A Survey of the Lower Limb Amputee Population in Scotland 2018

Public Report

SPARG
Scottish Physiotherapy Amputee Research Group

November 2022

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1 Acknowledgements

We wish to thank all physiotherapy teams who are involved in the work of SPARG and without whose loyal, tireless, and determined support this work would not have been accomplished.

SPARG would also like to thank the British Association of Chartered Physiotherapists in limb Absence Rehabilitation (BACPAR) for providing the funding to allow us to produce this report.

The final draft of this report was reviewed by a national multidisciplinary group (see Appendix I) and we would like to thank each of them for taking the time to do this.

2 SPARG 2018 Annual Report: Executive Summary

National data: key points

The median age of patients with diabetes (66yrs) remains younger than those with peripheral arterial disease (PAD), who do not have diabetes (72yrs). Those with diabetes aetiology continue to be approximately 4 to 7 years younger.

The most common incidence of amputation remains diabetes (47.5%) or PAD (35.1%). However, in 2018 amputations due to tumour, drug abuse and blood borne infection were all higher than previous years.

The percentage of transtibial (56.7%) and transfemoral (41.9%) amputations remain the same. However, there are reducing numbers of knee disarticulation (2018 n=4, 2017 n=8), hip disarticulation (2018 n=4, 2017 n=8) and bilateral amputations in the same episode of care (2018 n=29, 2017 n=38).

There were a number of changes in relation to limb fitting which are detailed below:

- In 2018 45% of all patients were limb fitted, the highest over 5 years.
- The number of patients limb fitted at transfemoral level reduced from 26.4% in 2017 to 19.5% in 2018.
- Limb fitting was also reduced in those with bilateral transtibial amputations from 77.4% in 2017 to 60% in 2018.
- There was a noticeable reduction in the number of females with a unilateral transtibial amputation being limb fitted: 68% in 2016; 48% in 2017 and 25% in 2018. There was however a spike in the number of bilateral transtibial females' limb fitted from 19% in 2017 to 38.5% in 2018.

The percentage of patients abandoning limb use during their rehabilitation period has reduced from 15% in 2017 to 4% in 2018 in those with a transfemoral amputation. There may be a relationship between the reduction in the number of transfemoral patients being limb fitted and abandonment at this level.

The mean Locomotor Capability Index (LCI-5) score for those with a transfemoral amputation, improved to -12 in 2018 from -17 in 2017. This indicates an improvement in mobility achieved after rehabilitation.

Inpatient and outpatient falls have been recorded for the third year and the 2018 data showed that more active patients i.e., those that go on to limb fit, are more likely to fall than those with lower mobility.

There was a continued downward trend in 30-day mortality from 5.6% in 2017 to 4.7% in 2018.

The number of patients receiving compression therapy was significantly lower than previous years, from approximately 500 patients to 389 in 2018. We explored this further and surmise that this may be linked to compression only being provided when patients are likely to proceed to limb use. Only 54 of the 389 patients provided with compression in 2018 were not fitted with a prosthetic limb.

Days to casting has increased from 51 days in 2017 to 70 days in 2018 in those with a transfemoral amputation; the converse was observed at transtibial level (36 days).

Individual Hospital data

Each hospital's model of care (MOC) varies and the impact this has on the achievement of rehabilitation milestones and outcomes is complex and influenced by many factors including patient demographics (see Table 1). Hebenton et al 2019 identified key aspects of services that appear to improve speed and outcomes of rehabilitation after lower limb amputation[1]. These key aspects have been used to develop the weighted MOC scoring system used in this report.

Table 1 Factors influencing rehabilitation milestones and outcomes

Influencing factors	AH	DGRI	FVRH	GRI	HH	QEUH	NH	RH	RIE/AA	National
MOC score (max score = 11)	7	6	6	2	5	8	10	9	7	**6.7**
Median age	70	66	66	55	67	65	68	70	66	**66**
Mean FCI (max score = 18)	3.0	1.5	3.1	1.6	4.0	3.0	3.0	4.0	3.0	**3.1**

Table 2 Rehabilitation milestones and outcomes for unilateral TTA

Milestones and outcomes for unilateral TTA	AH N=23	DGRI N=12	FVRH N=23	GRI^ N=10	HH N=26	QEUH N=70	NH*° N=49	RH*° N=19	RIE/ AA° N=53	National median
Days to LF	72	50	59	73	62	48	33	29	72	**52**
%LF	73.9	75	47.8	70	65.4	67.1	83.7	52.6	71.7	**64.6**
LCI5 change score	-9.5	-6	-6	4.5	-2	-2	-11	-4	-8	**-6**

KEY: -
Red = less positive compared to national median, AMBER = similar to national median, GREEN = more positive compared to national median.
FCI = Functional Co-morbidities Index. MOC = model of care,
MOC indicators: Immediate post-operative rigid dressing, Specialist physiotherapy in first 14 days, Daily inpatient gym session, Inpatient gym session ≥ 1 hour, Prosthetic centre on site as inpatient, Prosthetic provision as an inpatient, Specialist physiotherapy outpatient service. LF = limb fitting i.e., being fitted with a prosthesis, and starting walking training,
LCI5 = Locomotor Capabilities Index 5 change score, difference between score 6 months before amputation and at the end of rehabilitation. *= rigid dressing used, °= limb fitted as inpatient, ^ note GRI has no vascular surgery.

The full report can be accessed from the BACPAR website (BACPAR website: https://www.bacpar.org/resources/sparg-resources/sparg-public-reports/)

3 Introduction

This is the 26th Annual Report on data collated from all major lower limb amputations in Scotland by the Scottish Physiotherapy Amputee Research Group (SPARG). All major amputations carried out in 2018 are included, that is, ankle disarticulation (AD), transtibial (TTA), knee disarticulation (KDA), transfemoral (TFA), hip disarticulation (HD), and transpelvic (TP). Patients having partial amputations of the feet and amputation of the toes are excluded.

All data are entered locally onto the SPARG web-based Database. The Database has reporting facilities which allow for local data checking and analysis.

National and individual hospital data are presented in this report. All outcomes are reported according to final level of amputation. Individual hospital data are summarised to facilitate comparison of outcomes and the benchmarking of services. The comparative data items or key performance indicators (KPIs) for each hospital were identified by a previous, multidisciplinary benchmarking exercise[2]. Each of the larger centres' (n≥10) models of care (MOC) has been described according to criteria identified in the benchmarking report and agreed following consultation with SPARG members. Each model of care has been scored according to a system described in a recent study into the impact MOC may have on rehabilitation milestones and outcomes after amputation [1].

Unfortunately, due to data governance restrictions for a fourth year, there are no data for those patients who underwent an amputation in the Grampian region, though the final number of amputees does include them. In addition to Grampian's data there were another 5 missing forms.

The quality management "data checking" system introduced in 2003 continues to be highly successful. The percentage of returned records which are complete in every respect is 97.1%.

Factors not currently accounted for in data analysis: -

- Pre-amputation vascular reconstructive surgery
- Incidence of palliative amputations, that is, life-improving surgery for patients who were previously and, in the long-term, immobile with no prospect of prosthetic rehabilitation
- Social deprivation
- Final outcome at a defined point in time after surgery and longer term follow up

4 Results: Demographic Profiles

4.1 Introduction

National survey data are presented in this section. Where possible, comparisons are shown for 2009-2018. The total number of amputees for 2018 was 794; data is available for 706 of these amputees therefore included in the analysis. Missing data includes all data sets from Grampian Health Board (n= 83) and those forms not returned for data input (n=5). These 706 patients underwent 735 amputation procedures; some patients having had a re-amputation (to a higher level), or bilateral amputations during the same episode of care.

4.2 Amputee Details

4.2.1 Age and Sex Distribution

The 2018 survey contains data from 706 amputees. The data for numbers of amputees from 2009-2018 by age and gender is shown in Table1. In 2018, the median age was 66 years at time of amputation and the population were 70% male and 30% female.

Table 3 Age and sex of amputee population, 2009- 2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of Amputees	746	740	700	708	809	819	803	780	798	**794**
No. of Amputee with Data	729	731	688	702	803	812	704	685	714	**706**
Age Lower Quartile	61	61	60	61	58	57	58	56	56	**57**
Age Upper Quartile	77	78	77	78	78	76	76	76	76	**76**
Age Median	70	70	70	70	69	67	68	67	66	**66**
Males %	64.5	67	65.9	66.4	66.5	71.9	66.5	69.5	70	**70**
Females %	35.5	33	34.1	33.6	33.5	28.2	33.5	30.5	30	**30**

4.2.2 Immediate cause of amputation

The immediate cause of amputation by level and by aetiology for 2018 is shown in table 4 and table 5 compares 2017 and 2018.

Analysis of 'immediate cause' has revealed ischaemia to be the cause of amputation in 50% of all amputations, infection in 21% and a combination of infection and ischaemia in 22% (immediate cause was not applicable for 7% of all amputations). Further analysis showed that the immediate cause of amputation was ischaemia in 76% of those with aetiology of peripheral arterial disease without diabetes (PAD) and in 41% of those with diabetes.

Table 4 Cause of amputation recorded by level and by aetiology

Cause of amputation 2018		**Ischaemia**	**Infection**	**Combination ***	**N/A****
		367 (50%)	151 (21%)	165 (22%)	50 (7%)
Level n= 733 (2 missing)	TT	196	90	106	24
	TF	171	60	55	21
	TP	0	0	0	1
	HD	0	1	0	3
	KD	0	0	4	0
	AD	0	0	0	1
Aetiology n= 605 (2 missing)	PAD without diabetes	195 (75.9%)	18 (7%)	44 (17.1%)	0
	Diabetes	143 (41.1%)	96 (27.6%)	107 (30.7%)	2(0.6%)

*Combination is when both ischaemia and infection were present, ** N/A is not caused by either ischaemia or infection

Table 5 Cause of amputation 2017 – 2018

Cause of amputation	**Ischaemia**	**Infection**	**Combination***	**N/A****
2017	55%	21%	20%	4%
2018	50%	21%	22%	7%

*Combination is when both ischaemia and infection were present, ** N/A is not caused by either ischaemia or infection

4.2.3 Diabetic Amputees

The following table summarises the age and sex of amputees with aetiology of diabetes and PAD without diabetes.

Nearly half of all amputees had the aetiology of diabetes recorded (49%) and these people were younger than those with PAD without diabetes (median 6 years).

Table 6 Diabetic amputees, age and sex, 2017 & 2018

	2017		2018	
	Diabetes	**PAD without diabetes**	**Diabetes**	**PAD without diabetes**
Number of Amputees	364	245	349	258
Number with age available	364	245	338	249
Age Lower Quartile	54	62	59	63
Age Upper Quartile	74	78	74	79
Age Median	65	72	66	72
N Male	264	163	256	171
N Female	100	82	82	78
Males %	72.5	66.5	75.7	68.7
Females %	27.5	33.5	24.3	31.3

4.2.4 Aetiology of Amputation

The incidence of each aetiology recorded is shown in Table 7. Peripheral arterial disease (without diabetes) and diabetes accounted for 82.6% of all amputations in 2018.

