

SwedAnkle

The Swedish Ankle Registry



Annual Report

2015 Summary in English

Participating units 2015

Alingsås	Movement Mölnadal
Borås	Nacka
Carlanderska Sportsmedicin Carlanderska Ortopedi	Norrköping Norrhälje Nyköping
Danderyd	Oskarshamn
Eksjö Elisabethsjukhuset Eskilstuna	Piteå
Falun	Skellefteå Sollefteå Sophiahemmet
Gävle	S:t Görans Sjukhus Sundsvall
Helsingborg Hudiksvall Hässleholm	Södersjukhuset Södertälje
Jönköping	Uddevalla Umeå Uppsala
Kalmar Karlshamn Karlstad KS Huddinge KS Solna Kungälv	Varberg Visby Värnamo Västervik Västerås Växjö
Ljungby Lund	Örebro Östersund
Malmö Motala	

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Legally responsible for the publication

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Front page. Remains of the originally 12 m statue of emperor Constantin at Museo Capitolino in Rome
(Photo: AC)

1. Background

The concept of reporting all ankle replacements to a national registry appeared 1997 and later that year a registry was initiated. Since 2008 the registry also includes ankle fusions and supramalleolar osteotomies. Questionnaires containing generic (SF-36 and EQ-5D) and ankle-specific scores SEFAS (Self-Reported Foot and Score) are filled out by the patient preoperatively at participating units. Post-operatively the same questionnaires are sent to the patients after 6 months, 1 year, 2 years and 5 years. The patients are then also asked to report their degree of satisfaction with the performed ankle surgery. The Swedish and English versions of the ankle-specific score (SEFAS) can be found in Appendix 1 and under the link *questionnaires* at www.swedankle.se. The database is administered by the Registry Centre South (RC-Syd) in Lund www.rcsyd.se.



Figure 1. X-rays of the ankle prosthesis Rebalance

2. News since the previous report and summary

Fifty ankles were replaced during 2015 which is fewer than during each of the years 2010-2013. One reason is that one major center closed permanently during the summer 2014. Another reason is that the production of the Mobility ankle prosthesis stopped mid-2014 and some units have not yet decided how to proceed. The procedure based coverage was 100%. Surgery has been performed at 8 units but the great majority (84 %) at 4 units: Falun, Movement, Nacka, and Malmö (Table 1 and Fig 5).

During 2014, 303 primary ankle fusions were reported, about the same number as in 2014. Procedure based coverage for ankle fusions has been estimated to 96%. Ankle fusions are potentially performed at 50 units but more than half of them perform less than 5 annual cases and certain years none at all. (Table 3) All but 2 hospitals have reported there ankle fusions during 2015.

The registry has decided to change to decentralized reporting and feed-back online. It will be implemented during late spring 2016.

For the second time we report smoking habits immediately before surgery. Among patients 111 patients scheduled for ankle replacement 2014-2015 information was available for 101 patients. Of these 5% were smokers but all stopped smoking 6 weeks before surgery. Among patients undergoing ankle fusion information was available for 514 patients. 10% of these were smokers but more than half stopped smoking at least 6 weeks before surgery. (Table 8)

For the first time we now also report ASA-classification (American Society of Anesthesiologists Physical Status) for patients scheduled for replacement and fusion of the ankle 2014-2015. 56% of the 109 patients undergoing replacement were classified as ASA 2-3 but non as ASA 4. 69% of patients undergoing ankle fusion were classified as ASA>1. Remarkably 4 were classified as ASA 4 – i.e. with a life-threatening disease. ASA >1 was more common in women than in men.

In May 2015 Maria Cöster presented her thesis "SEFAS – The Self-Reported Foot and Ankle Score". Concurrently analyzes of generic and ankle-specific scores (PROM/PREM) have continued. In 2015 two papers were published and another two have been accepted for publication.

3. Board and secretary

Board

Chair

Åke Carlsson, MD, PhD, Dept. of Orthopedics, Skåne University Hospital, Malmö

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Per-Anders Hamrén Patient representative, Stockholm

Anders Henricson, MD, PhD, Dept. of Orthopaedics, Falu Central Hospital

Sofia Lövendahl, Project administrator, Registry Centre South, Lund

Anna Petersson, Certified Nurse, Dept. of Orthopaedics, Kalmar

Per-Henrik Ågren, MD, Stockholms fotkirurgiklinik, Sophiahemmet, Stockholm

Secretary

Carina Malm, Dept. of Orthopaedics, Skåne University Hospital, Malmö

4. Webpage: www.swedankle.se

The webpage contains information directed to patients concerning ankle surgery. For the profession it contains report forms, questionnaires, recent results and annual reports.

5. Economy

Until to 2010 incomes were based on grants from various research funds. From 2011 the Registry has also received annual contributions from The Swedish Association of Local Authorities and Regions (SKL). (www.kvalitetsregister.se)

6. Research group

Åke Carlsson, MD, PhD, Associate Professor	Magnus Karlsson, MD, PhD, Professor
Björn Rosengren, MD, PhD Associate Professor	Håkan Magnusson, MD, PhD
Anders Henricson, MD, PhD	Jan-Åke Nilsson, statistician
Maria Cöster, MD, PhD	Ilka Kamrad, M

7. Research

Maria Cöster's research project deals with various aspects of Patient-Related Outcome Measurements (PROM) – notably the self-reported Foot and Ankle Score (SEFAS).

Ilka Kamrad's research project deals with self-evaluated function after primary ankle prosthesis and ankle fusion, but also following various revision procedures using validated generic and region-specific instruments.

8. Summary of studies based on the ankle registry

Two studies analyzing the results the result after ankle replacement have been published **(3-6)**. In a study from 2007 the survival rate of 531 primary ankle replacements was estimated to 78% **(3)**. A long learning curve was demonstrated in that the 5-year prosthetic survival regarding the procedures performed by 3 surgeons was 70% for their first 30 cases compared to 86% for those performed thereafter. The risk of revision was higher in younger patients than older **(3)**.

