

# A Survey of the Lower Limb Amputee Population in Scotland, 2010



**SPARG**  
Scottish Physiotherapy Amputee  
Research Group

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## Contents

<b>Tables and Figures.....</b>	<b>3</b>
<b>1. Acknowledgements.....</b>	<b>5</b>
<b>2. Executive Summary .....</b>	<b>6</b>
<b>3. Results: Demographic Profiles.....</b>	<b>9</b>
<b>3.1. Introduction.....</b>	<b>9</b>
<b>3.2. Amputee Details .....</b>	<b>9</b>
3.2.1. Age and Sex Distribution .....	9
3.2.2. Diabetic Amputees .....	9
3.2.3. Aetiology of Amputation.....	10
3.2.4. Level of Amputation.....	10
3.2.5. Patients Fitted with a Prosthesis .....	11
3.2.6. Prosthetic Rehabilitation Abandoned .....	12
3.2.7. Mortality.....	12
3.2.8. Final Outcome Summary.....	12
3.2.9. Bilateral Amputations in Same Episode of Care .....	13
3.2.10. Unilateral and Bilateral Amputees .....	13
3.2.11. Revisions and Re-amputations .....	14
3.2.12. Functional Co-morbidities Index.....	14
<b>3.3. Physiotherapy and Rehabilitation .....</b>	<b>15</b>
3.3.1. Compression Therapy.....	15
3.3.2. Early Walking Aids .....	15
3.3.3. Mobility Outcomes: Locomotor Capabilities Index 5 (LCI 5) .....	16
<b>4. Milestone Data .....</b>	<b>17</b>
<b>4.1. Statistics Presented .....</b>	<b>17</b>
<b>4.2. Days to Casting.....</b>	<b>18</b>
<b>4.3. Casting to Delivery.....</b>	<b>18</b>
<b>4.4. Days to Inpatient Discharge: Fitted with a Prosthesis.....</b>	<b>19</b>
<b>4.5. Days to Inpatient Discharge: Not Fitted with a Prosthesis.....</b>	<b>19</b>
<b>4.6. Days from Inpatient Discharge to Outpatient Discharge .....</b>	<b>20</b>
<b>5. Trends in Compression Therapy and Early Walking Aids (EWAs) .....</b>	<b>21</b>
<b>5.1. Statistics Presented .....</b>	<b>21</b>
<b>5.2. Trends in Compression Therapy .....</b>	<b>21</b>
<b>5.3. Trends in Early Walking Aids .....</b>	<b>22</b>
<b>6. Individual Hospital Summaries for 2010 – Key Performance Indicators ...</b>	<b>23</b>
<b>6.1. Final Outcome (all) .....</b>	<b>23</b>
<b>6.2. Milestones (Unilateral trans-tibial amputees) .....</b>	<b>25</b>

<b>References.....</b>	<b>26</b>
<b>Appendix A: Project Work .....</b>	<b>27</b>
<b>Appendix B: List of SPARG Database reporting facilities.....</b>	<b>28</b>
<b>Appendix C: SPARG Hospitals and Physiotherapists.....</b>	<b>30</b>
<b>Appendix D: Aetiology Mapping .....</b>	<b>34</b>
<b>Appendix E: Locomotor Capabilities Index 5.....</b>	<b>35</b>
<b>Appendix F: Functional Co-morbidities Index .....</b>	<b>36</b>
<b>Appendix G: Data Cleaning Steps.....</b>	<b>37</b>

## Tables and Figures

Table 1	Percentage of amputees who were limb fitted in each of the amputating centre (> 5 amputees).....	7
Table 3.2.1	Age and sex of amputee population, 2002 - 2010.....	9
Table 3.2.2	Diabetic amputees, age and sex, 2009 & 2010.....	9
Table 3.2.3.	Aetiology of amputation, 2005 - 2010.....	10
Table 3.2.4	Level of amputation, 2005 - 2010.....	10
Table 3.2.5.1	Patients fitted with a prosthesis, 2002 - 2010.....	11
Table 3.2.5.2	Patients fitted with a prosthesis by level, 2002 - 2010.....	11
Table 3.2.5.3	Patients fitted with a prosthesis, bilateral, 2002 - 2010.....	11
Table 3.2.5.4	Sex and limbfitting outcome, 2010.....	11
Table 3.2.6	Prosthetic rehabilitation abandoned, 2005 - 2010.....	12
Table 3.2.7	Mortality, 2007 - 2010.....	12
Table 3.2.8	Outcome summary, 2007 - 2010.....	12
Table 3.2.9	Bilateral amputations, 2002-2010.....	13
Table 3.2.10.1	Unilateral and bilateral amputees, 2005 – 2010.....	13
Table 3.2.10.2	Bilateral amputees, 2005 - 2010.....	13
Table 3.2.11.1	Revisions and re-amputations, 2005-2010.....	14
Table 3.2.11.2	Transtibial to transfemoral re-amputations, 2005-2010.....	14
Table 3.2.12.1	Functional Co-morbidities Score, 2010.....	14
Table 3.3.1	Type of compression therapy used, 2005-2010.....	15
Table 3.3.2	Type of EWA used, 2005-2010.....	15
Table 3.3.3	Locomotor Capabilities Index by level 2008 to 2010.....	16
Table 4.2.1	Days to casting milestone, descriptive statistics, 2010.....	18
Figure 4.2.2	Median days to casting milestone, 1997-2010 (2001 – 2010 – Unilateral Only).....	18
Table 4.3.1	Casting to delivery milestone, descriptive statistics, 2010.....	18
Table 4.3.2	Median casting to delivery milestone, 1997-2010 (2001 – 2010 – Unilateral Only).....	18
Table 4.4.1	Days to inpatient discharge, patients fitted with a prosthesis, descriptive statistics, 2010.....	19
Table 4.4.2	Median days to inpatient discharge, patients fitted with a prosthesis, 1997-2010 (2001 – 2010 – Unilateral Only).....	19
Table 4.5.1	Days to inpatient discharge, patients not fitted with a prosthesis, descriptive statistics, 2010.....	19
Table 4.5.2	Median days to inpatient discharge, patients not fitted with a prosthesis, 1997-2010 (2001 – 2010– Unilateral Only).....	19
Table 4.6.1	Days from inpatient discharge to outpatient discharge, all amputees, 2010.....	20

Table 4.6.2	Days from inpatient discharge to outpatient discharge, limb-fitted amputees 2010.....	20
Table 4.6.3	Days from inpatient discharge to outpatient discharge, limb-fitted amputees 2006 - 2010 .....	20
Table 4.6.4	Days from inpatient discharge to outpatient discharge, non limb-fitted amputees 2010 .....	20
Table 5.2.1	Patients receiving compression therapy within 10 days of amputation (%), 1994 – 2010.....	21
Figure 5.2.2	Percentage of transtibial and transfemoral amputees receiving compression therapy within 10 days of amputation surgery, 1993 - 2010.....	21
Table 5.3.1	Patients using EWAs within 10 days of amputation (%), 1994 - 2010 .....	22
Figure 5.3.2	Percentage of transtibial and transfemoral amputees using EWAs within 10 days of amputation surgery, 1993 -- 2010...	22
Table 6.1	The number of amputees at each hospital, the data completeness and FCI, 2010.....	23
Table 6.2	Key Performance Indicators by Amputating hospital, 2010..	24
Table 6.3	Key Performance Indicators by Amputating hospital, 2010..	25

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## 2. Executive Summary

### Introduction

This is the 18<sup>th</sup> Annual Report of data collected from lower limb amputees in Scotland by the Scottish Physiotherapy Amputee Research Group (SPARG). All major amputations carried out in 2010 are included, that is ankle disarticulation (A.D.), trans-tibial (T.T.), knee disarticulation (K.D.), trans-femoral (T.F.), hip disarticulation (H.D.), and trans-pelvic. Patients having partial foot amputations and amputation of the toes are excluded.

All data are entered locally onto the SPARG web-based database. The data base has reporting facilities which allow for local data checking and analysis (see Appendix A for list of available reports).

National and individual hospital data are presented in this report. Individual hospital data are summarised to facilitate comparison of outcomes and the benchmarking of services. The data items or key performance indicators for each hospital were identified by a previous national, multidisciplinary benchmarking exercise (Scott and Patel 2009).

Once again, the national data are broadly consistent with these from previous years; significant changes and trends of note are reported in this summary. Where possible, comparisons are given in the body of the report for at least the 5 years 2005-2010.