Table 7 Aetiology of amputation, 2013 – 2018

	2013		2014		2015		2016		2017		2018	
	N	%	N	%	N	%	N	%	N	%	N	%
PAD without diabetes	332	41.3	319	39.3	286	40.6	267	37.1	264	35.1	258	**35.1**
Diabetes	351	43.7	378	46.5	315	44.7	358	49.8	378	50.3	349	**47.5**
Trauma or Burns	13	1.6	17	2.1	14	2	9	1.3	21	2.8	21	**2.9**
Tumour	13	1.6	16	2	8	1.1	9	1.3	9	1.2	15	**2**
Congenital deformity	2	0.3	5	0.6	5	0.7	2	0.3	3	0.4	0	**0**
Drug abuse	13	1.6	14	1.7	17	2.4	15	2.1	12	1.6	19	**2.6**
Venous disease	10	1.3	0	0	5	0.7	15	2.1	16	2.1	6	**0.8**
Orthopaedic (total)	39	4.9	45	5.6	24	3.4	13	1.8	15	2.0	21	**2.9**
Orthopaedic – non union							8	1.1	12	1.6	13	**1.8**
Orthopaedic failed joint							4	0.6	1	0.1	3	**0.4**
Orthopaedic acquired deformity							1	0.1	2	0.3	3	**0.4**
Blood-borne infection	8	1	7	0.9	8	1.1	18	2.5	18	2.4	25	**3.4**
Renal Failure	4	0.5	1	0.1	2	0.3	4	0.6	1	0.1	7	**1**
CRPS*							5	0.7	9	1.2	8	**1.1**
Acute Vascular Injury **	17	2.1	10	1.2	13	1.9	4	0.6	6	0.8	6	**0.8**
Not recorded	1	0.12	0	0.00	7	0.99	1	0.1	0	0	0	**0**
Total	803	100	812	100	704	100	720	100	752	100	735	**100**

*CRPS= Chronic Regional Pain Syndrome (previously this would have been in either “orthopaedic” or “other” category)

** Acute vascular injury (AVI): “Other “prior to 2016

4.2.5 Initial Level of Amputation

Table 8 shows the incidence of six levels of amputation for the years 2013-2018. 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 initial level of the amputation.

Table 8 Amputation Level, 2013-2018

	2013		2014		2015		2016		2017		2018	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Transtibial	477	56.3	432	51.1	377	51.2	401	56	423	56.3	417	**56.7**
Transfemoral	340	40.1	395	46.7	342	46.4	304	42	313	41.6	308	**41.9**
Transpelvic	1	0.1	0	0	1	0.1	1	0.1	0	0	1	**0.1**
Hip Disarticulation	11	1.3	6	0.7	5	0.7	6	0.8	8	1.1	4	**0.5**
Knee Disarticulation	17	2.0	13	1.5	12	1.6	7	1.0	8	1.1	4	**0.5**
Ankle Disarticulation	2	0.2	0	0	0	0	1	0.1	0	0	1	**0.1**
Other	0	0	0	0	0	0	0	0	0	0	0	**0**
Not recorded	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	848	100	846	100	737	100	720	100	752	100	735	**100**

4.2.6 Patients Fitted with a Prosthesis

The number of patients fitted with a prosthesis at final discharge is shown in Table 9. Unilateral patients' limb-fitted are shown in Table 10, and bilateral patients are shown in Table 11. Table 11 gives more detail on bilateral patients fitted by their exact level of amputation. Table 11 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.

The proportion of patients (all levels) fitted with a prosthesis in 2018 is 45.2%. When examined by level, 64.6% of TTA and 19.5% of transfemoral (TFA) were fitted.

Table 9 Patients fitted with a prosthesis, all 2009 – 2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Number	729	731	688	702	803	812	704	685	714	**704**
Number fitted	301	315	288	286	322	338	293	321	313	**318**
Percentage fitted	41.3	43.1	41.9	40.7	40.1	41.6	41.6	44.6	43.8	**45.2**

Table 10 Proportion of patients with unilateral amputation fitted with a prosthesis by level (2009 – 2018)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TTA (%)	67.7	69.7	67.4	66.8	64.5	63.8	68	66.9	66.4	**64.6**
TFA (%)	24.1	32	26.1	26.3	23.2	28.1	23.9	20.9	26.4	**19.5**
Other (%)	17.1	11.5	50	19.1	21.7	31.3	30.8	12.2	0	**20**

Abbreviations: TFA=transfemoral, TTA=transtibial

Table 11 Proportion of patients with bilateral amputation fitted with a prosthesis, bilateral (2009 – 2018)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bilateral – all levels %	23.7	29.8	31.5	33.6	18.8	25.3	24.5	28.2	38.7	**29.3**

Table 12 Bilateral patients fitted with a prosthesis by level 2018

	Bilateral TTA (n=45)	Bilateral TFA (n=45)	TTA & TFA (n=23)
Limb-fitted % (n=)	60% (n=27)	4.4% (n=2)	17.4% (n=4)

Abbreviations: TFA=transfemoral, TTA=transtibial

Table 13 Sex and limb fitting outcome, 2017– 2018

	2017			2018		
	Unilateral TTA	Unilateral TFA	Bilateral	Unilateral TTA	Unilateral TFA	Bilateral
Total Males (n)	207	187	95	221	187	75
Total Females (n)	73	90	47	77	94	39
Males Limb-fitted (n)	151	56	43	155	64	18
Females Limb-fitted (n)	35	17	9	52	13	15
% Limb-fitted - male	72.9	29.9	45.3	74.9	83.1	24
% Limb-fitted - female	47.9	18.9	19.1	25.1	16.9	38.5

Abbreviations: TFA=transfemoral, TTA=transtibial

4.2.1 Prosthetic Rehabilitation Abandoned

There are a number of patients each year who are initially fitted with a prosthesis and start prosthetic rehabilitation but for whom prosthetic treatment is abandoned prior to their final discharge. The amputation level referred to in this section is the final level if re-amputation surgery has been carried out. Table 14 shows those people who have abandoned use of their prosthesis as a proportion of those initially fitted.

The number of those abandoning prosthetic use during the rehabilitation period fluctuates from year to year (4.7% in 2018). Of these 33 patients, 6.4% were unilateral TTA (n=19), 3.6% unilateral TFA (n=10) and 3.5% were bilateral of varying levels (n=4).

Table 14 Prosthetic rehabilitation abandoned as a proportion of those initially fitted, 2013–2018

	2013		2014		2015		2016		2017		2018	
	N	%	N	%	N	%	N	%	N	%	N	**%**
All patients	22	6.4	23	6.4	32	9.6	22	6.8	31	8.1	33	**4.7**
Unilateral TTA	12	5.1	15	6.9	13	7.1	9	3.5	15	6.6	19	**6.4**
Unilateral TFA	7	9.7	3	3.2	15	21.7	9	14.3	14	14.9	10	**3.6**
Other	1	16.7	1	16.7	0	0	0	0	1	33.3	0	**0**
Bilateral	2	6.5	4	9.3	4	11.1	4	8.5	1	1.7	4	**3.5**

Abbreviations: TFA=transfemoral, TTA=transtibial

4.2.2 Mortality

Table 15 shows the proportion of amputees who died within 30 days of their initial amputation.

Table 15 Mortality 2012 - 2018

	2012	2013	2014	2015	2016	2017	2018
Number of amputees	702	803	812	704	685	714	706
30-day Mortality (N)	40	51	45	44	47	40	33
30-day mortality (%)	5.7	6.4	5.5	6.3	6.9	5.6	4.7

4.2.3 Final Outcome Summary

Table 16 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 outpatient treatment. Non-Limb-fitted now includes those who abandoned prosthetic use as that was their final outcome. Table 17 shows final outcome by aetiology and including those abandoned.

When grouped by aetiology, the greatest percentage of patients **not** being fitted with a prosthesis are those with blood borne infection (56%) and PAD (51.4%).

Table 16 Final outcome summary, 2015 - 2018

	2015		2016		2017		2018	
	N	%	N	%	N	%	N	%
Limb-fitted	293	41.6	278	40.7	313	43.8	318	**45.2**
Not Limb-fitted	318	45.2	314	45.8	318	43.5	308	**43.8**
Deceased	92	13.1	92	13.4	83	11.6	78	**11.1**
Unknown	1	0.1	1	0.1	0	0	0	**0**

Table 17 Final outcome by aetiology

Aetiology	Limb-fitted % (n)	Non-limb-fitted % (n)	Abandoned % (n)	Deceased % (n)
PAD	34.1 (85)	51.4 (128)	3.6 (9)	10.8 (27)
Diabetes	49.4 (167)	32.8 (111)	5.6 (19)	12.1 (41)
Trauma or burns	70.6 (12)	17.6 (3)	5.9 (1)	5.9 (1)
Tumour	53.3 (8)	20.0 (3)	0	26.7 (4)
Congenital deformity	0	0	0	0
Drug abuse	57.9 (11)	36.8 (7)	5.3 (1)	0
Venous disease	40.0 (2)	20.0 (1)	20.0 (1)	20.0 (1)
Ortho non-union	62.5 (5)	25.0 (2)	0	12.5 (1)
Ortho joint replacement	66.7 (2)	33.3 (1)	0	0
Ortho acquired deformity	33.3 (1)	33.3 (1)	0	33.3 (1)
Blood borne infection	28.0 (7)	56.0 (14)	8.0 (2)	8.0 (2)
Renal Failure	83.3 (5)	16.7 (1)	0	0
CRPS	75.0 (6)	25.0 (2)	0	0
Acute vascular incident	83.3 (5)	16.7 (1)	0	0
Not recorded (n=2)				

4.2.4 Unilateral and Bilateral Amputees

Table 18 shows the number of unilateral and bilateral amputees for the years 2013-2018. 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 19 where there are two 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.

Table 18 Unilateral and bilateral amputees, 2013 – 2018

	2013		2014		2015		2016		2017		2018	
	N	%	N	%	N	%	N	%	N	%	N	%
Number of amputees	803	100	812	100	704	100	685	100	714	100	706	**100**
Unilateral amputees	649	80.8	658	81	556	79	543	79.2	572	80.1	590	**83.5**
Bilateral amputees	154	19.2	154	19	148	21	142	20.8	142	20.9	116	**16.4**
Unknown	0	0	0	0	0	0	0	0	0	0	0	**0**

Table 19 Bilateral amputees, 2013- 2018

	2013		2014		2015		2016		2017		2018	
	N	%	N	%	N	%	N	%	N	%	N	%
Bilateral Total	154	100	154	100	148	100	142	100	142	100	116	**100**
Bilateral – prior amputation(s)	109	70.8	120	77.9	115	77.7	107	75.4	104	73.2	86	**74.1**
Bilateral – both in same episode	45	29.2	34	22.1	33	22.3	35	24.6	38	26.8	29	**25.9**

4.2.5 Bilateral Amputations

Demographic and final outcome data for all patients with bilateral amputation are shown below in Table 20

Table 20 Demographic profile and final outcome summary of patients with bilateral amputations at end of rehabilitation period

	Bilateral TTA	Bilateral TFA	TTA & TFA	Other
Number	45	45	23	1
Age (median, years)	64.2	70.9	69.8	72.2
Gender (Male) %, (n)	62.2 (28)	71.1 (32)	60.9 (14)	100 (1)
Aetiology				
PAD without diabetes % (n)	20.0 (9)	55.6 (25)	34.8 (8)	0
Diabetes % (n)	66.7 (30)	37.8 (17)	56.5 (13)	100 (1)
Other % (n)	13.3 (6)	6.6 (3)	8.6 (2)	0
Final Outcome				
Limb-fitted % (n)	60.0 (27)	4.4 (2)	17.4 (4)	0
Non-Limb-fitted % (n)	24.4 (11)	82.2 (37)	56.5 (13)	100 (1)
Died % (n)	11.1 (5)	13.3 (6)	17.4 (4)	0
Abandoned % (n)	4.4 (2)	0	8.7 (2)	0
Missing	0	0	0	0

Abbreviations: TFA=transfemoral, TTA=transtibial, PAD=Peripheral Arterial Disease.
*Other=various combinations of amputation levels i.e., hip disarticulation and transfemoral etc.

4.2.6 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 21 below for 2009-2018.

Table 21 Bilateral amputations, 2009-2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bilateral TTA	14	13	13	16	13	8	7	15	14	**12**
Bilateral TFA	13	12	12	22	25	20	21	11	18	**13**
TTA & TFA	4	5	2	6	5	6	2	8	5	**4**
Other	4	1	2	0	2	0	3	1	1	**0**
Total	35	31	29	44	45	34	33	35	38	**29**

Abbreviations: TFA=transfemoral, TTA=transtibial

4.2.7 Falls

This is the third year that we have reported on falls, Table 22 shows falls recorded for all amputees and for unilateral and bilateral amputees (all levels). Table 23 shows falls at home and both in hospital and at home, for all amputees who had outpatient physiotherapy. Falls at home are not recorded for those who do not receive any physiotherapy following in patient discharge. Note this is not the number of falls but is the number of amputees who reported a fall during their rehabilitation period. Table 24 shows recorded falls in hospital for 2017 – 2018. Table 25 records falls by limb fitting outcome.