In the second study from 2011 **(6)** on 780 ankles the 10-year survival of 780 ankles was estimated to 69% Excluding the STAR prosthesis, that no longer is used in Sweden, the 10-year survival was estimated to 78%. It was also demonstrated that women with osteoarthritis and below the age of 60 had a higher risk of revision.

A separate study on the STAR ankle **(1)** demonstrated that the 5-year survival of the double-coated STAR design was 98% and better than the corresponding value for the earlier and single-coated design.

Malposition of the hind-foot influences the outcome of ankle replacement. An analysis of 182 cases found that patients with a varus position of the ankle preoperatively were revised twice as often as patients with a normal or valgus position **(2)**.

In a study on 93 AES ankles the 5-year prosthetic survival was 90% **(4)**. In 27% of the cases a total of 36 surgical procedures had been performed simultaneously, demonstrating that replacement surgery often is demanding.

Reviewing existing definitions of "revision" resulted in a recommendation that has been adopted by the Swedish and British registries and is used in several publications (5).

Patient-Related Outcome Measures (PROM) are increasingly used for evaluation of outcome of various interventions. The Self-reported Foot and Ankle specific Score (SEFAS) has been found to have good validity, reliability and sensitivity to within-patient changes (7). It is used routinely in the Swedish Ankle Registry (8).

Ankle prostheses implanted as a revision procedure after failure of a primary prosthesis were found to have an estimated 10-year survival of 55%. Only half of the patients were however satisfied with the operation (9). A corresponding study in which the failed ankle prostheses were treated by fusion has been submitted.

A long-term study of the hitherto largest number of STAR-ankles demonstrated a 14-year survival of 47% for the single-coated STAR-design and a 12-year survival of 64% for the double-coated design. Women below 60 years of age had a higher risk of revision (12).

SEFAS score did not differ between sides in patients who had had one ankle replaced and the contralateral fused. Most patients were satisfied with both ankles (13).

The 10-year survival of prosthesis implanted after the first replaced ankle had failed was 55%. Half of the patients with the re-replaced ankle were satisfied. (11) The satisfaction rate was about the same in patient who instead had their ankle fused after failure. (14) The PROM-scores were about the same in both studies (11, 14). However, the reoperation rate was higher in the re-replaced group than in the group that had been fused.



. **Figure 2.** The CCI ankle (left) and the Mobility ankle (right)

9. Publications based on the ankle registry

1. Carlsson Å.
Single - and double-coated STAR total ankle replacements. A clinical and radiographical follow-up study of 109 cases.
Orthopäde 2006;35:527-532. (Artikel på tyska.)
2. Henricson A, Ågren P-H.
Secondary surgery after total ankle replacement. The influence of preoperative hindfoot alignment.
Foot Ankle Surg 2007; 13:41-44.
3. Henricson A, Skoog, A, Carlsson Å.
The Swedish Ankle Arthroplasty Register. An analysis of 531 arthroplasties between 1993 and 2005.
Acta Orthop 2007;78:569-574.
4. Henricson A, Knutson K, Lindahl J, Rydholm U.
The AES total ankle replacement. mid-term analysis of 93 cases. Foot Ankle Surg 2010;16:61-64.
5. Henricson A, Carlsson Å, Rydholm U.
What is a revision of total ankle Replacement Foot Ankle Surg 2011;17:99-
6. Henricson A, Nilsson J-Å, Carlsson Å.
10-year survival of total ankle arthroplasties. A report on 780 cases from the Swedish Ankle Register.
Acta Orthop 2011;82:655- 659.
7. Cöster M, Karlsson M, Nilsson J-Å, Carlsson, Å.
Validity, reliability, and responsiveness of a self-reported foot and ankle score (SEFAS).
Acta Orthop.2012;83:197-203.
8. Henricson A, Cöster M, Carlsson Å
The Swedish National Ankle Registry Fuss Sprungelänk 2014;12; 65-6.
9. Cöster M. Bremander A, Rosengren B E et al.
Patientutvärdering skall mäta vad man vill mäta.
Ortopediskt Magasin 3: 2014
10. Cöster M, Rosegren B, Carlsson Å, Montgomery F, Karlsson M.
Frågeformulär bra utvärderingsmetod vid fot- och fotledsbesvär.
Läkartidningen. 2015; 112:C9LS
11. Kamrad I, Henricsson A, Karlsson MK, Magnusson H, Nilsson J-Å, Carlsson Å, Rosengren BE
Poor prosthetic survival and function after component exchange of total ankle prosthesis. An analysis of 69 cases in the Swedish Ankle Register.
Acta Orthop 2015;86(4):407-11.

12. Henricson A, Carlsson Å.
Survival analysis of the single- and double-coated STAR ankle up to 20 years.
Long-term follow-up of 324 cases from the Swedish Ankle Registry.
Foot Ankle Int 2015; 36: 1156-1160.
13. Henricson A, Fredriksson M, Carlsson Å.
Total ankle replacement and contralateral ankle arthrodesis in 16 patients from the Swedish Ankle Registry. Self-reported function and satisfaction.
Foot and Ankle Surgery 2015: In press.
14. Kamrad I, Henricson A, Magnusson H, Carlsson Å, Rosengren B.
Outcome After Salvage Arthrodesis for Failed Total ankle Replacement.
Foot and Ankle International 2015 in press



Figure 3 The STAR ankle

10. Procedure- based coverage

Primary ankle prostheses: **100%**

Primary ankle fusions: **96.8%**

Ankle fusions are potentially performed at 50 units in Sweden but more than half of these perform less than 5 cases annually and certain years none at all. All but 2 Swedish units reported data on their ankle fusion during 2015. According to statistics from the Swedish health authorities 313 primary ankle fusions were been performed in Sweden during 2015. The 303 cases reported to the registry out of an estimated total of 313 ankle fusions results in a procedure-based coverage of 96.8 % (Table 4 and Figure 11).

