions on various topics
Patient/relatives education programme.
Russian OT Students

Courses attended by staff:

All staff have attended a variety of in-Trust courses including, Conflict management, Effective presentations, Food Handling, MICRSOSOFT Excel, Word advanced and Access and Supervision.
Writing for Publication course
Dynamic lycra splinting
Basic Database searching – a six week course
Occupational Therapy and Job-site evaluation
Work Matters Course
GGiles Training

CLINICAL GOVERNANCE ACTIVITY

OT is represented at each spinal unit Clinical Governance meeting. Presented outcome on cause of skin mark, one month audit, to OT service clinical effectiveness group

The OT Journal Club is now well established and has developed into a Research and Development group, giving the opportunity for each of the OT spinal unit staff to feedback on research/audit or other clinical effectiveness projects they are involved in. This offers peer support and opportunity for brainstorming and developing ideas.

Case study completed reviewing use of FES in upper limb in both complete and incomplete injured. The results are to be submitted for publication

Literature review completed on Life Skills Groups in spinal rehabilitation. Data is being used to develop proposal for development of a pilot group in the unit in collaboration with Psychologist

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.

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.

ACHEIVEMENTS/DEVELOPMENTS

Working with ASPIRE charity and Margaret Blackwood Housing Association a property has been fully adapted for use as an interim housing solution for patients awaiting alterations and/or re-housing. This is now being used and has already proven to reduce hospital length of stay for its first tenants

An OT staff member was nominated by a patient's relative for the Daily Record Heros award. She was short-listed for the Caring category.

Audit of cause of any skin lesion developed in the unit repeated and compared with the previous years audit. Results are very favourable with a 37% decrease in prevalence. Action taken and outcomes have been presented at both the Occupational Therapy Clinical Effectiveness Groups and Spinal Unit Audit meeting. A paper is currently being prepared for submission for publication. An abstract for a poster presentation has been accepted for the NHS Scotland Event 2007- Delivering Healthcare for the 21st Century.

Application submitted for NICE travel scholarship to allow the hand therapist visit to Swedish Spinal Unit to review best practice in assessment and treatment in tendon transfer surgery

A checklist for documentation of intervention with neurologically intact spinal patients has been devised and is currently being piloted

Use of LUTM programme now established in the outpatient department. This records and measures changes in pressure sores. Selected ward staff have been trained to allow roll-out of use to include in-patients

Continued work with Cochrane review entitled "Educational Interventions for Health Care Professionals to prevent Pressure Ulcers". Title has been accepted and literature review complete. Now at stage of writing report

Review of pressure monitors completed and recommendation made for purchase of X-sensor. Order is being processed along with lap-top

Commented on plans for Step-down unit

New lap-top and purchase of Nintendo Wii have enhanced upper limb assessment and treatment

Reviewed/improved housing needs report proforma

KSF outlines completed for all staff grades. Are now ready for validation

Following audit, a review of the OT standards in Spinal Cord Injury continues in collaboration with the other UK spinal units

ECU use on the ward has been established. This has allowed increased independence and quality of life for patients with the highest level of injury

Integrated electronic page-turner and voice operated ECU into SMART facility. SMART facility maintained and kept up to date for utilization as patient and carer training resource

Collation of literature related to ECU/assistive technology and outcome measures is ongoing

Active member of Scottish Occupational Therapy Special Interest Group in Work and Productivity in Practice/ Employment Issues

Supported 7 patient team to inter-spinal unit games at Stoke Mandeville

All OT staff successfully ran in the 2006 Women's 10k, raising money for the unit

Patients taken to both Independent Living exhibition and Mobility roadshow

OT policies and procedures manual revised and completely updated. Review due September 2007

Music Quiz/karaoke nights organized and run with a volunteer from the ambulance crew. These two monthly events have proven to be very popular with patients and relatives.

There has been a general increase in the number and types of patient outings

OCCUPATIONAL THERAPY FUTURE PLAN 2007-2008

Staff to be trained in use of X-sensor pressure monitor

Develop proposal for audit of incidence of return to work post spinal cord Injury and identify limiting factors.

Splinting – a considerable amount of staff time is spent on manufacturing splints. It is proposed that a trial of pre-fabricated splints be carried out. This potentially will ease the pressure of work on the hand therapist. This has a cost implication for the appliances budget

Develop and pilot a Life Skills Group

Submit paper for publication on Cause of Skin Mark audit

Submit paper for publication based case study into use of FES in upper limb function in tetraplegia

ADDITIONAL CONSIDERATIONS FOR FUTURE

Step-down Unit
The halfway house was a facility well used by patients throughout the length of stay as an integral part of the rehabilitation process. The opportunity to practice skills, allow carers to develop confidence and skills and to facilitate community integration is invaluable. The previous unit is now scheduled for demolition and has not been fit for use for the last 10 months. This has been greatly missed by the patients, carers and staff. We now look

forward to the new facility being completed. Occupational Therapy has been involved in the review of plans
In preparation for the new unit, guidelines for use and management should be reviewed in collaboration with other team members.

2. Out patient service
As with previous years, demands on out patient services continue. Interventions are reactive and little time can be invested in re-evaluating the aging population in a planned way in an attempt to prevent deterioration in function and enhance quality of life.
Due to demand there is an inconsistency of service provision between patients that are seen here and at outreach clinics, which the OT, currently cannot always attend. Conversely, when the therapist is at outreach clinics or on visits, patients are not seen at the unit's outpatient clinic at the time of attendance. They therefore do not receive the standard review. If they require the input of an OT, they either need to return to the clinic again, or a home visit may be required. This creates a backlog.
It should also be noted that, as the therapist's expertise is increasingly acknowledged, demands for input into various projects continue to increase. This service and its demands will continue to be monitored

3. Mezzanine floor.
Whilst this valuable facility is being built there will be disturbance to the treatment area, which will necessitate hand therapy sessions being carried out in the patient dining area. No significant disturbance to treatment sessions are anticipated in terms of quantity or quality. Any change is challenging. However staff are to be commended on their positive attitude in preparing for the move.

APPENDIX D Spinal Injuries Scotland [SIS]

Services:
SIS has continued a high level of service to support the Spinal Cord Injured [SCI] community in Scotland over the last year. We continued to attend Outpatients at QENSIU on Tuesday through Thursday when appropriate to compliment the support SIS gives to the Outreach Clinics held in Aberdeen, Arbroath, Inverness, Dumfries and Melrose.