Falls have been reported for the third year and this has increased from 19.1% in 2016, to 22.2% in 2018.

Table 22 Reported falls in hospital for all amputees and also for unilateral and bilateral amputees (all levels)

	All Amputees (n= 706)	**Unilateral** (n= 590)	**Bilateral -** previously unilateral (n= 86)	**Bilateral -** same episode (n= 30)
In hospital % (n)	22.2% (157)	23.2% (137)	11.6% (10)	33.3% (10)

Table 23 Recorded falls at home for all amputees who had outpatient physiotherapy

Amputees Outpatient rehab	**All Amputees** (n= 351)	**Unilateral** (n= 313)	**Bilateral -** previously unilateral (n= 26)	**Bilateral -** same episode (n= 12)
At home % (n)	16.8% (59)	17.3% (54)	11.5% (3)	16.7% (2)

Table 24 Recorded falls for all amputees in hospital 2016 – 2018

Recorded falls	**2016**	**2017**	**2018**
In hospital	19.1%	23.4%	22.2%
At home	13%	26%	16.8%

Table 25 Recorded Falls based on Limb Fitting Outcome

	Limb-Fitted	**Non-Limb-fitted**	**Abandoned**
Falls in hospital	28.9%	15.3%	36.4%
Falls at home	16.4%	n/a	21.2%

4.2.8 Revisions and Re-amputations

The number of amputees having revision or re-amputation surgery is shown in Table 26. A revision is defined as further primary residual limb surgery which may involve bone but does not change the level of amputation. A re-amputation is defined as further surgery of the primary residual limb, 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 2013-2018 are shown in Table 27

Table 26 Revisions and re-amputations, 2013-2018

	2013		**2014**		**2015**		**2016**		**2017**		**2018**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Amputations	848	100	846	100	737	100	720	100	752	100	735	**100**
Revisions	37	4.4	27	3.2	9	1.2	11	1.5	12	1.6	10	**1.4**
Re-amputations	59	7	49	5.8	46	6.2	44	6.1	59	7.8	51	**6.9**
Total revisions + re-amputations	96	11.3	76	9	55	7.5	55	7.6	71	9.4	61	**8.3**

Table 27 Transtibial to transfemoral re-amputations, 2013-2018

	2013		2014		2015		2016		**2017**		**2018**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Initial TTA	477	100	432	100	378	100	401	100	423	100	417	**100**
Re-amputated to TFA	43	9.0	43	10.0	42	11.1	40	10.0	54	12.8	43	10.3

Abbreviations: TFA=transfemoral, TTA=transtibial

4.2.1 Functional Co-morbidities Index

The Functional Co-morbidities Index (FCI) was incorporated into the data set from 2008 to account for the relatively high incidence of co-morbid disease in the lower limb amputee population (see Appendix F).

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.

Table 28 Functional Co-Morbidities by Level and Aetiology

	Number	Min	Max	Mean	Lower Quartile	Upper Quartile	Median
All Patients	706	0	11	3.1	2.0	4.0	3.0
Level of Amputation							
Unilateral TTA	298	0	11	3.1	2.0	4.0	3.0
Unilateral TFA	281	0	10	3.0	2.0	4.0	3.0
Other	13	0	4	1.6	0	3.0	1.0
All Bilateral	114	0	8	3.1	2.0	4.0	3.0
Bilateral TTA	45	0	8	3.2	2.0	4.5	3.0
Bilateral TFA	45	0	7	3.2	2.0	4.0	3.0
TTA & TFA	23	0	7	2.9	2.0	4.0	3.0
Aetiology							
PAD without diabetes	249	0	11	3.0	2.0	4.0	3.0
Diabetes	338	0	10	3.6	3.0	5.0	3.0
Other	119	0	6	1.5	0	2.0	1.0

Abbreviations: TFA=transfemoral, TTA=transtibial, PAD=Peripheral Arterial Disease

Table 29 Functional Co-morbidities Mean Score, 2013 – 2018

	2013	2014	2015	2016	2017	2018
	Mean	Mean	Mean	Mean	Mean	Mean
All Patients	3	3.0	3.1	2.9	3.1	**3.1**
Unilateral TTA	2.9	3.0	3.1	2.9	3.1	**3.1**
Unilateral TFA	2.9	2.9	3.1	3.0	3.1	**3.0**
Other	2.3	2.5	0.8	3.0	3.1	**1.0**
All Bilateral	3.3	3.4	2.5	3.5	3.3	**3.1**
PAD without diabetes	2.8	2.8	2.9	2.7	2.9	**3.0**
Diabetes	3.6	3.6	3.8	3.4	3.7	**3.6**

Abbreviations: TFA=transfemoral, TTA=transtibial, PAD=Peripheral Arterial Disease

5 Physiotherapy and Rehabilitation

5.1 Compression Therapy

Compression therapy of the residuum is widely used and figures for 2013-2018 are presented in Table 30. These figures capture the first method of compression used.

Table 31 shows the type of compression therapy used by level.

Table 30 Type of compression therapy used, 2013-2018

	2013		2014		2015		2016		2017		2018	
	N	%	N	%	N	%	N	%	N	%	**N**	**%**
Elset 'S' bandage	6	1	5	0.8	11	2.1	2	0.4	2	0.4	**0**	**0**
Flowtron	11	1.7	11	1.8	6	1.1	9	1.7	6	1.1	**2**	**0.3**
Plaster cast	156	24.7	123	19.8	96	18.2	113	21.6	86	16.6	**67**	**17.2**
Shrinker sock	414	65.6	428	68.9	370	70.2	357	67.7	400	77.1	**305**	**78.4**
Silicone Sleeve	10	1.6	18	2.90	12	2.3	8	1.5	3	0.6	**1**	**0.3**
Other	2	0.3	0	0.00	0	0	0	0	0	0	**1**	**0.5**
PPAM*	32	5.1	36	5.80	32	6.1	38	7.2	22	4.2	**13**	**3.3**
Total	631	100	621	100	527	100	527	100	519	100	**389**	**100**

Abbreviations= PPAM Aid= Pneumatic Post Amputation Mobility Aid
*Inclusion of PPAM aid here indicates it has been used without the walking frame for compression therapy only

Table 31 Type of compression therapy used by amputation level (limb fitted patients)

	TTA (%)	TFA (%)	Bilateral TTA (%)
Plaster cast	18.8	2.6	14.8
Shrinker sock	64.7	77.9	74.1
PPAM aid bag	2.4	2.6	3.7
Unknown	12.6	15.6	7.4

Abbreviations: TFA=transfemoral, TTA=transtibial

5.2 Early Walking Aids

The types of Early Walking Aids (EWA) used in 2013-2018 are shown in Table 32. Table 33 shows EWA used by amputation level. Note that these figures relate to the first device used.

Table 32 Type of EWA used, 2013-2018

	2013		2014		2015		2016		2017		2018	
	N	%	N	%	N	%	N	%	N	%	N	%
AMA	0	0	0	0	0	0	1	0.3	0	0	0	**0**
Femurett	59	15.1	81	20.1	65	18.5	57	16.8	63	15.9	48	**13.9**
PPAM	331	84.9	323	80	287	81.5	281	82.7	333	83.8	297	**86.1**
Other	0	0	0	0	0	0	1	0.3	1	0.3	0	**0**
Total	390	100	404	100	352	100	340	100	397	100	345	**100**

Abbreviations: PPAM= Pneumatic Post Amputation Mobility Aid, AMA=Amputee Mobility Aid

Table 33 Type of EWA used by amputation level (Limb-fitted)

	TTA (%)	TFA (%)	Bilateral TTA (%)
PPAM aid	85	44.2	81.5
Femurett	0	45.5	0
Unknown	14	10.4	18.5

Abbreviations: PPAM= Pneumatic Post Amputation Mobility Aid, TFA=transfemoral, TTA=transtibial

5.3 Mobility Outcomes: Locomotor Capabilities Index 5(LCI-5)

The LCI-5 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 [3].

The LCI-5 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 [4]. The LCI-5 has been found to reduce the ceiling effect associated with the LCI by 50%[4,5]. The higher the score of the LCI-5 the greater the capabilities of the amputee. The LCI-5 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.

Table 34 Locomotor Capabilities Index by level, 2014 to 2018

	6/12 Pre-amp			Final Outcome			
2014	**Basic**	**Adv.**	**Total**	**Basic**	**Adv.**	**Total**	**Change**
Transtibial (n=203)	23	21	44	20	17	37	-6
Transfemoral(n=78)	23	19	42	20	13	-12	-12
Bilateral (n=31)	22	15	37	17	11	28	-13
	6/12 Pre-amp			**Final Outcome**			
2015	**Basic**	**Adv.**	**Total**	**Basic**	**Adv.**	**Total**	**Change**
Transtibial (n=182)	23	23	46	21	19	40	-5
Transfemoral (n=70)	26	27	53	19	15	35	-18
Bilateral transtibial (n=30)	21.2	20.4	41.6	19.5	14.6	34.2	-7.5
Transtibial and transfemoral (n=5)	21.3	17	38.3	16.3	12	28.3	-10
	6/12 Pre-amp			**Final Outcome**			
2016	**Basic**	**Adv.**	**Total**	**Basic**	**Adv.**	**Total**	**Change**
Transtibial (n=175)	23	20	43	20	16	36	-7
Transfemoral(n=57)	26	23	49	20	13	34	-15
Bilateral (n=31)	21	18	39	18	12	31	-8
	6/12 Pre-amp			**Final Outcome**			
2017	**Basic**	**Adv.**	**Total**	**Basic**	**Adv.**	**Total**	**Change**
Transtibial (n=211)	22	18	40	18	14	31	-8
Transfemoral(n=88)	22	20	42	15	10	25	-17
Bilateral (n=55)	15	12	27	12	8	21	-6
	6/12 Pre-amp			**Final Outcome**			
2018	**Basic**	**Adv.**	**Total**	**Basic**	**Adv.**	**Total**	**Change**
Transtibial (n=188)	24	20	44	22	18	39	**-5**
Transfemoral(n=66)	25	23	48	21	15	36	**-12**
Bilateral transtibial (n= 23)	**22**	**16**	**38**	**20**	**12**	**32**	**-6**

6 Milestone Data

6.1 Statistics Presented

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

Milestones	Names by which milestones are referred to in this report
Number of days from final amputation to casting for prosthesis	*'days to casting'*
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.	*'casting to delivery'*
Number of days from primary amputation to inpatient discharge (for patients having bilateral amputations and/or revision surgery see notes below)	*'days to inpatient discharge'* (length of stay)
Number of days from inpatient discharge to discharge from outpatient physiotherapy	'days inpatient discharge to outpatient discharge'

Figure 1 Rehabilitation Milestones

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

Only patients who were limb-fitted at 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 primary amputation.

For each milestone, and each group, the statistics represent available data including data from patients who have died.