11. Ankle replacements

Number of reported procedures

The number of primary ankle replacements performed in 2015 was 50, i.e. 11 fewer than 2014 (Table1). The reason is that one major center closed down permanently during 2014 and that the company producing the well-functioning Mobility prostheses withdrew it. The procedure-based coverage is 100%. . The majority of the procedures have been performed at 4 units (Table 1 and Figure 4). The annual distribution of prosthetic designs since 1993 is presented in Figure 5.



Figure 4. The TM-ankle was introduced in Sweden during 2014.

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Table 1. Primary ankle replacements per unit 2013-2015. For 2015 distributions according to diagnosis, gender and prosthetic design are presented.

Unit	Replacements (n)			Diagnoses 2015			Gender 2015		Prosthetic designs 2015				
	2013	2014	2015	OA	RA	Other	Women	Men	Mob	CCI	Reb	TM	Hintegra
Falun (+Elisabeth-sjukhuset)	21	23	12	10	1	1	4	8	0	0	6	6	0
Nacka (+Sollefteå)	13	16	10	10	0	0	4	4	0	0	10	0	0
SUS Malmö	12	9	12	7	2	3	4	8	0	0	12	0	0
SUS Lund	5	5	2	0	2	0	2	0	0	0	2	0	0
Spenshult	14	5	Closed	-	-	-	-	-	-	-	-	-	-
Uppsala	5	1	1	0	1	0	1	0	1	0	0	0	0
Sophiahemmet	2	1	2	0	2	0	1	1	0	2	0	0	0
Mölnadal	0	0	3	1	1	1	1	2	0	0	0	0	3
Movement	0	1	8	4	4	0	1	0	0	0	3	5	0
Sundsvall	4	0	0	0	0	0	0	0	0	0	0	0	0
KS Solna	2	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	78	61	50	32	13	5	26	24	1	2	33	11	3

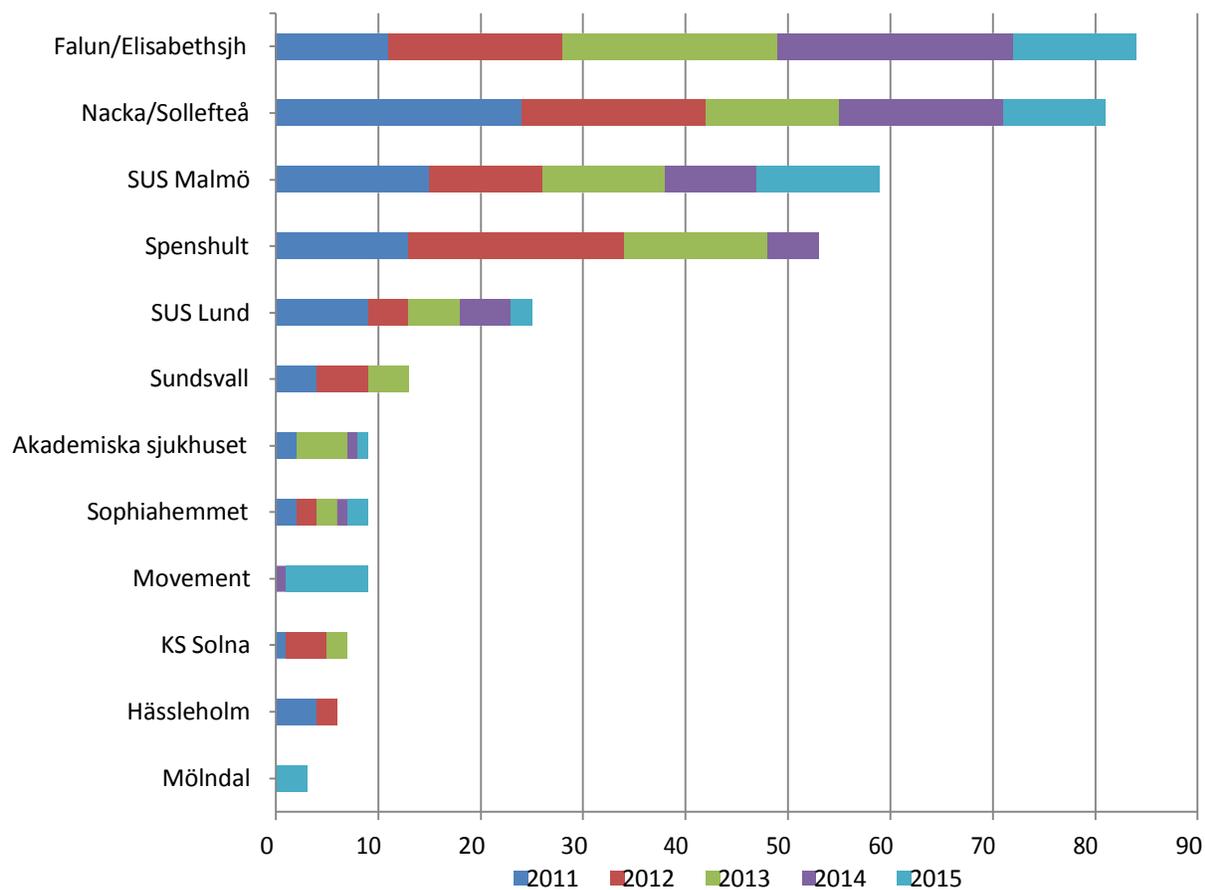


Figure 5 Number of ankle replacements per unit during 2011-2015.