Inpatient Unit visits on a Wednesday afternoon is now standard practice where a wide variety of topics, emotional support and advice can be given to both patients and relatives. Several relatives evenings where held over the year with good success and effectiveness.

Information & Advice:
In April we launched a FREEPHONE Helpline (0800 0132 305) to enhance our office based service to those seeking information and support. Our web-site has been re-hosted to allow the expansion of information and to ensure it is updated on a more regular basis. It will be more interactive where donations and payments can be made as well as important information documents can be downloaded. Additionally, short films may be viewed on the web-site. The SIS 'Newsline' magazine has gone from strength to strength. It has now has twice the number of pages from last year's publication and has articles as diverse as Welfare & Advice to gardening, holidays, motoring, performing arts and even bird watching. Many of these articles have been written by our members.

SIS released a DVD to illustrate what we do as well as raise awareness of spinal cord injury and promote an active a life as possible post SCI. This can be viewed on the SIS web-site and has been widely distributed.

Free legal and welfare advice is available from Digby Brown Solicitors who offer this service free to those affected by SCI through SIS. A presence at the Independent Living Show at the SECC, Glasgow by SIS allowed another point of contact to those affected by SCI.

Spinal Injuries Awareness:
We were delighted to announce that Her Royal Highness the Princess Royal accepted our invitation to become SIS Honorary President and attended a SIS event in Aberdeen as a guest of SIS. Sir Ian Wood, Chairman and Chief Executive of the Wood Group also accepted an invitation to become a patron of SIS. These appointments help raise the profile of spinal injuries to the wider community and underlines the importance of the work of SIS does across Scotland.

Fundraising events can be an effective way of spinal injury awareness. We host two large and successful annual fundraising events in Glasgow and Aberdeen. A number of members attend these events and this can help integration into a social environment for those with a SCI. We have had several companies fund raise for SIS which also increases the profile of SCI. One successful example of this in 2006 was Ernst & Young cycling from Glasgow to Amsterdam in aid of SIS.

Participation:
SIS is involved with several other organisations to enhance the knowledge and make our work more effective. Spinal Injuries Together [SIT] are the five main charities for SCI in the UK (SIA, ASPIRE, Back-Up, Spinal Research and SIS) who work together to ensure that SCI people receive the best possible services from each charity without duplication. The Joint Volunteer Group (JVG) is the umbrella of all main voluntary groups who work within

the QENSIU that SIS works closely with to offer a varied, appropriate and attractive range of activities.

SIS is one on the founder members of the European Spinal Cord Injury Federation [ESCIF] in Switzerland. This is an umbrella group of like minded organisations to share and encourage best practice in all aspects of living with a spinal cord injury. There are seventeen different European countries who are members of ESCIF. The Chairman of SIS is also the Treasurer of ESCIF.

Education:
SIS has provided presentations and training to health professionals at the QENSIU when requested.

The Department of Sociology at Edinburgh University involved SIS to seek a broad range of views about stem cell research by setting up small discussion groups from a broad range of people across Scotland. SIS was able to facilitate a small discussion group from the membership and has been an active participant with this research. A team at the University of Dundee is looking at how disabled people use technology in their homes. SIS has been able to help facilitate this study through SIS membership.

Summary:
There has been significant progress and improvements made across all areas of SIS services. SIS has almost a daily presence at the QENSIU. We routinely respond to requests from staff, patients and relatives.

We have retained number of Council member's to 15, however, in the past three years 10 Directors retired and the replacements now play a major part in the running and activities of the charity. The new Directors have brought down the average age of the Council, come from more geographically diverse areas of Scotland and it is more gender balanced. The Directors are mainly made up from people who live with a spinal cord injury. The remaining Directors either work with people with SCI or are a relative of a person with SCI.

There have been some changes in personnel at SIS in 2006-2007. We have maintained our staffing levels to 2 full-time and 2 part-time employees. Two of our employees have a spinal cord injury and are wheelchair users. We have a new General Manager who joined SIS in April 2007 replacing the Chief Executive who left in September 2006. We have maintained the number of volunteers, but look to increase the number over the next year or two and we have maintained the visits to the QENSIU. We have also continued supporting the Outpatients clinics, where possible, at the Spinal Unit to compliment our Outreach clinic support. SIS has remained firmly focused on the services delivered to the SCI community in Scotland.

APPENDIX F MOMENTUM

Content:

1. Introduction

Momentum is one of Scotland's leading not-for-profit organisations.

The Momentum Scotland group has more than 50 years of experience assisting disabled and excluded people throughout the country to achieve their potential and realise their goals. Formerly known as Rehab Scotland, we became Momentum in March 2003.

The service at the Queen Elizabeth National Spinal Injury Unit is funded by Glasgow City Social Work Department under a Section 10 Grant to voluntary organisations. It is person centred with a number of underlying principles; needs led, flexible and integrates with the multi-disciplinary rehabilitation approach of the unit.

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

Initial consultation and Assistive Technology assessment to appreciate the patient's needs and physical capabilities.

Primary goals are pre-vocational exploration and rehabilitation based on the use of computers.

Some patients are uninformed about the value of computers in rebuilding their lives! Part of the service is designed to discover how using assistive technology can make access to home computing possible and open up a whole new world of independent communication and information.

For those patients using assistive devices such as speech recognition, single switch or headset technology, training will be pertinent to the technology and tailored so patients acquire command and control of their application programmes.

With more people in society becoming computer literate, E-Mail communication and Internet exploration are popular.

For people retaining employment or university courses the project works closely with employers and other agencies ensuring the correct assistive technology devices are prescribed. Carers and family are also given much needed support

The tangible results for patients participating in the service are: -

a. More constructive use of leisure time, vocational independence and social integration to prevent social exclusion.

b. Improved competency and confidence in using technology to reduce barriers and increase flexibility and adaptability, thereby reducing discrimination.

c. As a result of working with computers and Assistive Technology, Momentum makes a significant contribution to improve patient work tolerance, volition, general endurance, self esteem and self worth of patients.

2. Equal Access to Employment

Momentum's Spinal Injury Service fits extremely well with the Joint Equal Access to Employment strategy of Glasgow City Council. The core purpose of the service is to find the most appropriate assistance and support mechanisms to allow someone who has suffered paralysis to rebuild a productive and socially inclusive lifestyle. Without the technological and human foundation laid by this service, the future would be bleak indeed for our clients.