### Results

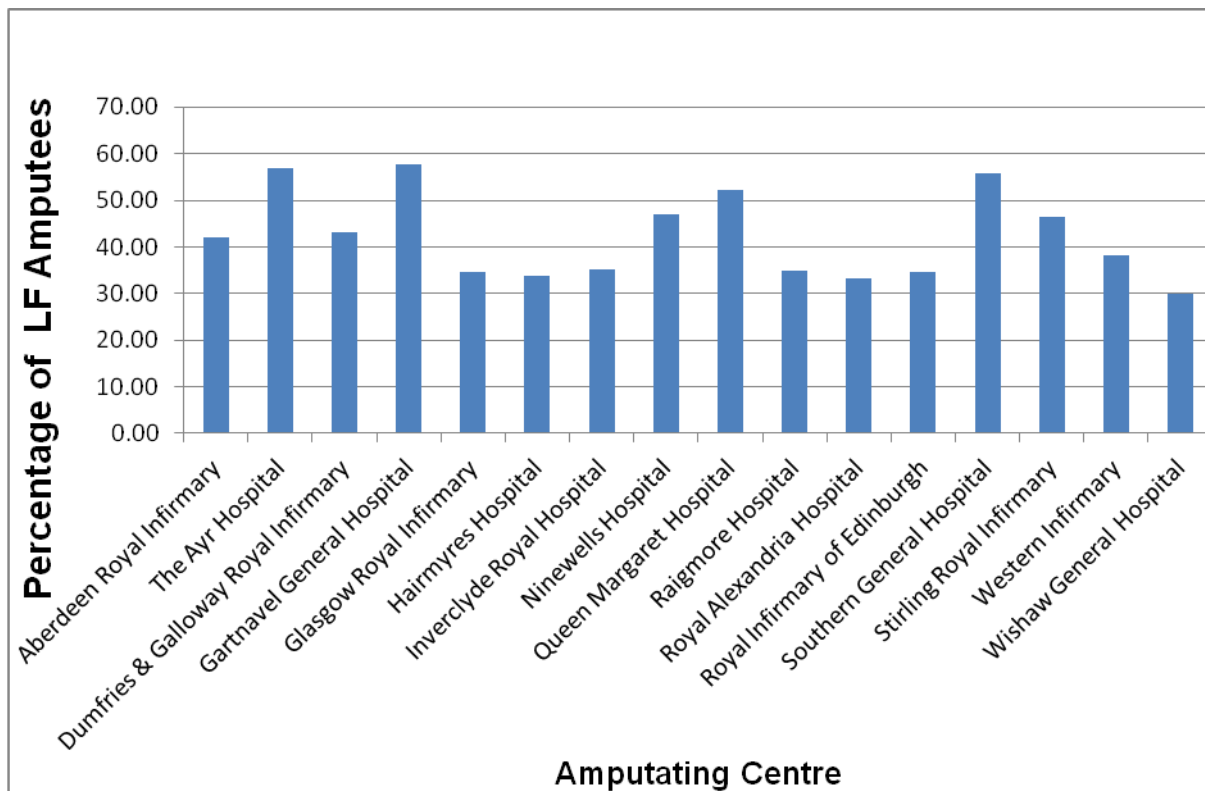
In 2010 there were 740 amputees and 763 amputations, some patients having a re-amputation to a higher level, or a bilateral amputation, during the same episode of care. Numbers have remained the same for the past three years.

The quality management “data checking” system introduced in 2003 continues to be highly successful. The percentage of records which are complete in every respect is 93.1%.

Demographic data remain similar over 5 years. The mean age at amputation is 68.5 years in 2010 and peripheral arterial disease, with or without diabetes, accounted for 86.5% of all amputations. The percentage of amputations due to diabetes has risen slightly to 45%. In this group males outnumber females by 2.6:1 and the mean age at amputation is four years less than the group with peripheral arterial disease without diabetes.

The percentage of amputations carried out at a T.T. level in 2010 was 50%, reduced from a peak of 60% in 2007. When individual hospital data are examined, the differences are large, varying from 80% to 38%.

43% of all amputees are fitted with a prosthesis. When examined by level, 70% of T.T. and 32% of T.F. amputees are fitted. There is still discrepancy between males and females fitted with a prosthesis with significantly more men being fitted than women (T.T., M:F=75%:59%) (T.F., M:F=40%:20%). When individual hospital data are examined, the differences in percentage of amputees being successfully fitted are large, varying from 58% to 29%.



**Table 1: Percentage of amputees who were limb fitted in each of the amputating centres (> 5 amputees)**

For the fifth year, the figures for prosthetic rehabilitation being abandoned are reported. These are unilateral, T.T.= 1.4%, unilateral, T.F.=10.2% and bilateral, 5.1%.

## Discussion and Conclusions

### *New local audit, research and development projects*

The SPARG data set has been central to several additional pieces of work as follows (see Appendix A for further details): -

- An MSc project analysing SPARG data for patients having undergone a T.T. or T.F. amputation for peripheral arterial disease (PAD) with or without diabetes in the years 2007 to 2009 has revealed that in this cohort, proportionally half as many women were successfully fitted with a prosthesis as their male counterparts (Smith 2012).
- A collaborative project linking SPARG data to vascular surgery data to investigate factors affecting survival following major lower limb amputation for PAD with or without Diabetes, indicates that those people not successfully fitted with a prosthesis have a significantly poorer long term survival rate compared with those who are fitted (Stuart 2012).
- SPARG data was used to answer the question: 'Has centralisation of the Vascular Service in Glasgow been successful? A physiotherapists perspective'. This local audit revealed that in Glasgow, the length of stay of non-limb fitted amputees transferred from the specialist amputating service to non-specialist wards had a significantly increased their mean length of stay by 28 days (Hebenton 2012).
- The evidence based practice guideline 'Exercise Intervention for the Treatment of Patients with Intermittent Claudication.' was published this year (McNaughton et al 2012).



### *Changes in practice*

Prompted by the increased number of T.F. amputees abandoning prosthetic use, SPARG developed a physical assessment tool to aid pre-prosthetic assessment of these patients, the Trans-femoral Predictor (TFP) (Condie et al 2011). The TFP is now in use in several amputating centres and prosthetic services in the UK ensuring a more standardised and explicit physiotherapy assessment for T.F. amputee patients whose potential to use a prosthesis is uncertain.

### *Key messages from 2010 SPARG data:-*

1. The number of amputees and amputations has remained the same for the past 3 years
2. Outcomes vary significantly between hospitals, most noticeably, the proportion of amputations carried out at T.T. level and proportion limb fitted
3. Significantly fewer women are limb fitted compared to men.
4. Fewer T.F. amputees are limb fitted and more abandon use of their prosthesis within the rehabilitation period compared to T.T. amputees
5. Fewer patients are using early walking aid therapy, for example, PPAM aid within 10 days of surgery
6. Time from surgery to casting for first prosthesis has increased by 10 days for transtibial amputees and 10 days for transfemoral amputees since 1997

### *Points for action; -*

- SPARG physiotherapists require to investigate why there appears to be a trend for fewer amputees to be treated with EWAs prior to 10 days after surgery. A critical literature review (Smith et al 2003) and Evidence Based Practice Guidelines (Dawson et al 2008, Bouch et al 2012) indicate that early use of these devices is associated with improved wound healing, reduced post-operative oedema and earlier prosthetic fitting.
- The large variation in the proportion of amputees successfully limb fitted between centres warrants investigation by the local multidisciplinary teams as being more mobile after lower limb amputation not only improves quality of life (Pell et al 1993) but, being fitted with a prosthesis is now linked to improved long term survival rates.
- Can outcomes for women after amputation be improved?
- Can long term survival rates of patients not fitted with a prosthesis be improved?

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### 3. Results: Demographic Profiles

#### 3.1. Introduction

National survey data are presented in this section. Where possible, comparisons are shown for 2002-2010.

The total number of amputees for 2010 is 740. Data is available for 731 of these amputees, therefore included in the analysis.

#### 3.2. Amputee Details

##### 3.2.1. Age and Sex Distribution

The 2010 survey contains data from 731 amputees. The distribution of age and sex for the years 2002-2010 are shown in table 3.2.1.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
No. of amputees	831	823	831	732	704	699	741	746	740
No. of amputee with data	*	*	*	716	690	678	702	729	731
Age minimum	10	8	12	17	0	3	2	0	11
Age lower quartile	62	61	62	62	61	60	61	61	61
Age median	71	71	71	70	69	69	70	70	70
Age upper quartile	79	78	78	78	78	77	79	77	78
Age maximum	100	101	104	95	97	93	99	97	97
Mean age	69	68.15	68.76	68.48	67.49	66.78	68.14	67.47	68.50
Males %	64.12	66.15	65.10%	66.34%	67.49%	64.16%	62.09%	64.50%	67.03%
Females %	35.88	33.85	34.90%	33.66%	32.51%	35.84%	37.91%	35.50%	32.97%

Table 3.2.1 Age and sex of amputee population, 2002 - 2010

\* not reported

##### 3.2.2. Diabetic Amputees

The following table summarises the age and sex of amputees with an aetiology of PAD with Diabetes.