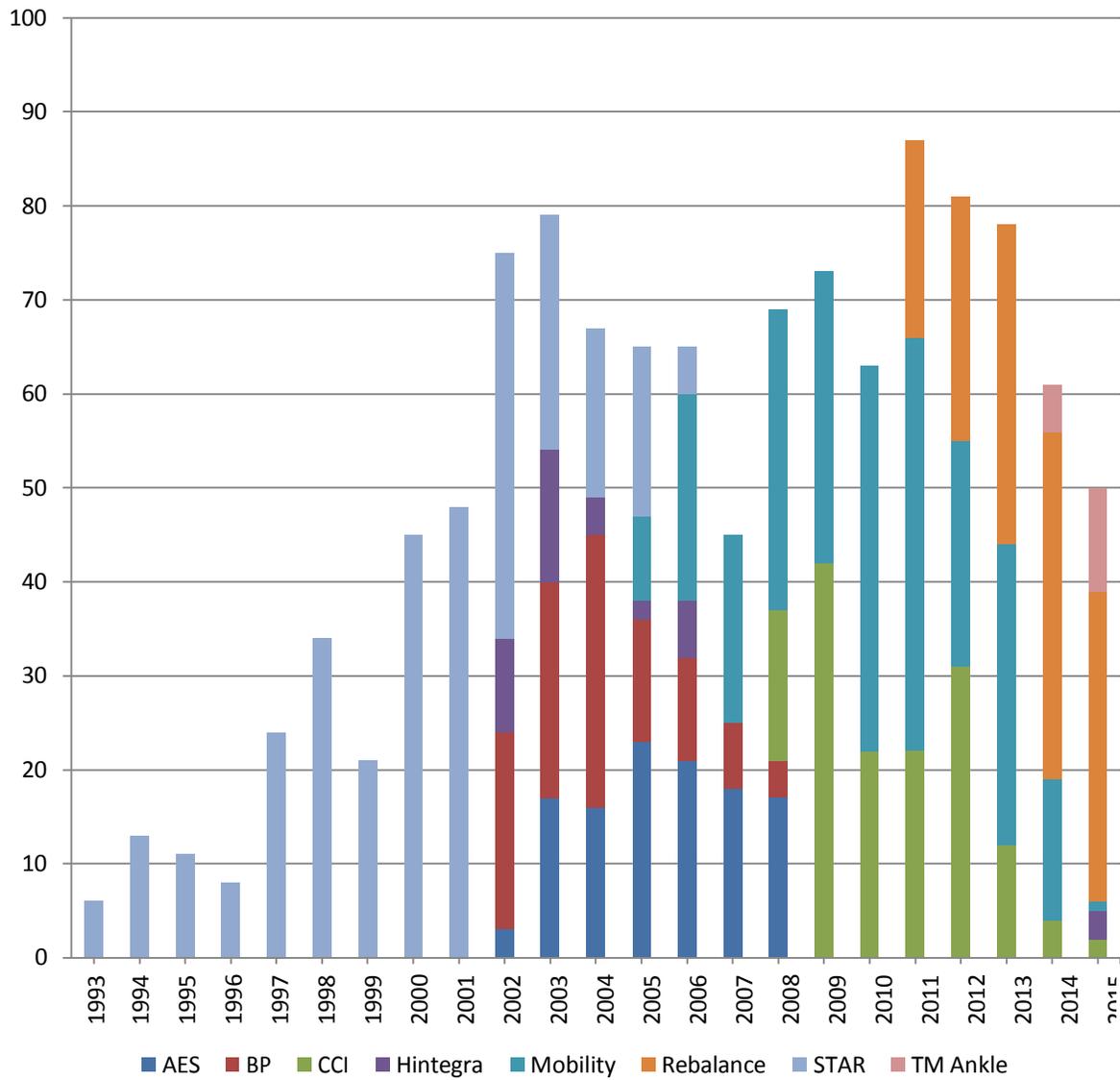


Figure 6. Primary ankle replacement according to prosthesis design during 1993 - 2015.

The fractions of patients having their ankle replaced (Figure 7) or fused (Figure 14) due to rheumatic disease have become lower, notably during 2014 and 2015

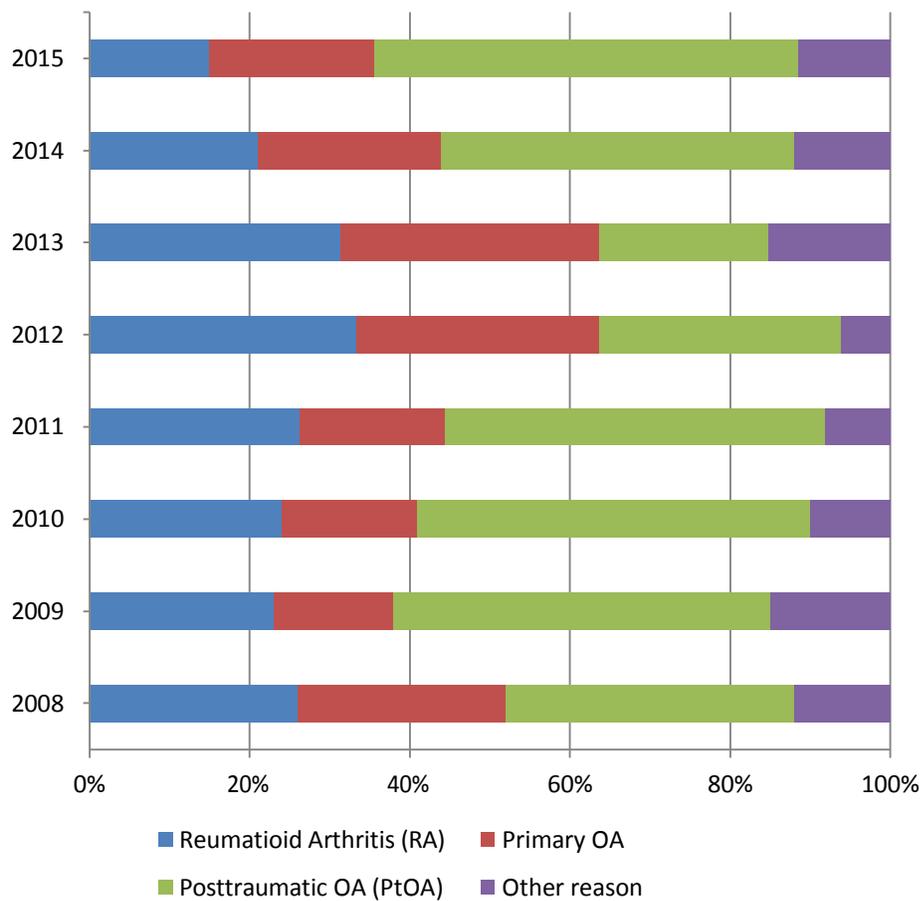


Figure 7. Primary ankle replacements according to diagnosis 2008-2015.