In order to fully meet the implicit demands of the Equal Access agenda, the service requires fulfilling a development need. This need centres round the lack of ongoing support for the client group, and those mainstream agencies who will be delivering services to the client group.

To meet this extended facility the provision of additional elements to the service are required.

Creation of formal links and networking to the statutory employment services.
The conduit for onward referral to other Momentum services will be enhanced by creating a seamless facility covering the whole spectrum of a person's journey from trauma to returning to employment.
Internal unit links to Liaison Sisters, Discharge Nurses, Social Workers, etc needs to be maintained on a patient by patient basis.
Our specialist assistive technology assessment service must be made visible to all employers having employees who have acquired a spinal cord injury.

It will be impossible to achieve this level of intervention with the current service manning level of one person.

3. Service Developments

Outreach Programme:

During 2004 Momentum's Outreach Programme was awarded limited Section 16b funding to extend our service to meet the needs of patients after discharge.

Unfortunately funding to provide continuity of support in 2006 was not forthcoming. This service has now stopped. However, Momentum are hopeful that in the near future funding

through the Lottery organisation with enable a pan disability outreach service to be launched across Scotland. The objective is to utilise and tap the resources of Scotland's volunteer work force by partnering a venture with the IT-Can-Help programme of the British Computer Society.

Patient Internet and E Mail Wireless Network:

The unit is equipped with a patient dedicated Wireless (802.11b) Network covering most of Philipshill Ward and the Day Room. It is available 24 hours a day, 7 days a week and is one of the most successful innovations in this service. Five wireless networked equipped laptops are available on short term loan to patients during their stay in the unit.

Opening Hours:

Patients can be in this unit for long periods, therefore at weekends and in the evening time can be unproductive and monotonous with no hospital activities. Further, those patients with homes some distance from Glasgow tend not to have frequent visitors to help pass the time. Encouragement for the constructive use of leisure time has to be considered a homogeneous part of this service. To meet this particular need we are flexible with our approach. The current level of Section 10 funding allows five day opening only. To extend the service to include weekends and evenings requires a team of volunteer A/T trainers. The practicality of managing and manning such an operation is currently under discussion.

Patient Entertainment System:

The service has been working with a Swiss software developer to introduce E Mail/Internet/Television and other entertainment at the bedside of ten beds in Edenhall Ward (High Dependency).

The system includes an ingenious assistive technology software program for meeting the needs of a variety of special needs access. This A/T program is integrated with unique applications and sits over and above the Microsoft Windows operating System

Due to the nature of this project no costs would be borne by the patient. It would be completely free of charge and available at any time. The hardware comprises a medically approved 15inch LCD Tablet PC Screen. Internal multi-media devices allow a plethora of different memory platforms to be used.

Funding for this is available through the Abbey Bank Trust and from donations to the Spinal Injury Endowment Fund.

The LCD Screen would be mounted on an articulated arm secured to the wall behind each bed. However unforeseen factors discovered in the partition wall construction have delayed progress in this project.

Southern General Hospital Estates Department are currently working an a structure designed to support the arm and computer without imposing unacceptable loading on the partitioning walls.

4. Conferences Attended 2006 / 2007

November 2006. MASCIP Conference in Manchester on Home Support for the Spinal Cord Injured.

April 2007. Conference organised by the Edinburgh Science Festival on the use of technology to remotely support people with special needs in the home environment.
5. Technology Developments:

Developing and evolving technologies are likely to have a significant impact on the delivery of future Momentum Spinal Injury Services. The service keeps a watchful eye on noteworthy assistive technology advancements that are likely to enhance the lives of spinal cord injured people.

COGAIN:

A Joint European venture COGAIN: is a five year research and development project aimed at harnessing eye movement to improve the life of those with motor control disorders. The principle is that eye pupil movement is tracked by an array of CCD cameras. The location is then converted into pixel addresses to move the mouse cursor around the screen

This equipment comprises a monitor into which several LCD cameras are integrated. A MyTobii system has been demonstrated to us using application software with commands and input as icons. The cost of such a system is in excess of. £15,000. It has to be said that users of corrective lenses, especially bifocals, can find the signal distorted to the extent that it becomes unusable.

Clearly, capital investment of this magnitude is not justified when balanced against the number of potential users in the unit. Until the cost of such a system reaches an economically viable price, purchase of this kit is not an option. However a watching brief is kept of COGAIN developments and we have been asked to present a paper in September at the De Montfort University, Leicester. It will provide a platform where we can influence the design of the system the subject is likely to be based upon the needs of the spinal injury community.

Motion –sensitive Laptops:

BT are currently developing a tablet PC that responds to the user moving the computer up or down, side to side, or backwards and forwards. The intent is to make access to computers as simple as possible, especially for the physically disabled person. It is too early to provide intelligent commentary on this system; however developments will be closely followed. It remains to be seen just how sensitive and hence usable for spinal injured people this system will be.

Brain Wave Technology:

Control of devices by brain wave was initially under development for a number of years now for military aviation purposes.
The neurons that comprise the brain work on electrical impulses. Neurological research has shown that brainwaves of different wavelengths indicate different emotional states, like a focused awareness, a meditative state, or drowsiness. Brainwaves have been used in medical research and therapy for years.
The most common system used to run a computer is controlled by electrical voltages found on the surface of the forehead. When muscles of a body contract a corresponding

voltage is detected on the surface of the skin. In a similar fashion the actions of the brain result in the production of voltages that migrate to the surface of the skin.

Three different types of control signals are derived: -

ElectroOculoGraphic (EOG) signals are typically used to detect left and right cursor motion.

The ElectroEncephaloGraphic (EEG) signals reflect mental/brainwave activity and is typically used for vertical cursor movement.

Switch activation or keyboard commands use ElectroMyoGraphic (EMG) signals.

This technology will revolutionise the way we all interface with computers. Once fully developed, the spinal cord injury sector will find this technology a quantum leap in obtaining access to a whole range of domestic devices as well as computers.
A Californian organization called NeuroSky is developing a bio sensor and signal processing system for the consumer market. Using wearable technology in the form of sensors integrated into a set of earphones it is aimed mainly for the games market. However it could also be adapted for new applications such as, health, wellness, education and training. Claims are made that this system will be available commercially for the consumer games market in 2008
Our considered judgment is that, despite media hype, the emergence of this technology into a commercially viable product is many years away.