Figure 2 Groups in milestones

Groups with results prepared for all milestones	Additional groups for ***days to inpatient discharge***
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

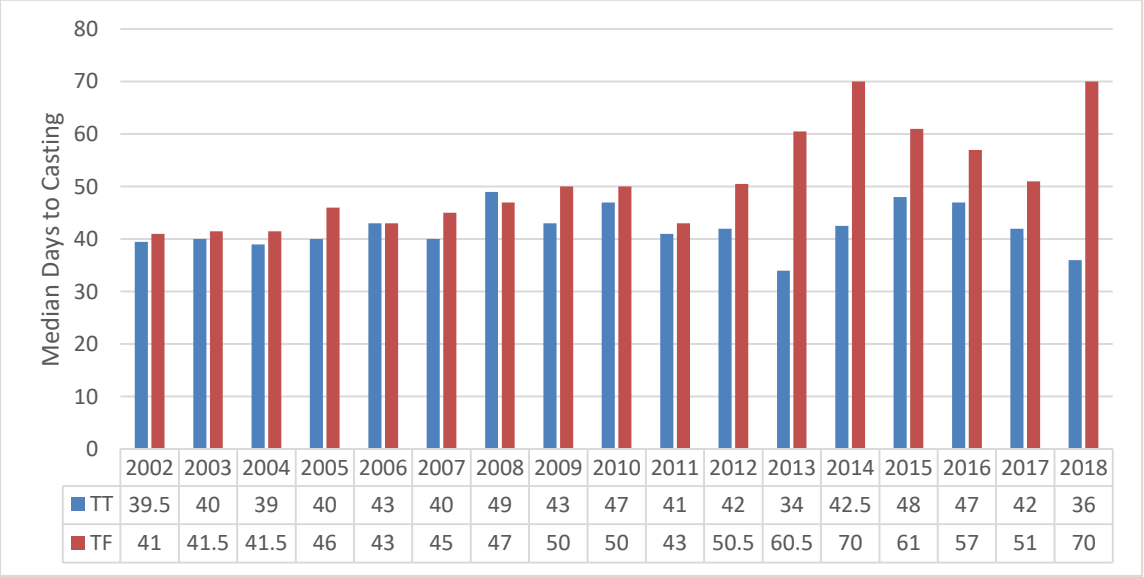
6.2 Days to Casting

Table 35 Days to casting milestone, descriptive statistics, 2018

	All Patients	Unilateral TTA	Unilateral TFA	Bilateral TTA	TTA & TFA
Number Included	318	207	77	27	4
Lower Quartile	26	26	36	26	41.75
Upper Quartile	84	72	114.5	58	126
Median	43	36	70	37	101.5

Abbreviations: TFA=transfemoral, TTA=transtibial

Figure 3 Median days to casting milestone, for all unilateral TTA and unilateral TFA, 2002-2018



6.3 *Casting to Delivery*

Table 36 Casting to delivery milestone, descriptive statistics, 2018

	All	Unilateral TTA	Unilateral TFA	Bilateral TTA	TTA & TFA
Number Included	310	203	74	27	3
Lower Quartile	7	7	9	7	10
Upper Quartile	15.25	15	16.75	14	14
Median	10	9	14	10	14

Abbreviations: TFA=transfemoral, TTA=transtibial

Table 37 Median casting to delivery milestone, 2004-2018

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TTA	14	14	14	13	14	13	10	10	9	8	9	9	8	10	**9**
TFA	14	14	15	14	15	15	15	14	14	13	15	14	14	13	**14**

Abbreviations: TFA=transfemoral, TTA=transtibial

6.4 Days to Inpatient Discharge: Fitted with a Prosthesis

Table 38 Days to inpatient discharge, patients fitted with a prosthesis, descriptive statistics

	Unilateral TTA	Unilateral TFA	Bilateral TTA
Number Included	207	77	27
Lower Quartile	26	24.5	28
Upper Quartile	68	77.5	107
Median	43	41	46

Abbreviations: TFA=transfemoral, TTA=transtibial

Table 39 Median days to inpatient discharge, patients fitted with a prosthesis, 2004-2018 (Unilateral Only)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TTA	55	54	56	55	55	55	59	50	51.5	47.5	41.5	43	49	40	**43**
TFA	55.5	63.5	57	58	67.5	53	59	33	49.5	37	35	48	41	39	**41**

Abbreviations: TFA=transfemoral, TTA=transtibial

6.5 Days to Inpatient Discharge: Not Fitted with a Prosthesis

Table 40 Days to inpatient discharge, patients not fitted with a prosthesis, descriptive statistics, 2018

	Unilateral TTA	Unilateral TFA	Bilateral TTA	Bilateral TFA	TTA & TFA
Number Included	297	227	44	45	23
Lower Quartile	24.5	19	24.3	16.5	46
Upper Quartile	76	72.5	111.5	73	101
Median	43	38	53.5	33	46

Abbreviations: TFA=transfemoral, TTA=transtibial

Table 41 Median days to inpatient discharge, patients not fitted with a prosthesis, 2004-2018 (Unilateral Only)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TTA	52	51.5	66	60.5	62	61	45	53	64.5	45.5	42.5	40	59	44	**43**
TFA	42	47	52	46	47	51	41	34	36	32	34	43	53.5	40	**38**

Abbreviations: TFA=transfemoral, TTA=transtibial

6.6 Days from inpatient to outpatient discharge: Fitted with a prosthesis

Table 42 shows the days from inpatient discharge to outpatient discharge (length of outpatient rehabilitation) for all limb-fitted patients; however, this does not consider the frequency or type of rehabilitation which will vary from hospital to hospital. The different models of care are described in appendix H.

Table 42 Days from inpatient discharge to outpatient discharge, limb-fitted amputees, 2018

	Unilateral TTA	Unilateral TFA	Bilateral TTA
Number Included	207	77	26
Lower Quartile	33	53.5	0
Upper Quartile	168	211.5	172.75
Median	90	141	107

Abbreviations: TFA=transfemoral, TTA=transtibial

Table 43 Median Days from inpatient discharge to outpatient discharge, limb-fitted amputees 2013 - 2018

	2013	2014	2015	2016	2017	2018
Transtibial	96.5	111	99.5	91	101	**90**
Transfemoral	221	164.5	107	126	145	**141**
Bilateral	68	148.5	69	76	75.5	**107**

Abbreviations: TFA=transfemoral, TTA=transtibial

7 Trends in Compression Therapy and Early Walking Aids (EWAs)

7.1 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.

7.2 Trends in Compression Therapy

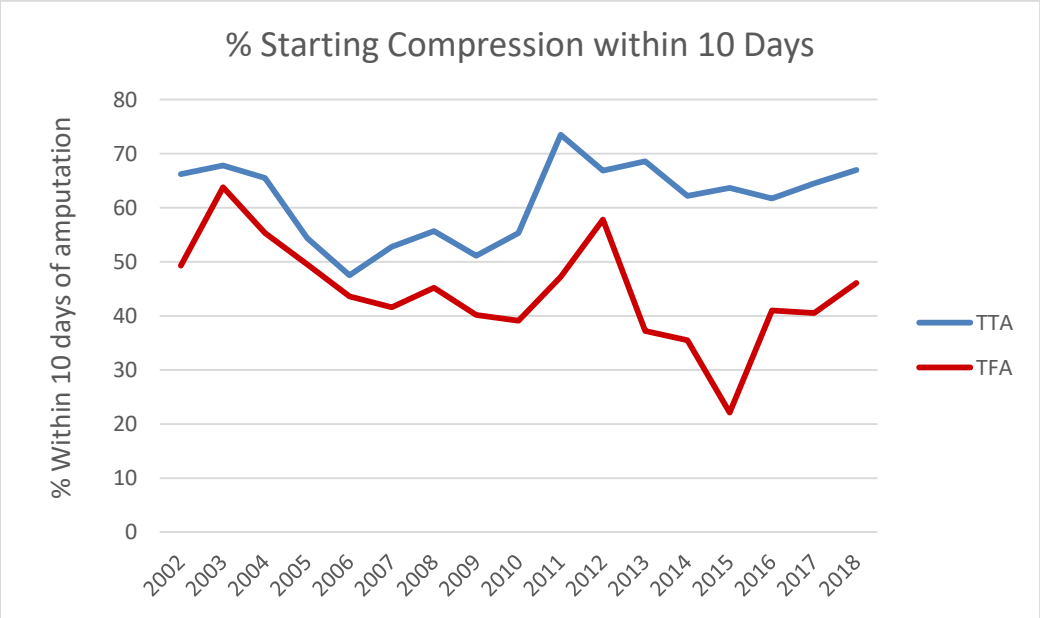
Of the patients receiving compression therapy, the percentage who received it within 10 days of amputation is shown in Table 44 for 2002-2018. A line chart representing this data is shown in Figure 4

Table 44 Patients receiving compression therapy within 10 days of amputation (%), 2002–2018

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TTA	66.2	67.8	65.5	54.4	47.5	52.8	55.7	51.1	55.3	73.5	66.9	68.6	62.2	63.7	61.7	64.5	**67**
TFA	49.3	63.8	55.3	49.5	43.6	41.6	45.2	40.2	39.1	47.2	57.8	37.2	35.5	22.1	41.	40.5	**46.1**

Abbreviations: TFA=transfemoral, TTA=transtibial

Figure 4 Percentage of unilateral transtibial and transfemoral amputees receiving compression therapy within 10 days of amputation surgery, 2002– 2018



Abbreviations: TFA=transfemoral, TTA=transtibial

7.3 Trends in Early Walking Aids

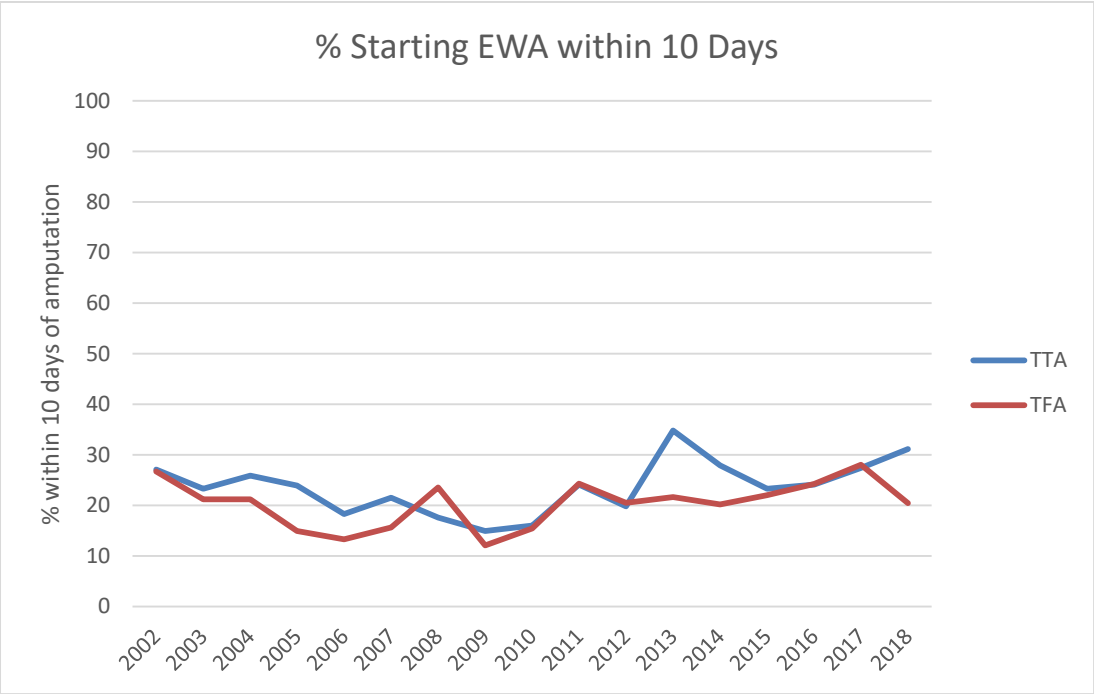
342 patients received Early Walking Aids (EWA) therapy, 26% received it within 10 days of amputation in 2018 and this is shown in Table 45 for 2002-2018, categorised by level of amputation. A line chart representing this data is shown in Figure 5

Table 45 Patients using EWAs within 10 days of amputation (%), 2002– 2018

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TTA	27.1	23.3	25.9	23.9	18.3	21.5	17.6	14.9	16.0	24.1	19.8	34.8	27.9	23.3	24.1	27.4	**31.1**
TFA	26.7	21.2	21.2	14.9	13.3	15.6	23.5	12.1	15.4	24.3	20.5	21.6	20.2	22.0	24.2	28.0	**20.4**

Abbreviations: TFA=transfemoral, TTA=transtibial

Figure 5 Percentage of unilateral transtibial and transfemoral amputees using EWAs within 10 days of amputation surgery, 2002- 2018



Abbreviations: TFA=transfemoral, TTA=transtibial

8 Individual Hospital Summaries for 2018

8.1 Data Checking Summary

This section presents the national data broken down by amputating hospital; please refer to Appendix H for further information on each service's model of care.