12. Revisions, prosthetic survival and risk factors

Since 1993, i.e. during a period of 21 years, 252 (21%) ankle replacements have been revised. Numbers and reasons for first time revisions – defined as exchange of components or fusion – are presented in Table 2. In addition, 123 re-operations in 102 ankles, defined as secondary surgery not including the ankle itself, were undertaken. Examples are lengthening of the Achilles tendon, osteotomies of the calcaneus and subtalar fusions.

Table 2. Reasons for revision per type of prosthesis 1993–2015.

	STAR		BP	AES	Protestyp					Total
	Single coated	Double coated			Hintegra	Mobility	CCI	Rebalance	TM	
Period in use	1993- 1999	1999- 2007	2000- 2008	2002- 2008	2002- 2006 2015-	2005- 2015	2008-	2011-	2015-	
Replacements (n)	118	205	108	115	39	271	152	152	16	1176
Revisions (n)	64	69	22	32	8	25	26	6	0	252
Revision rate	54%	34%	20%	28%	21%	9%	17%	4%	0%	21%
Reason for revision										
Loosening	37	26	8	15	4	9	17	3		119
Technical error	7	9	2		2			1		21
Instability	1		2	3	1	4	1			12
Infection	4	12	1	4		1	1			23
Pain	5	5	1	2		6	4	1		24
PE-wear/frcture	10	12	2	2		1				27
Painful valgus			1	2	1	1				5
Painful varus		2	2	3		2	2	1		12
Fractruere		3	3	1		1				8

Prosthetic survival at 5 years irrespective of reason was estimated to 0.81 (95% CI: 0.79-0.83) and to 0.69 (95% CI: 0.67-0.71) at 10 years when all designs were included. Notably the outdated single-coated STAR-prosthesis tended to have an inferior survival compared to the other designs which were similar in this aspect. The 10-year survival was not influenced by diagnosis.

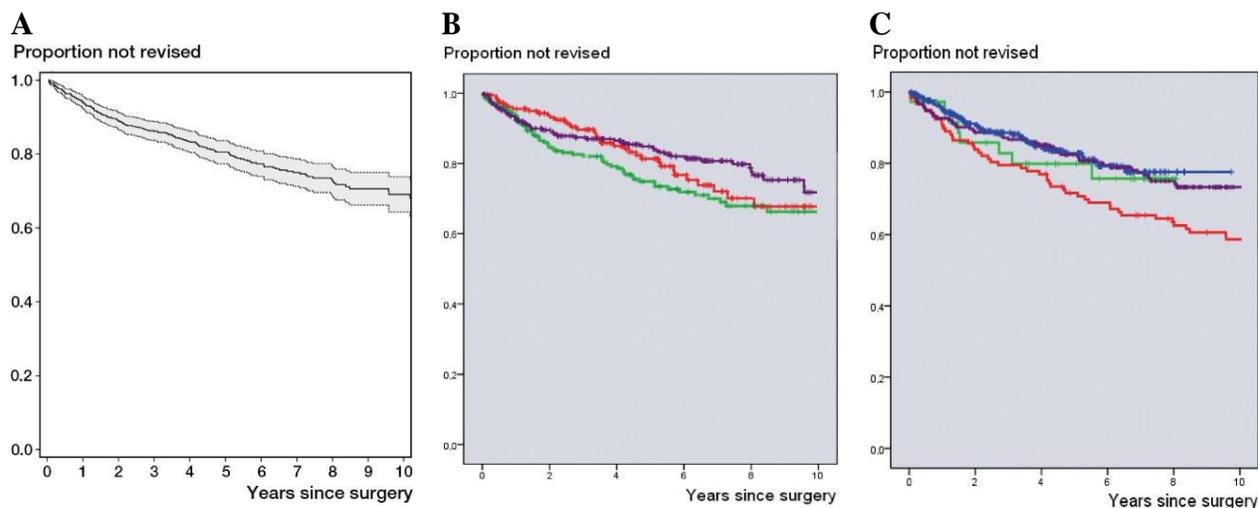


Figure 8 Estimated cumulative prosthetic survival inc. 95 % CI for (A) all ankle replacement in Sweden up to 2010 (B) Per diagnosis (rheumatoid arthritis (purple), primary osteoarthritis (red) posttraumatic osteoarthritis (green)) (C) per prosthetic design (BP-type (blue), Hintegra (green), double-coated STAR (purple) and single-coated STAR (red))

13. Primary ankle arthrodesis

Number of reported procedures

The distribution of arthrodeses per unit 2013- 2015 is presented in Table 4 and the surgical methods per unit in Table 5. Distribution of age, gender and diagnosis in patients with primary ankle fusion is presented in Table 6 b.

It is natural that the greatest number of ankle fusions is performed at hospitals with experts in ankle surgery. Thus, only 9 of about 50 orthopaedic units performed 10 or more ankle fusions during 2015. Only 2 university hospitals perform more than 20 primary ankle fusions during 2015. (Table 3). Open surgery and fixation with cannulated screws has been the dominating method during later years followed by retrograde intramedullary nailing. Arthroscopic exploration with screw fixation and fixation with plate and screws have only had limited use (Table 6). Only 6 cases treated with external fixation have been performed, all at a single hospital.

Out of 1931 primary fusions reported to the registry until December 31st 2015, 141 have undergone at least one re-arthrodesis (7.3%). Of these 10 % have undergone one re-re-arthrodesis.

The annual number of ankle fusions has been about 300 during later years or about 3 per 100.000 inhabitants.. Osteoarthritis is the most common diagnosis - posttraumatic osteoarthritis being somewhat more common than primary osteoarthritis. Table 6 b and Fig 14

Table 3: Number of ankle arthrodesis 2015 according to type of hospital.