Speech Recognition:

For many years Speech Recognition has been increasing in popularity within the mainstream professional sectors (Doctors, Legal Professionals and those with a heavy dictation workload). The result is that spinal injured people have benefited by the volume of scale in production.

Dragon Naturally Speaking, is the preferred product, however some constraints exist when using it with certain applications.

When this solution is selected it is made clear to the patient that success will depend upon their desire to succeed through their own perseverance and patience. Training and constant enhancement to the personal speech signature is the secret to success for accurate speech recognition.

In recent months we have been evaluating IBM Via Voice for its suitability within the unit. IBM were one of the pioneers of Speech Recognition in the 1960's and 1970's using Dragon licensed speech engine.

The accuracy rate is, in general, extremely good for both systems; however the user licence from IBM is expected to be more flexible to meet the needs of the environment we work in.

Microsoft Windows XP includes a speech recognition system. Our use of this system indicates: -

The training period is longer
It is more suited to North American English accents than Western European English accents.

The accuracy is not as good as the dedicated speech recognition systems.
The vocabulary is not as large

These limitations impose unacceptable restrictions to its use in the environment.

Windows Vista:

The new operating system, Windows Vista, launched by Microsoft in January 2007, has been evaluated on some of our personal computer systems. Results indicate that there are no perceivable significant benefits or performance improvements by migrating to this system in the immediate future.

This coupled with the anecdotal press evidence indicating that not all the compatibility and driver issues have been resolved, has led us to adopt a policy on upgrading that will be led by the assistive technology software developers. When they upgrade their products, we will follow suit. That is expected to be about end 2008 / 2009.

Other Developments Include:

Other developments beginning to emerge from the research in UK universities are: -

Adding dosage and personal data to medicine labelling at the pharmacy in barcode reader format. This will enable people with special needs to download the data to a home computer for inclusion in an “Alarm” reminder system for taking medicines. This system is being integrated into a “universal” computerise shopping system for the housebound.

Although not connected with assistive technology for computer access, a bottle / jar opening system is under development at a Scottish University. Designed especially for people with hand and finger difficulties.

These activities are still in the research phase. It has to be said, although the objective in meeting some of the needs of the housebound disabled people is to be applauded, the proposed solution is more complicated then necessary. The demonstrated equipment ignored the potential of adapting existing technology to achieve the same result.

6. Proposed Service Innovations:

Outcome Measurement:

In the field of research not a great deal of creditable evidence exists on the measurement of positive Outcomes for people using A/T in a hospital environment. Over the years the service has developed is own standards and measurement.

The current refinement divides achievements into three areas relating to rehabilitation and will be implemented from June 2007: -

1. Clinical
   Introduction / Assessment / Exploration

2. Assistive Technology
   Speech Recognition / Head – Set Technology
3. Social / Therapy
   Social Interaction / Prescribed Therapy / Communication

4. Supported Prevocational Activities
Onward Referral / Continuing Education / Employment

Further research into identifying the “Best of Breed” outcome measurement tool for this programme will continue. Among others, the following tools and processes will be investigated: -

EATS (Efficiency of Assistive Technology and Services)

MPT (Matching Person and Technology Assessment)

PIADS (Psychosocial Impact of Assistive Devices Scale)

QUEST (Quebec User of Evaluation of Satisfaction with Assistive Technology)

The outcome of this investigation will probably by a hybrid system that extracts the most appropriate parts from each process.

There is a need for A/T practitioners in all the UK spinal Injury Units to meet regularly and discuss common problems and share new ideas. (The “wheel” must get re-invented several times as each unit faces the same A/T issues.) It is becoming increasingly evident that the speed of technology development is such that a unique profession with Assistive Technology skills is emerging.

EqualSkills:

Managed by the British Computer Society (BCS), EqualSkills is a short, staged training and assessment programme with a certificate awarded upo0n successful completion. The programme will be fun, informal and easy-to-use and will show newcomers to IT the very basics of computing from using a mouse and keyboard, to exploring the Internet and sending E Mail messages.

Specifically designed to address the needs of those intimidated by computers, EqualSkills is the first step on the IT skills ladder, with patients then encouraged to move on the gain the ECDL qualification, also managed by the BCS.

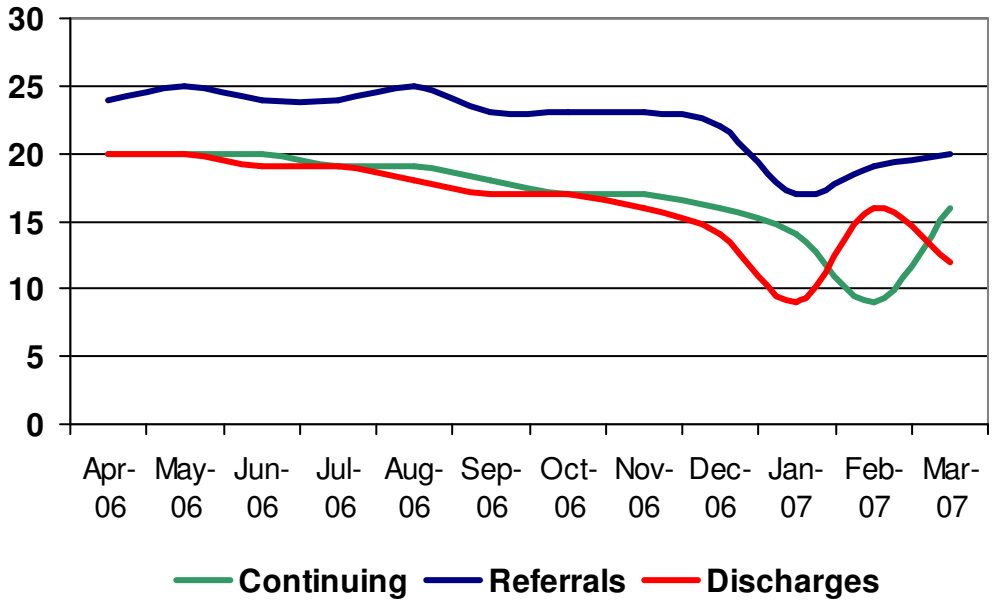
EqualSkills covers four topics: -

Computer Basics
Introduction to the Desktop
World Wide Web
E Mail

Positive progress is being made to acquire funding and accreditation to award this certificate. 4QTR 2007 is the planned implementation date.