The number of amputees at each hospital and the data completeness are shown in Table 46.

Table 46 Data Checking Summary by Hospital

Hospital	Forms issued (n=)	Forms Missing (n=)	Forms complete (n=)	Forms Incomplete (n=)
Aberdeen Royal Infirmary	83	83	0	0
University Hospital Ayr	63	0	63	0
Borders General Hospital	0	0	0	0
Dumfries & Galloway Royal Infirmary	20	0	20	0
Edinburgh Sick Kids	1	1	0	0
Forth Valley Royal Hospital	46	0	46	0
Glasgow Royal Infirmary	20	0	20	0
Golden Jubilee National Hospital	0	0	0	0
University Hospital Hairmyres	69	0	69	0
University Hospital Monklands	0	0	0	0
Ninewells Hospital	117	0	117	0
Raigmore Hospital	32	0	32	0
Royal Alexandria Hospital	7	0	7	0
Royal Infirmary of Edinburgh	136	0	136	0
Queen Elizabeth University Hospital	178	0	178	0
St John's Hospital	0	0	0	0
University Hospital Wishaw	2	1	1	0
Woodend hospital	1	1	0	0
Victoria Hospital (Kirkcaldy)	10	0	10	0
Royal Children's Hospital Glasgow	2	2	0	0
Outside Scottish Service	7	0	7	0
National	**794**	**88**	**706**	**0**

8.2 Key Performance Indicators by Hospital

Tables 48 to 52 only include those centres with > 10 amputation surgeries in 2018. This is to ensure data protection and validity of data analysis.

Models of Care

Each hospital's model of care (MOC) varies and the impact this has on the achievement of rehabilitation milestones and outcomes is complex and influenced by many factors including patient demographics. Hebenton et al (2019) identified key aspects of services that appear to improve speed and outcomes of rehabilitation after lower limb amputation[1]. These key aspects have been used to develop the weighted MOC scoring system used in this report see table 47. Detailed description of the models of care for each service can be found in Appendix H. Table 48 shows the total score for each centre.

Table 47 Model of care (MOC) indicators

Aspect of model of care identified as influential	**Score**
Immediate post-operative rigid dressing	**0-2**
Specialist physiotherapist in first 14 days	**0-2**
Daily inpatient gym session (Mon- Fri)	**0-2**
Inpatient gym session ≥ 1 hour	**0-1**
Prosthetic centre on site when in patient	**0-1**
Prosthetic provision as an in patient	**0-2**
Routine specialist physiotherapy outpatient service	**0-1**
Total	**11**

Scoring system: -
Aspects found to be statistically significant in previous study[6] have been given a higher rating
Score < optimum means aspect is only partially available

Table 48 Total model of care score for centres n ≥ 10 (see Appendix H for more detail)

	AH	DGRI	FVRH	GRI	HH	QEUH	NH	RH	RIE/AA	National median
Total moc score (max score = 11)	7	6	6	2	5	8	10	9	7	**6.7**

Key: University Hospital Ayr (AH), Dumfries and Galloway Royal Infirmary (DGRI), Forth Valley Royal Hospital (FVRH), Glasgow Royal Infirmary (GRI), University Hospital Hairmyres (HH), Queen Elizabeth University Hospital (QEUH), Ninewells Hospital (NH), Raigmore Hospital (RH), Royal Infirmary Edinburgh/Astley Ainslie (RIE/AA).

There are clear variations in milestones and outcomes between these larger centres. These are as follows: -

1. The percentage of amputations carried out at a transtibial (TTA) level in individual hospitals (centres, n>10) shows significant variation, from 36.5% to 60%.
2. The proportion of patients being successfully fitted varies from 37.5% to 55% (centres, n>10).
3. Time to provision of a prosthesis for both TTA and TFA levels has continued to improve nationally but, but this still varies hugely from centre to centre (unilateral TTA time to cast; Raigmore 22.5 days, GRI 62 days: unilateral TTA time to delivery; Raigmore 29 days; GRI 73 days)
4. The change in self-reported community mobility from 6 months before surgery to the end of rehabilitation for unilateral TTA shows significant variation (Ninewells -11; QEUH & Hairmyers -2). Note: a negative number indicates a *loss* of independence, whereas a positive number would indicate an *improvement* in independence.

8.2.1 Age and FCI

Table 49 Median Age, and FCI

Hospital	**Median Age** (years)	**Mean FCI**
Aberdeen Royal Infirmary	**	**
University Hospital Ayr	70	3.0
Dumfries & Galloway Royal Infirmary	66	1.5
Forth Valley Royal Hospital	66	3.1
Glasgow Royal Infirmary *	55	1.6
University Hospital Hairmyres	67	4.0
Ninewells Hospital	68	3.0
Queen Elizabeth University Hospital	65	3.0
Raigmore Hospital	70	4.0
Royal Infirmary of Edinburgh	66	3.0
National	66	3.1

Abbreviations: FCI = Functional Co-morbidities Index (Appendix F)
*Note: there are no amputations due to vascular aetiology at Glasgow Royal Infirmary
**No data as Grampian not included in report.

8.2.2 Final Level of Amputation

The final level of Amputation at end of the rehabilitation period is recorded in Table 50.

Table 50 Final level of Amputation at end of Rehabilitation by Hospital

Hospital	Unilateral TTA % (n)	Unilateral TFA %(n)	Other % (n)	Bilateral TTA % (n)	Bilateral TFA % (n)	TTA & TFA% (n)	Other % (n)	Total % (n)
Aberdeen Royal Infirmary	**	**	**	**	**	**	**	**
University Hospital Ayr	36.5 (23)	41.3 (26)	4.8 (3)	9.5 (6)	4.8 (3)	3.2 (2)	0	100 (63)
Dumfries & Galloway Royal Infirmary	60 (12)	20 (4)	0	5 (1)	5 (1)	10 (2)	0	100 (20)
Forth Valley Royal Infirmary	50 (23)	32.6 (15)	4.4 (2)	6.5 (3)	2.2 (1)	4.3 (2)	0	100 (46)
Glasgow Royal Infirmary	50 (10)	40 (8)	10 (2)	0	0	0	0	100 (20)
University Hospital Hairmyres	37.7 (26)	42 (29)	0	4.3 (3)	10.1 (7)	5.8 (4)	0	100 (69)
Ninewells Hospital	41.9 (49)	37.6 (44)	1.8 (2)	6 (7)	8.5 (10)	3.4 (4)	0.9 (1)	100 (117)
Queen Elizabeth University Hospital	39.3 (70)	41.6 (74)	1.1 (2)	8.4 (15)	6.7 (12)	2.8 (5)	0	100 (178)
Raigmore Hospital	59.4 (19)	21.9 (7)	3.1 (1)	12.5 (4)	0	3.1 (1)	0	100 (32)
Royal Infirmary of Edinburgh	39 (53)	47.1 (64)	0.7 (1)	4.4 (6)	7.4 (10)	1.5 (2)	0	100 (136)
National	**42.2** (298)	**39.8** (281)	**1.8** (13)	**6.4** (45)	**6.4** (45)	**3.3** (23)	**0.1** (1)	**100** (706)

Abbreviations: TFA=transfemoral, TTA=transtibial, ******No data as Grampian not included in report

8.2.3 Final Outcome

Final outcome (at discharge from physiotherapy) by hospital are shown in Table 51

Table 51 Key Performance Indicators by Hospital

Hospital	**LF %** (n)	**NLF %** (n)	**Aban %** (n)	**Died %** (n)	**Total** (n)
Aberdeen Royal Infirmary	**	**	**	**	83
University Hospital Ayr	46 (29)	34.9 (22)	3.2 (2)	15.9 (10)	63
Dumfries & Galloway Royal Infirmary	55 (11)	40 (8)	0	5 (1)	20
Forth Valley Royal Hospital	40 (18)	37.8 (17)	2.2 (1)	20 (9)	45
Glasgow Royal Infirmary	55 (11)	25 (5)	10 (2)	10 (2)	20
University Hospital Hairmyres	42 (29)	42 (29)	10.1 (7)	5.8 (4)	69
Ninewells Hospital	47.9 (56)	41.9 (49)	0.9 (1)	9.4 (11)	117
Queen Elizabeth University Hospital	43.8 (78)	36.5 (65)	8.4 (15)	11.2 (20)	178
Raigmore Hospital	37.5 (12)	34.4 (11)	3.1 (1)	25 (8)	32
Royal Infirmary of Edinburgh	45.2 (61)	45.9 (62)	1.5 (2)	7.4 (10)	135
National	**45.2** (318)	**39.1** (275)	**4.7** (33)	**11.1** (78)	704

Abbreviations: LF=Limb-fitted, NLF=non-Limb-fitted, Aban=Abandoned

**No data as Grampian not included in report.

8.3 Milestones by hospital (limb-fitted unilateral transtibial amputees)

The number of, and milestones data for limb-fitted unilateral transtibial amputees are presented for each hospital in Table 52.

Table 52 Key Performance Indicators (milestones) by hospital, 2018

Hospital – unilateral TTA	% LF	Days to CT	Days to EWA	Days to Casting	Days to Delivery	In Patient Stay	Overall Length of Rehab	LCI-5 change score
University Hospital Ayr (n=23)	73.9% (n=17)	14	27	58	72	21	213	-9.5
Dumfries & Galloway Royal Infirmary (n=12)	75% (n=9)	6	7	35	50	56	105	-6
Forth Valley Royal Hospital (n=23)	47.8% (n=11)	11	18	43	59	28	121	-6
Glasgow Royal Infirmary (n=10)	70% (n=7)	14	43.5	62	73	7	252	4.5
University Hospital Hairmyres (n=26)	65.4% (n=17)	0	12	43	62	14	135	-2
Ninewells Hospital (n=49)	83.7% (n=41)	0	9	26	33	46	83	-11
Queen Elizabeth University Hospital (n=70)	67.1% (n=47)	7	11	29	48	40	167	-2
Raigmore Hospital (n=19)	52.6% (n=10)	0	12.5	22.5	29	37.5	99	-4
Royal Infirmary of Edinburgh (n=53)	71.7% (n=38)	9.5	22	54.5	72	79	134	-8
National Median (n=298)	**69.5% (n=207)**	**7**	**14**	**36**	**52**	**43**	**145**	**-6**

Abbreviations: Compression therapy (CT), Early Walking Aid (EWA), Length of Stay (LOS)

Definitions:

Days to CT	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 final surgery to delivery of prosthesis
In Patient LOS	Median days from amputation surgery to discharge from inpatient care
Overall Length of Rehab	Median days from amputation surgery to discharge from outpatient care

Figure 6 Days from surgery to commencing compression therapy (CT) and early walking aid (EWA) use in unilateral TTAs by hospital