	2009			2010		
	Diabetes	PAD Without Diabetes	Unknown Aetiology	Diabetes	PAD Without Diabetes	Unknown Aetiology
Number of Amputees	284	323	7	332	306	4
Number with age available	280	319	0	328	302	3
Age Min	32	36	0	31	23	73
Age Lower Quartile	62	66	0	60	65	0
Age Median	70	73	0	69	73	0
Age Upper Quartile	76	80	0	77	80	0
Age Max	94	97	0	96	97	85
Age Mean	68.29	72.06	0.00	67.95	71.99	0.00
N Male	188	201	0	240	188	0
N Female	96	120	0	92	117	0
% Male	66.20%	62.62%	0.00%	72.29%	61.64%	0.00%
% Female	33.80%	37.38%	0.00%	27.71%	38.36%	0.00%

Table 3.2.2 Diabetic amputees, age and sex, 2009 & 2010

### 3.2.3. Aetiology of Amputation

The incidence of each aetiology recorded is shown in table 3.2.3.

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
Peripheral arterial disease – without diabetes	343	47.91	291	42.17	280	40.06	339	45.93	323	44.31	306	41.86
Diabetes	277	38.69	285	41.30	289	41.34	284	38.48	284	38.96	332	45.42
Trauma or Burns	22	3.07	15	2.17	19	2.72	17	2.30	16	2.19	11	1.50
Tumour	8	1.12	14	2.03	13	1.86	10	1.36	18	2.47	9	1.23
Congenital deformity	3	0.42	6	0.87	1	0.14	4	0.54	11	1.51	2	0.27
Drug abuse	4	0.56	4	0.58	6	0.86	6	0.81	12	1.65	5	0.68
Venous disease	7	0.98	7	1.01	5	0.72	7	0.95	2	0.27	10	1.37
Orthopaedic	29	4.05	33	4.78	31	4.43	33	4.47	33	4.53	28	3.83
Blood-borne infection	4	0.56	4	0.58	9	1.29	10	1.36	2	0.27	5	0.68
Renal Failure	3	0.42	4	0.58	1	0.14	6	0.81	5	0.69	5	0.68
Other	15	2.09	18	2.61	17	2.43	19	2.57	16	2.19	14	1.92
Not recorded	1	0.14	9	1.30	28	4.01	3	0.41	7	0.96	4	0.55
<b>Total</b>	<b>716</b>	<b>100.00</b>	<b>690</b>	<b>100.00</b>	<b>699</b>	<b>100.00</b>	<b>738</b>	<b>100.00</b>	<b>729</b>	<b>100.00</b>	<b>731</b>	<b>100.00</b>

Table 3.2.3. Aetiology of amputation, 2005 - 2010

### 3.2.4. Level of Amputation

Table 3.2.4 shows the incidence of six levels of amputation for the years 2005-2010. For amputees who had bilateral amputations in the reported period, both amputations are included in the data. The number of levels recorded will therefore be greater than the number of amputees for any given year. The level indicates the final level of the amputation, following any further surgery within the same period of hospital admission.

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
Transtibial	378	49.48	382	51.62	444	60.41	432	54.75	410	53.04	383	50.20
Transfemoral	367	48.04	344	46.49	268	36.46	337	42.71	321	41.53	348	45.61
Transpelvic	7	0.92	4	0.54	1	0.14	0	0.00	0	0.00	2	0.26
Hip Disarticulation	10	1.31	5	0.68	3	0.41	5	0.63	10	1.29	11	1.44
Knee Disarticulation	0	0.00	4	0.54	7	0.95	11	1.39	30	3.88	19	2.49
Ankle Disarticulation	1	0.13	0	0.00	1	0.14	2	0.25	2	0.26	0	0.00
Other	0	0.00	1	0.14	0	0.00	0	0.00	0	0.00	0	0.00
Not recorded	1	0.13	0	0.00	11	1.50%	2	0.25	0	0.00	0	0.00
<b>Total</b>	<b>764</b>	<b>100.00</b>	<b>740</b>	<b>100.00</b>	<b>735</b>	<b>100.00</b>	<b>789</b>	<b>100.00</b>	<b>773</b>	<b>100.00</b>	<b>763</b>	<b>100.00</b>

Table 3.2.4 Level of amputation, 2005 - 2010

### 3.2.5. Patients Fitted with a Prosthesis

The number of patients fitted with a prosthesis at final discharge is shown in table 3.2.5.1. Limb-fitting by level of amputation is shown in table 3.2.5.2. Since 2002, data on bilateral patients has been reported separately. Table 3.2.5.2 shows unilateral patients only for 2002-2010, and the bilateral patients for those years are shown in table 3.2.5.3. Table 3.2.5.4 shows the proportion of males and females who were fitted with a prosthesis. Those patients who have abandoned limb-fitting are not included in this "limb-fitted" patient group.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Number of amputees</b>	831	823	831	716	690	678	702	729	731
<b>Number fitted</b>	360	359	302	268	289	312	297	301	315
<b>Percentage fitted (%)</b>	43.32	43.62	36.34	37.43	41.88	44.64	42.31	41.29	43.09

Table 3.2.5.1 Patients fitted with a prosthesis, 2002 - 2010

	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Transtibial (%)</b>	62.56	66.57	60.35	55.63	64.63	63.11	68.18	67.69	69.67
<b>Transfemoral (%)</b>	26.08	31.38	20.71	25.90	26.17	29.27	24.80	24.14	31.99
<b>Other (%)</b>	25.00	50.00	43.75	5.88	41.67	61.54	23.53	17.14	11.54

Table 3.2.5.2 Patients fitted with a prosthesis by level, 2002 - 2010

	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Bilateral, any level(%)</b>	32.93	26.95	20.83	22.88	22.13	28.24	23.36	23.74	29.77

Table 3.2.5.3 Patients fitted with a prosthesis, bilateral, 2002 - 2010

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
<b>Total Males</b>	216	166	90
<b>Total Females</b>	85	108	39
<b>Males Limbfitted</b>	162	66	32
<b>Females Limbfitted</b>	50	22	5
<b>% of Males Limbfitted</b>	75.00%	39.76%	35.56%
<b>% of Females Limbfitted</b>	58.82%	20.37%	12.82%

Table 3.2.5.4 Sex and limbfitting outcome, 2010

### 3.2.6. Prosthetic Rehabilitation Abandoned

There are a number of patients each year who are initially fitted with a prosthesis, but for whom prosthetic treatment is abandoned prior to their final discharge. For the purposes of this report these patients are included in the “not limb-fitted” group, as this is their final outcome on discharge.

	2005		2006		2007		2008		2009		2010	
	n	% of init. fitted	n	% of init. fitted	n	% of init. fitted	n	% of init. fitted	n	% of init. fitted	n	% of init. fitted
<b>All patients</b>	20	6.94	29	9.12	29	8.50	20	5.95	24	7.38	15	4.25
<b>Unilateral TTA</b>	7	4.02	8	4.04	10	4.11	11	4.75	6	2.93	3	1.42
<b>TFA</b>	9	11.11	12	15.09	14	18.92	7	10.45	13	17.11	10	10.31
<b>Other</b>	0	0.00	0	0.00	2	20.00	0	0.00	0	0.00	0	0.00
<b>Bilateral</b>	4	12.50	9	25.00	3	7.50	2	5.88	5	13.16	2	4.88

Table 3.2.6 Prosthetic rehabilitation abandoned, 2005 - 2010

### 3.2.7. Mortality

Table 3.2.7 gives the inpatient mortality rates for 2010. This is the proportion of amputees who died within 30 days of their respective amputation (see also 3.2.8. for overall)

	2007	2008	2009	2010
<b>Number of amputees</b>	678	702	729	731
<b>Deaths within 30 days of amputation surgery</b>	41	43	44	54
<b>30 day mortality (%)</b>	6.05%	6.13%	6.04%	7.39%

Table 3.2.7 Mortality, 2007 - 2010

### 3.2.8. Final Outcome Summary

Table 3.2.8 gives a summary of gross outcomes for all amputees at the time of final discharge from physiotherapy whether at in patient discharge or after a period of out patient treatment in 2009.