7. Service Performance Indicators:

Referrals and Discharges 2006 / 2007 (Inpatient):

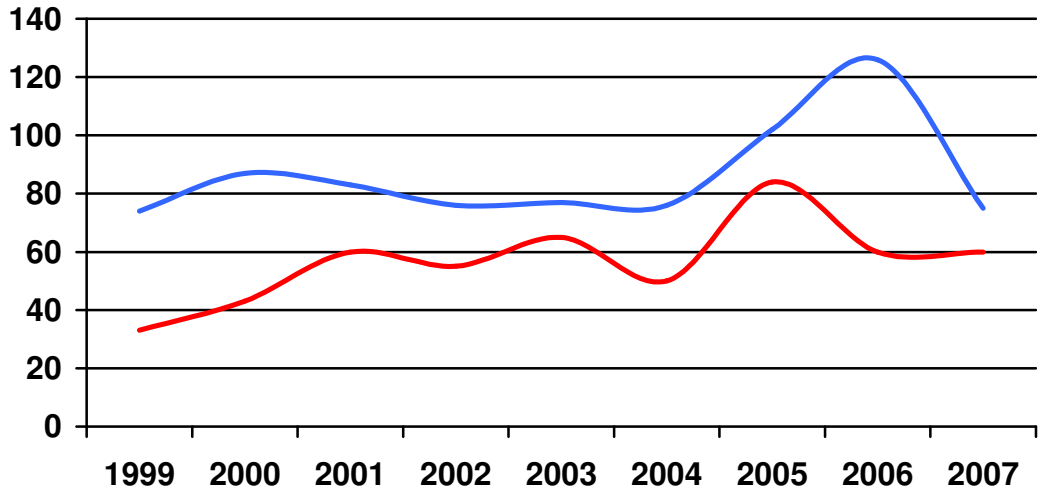


Patient Achievements 2006 / 2007 (Inpatient):

Initial Achievement	15	
Therapy / Leisure Achievement	5	
Assistive Technology Achievement		12
Family / Carer Achievement		19`
Support for Continuing Education	1	
Support for Employment	1	
	S/Total:	53

The 12% reduction in achievements over the same period 2005/2006 was been due to long term sick leave of Geoff Orry. During that time this Momentum Scotland service was managed remotely and manned part-time.

Nine Year Referral Trend:



Referrals Achievements

The drop in referrals in 2004 was caused when the service had several high level injury, ventilator dependant patients requiring simultaneous assistive technology training. Ventilator patients require frequent training sessions and exclude others from using the facilities.

Project Highlights:

Investigation into obtaining accreditation to offer patients chance to obtain EqualSkills qualification through the BCS is underway. This will give patients an added incentive to achieve the ECDL (European Computer Driving Licence) after discharge.

Following up on the design for a mouth operated mouse for tetraplegics revealed that a version called “”IntegraMouse” developed by a European consortium may be a possible solution.

Proposals have been submitted to Glasgow Social Work Dept as to how the service would dovetail into the Equal Access to Employment Strategy. We have been proactive in bringing together a strategy for this service that supports that principle and the spirit of the Equal Access to Employment Strategy.

Service Development Plans:

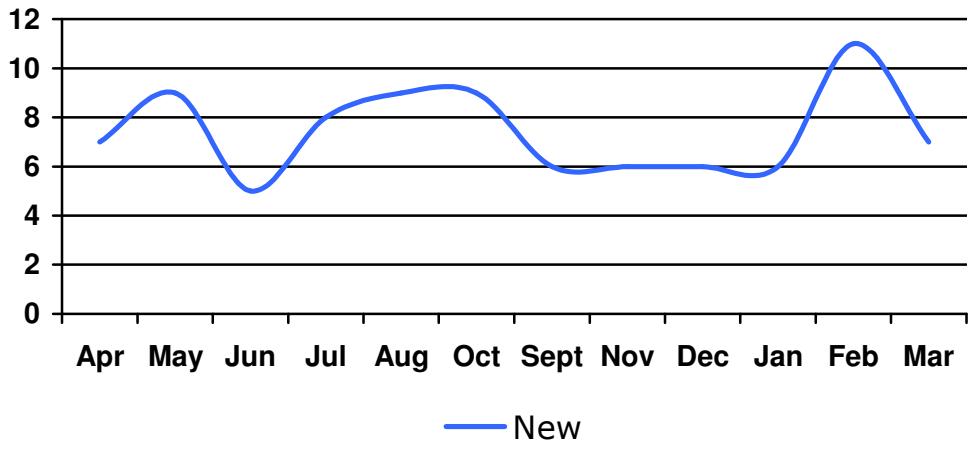
We will continue to look at the feasibility of supporting outreach patients by the use of remote access software. With the spread of Broadband through Scotland this philosophy will be a core feature of any future outreach service.

Through membership of the AAATE (Association for the Advancement of Assistive Technology in Europe) we will monitor various projects of interest within European and follow up on technical developments likely to prove a positive improvement for the independence of spinal cord injured patients.

The service will become more proactive in creating links with European providers with a view of sharing ideas.

An invitation has been received from the organisers of the 2007 COGAIN Conference to present a paper at Montfort University in September.

8. Performance Targets for 2007 / 2008



9. Equipment Expenditure Requirements 2007 / 2008

Item	Justification	Cost	Spend
Laptop (2)	Increase the availability for patients to use wireless network	£900	1th Qtr 2007 (Completed)
IBM Via Voice (2)	Performance Evaluation	£400	2nd Qtr 2007 (Completed)
CorelDraw Graphic Suite 12	To upgrade Software	£420	3th Qtr 2007
IntraMouse	High Level Dependency use	£1,600	1th Qtr 2008
BigKeys Keyboard	Expand on existing equipment	£220	3st Qtr 2008

10. Concerns and Issues

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

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

11. And Finally

Geoff Orry, after providing an assistive technology service through Momentum (Rehab Scotland) for the past 15 years is taking semi retirement in June 2007. His working days at the Spinal Unit will be limited to two days at the unit, plus one day (Wednesday) at a Momentum Centre to follow up on assistive technology developments that are likely to benefit spinal cord injured people.