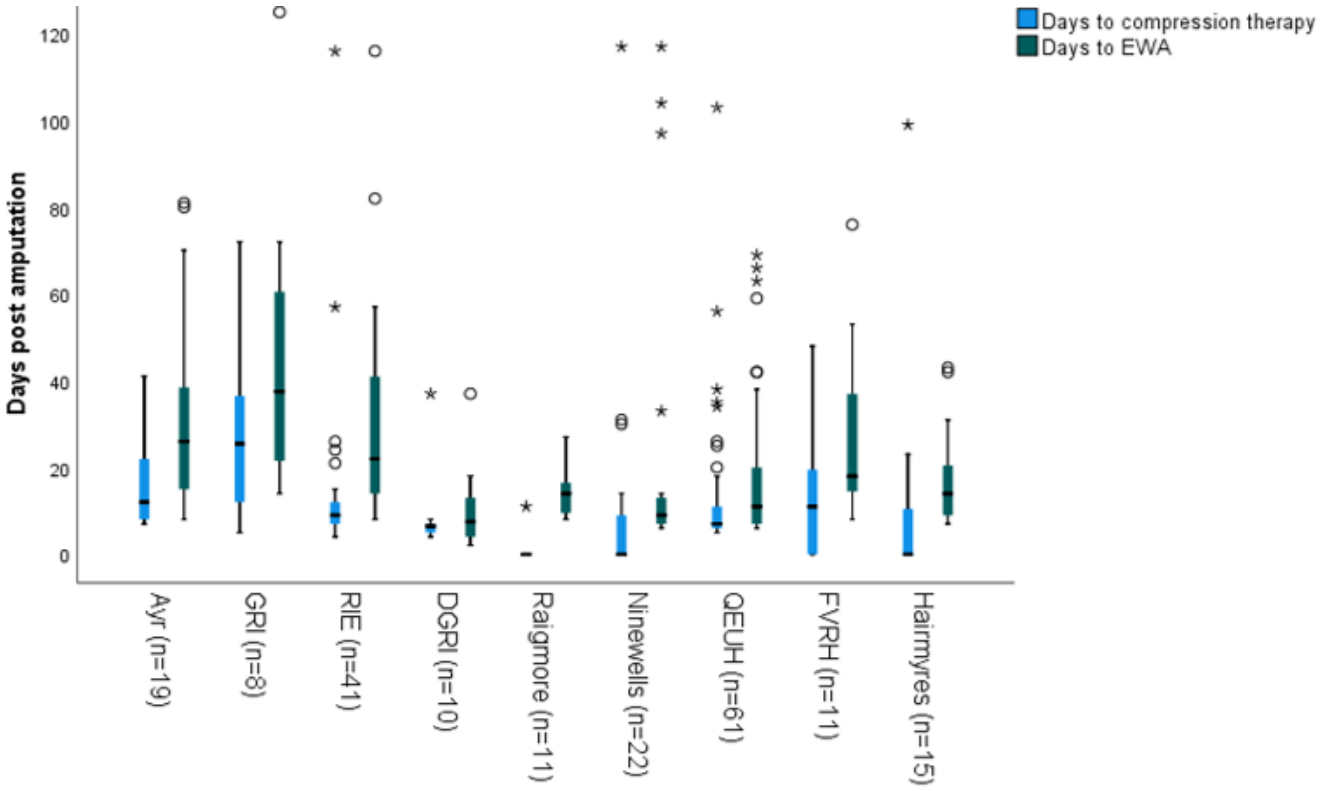


Figure 7 Days from surgery to cast and delivery of a prosthetic limb in unilateral TTA's by hospital

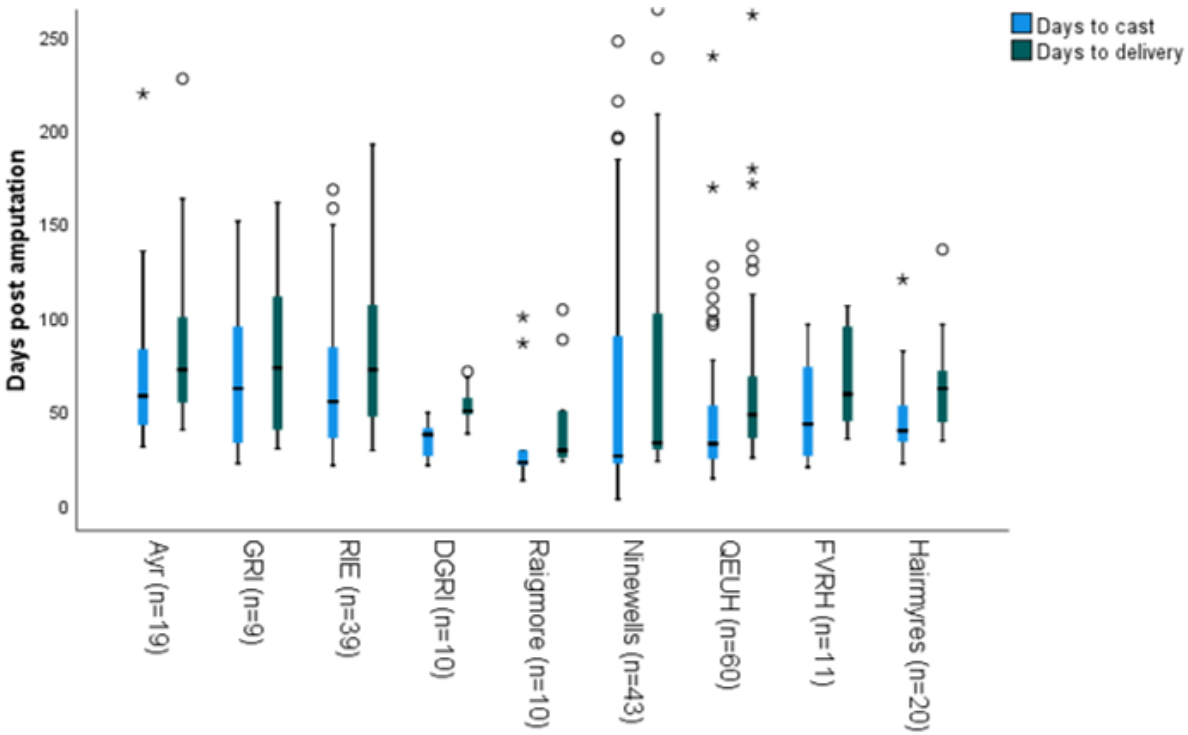
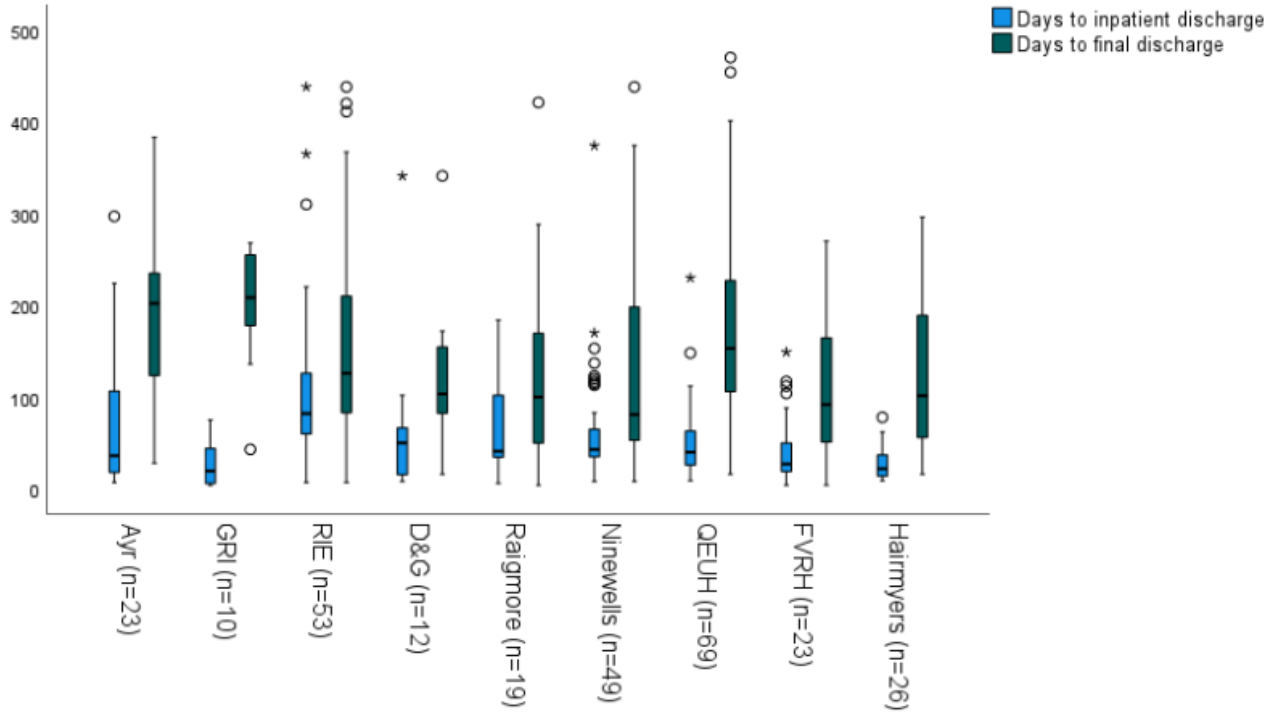


Figure 8 Days from surgery to inpatient and final discharge from physiotherapy in unilateral limbfitted TTAs by hospital



9 Limb -fitting Centres

9.1 *Hospital to Limb fitting centre*

Each of the five limb fitting centres receives referrals depending upon their geographical location. Table 53 shows which limb-fitting centre each hospital refers to; the number of amputees in 2018 from each hospital, and the percentage Limb-fitted at each centre categorised into unilateral transtibial (TTA) and unilateral transfemoral (TFA) level.

Table 53 Limb-fitting centres, referring hospitals and % limb-fitted

Limb-fitting Centres (LFC)	Referring hospital (n= number of TT & TF amputees in 2018)	% Limb-fitted Unilateral TTA	% Limb-fitted Unilateral TFA
WestMARC (n=297) (NHS GG&C, NHS Forth Valley, NHS Dumfries and Galloway, NHS Lanarkshire and NHS Ayrshire and Arran)	Queen Elizabeth University Hospital (n= 144)	67.1	23
	Glasgow Royal Infirmary (n=18)	70	50
	Royal Alexandria Hospital (n=27)	65.4	0
	University Hospital Monklands (n=0)	n/a	n/a
	University Hospital Hairmyres (n=54)	65.4	31
	Forth Valley Royal Hospital (n=38)	47.8	40
	Dumfries and Galloway Royal Infirmary (n=16)	75	25
	Golden Jubilee National Hospital (n=0)	n/a	n/a
Ayr (n=49) **WestMARC satellite clinic**	Ayr University Hospital (n=49)	73.9	34.6
SMART (n=116) (NHS Lothian, NHS Borders)	Royal Infirmary of Edinburgh (n=116)	71.7	28.1
	St John's Hospital, Livingstone (n=0)	n/a	n/a
	Borders General (n=0)	n/a	n/a
TORT (n=101) (NHS Tayside, NHS Fife)	Ninewells Hospital (n=93)	83.7	20.5
	Victoria Hospital, Kirkcaldy (n=8)	100	50
Raigmore (n=26) (NHS Highland)	Raigmore Hospital (n=26)	52.6	14.3
MARS (n=84*)** **(NHS Grampian)**	**Aberdeen Royal Infirmary (n=83)** **Woodend Hospital (n=1)**	**	**

Abbreviations: TFA=transfemoral, TTA=transtibial, **No data as Grampian not included in report

***please note the numbers for MARS include all levels of amputation

9.2 Milestones by Limb-fitting centre

The number of, and milestones data for limb-fitted unilateral transtibial amputees are presented for each hospital in Table 54.

Table 54 Key performance Indicators (milestones) for unilateral TTA, by limb-fitting centre

Limb fitting Centre	Days to CT	Days to EWA	Days to Casting	Days to Delivery	In Patient LOS	Overall Length of Rehab
WestMARC (NHS GG&C) (n=96)	7	12	34.5	49	34	158
Ayr (satellite clinic of WestMARC) (n=17)	14	27	58	77	21	213
SMART (n=38)	9.5	22	54.5	70.5	79	134
TORT (n=45)	0	9	27	33	49	83
Raigmore (n=10)	0	12.5	22.5	29	37.5	99
MARS	**	**	**	**	**	**
National Median	7	14.5	39	52	43	133

Abbreviations: TTA=transtibial, Compression therapy (CT), Early Walking Aid (EWA), Length of Stay (LOS)
**No data as Grampian not included in report

Definitions:

Days to CT	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 final surgery to delivery of prosthesis
In Patient LOS	Median days from amputation surgery to discharge from inpatient care
Overall Length of Rehab	Median days from amputation surgery to discharge from outpatient care

10 References

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11 Appendices

11.1.1 Appendix A Bibliography & Research

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11.1.2 Appendix B List of SPARG Database reporting facilities

Facility to check entered data only: -

Amputee Details

Previous amputations

LCI5 Mobility Outcome

Functional Co-morbidities Index

Other issues

Home circumstances

Check final outcome

Check important dates

11.1.3 Appendix C SPARG contact details

Email: spargphysio@outlook.com

Chair: joanne.hebenton@ggc.scot.nhs.uk

WestMARC generic: westmarc.physiotherapy@ggc.scot.nhs.uk

11.1.4 Appendix D Aetiology Mapping

Definition

If there are several factors contributing to the patient's need for an amputation, the main or root cause of the amputation will be selected here, other factors are included as co-morbidities using FCI.