	2007		2008		2009		2010	
	N	% of all amputees	N	% of all amputees	N	% of all amputees	N	% of all amputees
<b>Limb-fitted</b>	325	47.94%	297	42.31%	301	41.29%	315	43.09%
<b>Not Limb-fitted</b>	232	34.22%	291	41.45%	306	41.98%	274	37.48%
<i>Of which abandoned</i>	(29)	(4.28)	(20)	(2.85%)	(24)	(3.29%)	(15)	(2.05%)
<b>Deceased (inpatient or outpatient)</b>	93	13.72%	125	17.81%	104	14.27%	134	18.33%
<b>Unknown</b>	28	4.13%	25	3.56%	18	2.47%	8	1.09%

Table 3.2.8 Outcome summary, 2007 - 2010

### 3.2.9. Bilateral Amputations in Same Episode of Care

The number and levels of bilateral amputations carried out in the same episode of care are shown in table 3.2.9 below for 2002-2010.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Transtibial x 2	19	24	13	9	14	23	16	14	13
Transfemoral x 2	16	13	20	11	13	6	12	13	12
Transfemoral & Transtibial	7	4	6	1	9	8	2	4	5
Other	2	1	3	0	0	0	3	4	1
<b>Total</b>	<b>44</b>	<b>42</b>	<b>42</b>	<b>21</b>	<b>36</b>	<b>37</b>	<b>33</b>	<b>35</b>	<b>31</b>

Table 3.2.9 Bilateral amputations, 2002-2010

### 3.2.10. Unilateral and Bilateral Amputees

The table 3.2.10.1 shows the number of unilateral and bilateral amputees for the years 2005-2010. In this table bilateral amputees includes all amputees who were bilateral in the reported year.

The bilateral amputees are defined in more detail in table 3.2.10.2, where there are 2 groups shown: those amputees who had a prior amputation; and those who were not previously amputees, that is, underwent bilateral amputations in the same episode of care.

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Number of amputees</b>	716	100.00	690	100.00	678	100.00	738	100.00	729	100.00	731	100.00
<b>Unilateral amputees</b>	598	83.70	568	82.32	546	80.53	601	81.44	590	80.93	610	82.54
<b>Bilateral amputees</b>	118	16.30	122	17.68	131	19.32	137	18.56	139	19.07	129	17.46
<b>Unknown</b>	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Table 3.2.10.1 Unilateral and bilateral amputees, 2005 – 2010

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Bilateral Total</b>	117	100.00	122	100.0	131	100.00	137	100.00	139	100.00	129	100.00
<b>Bilateral – prior amputation(s)</b>	97	70.83	86	70.49	94	71.76	104	68.61	104	74.82	98	75.97
<b>Bilateral – both in same episode</b>	21	29.17	36	29.51	37	28.24	33	27.01	35	25.18	31	24.03

Table 3.2.10.2 Bilateral amputees, 2005 - 2010

Note - % here show proportion of all bilateral amputees in each group

### 3.2.11. Revisions and Re-amputations

The number of amputees having revision or re-amputation surgery is shown in table 3.2.11.1. A revision is defined as further primary stump surgery which may involve bone, but does not change the level of amputation. A re-amputation is defined as further surgery of the primary stump which changes the level of amputation. Each revision and re-amputation is counted, therefore amputees who had a revision then a re-amputation would be included in both counts.

Re-amputations from the transtibial to the transfemoral level for 2005-2010 are shown in table 3.2.11.2

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Amputations</b>	716	100.00	735	100.00	732	100.00	790	100.00	783	100.00	763	100.00
<b>Revisions</b>	22	3.07	23	3.13	21	2.87	17	2.15	22	2.81	21	2.75
<b>Re-amputations</b>	31	4.33	37	5.03	36	4.92	36	4.56	48	6.13	49	6.42
<b>Total revisions + re-amputations</b>	53	7.40	60	8.16	57	7.79	53	6.71	70	8.94	70	9.17

Table 3.2.11.1 Revisions and re-amputations, 2005-2010

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Initial transtibial amputations</b>	407	100.00	424	100.00	443	100.00	433	100.00	410	100.00	425	100.00
<b>Re-amputated to transfemoral</b>	29	7.13	41	9.67	36	8.13	33	7.62	40	9.76	40	9.41

Table 3.2.11.2 Transtibial to transfemoral re-amputations, 2005-2010

### 3.2.12. Functional Co-morbidities Index

The Functional Co-morbidities Index (FCI) was incorporated into the data set from 2008 in an effort to account for the relatively high incidence of co-morbid disease in the lower limb amputee population (see Appendix E). It is reported for the first time in this report.

The FCI is completed by scoring 1 if a disease is present, that is, diagnosed and recorded in the medical notes of a patient, and 0 if not. A score of 0 indicates no co-morbid disease and a score of 18 the highest number of co-morbid illnesses.

	Number	Min	Lower Quartile	Median	Upper Quartile	Max	Mean
<b>All Patients</b>	731	0	2	3	4	10	3.07
<b>Unilateral TTA</b>	300	0	2	3	4	10	3.17
<b>Unilateral TFA</b>	272	0	2	3	4	8	2.94
<b>Other</b>	28	0	2	3	4	6	2.88
<b>Bilateral</b>	131	0	2	3	4	8	3.36
<b>Diabetic</b>	332	0	2	3.5	5	9	3.74
<b>PAD without Diabetes</b>	306	0	2	3	4	10	2.82
<b>Other</b>	14	0	1	2	3	4	2.07

Table 3.2.12.1 Functional Co-morbidities Score, 2010.

### 3.3. Physiotherapy and Rehabilitation

#### 3.3.1. Compression Therapy

Compression therapy of the stump is widely used and figures for 2005-2010 are presented in table 3.3.3. These figures relate to the number of modalities used: if a single amputee received more than one type of therapy these would both appear in the table. Patients who died while registered as inpatients are excluded.

As of the 2004 report, Crepe Bandage has been removed from this section as it is not considered to be a form of compression therapy, rather a post-operative dressing, and will no longer be reported. Patients using the PPAM aid and sleeve as compression therapy i.e. without the frame and non-weight bearing, are also recorded from 2007.

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Elset 'S' bandage</b>	37	7.47	24	4.84	12	2.27	16	2.66	10	1.28	5	0.87
<b>Flowtron</b>	2	0.40	3	0.60	13	2.46	8	1.33	27	3.45	12	2.09
<b>Plaster cast</b>	78	15.76	62	12.50	82	15.50	98	16.28	127	16.24	89	15.51
<b>Shrinker sock</b>	371	74.95	378	76.21	379	71.64	425	70.60	519	66.37	392	68.29
<b>Silicone Sleeve</b>	3	0.61	0	0.00	9	1.70	21	3.49	7	0.90	8	1.39
<b>Other</b>	4	0.81	10	2.02	6	1.13	1	0.17	7	0.90	1	0.17
<b>PPAM</b>	-	-	-	-	28	5.29	33	5.48	85	10.87	67	11.67
<b>Total</b>	157	100.00	496	100.00	529	100.00	602	100	782	100.00	574	100.00

Table 3.3.1 Type of compression therapy used, 2005-2010

#### 3.3.2. Early Walking Aids

The types of Early Walking Aids (EWA) used in 2004-2009 are shown in table 3.3.4. Note that these figures relate to the number of devices used: if a single amputee used more than one type of EWA, both would appear in the table. Patients who died while registered as inpatients are excluded.

	2005		2006		2007		2008		2009		2010	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>AMA</b>	0	0.00	3	0.83	6	1.57	6	1.52	8	1.56	3	0.76
<b>Femurett</b>	42	12.43	54	14.96	46	12.01	51	12.88	71	13.87	47	11.90
<b>PPAM</b>	295	87.28	304	84.21	323	84.33	339	85.61	433	84.57	342	86.58
<b>Other</b>	1	0.30	0	0.00	8	2.09	0	0.00	0	0.00	3	0.76
<b>Total</b>	338	100.00	361	100.00	383	100.00	396	100.00	512	100.00	395	100.00

Table 3.3.2 Type of EWA used, 2005-2010



### 3.3.3. Mobility Outcomes: Locomotor Capabilities Index 5 (LCI 5)

The LCI is a widely used and validated self report tool that measures a lower limb amputee's locomotor capabilities with their prosthesis during and after rehabilitation (Condie et al 2006).

It was developed and validated as part of the Prosthetic Profile of the Amputee Questionnaire and can be used in isolation (*Gauthier-Gagnon and Grise 2001*). It consists of 14 items divided into 2 subscales: basic and advanced (see Appendix C). Each item is scored on a 4 point ordinal scale giving a total maximum score of 42 with sub-scores of 21 for the basic and advanced activities.

The LCI5 is an amended version of the LCI in which the upper ordinal level is split into 2 according to the use or non use of walking aids to give maximum sub-scores of 28 and total score of 56 (Franchignoni et al 2007). The LCI 5 has been found to reduce the ceiling effect associated with the LCI by 50% (Franchignoni et al 2004, Franchignoni et al 2007).

The higher the score of the LCI 5 the greater the capabilities of the amputee. The LCI5 is completed retrospectively for the amputee patient's mobility six months prior to their amputation and prospectively on final discharge. The difference between these two scores is calculated for each patient to give a score for their change in mobility. A positive score indicates an improvement in mobility and a negative score deterioration. All Basic and Advanced values in the tables below are the **mean** values.