Type of operating unit (n)	Number of procedures 2015			
	>20	10-19	5- 9	<5
University hospital (9)	2	1	3	3
Other hospitals (40)	0	6	15	19

Table 4. Number of reported primary ankle arthrodeses per unit 2013-2015

	2013	2014	2015	Reporting 2015
TOTAL (Sweden)	297	308	303	
01 Stockholm	66	56	58	Complete
Danderyd	2	0	8	
KS Huddinge	0	5	8	
KS Solna	6	6	0	
Nacka	31	26	17	
Norrtälje	4	3	6	
S:t Görans sjukhus	5	3	0	
Sophiahemmet	1	3	7	
Södersjukhuset	2	2	10	
Södertälje	15	8	2	
03 Uppsala	25	25	29	Complete
Akademiska sjukhuset	20	19	25	
Elisabethsjukhuset	5	6	4	
04 Södermanland	10	7	2	Complete
Eskilstuna	6	5	0	
Nyköping	4	2	2	
05 Östergötland	11	13	7	Complete
Linköping	0	1	0	
Motala	5	8	6	
Norrköping	6	4	1	
06 Jönköping	5	13	10	Complete
Eksjö	Not reported	5	4	
Jönköping	2	3	6	
Värnamo	3	5	0	
07 Kronoberg	5	8	5	Complete
Ljungby/ Växjö	5	8	5	
08 Kalmar	9	5	7	Complete
Kalmar	6	3	6	
Oskarshamn	3	2	0	
Västervik		0	1	
09 Gotland	0	4	2	Complete
Visby	0	4	2	
10 Blekinge	7	6	2	Complete
Karlshamn	7	6	2	

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Continuation **Table 4.**

	2013	2014	2015	Reporting 2015
12 Skåne	47	48	60	Complete
Helsingborg	3	1	6	
Hässleholm	14	13	13	
SUS Lund	7	3	6	
SUS Malmö	23	31	35	
13 Halland	33	27	20	Incomplete
Halmstad	Do not participate	Do not participate	Do not participate	
Varberg	0	2	3	
Movement	10	11	17	
Spenshult	23	14	Closed	
14 Västra Götaland	29	43	42	Incomplete
Alingsås	5	4	7	
Borås	2	2	3	
Carlanderska sport	2	1	1	
Carlanderska ortopedi	-	5	4	
Kungälv	-	4	6	
Uddevalla	12	17	7	
Mölnådal	10	10	14	
Skövde	Do not participate	Do not participate	Do not participate	
17 Värmland	8	3	6	Complete
Karlstad	8	3	6	
18 Närke	2	3	4	Complete
Örebro	2	3	4	
19 Västmanland	6	3	1	Complete
Västerås	6	3	1	
20 Dalarna	8	7	15	Complete
Falun	8	7	15	
21 Gävleborg	6	5	10	Complete
Bollnäs	1	0	0	
Gävle	4	3	9	
Hudiksvall	1	2	1	
22 Västernorrland	4	12	7	Complete
Sundsvall	3	10	4	
Sollefteå	1	2	3	
23 Jämtland			2	Incomplete
Östersunds sjukhus	Not reported	Not reported	2	
24 Västerbotten	4	6	8	Complete
Umeå	3	4	8	
Skellefteå	1	2	0	
25 Norrbotten	13	14	6	Complete
Gällivare	0	0	0	
Piteå	12	14	6	
Sunderbyn	1	0	0	