During Geoff Orry's 15 years at the unit about a 1000 spinal cord injured patients have been helped with assistive technology to harness computer technology.

Mr Shaun Digges will be starting with Momentum Scotland in June to provide continuity of service on Mondays, Wednesdays and Fridays.

Geoff Orry
May 2007

APPENDIX G Spinal Liaison Nurses

The spinal liaison nursing team continues to visit patients out with the spinal unit in many settings, including the patient's home, nursing homes and other hospitals around Scotland.
These visits are to give ongoing education and support to patients, carers and community teams following discharge home. This is especially the case when problems are encountered such as pressure sores, bowel and bladder problems and so preventing readmission to hospital.
Last year 243 home visits were carried out by the two nurses, covering 21364 miles.
Patients living in the more remote corners of the country are contacted and reviewed at our spinal outreach clinic, at home as an extension to the outreach clinic and via tele medicine links.
The spinal outreach service is managed by the liaison nurses. Last year outpatient attendance rates for the fifteen out reach clinics held was 92% over the clinic in five sites.

Location	Date	Attendance rate
Aberdeen	07.06.06	100%
	06.09.06	83%
	06.10.06	90%
	07.03.07	100%
	07.03.07	81%
Inverness	04.05.06	100%
	10.08.06	100%
	09.11.06	92%
	08.02.07	91%
Dumfries	17.05.06	90%
	13.09.06	87%
Arbroath	21.04.06	88%
	25.08.06	100%
Borders	27.10.06	90%
	16.03.07	88%
Average attendance rate		92%

Linda Woods

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APPENDIX H DEPARTMENT OF CLINICAL PSYCHOLOGY

SERVICE AIM

The purpose of the Psychology Department at QENSIU is to provide assessment, support, consultation and intervention to patients, their families and staff so as to support the rehabilitation of those with a spinal cord injury.

TASKS OF THE DEPARTMENT

Firstly psychology can assist in determining to what degree a patient understands their diagnosis and prognosis and assist in that process. This contributes to the participation of the patient in goal planning and rehabilitation.

Secondly comprehensive and timely assessment will assist in the early identification of problems allowing targeted intervention and support. The range of problems that may limit rehabilitation are many; adjustment, coping or skills deficits, motivation, anxiety, depression, serious pre-existing mental illness, drug and alcohol problems, or cognitive difficulties or social and relationship issues.

Thirdly while the department's focus is primarily on the individual an awareness of the larger systems the patient inhabits is crucial to appropriate psychological care. Consequently intervention and education with family and consultation with staff are important components of the psychology care that is offered at QENSIU.

Fourthly the process of adjustment continues into the community over a period of years. The department is available for consultation with treating clinicians in the community to provide psychological advice from a spinal injuries perspective.

STAFFING

The post of Clinical Psychologist at QENSIU has been filled since January 2006, by Clinical Psychologist, Mr. James Anderson. This is a full time post with close professional links with other psychologists in the hospital. He holds full UK registration with the British Psychological Society. Further development in staffing is to hopefully offer a placement for a clinical psychology trainee within the next year.

ACHIEVEMENTS/DEVELOPMENTS 2006-2007

Orientation

The provision of a psychology service has been welcomed at QENSIU and strong working relationships with inter-disciplinary staff have been formed.

Teaching and Training

A short series of lectures to nursing staff on intervention with distressed patients and reflective practice groups to assist in the management of difficult patients have been held. Teaching sessions have continued for both students and staff in allied professions. I have also had the opportunity to lecture to student doctors and provided teaching to registrars. Attendance at in-service hospital training and education sessions continues as well as attendance at conferences.

Audit/Research

As part of good clinical practice and to support the profile of psychology within QENSIU audit and research continues. Two audit projects have been completed. The first demonstrated that (excepting medical reasons) 90% of all new patients were been seen within a week of admission and 100% within two weeks of admission. Feedback on the service was sought from patients, which was highly positive of the contribution to their

care made by psychology. A second audit retrospectively examined the rates of mood problems within the unit; this data is routinely collected by staff as part of admission/discharge data.
A further research project has been initiated with the support of Mr. Allan, Director, examining the history and outcome of those who sustained SCI by self harm.

Clinical Links
In the context of a single psychologist working in QENSIU considerable effort has been made to make links with psychology colleagues at other units. This has culminated in visits to other psychology departments in UK spinal injuries units.

Intensive Outpatient Service
A pilot has been initiated of an outpatient psychology service with referral accepted from medical staff. The goal is to offer patients of QENSIU (and their community teams) focused intervention, assessment, referral advice or consultation. This can be provided either in person or by telephone so as to offer an equality of access. The goal is to provide a service to patients in urgent need or for those whose needs are not easily been met in their local area. The service is seen as adjunctive to any community service and consequently liaison with local GP's, teams and referral where possible is crucial. Demographics, uptake and value of the service will be audited. It is hoped this will serve as the basis for an ongoing outpatient service.

CLINICAL ACTIVITY
The department has continued to see every new spinal injured patient, unless requested otherwise by medical staff. Additionally neurologically intact, readmissions or urgent out-patients have been reviewed at medical staff's request. Table 1 presents individual sessions for the 12 month period ending the 1st of April 2007. Each session represents approximately 45mins of time.

Table 1: Patients Seen – 31st of March 2006- 1st of April 2007

	New Contacts	Return Appts.
New SCI Inpatients	98	317
Neurologically Intact Patients	7	22
Readmissions	4	5
Family/Spouse	28	26
Outpatient	13	16

Other Clinical Activity
Consultation, advice to staff, incidental patient/family contact and participation in goal planning meetings occur regularly and constitutes part of core clinical activity.

DEVELOPMENT GOALS FOR 2007-2008
For the current teaching and professional development activities to continue. In the coming year, this is planned to include a conference paper.
To develop the current research interest in the outcome of those who sustained SCI by suicide attempt into a more detailed research project.
Continuing active outreach and support to community psychology services. It is hoped that liaison and referral will support the transition to the community for those with a need for ongoing psychological intervention.
To audit the outpatient pilot, to review its use for patients and community staff and to ensure that it is offering an equality of access to QENSIU patients.
To investigate and pilot psychological groups within the unit. Options identified include pain management, alcohol and drug or life skills/adjustment to community groups.