2008	6/12 Pre-amp			Final Outcome			Change	N
	Basic	Adv.	Total	Basic	Adv.	Total		
Transtibial	24	20	44	21	16	37	-7	213
Transfemoral	25	22	47	20	13	33	-14	51
Bilateral	24	22	46	22	15	37	-9	8

2009	6/12 Pre-amp			Final Outcome			Change	N
	Basic	Adv.	Total	Basic	Adv.	Total		
Transtibial	24	21	45	21	16	37	-8	208
Transfemoral	23	20	43	16	11	27	-16	60
Bilateral	20	16	36	16	11	27	-9	28

2010	6/12 Pre-amp			Final Outcome			Change	N
	Basic	Adv.	Total	Basic	Adv.	Total		
Transtibial	24	20	44	20	15	35	-9	221
Transfemoral	24	21	45	18	13	31	-14	63
Bilateral	23	17	40	17	9	26	-14	26

Table 3.3.3 Locomotor Capabilities Index by level, 2008 to 2010.

## 4. Milestone Data

### 4.1. Statistics Presented

This section of the report deals with the statistical analysis of the rehabilitation milestones. The three rehabilitation milestones are shown in the table below:-

Milestones	Names by which milestones are referred to in this report
<i>Number of days from primary amputation to casting for prosthesis</i>	<i>'days to casting'</i>
<i>Number of days from casting to delivery of prosthesis where delivery is defined as the date at which the patient begins gait training with the prosthesis – finished or unfinished.</i>	<i>'casting to delivery'</i>
<i>Number of days from primary amputation to inpatient discharge</i>	<i>'days to inpatient discharge'</i>

For each milestone, the following descriptive statistics are presented: the number of amputees included in the analysis, minimum, lower quartile, median, upper quartile, maximum days.

Only patients who were limb-fitted by inpatient or outpatient discharge are included in *days to casting* and *casting to delivery*.

Where patients have undergone revisions or re-amputations, the latest date of surgery is used as the date of amputation. The final level, in the case of re-amputations to higher levels, is used to group the patients for this milestone.

*Days to inpatient discharge* is the length of stay in hospital for each amputee calculated in days from the date of amputation. The length of stay for bilaterals amputated in same hospital admission is calculated from the date of first surgery.

The length of hospital stay for patients re-amputated to a higher level will be calculated from the date of their final amputation.

For all milestones, patients who died as inpatients or as outpatients are excluded.

Groups with results prepared for all milestones	Additional groups for <i>days to inpatient discharge</i>
Transtibial Unilateral Fitted	Transtibial Unilateral Not Fitted
Transfemoral Unilateral Fitted	Transfemoral Unilateral Not Fitted
Bilateral* Fitted	Bilateral* Not Fitted

\*Bilateral includes all those who underwent one amputation in the report period having had a prior amputation(s), and those who underwent bilateral amputations in the report period having had no prior amputations.

For each milestone, and each group, the statistics represent available data. In addition, median days are shown for 1996-2010 with 1996-2000 including bilateral patients and 2001-2010 unilateral only.

Additionally for 2010, table 4.6 shows the *days from inpatient discharge to outpatient discharge* for transtibial unilateral, transfemoral unilateral and bilateral patients.

## 4.2. Days to Casting

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
Number Included	206	79	39
Minimum	10	15	20
Lower Quartile	31	33	39
Median	46	49	67
Upper Quartile	64.75	83.5	127
Maximum	319	289	262

Table 4.2.1 Days to casting milestone, descriptive statistics, 2010

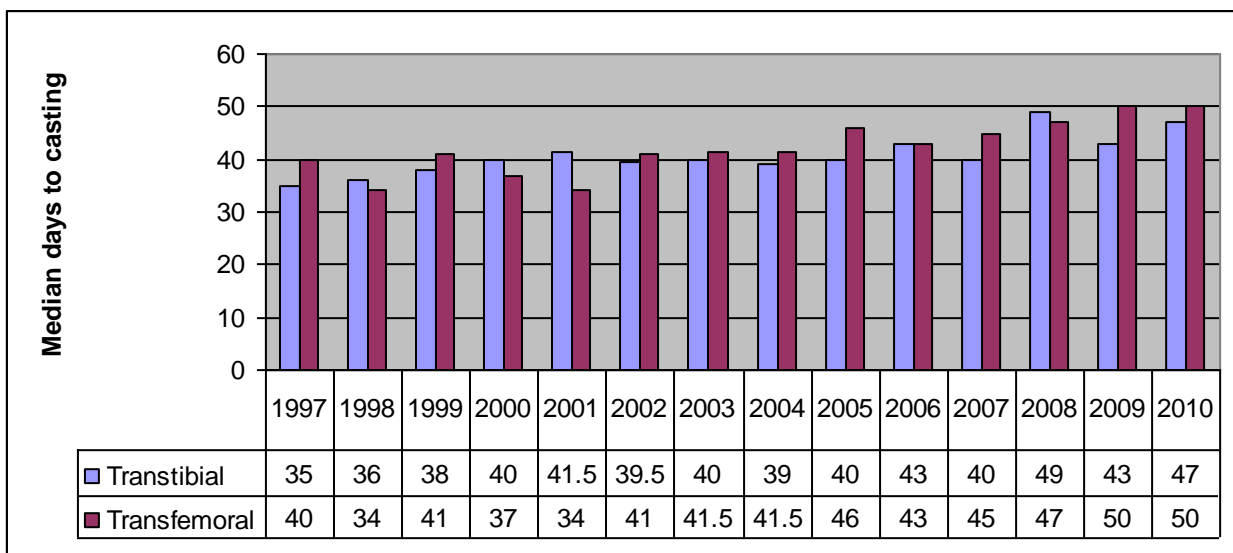


Figure 4.2.2 Median days to casting milestone, 1997-2010 (2001 – 2010 – Unilateral Only)

## 4.3. Casting to Delivery

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
Number Included	206	82	40
Minimum	1	2	2
Lower Quartile	7	13	7
Median	10	15	12.5
Upper Quartile	14	21	17.25
Maximum	126	71	38

Table 4.3.1 Casting to delivery milestone, descriptive statistics, 2010

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Transtibial	12	20	20	16	14	14	14	14	14	14	13	14	13	10
Transfemoral	16	21	20	21	22	15.5	14	14	14	15.5	14	15	15	15

Table 4.3.2 Median casting to delivery milestone, 1997-2010 (2001 – 2010 – Unilateral Only)

#### 4.4. Days to Inpatient Discharge: Fitted with a Prosthesis

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
Number Included	203	77	34
Minimum	5	7	6
Lower Quartile	33.5	34	32.5
Median	59	58	68
Upper Quartile	86.5	113	157.5
Maximum	331	524	288

Table 4.4.1 Days to inpatient discharge, patients fitted with a prosthesis, descriptive statistics, 2010

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Transtibial	59	63	60	62	57	61	53	55	54	56	55	55	55	59
Transfemoral	66	66	60	54	65.5	71	69	55.5	63.5	57	58	67.5	53	59

Table 4.4.2 Median days to inpatient discharge, patients fitted with a prosthesis, 1997-2010 (2001 – 2010 – Unilateral Only)

#### 4.5. Days to Inpatient Discharge: Not Fitted with a Prosthesis

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
Number Included	57	128	72
Minimum	0	1	5
Lower Quartile	21	20	15
Median	55	43.5	28
Upper Quartile	101	75	58
Maximum	323	524	310

Table 4.5.1 Days to inpatient discharge, patients not fitted with a prosthesis, descriptive statistics, 2010

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Transtibial	61	46	61	47	43	50	37	52	51.5	66	60.5	62	61	45
Transfemoral	36	36	45	40	42.5	48	41	42	47	52	46	47	51	41

Table 4.5.2 Median days to inpatient discharge, patients not fitted with a prosthesis, 1997-2010 (2001 – 2010– Unilateral Only)

## 4.6. Days from Inpatient Discharge to Outpatient Discharge

The following tables describe outpatient treatment length; however, this does not take into account the frequency or type of rehabilitation treatment which will vary from hospital to hospital. The 3 tables show respectively: all amputees, limb-fitted and not limb-fitted.