- PAD – Peripheral Arterial Disease this terminology replaces the previously used "Peripheral Vascular Disease".
- Diabetes. If patient is diabetic enter as aetiology unless tumour, trauma, burns, drug abuse or orthopaedic is the cause. The amputation may be the result of PAD and/or neuropathy and/or renal failure.
- Blood borne infection includes meningitis
- Renal Failure – only where diabetes is not present
- Other for any aetiology not listed.

Since 2016 **'immediate cause of amputation'** has been included. This is either infection, ischaemia or a combination of both and will be secondary to aetiology. This section may not be applicable when amputation is due to trauma, tumour or congenital deformity in which case mark as not applicable.

Mapping

The list of aetiologies used in this report was revised and reduced in 2004 and revised again in 2016 to improve accuracy of recording and relevance of categories. The following shows the mapping of the previous list of aetiologies to the current list.

Previous category	New category 2004	2016
PAD – Arteriosclerosis	Unchanged	Unchanged
PAD – Diabetes	Diabetes	Unchanged
Trauma	Trauma or Burns	Unchanged
Burns		
Tumour	Unchanged	Unchanged
Congenital deformity	Unchanged	Unchanged
Drug abuse	Unchanged	Unchanged
Venous Problems	Venous disease	Unchanged
Non-union of fracture	Orthopaedic	Non-union of fracture
Failed joint replacement		Failed joint replacement
Acquired deformity		Acquired deformity
Septicaemia	Blood-borne infection	Unchanged
Renal Problems	Renal Failure	Unchanged
Other	Other	Chronic regional pain Syndrome
Local Infection		Acute vascular incident
Not recorded	Unchanged	Not recorded

11.1.5 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**
Basic Activities		
Get up from a chair		
Walk indoors		
Walk outside on even ground		
Go up the stairs with a handrail		
Go down the stairs with a handrail		
Step up a kerb		
Step down a kerb		
TOTAL		
Advanced activities		
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 handrail		
Walk down without a handrail		
Walk while carrying an object		
TOTAL		
OVERALL TOTAL		
CHANGE of overall total from 6 months preadmission to final discharge		

11.1.6 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 $^{2)}$. If neither height nor weight cannot 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^2 i.e., patient is likely to be obese.

Functional Co-morbidities Index

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

11.1.7 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"

11.1.8 Appendix H Models of Care Summary for 2017

Scoring system

Aspect of model of care identified as influential	Scoring system Aspects found to be statistically significant in previous study[6] have been given a higher rating i.e. 2 Score < optimum means aspect is only partially available	Score
Immediate post-operative rigid dressing	0 = not used, 1 = used with some patients, 2 = used routinely	**2**
Specialist physiotherapy in first 14 days	0 = non-specialist physio, 1 = non-specialist supported by specialist e.g., in-reach, 2 = specialist physio	**2**
Daily inpatient gym session (Mon- Fri)	0 = no gym sessions,1 = gym sessions 2-3 xs per week or daily ward sessions, 2 = daily gym sessions	**2**
Inpatient gym session ≥ 1 hour	0 = < 60 mins, 1 = ≥ 60 minutes	**1**
Prosthetic Service on site when in patient	0 = on site, 1 = not on site	**1**
Prosthetic provision as an in patient LF = limbfitted, IP =inpatient, OP = outpatient	0 = LF as OP, 1 = some patients LF as IP and/or all patients cast as IP, 2 = all patients LF as IP	**2**
Routine specialist physiotherapy outpatient service	0 = not routine, 1 = routine	**1**
	Maximum score	**11**

QUEEN ELIZABETH UNIVERSITY HOSPITAL, NHS GREATER GLASGOW & CLYDE: Vascular Unit

Following an amputation, patients at QEUH will receive treatment from a specialist physiotherapist (2). Rehabilitation will occur in their amputating bed. A post-operative rigid dressing is not routinely used. Multi-disciplinary team working is complemented by regular MDT meetings, with a discharge co-ordinator and MDT ward rounds.

As an in-patient, physiotherapy will be provided in one-to-one and group sessions, based on the ward and in a therapy gym. Patients will routinely receive one treatment session daily (2), Monday to Friday, with an average treatment session lasting 60 minutes (1). Patients who are appropriate for prosthetic input will be routinely discharged after casting for their prosthetic limb. However, if there are access difficulties at home some are kept in until they are mobilising with their prosthesis (1). At QEUH, there is an on-site prosthetic centre (Westmarc) (1)

Patients who are appropriate for prosthetic input will have access to out-patient physiotherapy follow-up at WestMARC, their nearest limb-fitting centre. They will see a specialist physiotherapist (1) twice a week and have access to community outreach, clinical psychology and specialist OT services.

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input, but do not routinely access physiotherapy on discharge.

MOC Score = 8/11

QUEEN ELIZABETH UNIVERSITY HOSPITAL, NHS GREATER GLASGOW & CLYDE: Orthopaedic Unit

Following an amputation, patients at QUEH (Ortho) will receive treatment from orthopaedic physiotherapist (whilst on Ward) and specialist amputee physiotherapist (1) once they start GYM treatment. They will remain in their amputating bed during their inpatient rehabilitation. A post-operative rigid dressing is not routinely used. Multi-disciplinary team working is complemented by regular MDT meetings. These are not attended by a discharge co-ordinator.

As an in-patient, physiotherapy will be provided in one-to-one and group sessions, based on the ward and in a therapy gym. Patients will routinely receive two treatment sessions daily, Monday to Friday (2), with an average total treatment time of 180 minutes (1). Patients who are appropriate for prosthetic input will routinely be discharged after their first casting. At QEUH, there is an onsite prosthetic centre; WestMARC (1).

Patients who are appropriate for prosthetic input will have access to out-patient physiotherapy follow-up at WestMARC, their onsite limb-fitting centre. They will see a specialist physiotherapist (1) twice a week and have access to community outreach, clinical psychology, and specialist OT services.

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input, but do not routinely access physiotherapy on discharge.

MOC Score = 6/11

GLASGOW ROYAL INFIRMARY, NHS GREATER GLASGOW & CLYDE

Following an amputation, patients at GRI will receive treatment from a non-specialist physiotherapist. Rehabilitation will occur in their amputating bed. A post-operative rigid dressing is not routinely used. There is no formal multi-disciplinary team (MDT) meetings/working.

As an in-patient, physiotherapy will take the form one-to-one sessions. These will take place on the ward (no gym/ group treatment as an inpatient). Patients will routinely receive one treatment session daily, Monday to Friday (1), with average treatment time lasting 30 minutes. There is provision for rehabilitation at the weekend as required. Patients who are appropriate for prosthetic input will routinely be discharged before their first casting. At GRI, there is no on-site prosthetic centre and subsequently they will be referred to their nearest site which is WestMARC.

Prosthetic candidates will have access to out-patient physiotherapy follow-up at WestMARC, their nearest limb-fitting centre. They will see a specialist physiotherapist (1) twice a week and have access to community outreach, clinical psychology and specialist OT services.

Patients who are not appropriate for prosthetics will receive the same level of in-patient input, but do not routinely have access to out-patient physiotherapy follow-up unless required.

MOC Score = 2/11

ROYAL ALEXANDRA HOSPITAL, NHS GREATER GLASGOW & CLYDE

Following an amputation, patients at RAH will receive treatment from a non-specialist physiotherapist. Rehabilitation commences in their amputating bed and, where appropriate, will continue in a slow-stream rehab bed. A post-operative rigid dressing is not routinely used. No formal multi-disciplinary team working occurs.

As an in-patient, physiotherapy will take the form of one-to-one, ward-based sessions. Patients will routinely receive one treatment session daily (1), Monday to Friday, with an average treatment session lasting 30-45 minutes. Discharge timing will be planned on an individual basis.

At RAH, there is no on-site prosthetic centre and subsequently they will be referred to their nearest site, which is WestMARC.

Patients who are appropriate for prosthetic input will have access to out-patient physiotherapy follow-up at WestMARC, their nearest limb-fitting centre. They will see a specialist physiotherapist twice a week and have access to community outreach, clinical psychology, and specialist OT services (1).

Patients who are not appropriate for prosthetics will receive the same level of in-patient input, but do not routinely access physiotherapy on discharge.

MOC Score = 2/11

INVERCLYDE ROYAL HOSPITAL, NHS GREATER GLASGOW & CLYDE

From 2017, all patients who would have been amputated at Inverclyde Hospital are now amputated in QEUH (see service description above).

Patients who are appropriate for prosthetic input will routinely be discharged from QEUH after their first casting and will attend WestMARC for their prosthetic care. Patients who are appropriate for prosthetic input will have access to out-patient physiotherapy follow-up at IRH or Westmarc. They will see a specialist physiotherapist twice a week.

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input in QEUH, but will only access physiotherapy on discharge as required. This will be provided via a domiciliary service

MOC Score = N/A outpatient service only

UNIVERSITY HOSPITAL HAIRMYRES, NHS LANARKSHIRE

Following an amputation, patients at Hairmyres Hospital will receive treatment from a specialist physiotherapist (2). Rehabilitation will occur in their amputating bed. A post-operative rigid dressing is not routinely used. Multi-disciplinary team (MDT) working is complemented by regular MDT meetings and MDT ward rounds. These are not attended by a discharge co-ordinator.

As an in-patient, physiotherapy will be provided in one-to-one and group sessions, based on the ward and in a therapy gym. Patients will routinely receive one treatment session daily Monday to Friday (3 ward sessions and 2 gym sessions) (1), with an average Gym treatment session lasting 60 minutes and the ward session, 45 minutes (1). Patients who are appropriate for prosthetic-fitting will routinely be discharged before primary prosthetic review. At Hairmyres, there is no on-site prosthetic centre and subsequently they will be referred to their nearest site which is WestMARC.

Patients who are appropriate for prosthetic input will have access to routine out-patient physiotherapy follow-up at their nearest acute hospital. They will see a specialist physiotherapist (1) twice a week in a group exercise setting.

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input, but will only access physiotherapy on discharge as required. This will be provided via a domiciliary service.

MOC Score = 5/11

From 2018 - No longer routinely use rigid dressing post-operatively

ROYAL INFIMARY EDINBURGH / ASTLEY AINSLIE HOSPITAL, NHS LOTHIAN

Following amputation, patients at RIE will receive treatment from a non-specialist physiotherapist. In RIE patients will be seen by the in-reach team from Astley Ainslie Hospital and, if assessed as having rehabilitation potential will be transferred to an amputee rehabilitation bed at AAH from 7 – 21 days post op. At AAH they will receive treatment from a specialist physiotherapist (1). A post-operative rigid dressing is not routinely used. Multidisciplinary team working is complemented by regular MDT meetings and MDT ward rounds. These are not attended by a discharge coordinator.

As an inpatient at RIE, physiotherapy will take the form of x 2 per week Gym sessions with the in-reach physiotherapists. Occasional ward sessions may be provided by the surgical team physiotherapists. Following transfer to AAH, physiotherapy will take the form of one-to-one and group sessions based mainly in a physiotherapy gym. Patients will receive up to three sessions daily, Monday to Friday (1), with an average total daily treatment time lasting 60 minutes (1).

At AAH there is an on-site prosthetic centre; SMART Centre (1). Patients will routinely be discharged after prosthetic fitting (2). Outpatient physiotherapy is provided routinely as required (1). All prosthetic patients will be reviewed in an MDT clinic 6 weeks after discharge.