APPENDIX I: Raw Data

DA1: New Admissions

	Admissions
1992 - 2000	1148
2000/2001	199
2001/2002	164
2002/2003	165
2003/2004	201
2004/2005	144
2005/2006	153
2006/2007	169
Total 1992-2006	2343

DA2: New Admissions by Case-mix Complexity

Admissions	I	II	III	IV	Total
1992/2000	76	190	287	595	1148
2000/2001	13	24	40	122	199
2001/2002	11	24	30	99	164
2002/2003	14	23	32	96	165
2003/2004	8	28	28	137	201
2004/2005	13	28	28	75	144
2005/2006	7	29	37	80	153
2006/2007	16	32	39	82	169
Total	158	378	521	1286	2343

DA3: New Admissions by Health Board of Residence

	2000/ 2001	2001 /2002	2002 /2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	Total
Argyll & Clyde	28	12	18	27	9	13	19	315
Ayrshire & Arran	20	16	17	21	13	13	20	207
Borders	0	3	2	2	2	3	5	29
Dumfries & Galloway	7	10	10	13	9	11	8	122
Fife	2	7	4	6	4	2	7	58
Forth Valley	17	9	4	12	6	6	9	130
Grampian	8	8	9	7	8	5	8	86
Greater Glasgow	47	44	47	48	37	43	27	571
Highland	6	16	6	5	9	8	11	106
Lanarkshire	25	20	23	22	22	19	18	322
Lothian	14	8	8	14	8	11	16	140
Shetland	0	1	0	0	1	0	0	5
Tayside	5	5	3	5	6	5	10	75
Orkney	0	0	0	2	0	1	1	5
Western Isles	3	2	3	5	2	3	2	44
ECR	12	2	8	9	6	5	8	99
Unknown	5	0	2	1	0	2	0	11
Overseas / Private	0	1	1	2	2	3	0	18
TOTAL	199	164	165	201	144	153	169	2343

DA4: Admissions by Health Board compared with population size

	1992/2005	2006/2007	Total	% to Total	Population Size	% to Total
Argyll & Clyde	296	19	315	13.5%	430500	8.4
Ayrshire & Arran	187	20	207	8.8%	376500	7.3
Borders	24	5	29	1.2%	106100	2.1
Dumfries & Galloway	114	8	122	5.2%	147600	2.9
Fife	51	7	58	2.5%	349300	6.8
Forth Valley	121	9	130	5.5%	274600	5.4
Grampian	78	8	86	3.7%	531200	10.4
GGHB	544	27	571	24.4%	909600	17.7
Highland	95	11	106	4.5%	208700	4.1
Lanarkshire	304	18	322	13.8%	560800	10.9
Lothian	124	16	140	6%	767800	15.0
Shetland	5	0	5	0.1%	23020	0.4
Tayside	65	10	75	3.2%	393600	7.7
Orkney	4	1	5	0.1%	19800	0.4
Western Isles	42	2	44	1.9%	28880	0.6
ECR	91	8	99	4.3%		
Overseas / Private	18	0	18	0.8%		
Unknown	11	0	11	0.5%		
TOTAL	2174	169	2343	100%	5128000	

DA5: Admissions by Degree of Injury

	805	806	952	Other	Total
1992-2000	442	324	286	96	1148
2000/2001	100	60	26	13	199
2001/2002	76	62	23	3	164
2002/2003	71	58	36	0	165
2003/2004	112	49	35	5	201
2004/2005	77	47	19	1	144
2005/2006	54	71	27	1	153
2006/2007	72	54	42	1	169
Total	1004	725	494	120	2343

DA6: Discharges by Degree of Injury

Discharges	805	806	952	Other	Total
1992-2000	433	300	278	95	1106
2000/2001	99	52	25	13	189
2001/2002	81	51	22	3	157
2002/2003	70	68	34	1	173
2003/2004	94	56	32	5	187
2004/2005	82	34	24	1	141
2005/2006	58	69	23	1	151
2006/2007	70	59	37	1	167
Total	987	689	475	120	2271

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

Admissions	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Central Cord Lesion	11	23	24	12	14	24
Infection	4	1	2	1	1	1
Vascular	1	4	1	0	3	6
Tumour	1	1	0	0	1	2
Surgical	0	0	0	3	3	8
Non-specific Lumbar Lesions	0	3	3	0	0	0
Penetrating Wounds gun/stab	2	4	3	0	1	1
Other	4	0	2	3	4	0
Total	**23**	**36**	**35**	**19**	**27**	**42**

Discharges	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Central Cord Lesion	10	23	23	18	12	25
Infection	3	2	2	1	0	2
Vascular	3	4	2	2	4	5
Tumour	0	1	1	0	1	1
Surgical	0	0	0	2	1	2
Non-specific Lumbar Lesions	0	0	3	0	0	0
Penetrating Wounds gun/stab	2	4	1	1	0	2
Other	4	0	0	0	5	0
Total	**22**	**34**	**32**	**24**	**23**	**37**

DA8: Day case attendances by Health Board

	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	Total 92/07
Argyll & Clyde	59	94	65	93	100	78	81	**921**
Ayrshire & Arran	54	84	62	43	46	35	54	**579**
Borders	0	0	0	0	3	9	6	**26**
Dumfries & Galloway	2	8	8	12	4	2	8	**65**
Fife	16	4	4	6	11	9	24	**105**
Forth Valley	11	42	10	25	35	34	32	**258**
Grampian	2	2	0	1	0	0	6	**22**
Greater Glasgow	160	164	195	240	350	275	195	**2429**
Highland	0	2	3	0	9	9	7	**55**
Lanarkshire	177	138	125	100	128	97	93	**1423**
Lothian	11	15	16	48	35	28	21	**265**
Shetland	0	0	0	0	0	0	0	**0**
Tayside	2	1	2	17	12	13	10	**89**
Orkney	0	0	0	0	0	0	0	**0**
Western Isles	0	1	3	2	3	1	8	**19**
ECR	1	1	2	10	10	0	0	**30**
Total	**495**	**556**	**495**	**597**	**746**	**590**	**545**	**6286**