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
<b>Number Included</b>	177	106	34
<b>Minimum</b>	2	9	3
<b>Lower Quartile</b>	40	32.25	41.5
<b>Median</b>	91	82	95
<b>Upper Quartile</b>	174	193.25	166
<b>Maximum</b>	577	502	509

Table 4.6.1 Days from inpatient discharge to outpatient discharge, all amputees, 2010

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
<b>Number Included</b>	164	70	25
<b>Minimum</b>	4	9	21
<b>Lower Quartile</b>	42.75	54.25	34
<b>Median</b>	95	128.5	111
<b>Upper Quartile</b>	176.25	245.75	176
<b>Maximum</b>	577	502	509

Table 4.6.2 Days from inpatient discharge to outpatient discharge, limb-fitted amputees 2010

	2006		2007		2008		2009		2010	
	N	Median	n	Median	n	Median	n	Median	n	Median
<b>Unilateral TTA</b>	91	148	160	84	153	103	152	93.5	164	95
<b>TFA</b>	35	160	51	122	50	88.5	57	133	70	128.5
<b>Bilateral</b>	13	209	29	71	24	66	25	66	25	111

Table 4.6.3 Days from inpatient discharge to outpatient discharge, limb fitted amputees, 2006 – 2010

	Transtibial Unilateral	Transfemoral Unilateral	Bilateral
<b>Number Included</b>	13	36	9
<b>Minimum</b>	2	10	3
<b>Lower Quartile</b>	20	29	46
<b>Median</b>	34	43.5	74
<b>Upper Quartile</b>	98	86	132
<b>Maximum</b>	241	329	160

Table 4.6.4 Days from inpatient discharge to outpatient discharge, non limb-fitted amputees 2010

## 5. Trends in Compression Therapy and Early Walking Aids (EWAs)

### 5.1. Statistics Presented

This chapter looks at trends in the use of compression therapy and Early Walking Aids (EWAs). All patients receiving compression therapy or EWA therapy are included in each analysis.

### 5.2. Trends in Compression Therapy

Of the patients receiving compression therapy, the percentage who received it within 10 days of amputation is shown in table 5.2.1 for 1993-2009. A line chart representing this data is shown in figure 5.2.2.

	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
<b>TT</b>	28.5	40.6	52.8	52.7	49.8	50.7	61.3	69.8	66.2	67.8	65.5	54.4	47.5	52.8	55.7	51.1	55.3
<b>TF</b>	32.9	35.1	47.2	49.5	45.6	58.4	58.1	53.7	49.3	63.8	55.3	49.5	43.6	41.6	45.2	40.2	39.1

Table 5.2.1 Patients receiving compression therapy within 10 days of amputation (%), 1994 – 2010

#### Compression Therapy Timing

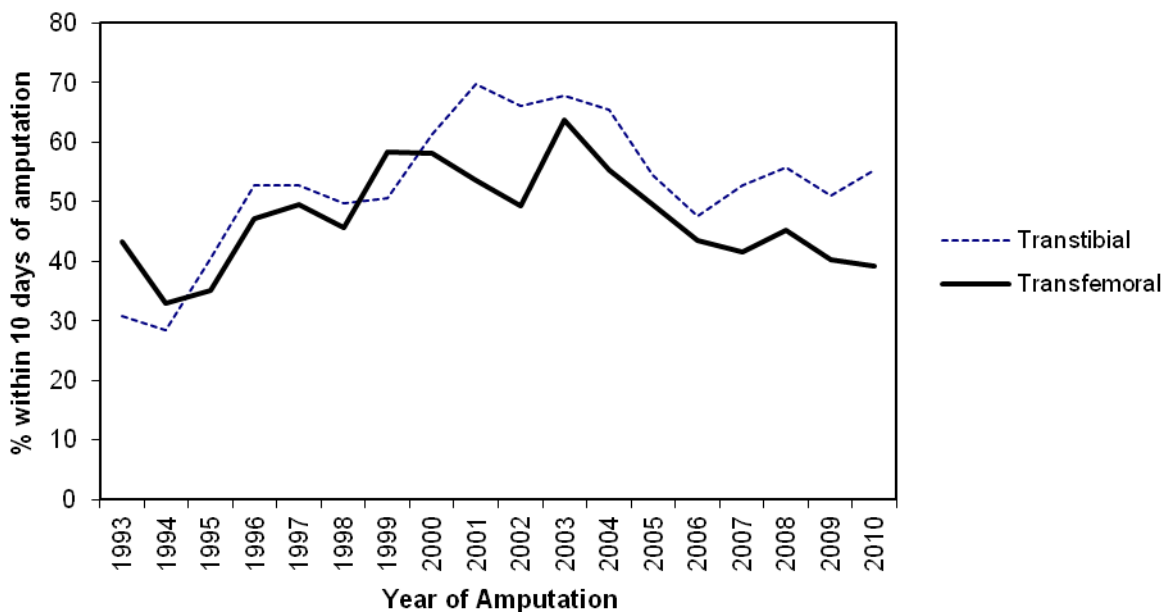


Figure 5.2.2 Percentage of transtibial and transfemoral amputees receiving compression therapy within 10 days of amputation surgery, 1993 - 2010

### 5.3. Trends in Early Walking Aids

Of the patients receiving EWA therapy, the percentage who received it within 10 days of amputation is shown in table 5.3.1 for 1994-2010. A line chart representing this data is shown in figures 5.3.2.

	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
TT	24.2	34.3	23.2	25.1	25.1	29.1	28.8	35.9	27.1	23.3	25.9	23.9	18.3	21.5	17.6	14.9	16.0
TF	24.6	17.9	25.8	27.1	26.9	30.9	24.5	26.2	26.7	21.2	21.2	14.9	13.3	15.6	23.5	12.1	15.4

Table 5.3.1 Patients using EWAs within 10 days of amputation (%), 1994 - 2010

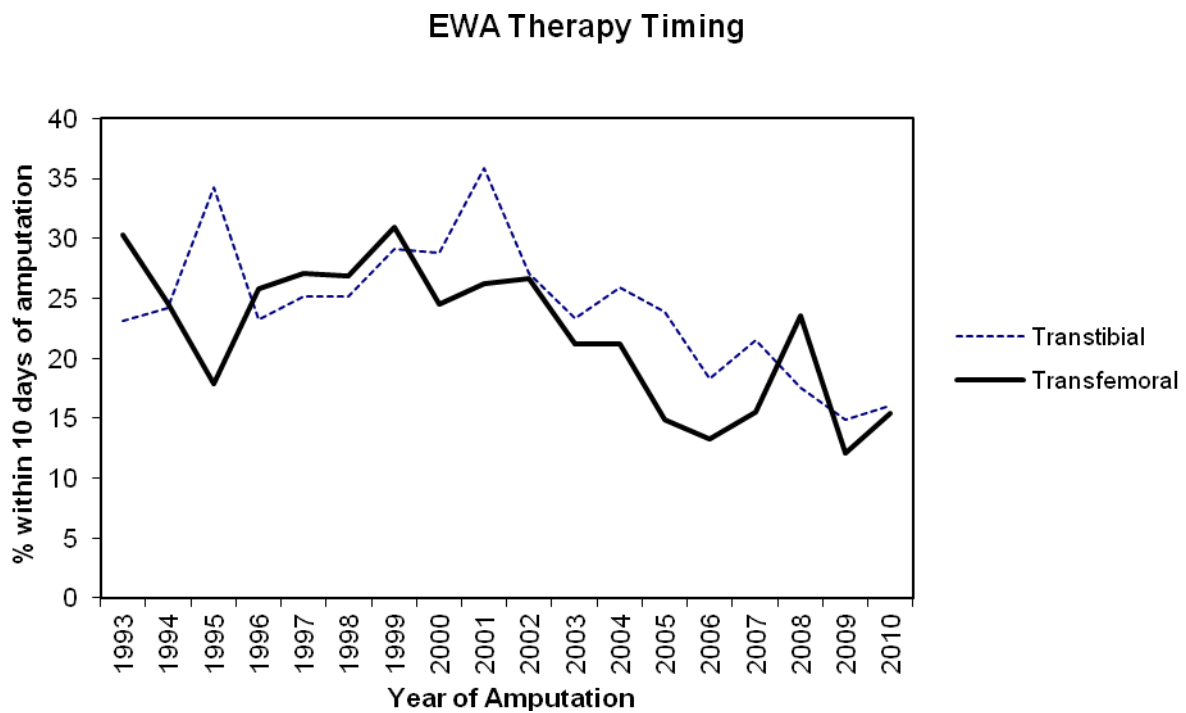


Figure 5.3.2 Percentage of transtibial and transfemoral amputees using EWAs within 10 days of amputation surgery, 1993 - 2010

## 6. Individual Hospital Summaries for 2010 – Key Performance Indicators

### 6.1. Final Outcome (all)

This section presents the national data broken down by amputating hospital.

The number of amputees at each hospital, the data completeness and Functional Comorbidities Index (see Appendix E) are shown in table 6.1.