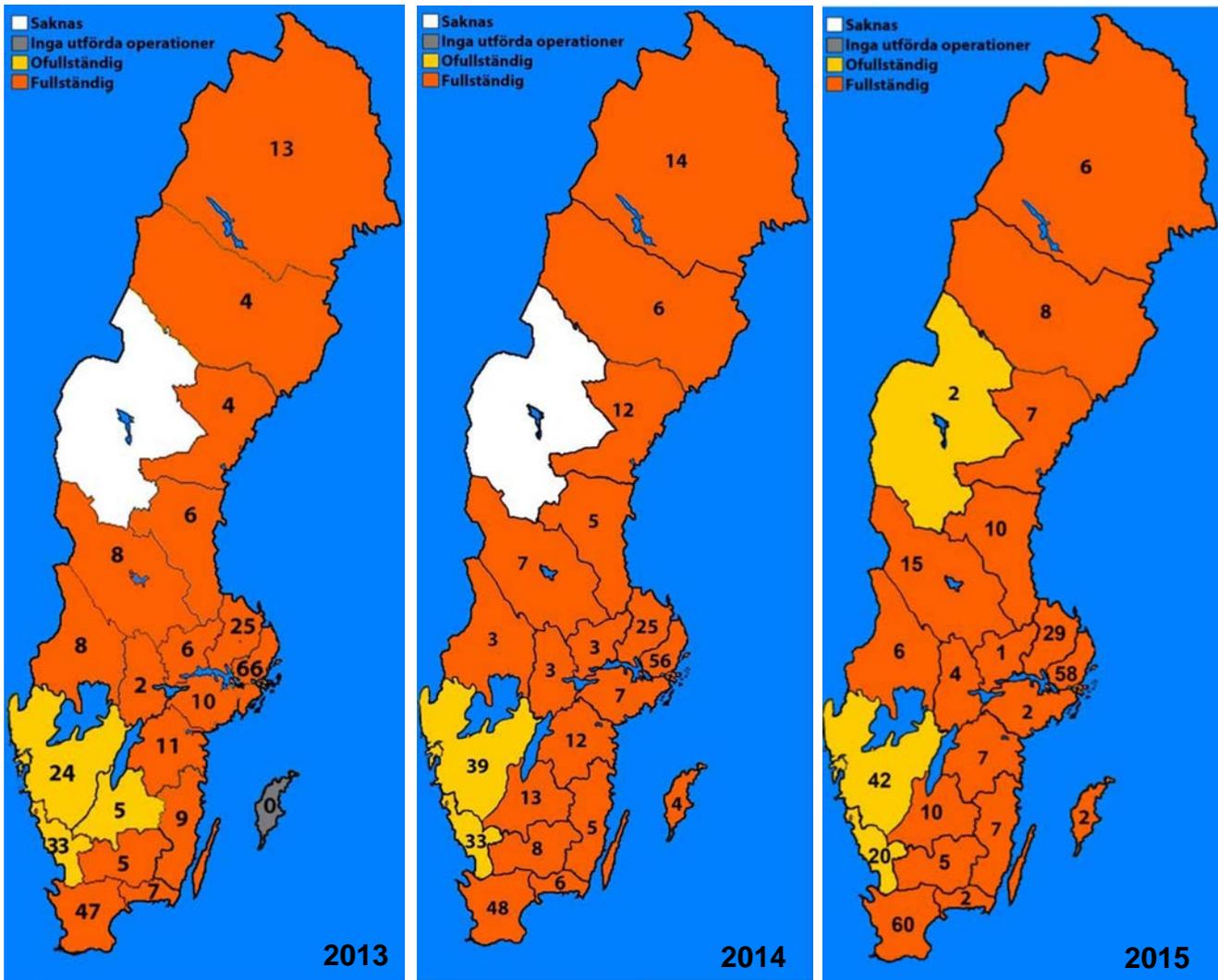


Figure 9. Number of primary ankle fusions per region 2013-2015. Complete reporting (red), Incomplete reporting (yellow), No unit participating (white)



Figure 10. Ankle arthrodesis fixated by retrograde intramedullary nail. X-ray frontal (left) and lateral view (right).



Figure 11. Ankle arthrodesis fixated with plates and screws. X-ray frontal (left) and lateral projection (right)

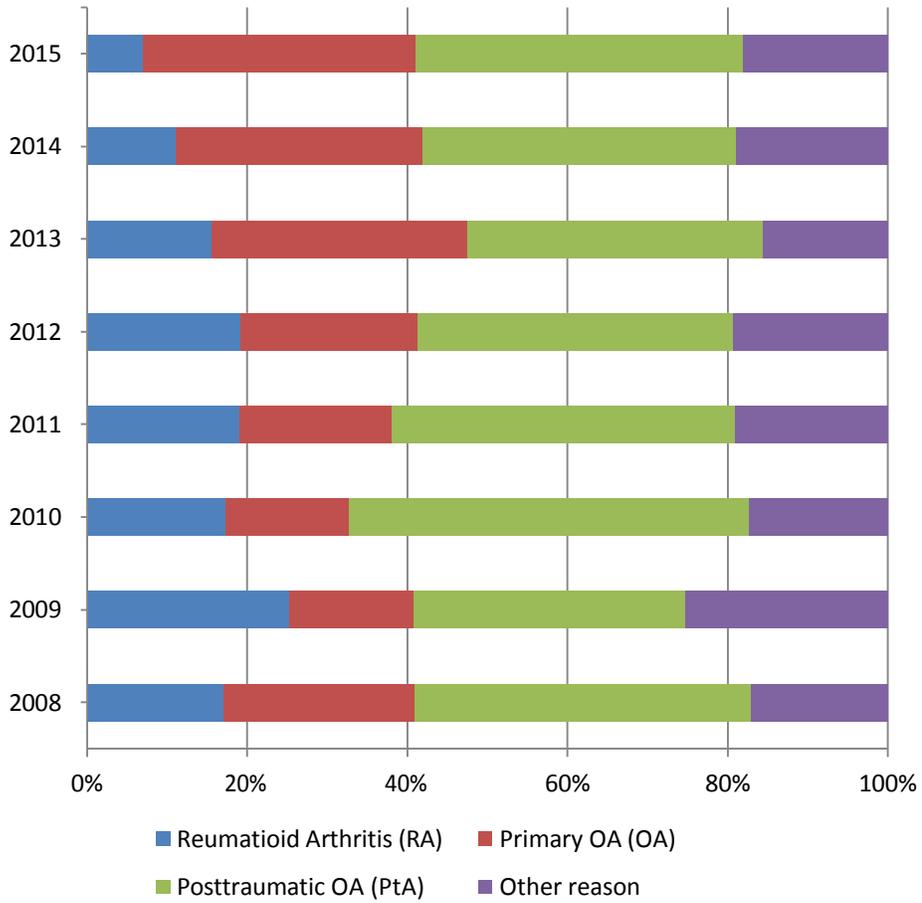


Figure 12. Distribution of diagnoses in patient that underwent arthrodesis 2008-2015.



Figure 13 Ankle fusion by screws. X-ray frontal (right) and lateral (left)

Table 5 Surgical methods for arthrodesis during 2015.

	Percut screws	Arthroscopy+ screws	Screws	Plates	Intramed nail	Ext fixation	Total
TOTAL (Sweden)	4	54	155	22	56	6	303
01 Stockholm	1	18	29	7	3	0	58
Danderyd		8					8
KS Solna							0
KS Huddinge		1	6		1		8
Nacka		4	10	2	1		17
Norrtälje			1	4	1		6
S:t Göran							0
Sophiahemmet	1	5		1			7
Södersjukhuset			10				10
Södertälje			2				2
03 Uppsala		7	14	3	5		29
Akademiska sjukhuset		4	13	3	5		25
Elisabethsjukhuset		3	1				4
04 Södermanland			4		3		7
Eskilstuna							0
Nyköping			1		1		2
05 Östergötland		1	6		2		7
Linköping							0
Motala		1	4		1		6
Norrköping			2		1		1
06 Jönköping			5		3		8
Eksjö			4				5
Jönköping			1		2		3
Värnamo							0
07 Kronoberg		3	2				5
Ljungby/ Växjö		3	2				5
08 Kalmar			5		2		7
Kalmar			5		1		6
Oskarshamn							0
Västervik					1		1
09 Gotland			1	1			2
Visby			1	1			2
10 Blekinge			2				2
Blekingesjukhuset			2				2
12 Skåne	2	11	38		5	4	60
Helsingborg			6				6
Hässleholm		11	1		1		13
SUS Lund	2		3		1		6
SUS Malmö			28		3	4	35