DA9 : Admissions by age group

Males										
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	>90	Total
1992-2000	87	181	156	120	125	80	47	12	0	808
2000/2001	17	30	23	22	18	15	9	4	0	138
2001/2002	14	22	32	20	17	19	5	2	0	131
2002/2003	6	20	25	20	16	15	12	2	0	116
2003/2004	10	20	23	16	18	26	13	0	1	127
2004/2005	9	20	19	16	17	17	7	2	1	108
2005/2006	11	15	13	17	20	14	8	5	0	103
2006/2007	8	23	14	22	23	10	11	4	1	116
Total	162	331	305	253	254	196	112	31	3	1647
Females										
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	>90	Total
1992-2000	47	55	63	44	42	36	33	16	4	340
2000/2001	1	13	9	11	8	6	5	7	1	61
2001/2002	4	8	5	4	0	6	1	4	1	33
2002/2003	4	9	4	9	8	4	6	4	1	49
2003/2004	3	17	10	17	6	11	7	3	0	74
2004/2005	4	5	3	4	10	5	5	0	0	36
2005/2006	8	6	7	10	7	5	6	1	0	50
2006/2007	3	10	8	9	10	5	6	1	1	53
Total	74	123	109	108	91	78	69	36	8	696
All Admissions										
	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	>90	Total
1992-2000	134	236	219	164	167	116	80	28	4	1148
2000/2001	18	43	32	33	26	21	14	11	1	199
2001/2002	18	30	37	24	17	25	6	6	1	164
2002/2003	10	29	29	29	24	19	18	6	1	165
2003/2004	13	37	33	33	24	37	20	3	1	201
2004/2005	13	25	22	20	27	22	12	2	1	144
2005/2006	19	21	20	27	27	19	14	6	0	153
2006/2007	11	33	22	31	33	15	17	5	2	169
Total	236	454	414	361	345	274	181	67	11	2343

DA 10: Age & Sex of New Patients by Category of Injury
Female Patients 2006/2007

Casemix	No. of patients	Mean Age	Range of Ages
I	2	85	78-90
II	8	60	24-81
III	12	37	18-55
IV	31	43	17-78
Females	**53**	**43**	**17-90**

DA 11: Age & Sex of New Patients by Category of Injury
Male Patients 2006/2007

Casemix	No. of patients	Mean Age	Range of Ages
I	14	49	18-76
II	24	59	22-90
III	27	42	16-80
IV	51	40	17-77
Males	**116**	**40**	**16-90**

DA 12: Age & Sex of New Patients by Category of Injury
All Patients 2006/2007

Casemix	No. of patients	Mean Age	Range of Ages
I	16	53	18-91
II	32	59	22-90
III	39	41	16-80
IV	82	41	17-78
All Patients	**169**	**46**	**16-91**

DA 13: Length of Stay for Traumatic Injury by level of Spinal Cord Lesion 2006/2007

Casemix	No. of patients	Mean L.O.S. (days)	Range of L.O.S.
I	19	201	10-710
II	32	167	7-480
III	36	117	5-259
IV	80	23	1-245
All	**167**	**91**	**1-710**

DA 14: All Discharges

1992/2000	1106
2000/2001	189
2001/2002	157
2002/2003	173
2003/2004	187
2004/2005	141
2005/2006	151
2006/2007	**167**
Total	**2271**

DA15: Discharges by Case mix Complexity

Discharges	I	II	III	IV	Total
1992-2000	70	171	276	589	1106
2000/2001	10	28	34	117	189
2001/2002	6	19	29	103	157
2002/2003	18	28	31	96	173
2003/2004	6	24	30	127	187
2004/2005	5	28	30	78	141
2005/2006	6	30	34	81	151
2006/2007	19	32	36	80	167
Total	140	360	500	1271	2271

DA16: Discharges by ASIA Impairment Level & Health Board

2006/2007	A	B	C	D	E	Total
Argyll & Clyde	4	1	0	5	10	20
Ayrshire & Arran	2	1	1	7	8	19
Borders	0	0	0	1	4	5
Dumfries & Galloway	1	1	0	1	3	6
Fife	1	0	0	1	3	5
Forth Valley	0	0	0	5	4	9
Grampian	3	1	1	3	0	8
Greater Glasgow	3	0	2	7	13	25
Highland	1	2	1	4	3	11
Lanarkshire	4	2	0	7	7	20
Lothian	3	1	2	6	6	18
Overseas / Private	0	0	0	0	0	0
Shetland	0	0	0	0	0	0
Tayside	6	0	0	2	0	8
Orkney	0	0	0	0	0	0
Western Isles	1	0	0	0	2	3
ECR	0	0	1	2	6	9
Unknown	0	0	0	0	1	1
TOTAL	29	9	8	51	70	167

DA17: Discharges by ASIA Impairment Level

Discharges	A	B	C	D	E	Total
2000/2001	35	9	8	30	107	189
2001/2002	23	7	10	43	74	157
2002/2003	21	10	13	52	77	173
2003/2004	21	6	9	51	100	187
2004/2005	31	3	7	34	66	141
2005/2006	32	2	9	45	63	151
2006/2007	29	9	8	51	70	167

DA18: Delay between actual and intended date of discharge

	No. of patients discharged	No. of patients delayed	Mean delay (days)	Range of delay (days)
2000/2001	**189**	**27**	**68**	**1 – 877**
2001/2002	**157**	**11**	**19**	**1 – 107**
2002/2003	**173**	**8**	**46**	**2 - 212**
2003/2004	**187**	**7**	**52**	**1 - 188**
2004/2005	**141**	**0**	**0**	**N/A**
2005/2006	**151**	**9**	**65**	**7 - 174**
2006/2007	**167**	**9**	**54**	**14-141**

DA19: Time between accident & admission

	No.of patients	Mean Time (Days)	Range of Time
2000-2001	199	163.3	0 - 12575
2001/2002	164	103	0 - 12012
2002/2003	165	62	0 - 4948
2003/2004	201	83	0 - 6596
2004/2005	144	231	0 - 11237
2005/2006	153	518	0 -21075
2006/2007	**169**	**815**	**0-17416**

DA20: Ventilated Bed Days

		No. Patients	Ave. Ventilated Days	Total Ventilated Days
2002/2003	Edenhall	11	28	304
	RCU	4	102	408
2003/2004	Edenhall	17	25	427
	RCU	3	160	481
2004/2005	Edenhall	21	39	813
	RCU	4	527	567
2005/2006	Edenhall	10	29	285
	RCU	1	365	365
2006/2007	**Edenhall**	**16**	**29**	**469**
	RCU	**1**	**365**	**365**