Hospital	Total number	Number returned	% Returned	Number incomplete	FCI
Aberdeen Royal Infirmary	81	81	100.00	2	4.0
The Ayr Hospital	44	44	100.00	1	3.0
Balfour Hospital	2	2	100.00	0	4.5
Borders	Unknown	0	0	n/a	unknown
Dumfries & Galloway Royal Infirmary	37	37	100.00	23	2.0
Gartnavel General Hospital	33	33	100.00	0	3.0
Gilbert Bain Hospital	2	2	100.00	0	1.5
Glasgow Royal Infirmary	55	55	100.00	0	3.0
Hairmyres Hospital	59	58	98.31	2	3.0
Inverclyde Royal Hospital	17	17	100.00	4	3.0
Ninewells Hospital	111	111	100.00	0	3.0
Queen Margaret Hospital	23	23	100.00	0	3.0
Raigmore Hospital	42	40	95.24	1	3.0
Ross Hall Hospital	1	1	100.00	0	2.0
Royal Alexandria Hospital	7	6	85.71	3	2.0
Royal Infirmary of Edinburgh	102	101	99.02	0	3.0
Southern General Hospital	36	34	94.44	3	3.0
St John's Hospital At Howden	1	1	100.00	0	1.0
Stirling Royal Infirmary	30	28	90.00	0	3.0
Victoria Infirmary	5	5	100.00	0	3.0
Western Infirmary	34	34	100.00	1	3.0
Wishaw General Hospital	10	10	100.00	0	3.5
Woodend General Hospital	5	5	100.00	0	1.0
Yorkhill Hospital	3	3	100.00	2	0.0
<b>Total</b>	<b>740</b>	<b>731</b>	<b>98.78</b>	<b>42</b>	<b>3.0</b>

**Table 6.1 The number of amputees at each hospital, the data completeness and FCI, 2010.**

Key: -

<i>Hospital</i>	Hospital Name
<i>Total Number</i>	Total number of amputees i.e. SPARG forms issued
<i>Number returned</i>	Number of amputees that have SPARG form retrieved
<i>% returned</i>	Percentage of retrieved SPARG forms
<i>Number incomplete</i>	Number of retrieved forms with missing data
FCI	Median Functional Co-morbidities Score (Appendix E)



Outcomes for each amputating centre are shown in table 6.2.

	<b>Number data available</b>	<b>% TTA</b>	<b>% LF</b>	<b>% Mortality</b>	<b>% Abandoned</b>	<b>% Readmissions</b>	<b>% WI</b>
Aberdeen Royal Infirmary	81	45.68	41.98	14.81	2.47	2.47	40.74
The Ayr Hospital	44	61.36	56.82	9.09	2.27	18.18	29.55
Balfour Hospital	2	0.00	0.00	0.00	0.00	0.00	0.00
Dumfries & Galloway Royal Infirmary	37	48.65	43.24	10.81	0.00	8.11	18.92
Gartnavel General Hospital	33	51.52	57.58	3.03	3.03	9.09	36.36
Gilbert Bain Hospital	2	50.00	50.00	0.00	0.00	50.00	0.00
Glasgow Royal Infirmary	55	38.18	34.55	12.73	9.09	5.45	34.55
Hairmyres Hospital	58	38.98	33.90	3.39	5.08	15.25	25.42
Inverclyde Royal Hospital	17	58.82	35.29	5.88	0.00	0.00	23.53
Ninewells Hospital	111	45.05	46.85	5.41	0.90	9.91	33.33
Queen Margaret Hospital	23	47.83	52.17	0.00	0.00	17.39	47.83
Raigmore Hospital	40	64.29	38.10	7.14	0.00	7.14	26.19
Ross Hall Hospital	1	100.00	100.00	0.00	0.00	0.00	0.00
Royal Alexandria Hospital	6	42.86	28.57	28.57	14.29	0.00	28.57
Royal Infirmary of Edinburgh	101	47.06	34.31	7.84	0.98	5.88	29.41
Southern General Hospital	34	52.78	52.78	2.78	0.00	8.33	19.44
St John's Hospital At Howden	1	0.00	0.00	0.00	0.00	0.00	100.00
Stirling Royal Infirmary	28	70.00	43.33	3.33	0.00	3.33	30.00
Victoria Infirmary	5	80.00	100.00	0.00	0.00	20.00	40.00
Western Infirmary	34	67.65	38.24	2.94	0.00	14.71	35.29
Wishaw General Hospital	10	40.00	30.00	10.00	0.00	10.00	60.00
Woodend General Hospital	5	40.00	80.00	0.00	0.00	0.00	20.00
Yorkhill Hospital	3	33.33	66.67	0.00	0.00	0.00	0.00
<b>Total</b>	<b>731</b>	<b>49.73</b>	<b>42.84</b>	<b>7.30</b>	<b>2.03</b>	<b>8.65</b>	<b>31.35</b>

**Table 6.2 Key Performance Indicators by Amputating hospital, 2010.**

Key

*% TTA* Percentage of transtibial amputees

*% LF* Percentage of amputees who were limb fitted

*Mortality* Percentage of amputees who died within 30 days of amputation

*% Abandoned* Percentage of amputees who abandoned limb fitting in rehabilitation period

*% Re-admissions* Percentage of amputees who were readmitted after initial inpatient discharge

*% Wound Infection* Percentage of amputees with wound infection within rehabilitation period, that is, amputee demonstrates symptoms of infection (localised erythema, pain, heat, cellulitis, oedema and/or a positive wound swab and is commenced on antibiotics and/or a topical treatment).

## 6.2. Milestones (Unilateral trans-tibial amputees)

The number of, and milestones data for unilateral transtibial amputees are presented for each hospital in Table 6.3.

	Number	Days to Compression Therapy	Days to EWA	Days to Casting	Days Casting to Delivery	Length of Hospital Stay
Aberdeen Royal Infirmary	32	11.5	14	32	8	74
The Ayr Hospital	22	29	36	63	14	33
Dumfries & Galloway Royal Infirmary	14	15.5	33	73	14	59
Gartnavel General Hospital	16	3.5	11	46.5	15	32
Gilbert Bain Hospital	1	0	-	-	-	42
Glasgow Royal Infirmary	17	11	12	41	14	36.5
Hairmyres Hospital	17	12	17	84	14	25
Inverclyde Royal Hospital	6	0	16.5	53	26.5	57.5
Ninewells Hospital	42	8	13	34.5	7	59
Queen Margaret Hospital	8	0	18	48	7	68.5
Raigmore Hospital	23	0	17	32.5	1	50
Ross Hall Hospital	1	7	14	39	10	21
Royal Alexandria Hospital	3	43	9.5	62	9	61
Royal Infirmary of Edinburgh	39	13	22	61	10	106
Southern General Hospital	16	0	14	32	12	41.5
Stirling Royal Infirmary	18	7	42	54	22	78.5
Victoria Infirmary	4	8	11.5	30.5	10	45.5
Western Infirmary	15	8	10	53	17	33
Wishaw General Hospital	4	18	14	-	7	85
Woodend General Hospital	2	2	34.5	53.5	5.5	56.5
Yorkhill Hospital	1	0	-	26	8	-
<b>Total</b>	<b>301</b>	<b>10</b>	<b>17</b>	<b>46</b>	<b>10</b>	<b>57</b>

**Table 6.3 Key Performance Indicators (milestones) by Amputating hospital, 2010.**

Key: -

*Number*

Number of unilateral trans-tibial amputees

*Days to Comp. Therapy*

Median days from final surgery to start of compression therapy

*Days to EWA*

Median days from final surgery to start of early walking aid therapy e.g. PPAM aid.

*Days to casting*

Median days from final surgery to casting for prosthesis

Days casting to delivery

Median days from casting to delivery of prosthesis

Length of hospital stay

Median days from amputation to final inpatient discharge

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- The 'MUST' Explanatory Booklet: A guide to the 'Malnutrition Universal Screening Tool' ('MUST'), Produced by Malnutrition Advisory Group, A standing committee of BAPEN, [http://www.bapen.org.uk/pdfs/must/must\\_explan.pdf](http://www.bapen.org.uk/pdfs/must/must_explan.pdf)

## Appendix A: Project work.

*Completed projects: -*

Smith F, Kennon B, Paul L and Nichols N (2012) "What are the key characteristics of an amputee population in relation to outcome?" *MSc Dissertation, Glasgow Caledonian University* (publication pending). Further information available from Ms Fiona Smith, Specialist Physiotherapist, Western Infirmary, Glasgow ([Fiona.smith6@ggc.scot.nhs.uk](mailto:Fiona.smith6@ggc.scot.nhs.uk)).