Physiotherapy input for in-patients not proceeding with prosthetic fitting will be gauged in accordance with specific rehab goals. On discharge, these patients do not routinely have access to out-patient physiotherapy.

Patients can be sent home to heal and may be readmitted for rehabilitation and prosthetic fitting or may attend as an outpatient.

MOC Score = 7/11

NINEWELLS HOSPITAL, NHS TAYSIDE

Following an amputation, patients at Ninewells Hospital will receive treatment from a specialist physiotherapist (2). Rehabilitation will commence in their amputating bed and, if suitable for prosthetic fitting, they will move to an amputee rehabilitation bed, of which there are ten. A post-operative rigid dressing is routinely used (2) for up to 7-day period. Multi-disciplinary team working is complemented by regular MDT meetings and MDT ward rounds. These are not attended by a discharge co-ordinator.

As an in-patient, physiotherapy will take the form of one-to-one sessions, based mainly in the therapy gym. Patients will routinely receive one treatment session daily (2), Monday to Friday, increasing to two per day if for prosthetic fitting with an average total daily treatment time of 120 minutes (1). Patients will routinely be discharged after prosthetic fitting (2) although this is beginning to change and some patients are being discharged home to be limb fitted as an outpatient. At Ninewells, there is an on-site prosthetic service (1) - TORT Centre.

Prosthetic candidates do not routinely access out-patient physiotherapy follow-up. Patients will receive a phone call at three weeks post-discharge and, if out-patient or community physiotherapy is required, this will be arranged accordingly.

Patients, who are not appropriate for prosthetic fitting, will receive the same level of in-patient input, but do not routinely access physiotherapy on discharge.

Patients can be sent home to heal.

MOC Score = 10/11

VICTORIA HOSPITAL, KIRKCALDY, NHS FIFE

Following an amputation, patients at VHK will receive treatment from a specialist physiotherapist (2). Rehabilitation will occur in their amputating bed. VHK also serves as a rehabilitation unit for amputees from other hospitals e.g. Ninewells Hospital. A post-operative rigid dressing is routinely used (2), usually for a ten day period. Multi-disciplinary team working is complemented by regular MDT meetings and MDT ward rounds. These are not attended by a discharge co-ordinator.

As an in-patient, physiotherapy will take the form of group based sessions, based mainly in the therapy gym. Patients will routinely receive one treatment session daily (2), Monday to Friday, with an average treatment session lasting 60 minutes (1). Patients who are appropriate for prosthetic fitting will routinely be transferred, as an in-patient, to Ninewells Hospital where there is on-site prosthetic service (1). In-patient rehab will continue at Ninewells until prosthetic-fitting (2) and they follow the rehab pathway used at Ninewells.

Prosthetic candidates routinely access specialist out-patient physiotherapy follow-up at Victoria Hospital following discharge from Ninewells (1).

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input, but will only access physiotherapy on discharge as required. This will be provided via a domiciliary service. When required, patients will receive daily non-specialist physiotherapy for two weeks via VHK Discharge team. After this, they will receive ongoing community physiotherapy as rehabilitation goals indicate.

MOC Score = 11/11

NB Fife patients are no longer all having surgery in VH, many are transferred to Ninewells for their amputation (in 2017, n=23 in VH, n= 43 in Ninewells), indeed from 2019 onwards all amputation surgery has been carried out in Ninewells Hospital. It appears that more complex and higher level amputations were carried out in Ninewells in 2017 and this may be related to the difference in outcomes between the 2 services.

FORTH VALLEY ROYAL HOSPITAL, NHS FORTH VALLEY

Following an amputation, patients at FVRH will receive treatment from a specialist physiotherapist (2) Patients who are for prosthetic fitting will receive it in their amputating bed. Rehabilitation for patients who are not for prosthetic fitting occurs in a slow-stream rehabilitation bed. A post-operative dressing is routinely used by 2/3 of surgeons (1). Multi-disciplinary team working is complemented by daily ward rounds. These are not attended by a discharge coordinator.

As an in-patient, physiotherapy will be provided in one-to-one and group sessions, based on the ward and in a therapy gym. Patients suitable for prosthetic fitting will routinely receive one treatment session daily (1), Monday to Friday. Patients not appropriate for prosthetic fitting will routinely receive daily treatment sessions three to five times a week. The average treatment session lasts 60 minutes (1).

Patients who are appropriate for prosthetic-fitting will routinely be discharged before primary prosthetic review. At FVRH, there is no on-site prosthetic centre and subsequently they will be referred to their nearest site which is WestMARC. After in-patient discharge, prosthetic candidates will have access to physiotherapy after in-patient discharge at the acute hospital. They will see a specialist physiotherapist (1) twice a week.

Patients who are not appropriate for prosthetics will receive the same level of in-patient input but will only access physiotherapy on discharge as required. This will be provided via domiciliary services or at a day hospital.

MOC Score = 6/11

RAIGMORE HOSPITAL, NHS HIGHLAND

Following an amputation, patients at Raigmore Hospital will receive treatment from a specialist physiotherapist (2). Rehabilitation will occur in their amputating bed. A post-operative rigid dressing is routinely used (2), for a 21-day period. Multi-disciplinary team (MDT) working is complemented by regular MDT meetings. These are not attended by a discharge co-ordinator.

As an in-patient, physiotherapy will take the form of both one-to-one and group sessions based on the ward and in a therapy gym. Patients will routinely receive one treatment session daily (1), Monday to Friday, with an average treatment session lasting 60 minutes (1). Patients who are appropriate for prosthetic-review will routinely be discharged after prosthetic fitting (2). At Raigmore, there is an on-site prosthetic centre (1).

Prosthetic candidates will have access to out-patient physiotherapy. Where geography allows, they will receive a weekly session at the acute hospital with a specialist physiotherapist. Where distance is an issue, they can attend non-specialist physiotherapy at their nearest community hospital.

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input, but do not routinely access physiotherapy on discharge.

MOC Score = 9/11

AYR HOSPITAL, NHS AYSHIRE & ARRAN

Following an amputation on the vascular ward, patients at Ayr Hospital will receive treatment from a specialist physiotherapist (2). Rehabilitation will occur in their amputating bed. A post-operative rigid dressing is not routinely used. Multi-disciplinary team (MDT) working is complemented by regular MDT ward rounds. These are not attended by a discharge co-ordinator.

As an in-patient, physiotherapy will take the form of both one-to-one and group-based sessions. Physiotherapy sessions will take place both on the ward and in the therapy gym. Patients will routinely receive two treatment sessions daily (2), Monday to Friday, with average treatment time lasting 60 minutes (1). Patients who are appropriate for prosthetic-review will routinely be discharged before their first casting. At Ayr, there is a satellite prosthetic service available to patients (1).

On occasion an amputation will occur under the orthopaedic team at Ayr or Crosshouse Hospitals. Those patients will receive daily physiotherapy from a non-specialist amputee physiotherapist with guidance from the specialist amputee physiotherapy team.

A patient requiring longer-term rehabilitation will be transferred to one of five downstream/community hospitals (Arran War Memorial Hospital, Ayrshire Central Hospital in Irvine, Biggart Hospital in Prestwick, East Ayrshire Community Hospital in Cumnock or Girvan Community Hospital). Those patients will receive regular physiotherapy from a non-specialist amputee physiotherapist with guidance from the specialist amputee physiotherapy team.

Once discharged from in-patient care, prosthetic candidates will have access to out-patient physiotherapy at one of two locations (Ayr Hospital or Ayrshire Central Hospital in Irvine). They will see a specialist physiotherapist (1) twice a week and have access to outreach community physiotherapy.

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input, but do not routinely access physiotherapy on discharge unless required. When required, their physiotherapy input will occur via a domiciliary service.

MOC Score = 7/11

NB Theatre dressings are left in place x 1 -2 weeks so it is not until these are changed that an assessment of the wound can be made and compression therapy and walking with an EWA can begin. These delays may be an influencing factor in patients being fitted much later in Ayr than at other centres (10 weeks compared to 5 weeks at other centres).

DUMFRIES & GALLOWAY ROYAL INFIRMARY, NHS DUMFRIES & GALLOWAY

Following an amputation, patients at DGRI Hospital will receive treatment from a specialist physiotherapist (2). Rehabilitation will initially occur in their amputating bed. However, once surgically fit, dependent on rehab needs and discharge planning, patients may be transferred to a rehabilitation unit either in DGRI or a community hospital. Whilst there is provision for rehabilitation beds for amputees, their physiotherapy input remains specialist.

A post-operative rigid dressing is not routinely used. Multi-disciplinary team (MDT) working is complemented by regular MDT meetings. These are not attended by a discharge co-ordinator.

As an in-patient, physiotherapy will take the form of both one-to-one and group-based sessions. Patients will routinely be seen daily, Monday to Friday (2), with an average treatment session lasting 60 minutes (1). There is no specific protocol/pathway for time of discharge in patients' hospital stay i.e., pre-cast, post-cast, after limb-fitting (1). At DGRI, there is no on-site prosthetic centre and subsequently they will be referred to their nearest site which is WestMARC.

Prosthetic candidates will have access to out-patient physiotherapy follow-up at their nearest acute hospital, DGRI or Galloway Community Hospital. They will see a physiotherapist more than once a week, this may be a specialist, dependent on location.

Patients, who are not appropriate for prosthetics, will receive the same level of in-patient input, but do not routinely have access to out-patient physiotherapy follow-up.

MOC Score = 6/11

ABERDEEN ROYAL INFIRMARY, NHS GRAMPIAN

Following an amputation, patients at ARI will receive treatment from a specialist physiotherapist (2). Rehabilitation will begin in their amputating bed with those suitable for a prosthesis moving to a 6-bed rehabilitation unit at Woodend Hospital once wound is deemed satisfactory. A post-operative rigid dressing is not routinely used. Multi-disciplinary team working is complemented by weekly MDT meetings at Woodend site. These are not attended by a discharge co-ordinator.

Patients assessed as suitable for prosthetic fitting will have physiotherapy in the form of gym-based sessions (both 1:1 and group sessions). Patients will routinely receive one treatment session five days a week (2), with an average treatment session lasting 45 minutes. These patients will be discharged routinely after prosthetic fitting (2). However, if wound healing is delayed, patients may be discharged and re-admitted to Woodend Hospital once they are able to commence EWA and prosthetic rehabilitation. Physiotherapy at Woodend Hospital is provided by staff travelling from ARI with support from 0.4 HCSW based permanently at Woodend. The prosthetic service is at M.A.R.S, Woodend Hospital (1).

Prosthetic candidates will have access to physiotherapy after discharge as required. The level of input is dependent on geography and ongoing rehabilitation goals. Local patients may access specialist physiotherapist up to two times a week. When geography necessitates non-specialist physiotherapy input, the physiotherapist will be supported by the prosthetic centre. Patients can be re-admitted to 6 bedded unit for 1-3 weeks intensive rehabilitation.

Patients who are not appropriate for prosthetic fitting will receive physiotherapy in the form of both gym based and ward sessions. These will be both 1:1 and in group settings. Patients will routinely receive 1 treatment session 3 days a week with an average session lasting 30 minutes. Following discharge from hospital physiotherapy will be provided as required by community non-specialist staff.

On referral from medical staff, patients are offered an early pre amputation home visit with OT and physiotherapy staff.

Patients can be sent home to heal. MOC Score = 7/11

In 2018 Number of physiotherapy sessions increased from four to five at the 6 bedded links unit

11.1.9 Appendix I Multidisciplinary Advisory Group

Joanne Hebenton, Physiotherapy Team Lead, WestMARC, QEUH

Rosie Carr, Specialist Physiotherapist, WestMARC, QEUH

Fiona Davie-Smith, Clinical Co-ordinator Specialist Prosthetics Service

Francine McCafferty, Prosthetist, SMART Centre, Edinburgh

Lynn Hutton, Rehabilitation Consultant, SMART Centre, Edinburgh

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