Stuart W, Hussey K, Ross P and Smith F (2012) 'Indicators of poor outcome following major amputation.' (publication pending) Further information available from Mr Wesley Stuart, Consultant vascular Surgeon, Western Infirmary, Glasgow ([wesley.stuart@ggc.scot.nhs.uk](mailto:wesley.stuart@ggc.scot.nhs.uk) )

Hebenton J (2012) 'Has centralisation of the Vascular Service in Glasgow been successful? A physiotherapists perspective'. Local audit, Western Infirmary, Glasgow. Further information available from Mrs Joanne Hebenton, Specialist Physiotherapist, Western Infirmary, Glasgow ([joanne.hebenton@ggc.scot.nhs.uk](mailto:joanne.hebenton@ggc.scot.nhs.uk))

McNaughton M, Robertson F, Ross M, Smith F, Smith S and Whitehead L (2012) 'Exercise Intervention for the Treatment of Patients with Intermittent Claudication.' Scottish Physiotherapy Amputee Research Group, Glasgow.

(<http://www.knowledge.scot.nhs.uk/sparg.aspx>)

*Ongoing projects: -*

Data linkage and longitudinal follow up of dysvascular amputees with and without diabetes examining in more detail their pre amputation morbidities, amputee level and limb salvaging surgery with discharge destination and outcome. Detailed analysis of their diabetic status and true mortality rates are also examined according to level and aetiology. Further information available from Mr Wesley Stuart, Consultant vascular Surgeon or Ms Fiona Smith, Specialist Physiotherapist, Western Infirmary, Glasgow ([Fiona.smith6@ggc.scot.nhs.uk](mailto:Fiona.smith6@ggc.scot.nhs.uk)).

## Appendix B: List of SPARG Database reporting facilities

30 days mortality

Amputees fitted with a prosthesis and abandoned - by level (bilateral)

Amputees fitted with a prosthesis and abandoned - by level (unilateral only)

Amputees fitted with prosthesis for transfers only (bilateral)

Amputees fitted with prosthesis for transfers only (unilateral only)

Bilateral amputation surgery - by level

Check final outcome

Check important dates

Cognitive status - by aetiology

Cognitive status - by level

Compression therapy - by type

Days from casting to delivery

Days from final surgery to casting

Days from final surgery to compression therapy - by aetiology

Days from final surgery to compression therapy - by level (bilateral)

Days from final surgery to compression therapy - by level (unilateral only)

Days from final surgery to EWA - by aetiology

Days from final surgery to EWA - by level (bilateral)

Days from final surgery to EWA - by level (unilateral only)

Days from in-patient discharge to out-patient discharge - by aetiology

Days from in-patient discharge to out-patient discharge - by level (bilateral)

Days from in-patient discharge to out-patient discharge - by level (unilateral only)

Delayed healing - by aetiology

Delayed healing - by level (bilateral)

Delayed healing - by level (unilateral only)

Delayed in-patient discharge

EWAs - by type

Falls

Final outcome summary

Final outcome summary - by aetiology

Final outcome summary - by level (bilateral)

Final outcome summary - by level (unilateral only)

Functional co-morbidities index - by aetiology

Functional co-morbidities index - by level (bilateral)

Functional co-morbidities index - by level (unilateral only)

Gender and mean age

Gender and mean age - by aetiology

Gender and mean age - by level (bilateral)  
Gender and mean age - by level (unilateral only)  
Healthcare acquired infection (other)  
Heamodialysis  
Home circumstances  
Interim discharge  
Length of stay (days from final surgery to in-patient discharge) - limb fitted amputees by aetiology  
Length of Stay (days from final surgery to in-patient discharge) - limb fitted amputees by level  
Length of stay (days from final surgery to in-patient discharge) - non limb fitted amputees by aetiology  
Length of Stay (days from final surgery to in-patient discharge) - non limb fitted amputees by level  
Limb fitting - timing  
Locomotor capabilities index 5 - by aetiology  
Locomotor capabilities index 5 - by level  
Overall summary - by aetiology  
Overall summary - by level (bilateral)  
Overall summary - by level (unilateral only)  
Revisions and re-amputations in same episode  
Wound infection - by aetiology  
Wound infection - by level (bilateral)

## Appendix C: SPARG Hospitals and Physiotherapists

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## Appendix D: Aetiology Mapping

The list of aetiologies used in this report was revised and reduced in 2004 in order to improve accuracy of recording and relevance of categories. The following shows the mapping of the previous list of aetiologies to the current list

<b>Previous category</b>	<b>New category</b>
PAD – Arteriosclerosis	Unchanged
PAD – Diabetes	Unchanged
Trauma	Trauma or Burns
Burns	
Tumour	Unchanged
Congenital deformity	Unchanged
Drug abuse	Unchanged
Venous Problems	Venous disease
Non-union of fracture	Orthopaedic
Failed joint replacement	
Acquired deformity	
Septicaemia	Blood-borne infection
Renal Problems	Renal Failure
Other	Other
Local Infection	
Not recorded	Unchanged

## Appendix E: Locomotor Capabilities Index 5

**Only fill this in for amputees who are using their prosthesis to WALK.**

Please note: this assessment must be completed *with the amputee present or on the telephone* and the amputee *must be asked* how they think they can manage each activity. It is how the patient perceives their own performance that is being measured.

Put 0,1,2,3 or 4 in the appropriate boxes where: -

- 0. = No
- 1. = Yes, if someone helps
- 2. = Yes, if someone is near
- 3. = Yes, alone with walking aid(s)
- 4. = Yes, alone **without** walking aid

Activity	6 months pre-admission	Final Discharge
<i>Basic Activities</i>		
Get up from a chair		
Walk indoors		
Walk outside on even ground		
Go up the stairs with a hand-rail		
Go down the stairs with a hand-rail		
Step up a kerb		
Step down a kerb		
TOTAL		
<i>Advanced activities</i>		
Pick up an object from the floor when standing		
Get up from the floor (e.g. after a fall)		
Walk outside on uneven ground (e.g. grass, gravel, slope)		
Walk outside in bad weather (e.g. rain, wind, snow)		
Go up a few steps without a hand-rail		
Walk down without a hand-rail		
Walk while carrying an object		
TOTAL		
OVERALL TOTAL		
CHANGE of overall total from 6 months preadmission to final discharge		

## Appendix F: Functional Co-morbidities Index

Lower limb amputees are a predominantly elderly group with a relatively high incidence of co-morbid disease. This has not been previously accounted for in the SPARG data collection and analysis. The Functional Co-morbidities Index (FCI) was incorporated into the data set from 2008.

The FCI was developed and validated with physical function as the outcome (Groll et al 2005). The more commonly used indices predict mortality or administrative outcomes such as hospital length of stay. These indices tend to include conditions that are asymptomatic and impact on life expectancy but not physical function (for example, hypertension) and have been found not to correlate strongly with physical disability.

The FCI was developed using 2 different samples of adults: 1 group n= 9,423 'random Canadian adults'; 2nd group n = 28,349 'US adults seeking treatment for spinal ailments' using the physical subscale of the SF36 as the outcome.

The FCI is completed by scoring a 1 if a disease is present and 0 if it is not. A score of 0 indicates no co-morbid illness and a score of 18 indicates the highest number of co-morbid illnesses. The disease is only scored as present if it is diagnosed and documented in medical notes.

The BMI is calculated for each patient by dividing the patient's weight by their height in metres squared (weight / height <sup>2</sup>). If neither height nor weight can not be measured or obtained, BMI can be estimated using the mid upper arm circumference (MUAC) ('Must' Explanatory Booklet). If MUAC is more than 32.0cm, BMI is likely to be more than 30kg/m<sup>2</sup> i.e. patient is likely to be obese.

### Functional Co-morbidities Index

Arthritis (rheumatoid and osteoarthritis)	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Osteoporosis	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Asthma	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Chronic Obstructive Pulmonary Disease, Acquired Respiratory Distress Syndrome, Emphysema	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Angina	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Congestive Heart Failure (or heart disease)	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Heart Attack (myocardial infarction)	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Neurological disease e.g. Multiple Sclerosis or Parkinson's	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
CVA or TIA	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Peripheral Arterial Disease	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Diabetes Type I and II	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Upper gastrointestinal disease (ulcer, hernia, reflux)	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Depression	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Anxiety or panic disorders	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Visual impairment (cataracts, glaucoma, macular degeneration)	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Hearing impairment (very hard of hearing even with hearing aids)	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Degenerative disc disease including, back disease, spinal stenosis or severe chronic back pain	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Obesity and/or BMI > 30 (Pre-op weight in Kg/height in metres <sup>2</sup> )	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Weight ..... (Kg)	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Height ..... (metres)				
		BMI = .....		
<b>Please see Guidance Notes</b>		<b>Score (Yes = 1, No = 0)</b>	/ 18	

## Appendix G: Data Cleaning Steps

- Remove records which are marked as missing
- Checked, flagged and fixed DOBs in current year and age >100
- Check, flagged and fix date of amputation
- Check Amputees with right and left amputations are marked as bilaterals
- Check milestones are calculated from final surgery
- Check if LF then final outcome is LF (1) or Abandoned (3).
- Where DOB, date of amputation, etc are left blank then these are flagged and marked as "Missing"