Continuation Table 5

	Percut screws	Arthroscopy +screws	Screws	Plates	Intramed nail	Ext fixation	Total
13 Halland			13	3	4		19
Halmstad							Ej rapporterat
Varberg			2		1		2
Movement			11	3	3		17
14 Västra Götaland	1	3	19	5	11		39
Alingsås	1	3	1		1		6
Borås				3			3
Carlanderska sport			1				1
Carlanderska ortopedi			4				4
Kungälv			7				7
Uddevalla			1	1	5		7
Mölnadal			1	1	5		7
Skövde							Deltar ej
17 Värmland			6				6
Karlstad			6				6
18 Örebro			3	1			4
Örebro			3	1			4
19 Västmanland					1		1
Västerås					1		1
20 Dalarna			2	1	12		15
Falun			2	1	12		15
21 Gävleborg		5	3	1	2		11
Bollnäs							0
Gävle		4	1	1	2		8
Hudiksvall		1	2				3
22 Västernorrland		3	4		1		12
Sundsvall			3		1		10
Sollefteå		3	1				2
23 Jämtland			2				2
Östersund			2				2
24 Västerbotten			3		5		8
Umeå			3		5		8
Skellefteå							0
25 Norrbotten		3	2		1		6
Gällivare							0
Piteå		3	2		1		6
Sunderbyn							0

Tabell 6a. Age distribution of patients 2008-2015, undergoing ankle replacement by diagnosis and gender.

	Diagnosis	Number	Mean Age	Lowest age	Highest age
All		563	61.3	17	87
	Reumatoid arthritis	151	55.9	17	79
	Primary OA	121	67.7	44	87
	Posttraumatic OA	231	62.1	29	85
	Other	60	58.8	34	75
Women		327	60.4	17	87
	Reumatoid arthritis	133	55.8	17	79
	Primary OA	50	69.2	44	87
	Posttraumatic OA	120	63.1	38	84
	Other	24	54.8	34	73
Men		236	62.5	29	85
	Reumatoid arthritis	18	56.8	35	71
	Primary OA	71	66.6	47	81
	Posttraumatic OA	111	61.1	29	85
	Other	36	61.6	35	75

Tabell 6b. Age distribution of patients 2008-2015 at ankle arthrodesis by diagnosis and gender.

	Diagnosis	Number	Mean age	Lowest age	Highest age
All*		1743	61.6	14	91
	Reumatoid arthritis	228	64.3	16	84
	Primary OA*	470	66.7	30	87
	Posttraumatic OA	724	59.6	16	91
	Other	321	56.7	14	87
Women		801	61.7	14	91
	Reumatoid arthritis	178	63.9	16	84
	Primary OA	158	67.9	43	87
	Posttraumatic OA	327	60.0	19	91
	Other	138	55.7	14	87
Men		941	61.5	14	86
	Reumatoid arthritis	50	65.5	33	82
	Primary OA	311	66.1	30	86
	Posttraumatic OA	397	59.3	16	86
	Other	183	57.4	14	82

*Including one patient of unknown gender

Table 7a. ASA–classification (American Society of Anesthesiologists (ASA) Physical Status) at the time of ankle replacement 2014-2015.

Diagnosis	ASA 1	ASA 2	ASA 3	ASA 4
Total	42	50	17	0
Reumatoid arthritis	1	15	9	0
Primary OA	12	8	3	0
Posttraumatic OA	26	21	3	0
Other	3	6	2	0
Women	19	35	11	0
Reumatoid arthritis	1	12	9	0
Primary OA	5	5	2	0
Posttraumatic OA	12	15	0	0
Other	1	3	0	0
Men	23	15	6	0
Reumatoid arthritis	0	3	0	0
Primary OA	7	3	1	0
Posttraumatic OA	14	6	3	0
Other	2	3	2	0

Table 7b. ASA–classification (American Society of Anesthesiologists (ASA) Physical Status) at the time of primary ankle arthrodesis 2014-2015.

Diagnosis	ASA 1	ASA 2	ASA 3	ASA 4
Total	173*	241	147	4
Reumatoid arthritis	1	12	36	2
Primary OA	61*	93	32	0
Posttraumatic OA	86	91	45	1
Other	25	45	34	1
Women	57	107	84	3
Reumatoid arthritis	1	8	29	2
Primary OA	16	31	10	0
Posttraumatic OA	31	48	28	0
Other	9	20	17	1
Men	115	134	63	1
Reumatoid arthritis	0	4	7	0
Primary OA	44	62	22	0
Posttraumatic OA	55	43	17	1
Other	16	25	17	0

*Information on gender missing

14. Supramalleolar osteotomies

Supramalleolar osteotomies have been unusual procedures in Sweden. The indication has been malposition combined with early signs of osteoarthritis. Between 2007 and 2015 only 4 units have reported a total of 40 such procedures- 22 ankles with "opening wedge", 16 with "closing wedge" and 2 with other techniques, the median patient age for the procedures was 51 years range 20–70).

15. Patient-reported Outcome Measures (PROMs)

A national registry should include not only number of reported cases but also complications and the patients' opinion about the result. The foot and ankle specific SEFAS-score, which is used in our follow up and outcome studies, was in 2011 validated with reference to the generic EQ-5D and SF-36 scores and the foot-specific FAOS- score. The validity, reliability and "responsiveness" is excellent and without any floor- or ceiling-effect. (See publication no 7 and the summary of registry research in page 8.)

The SEFAS-score is based on the oxford-12 for hips and is because it contains only 12 simple questions fast and user friendly. Our questionnaires also include a satisfactions scale in five steps from very satisfied to very dissatisfied.

Table 8. Smoking habits at the time of ankle replacement and arthrodesis

	Nonsmokers	Cessation >6 weeks	Smokers	Unknown
Total (n)	553 (77%)	39 (5%)	23 (3%)	103 (14%)
Replacement	96 (86%)	5 (5%)	0 (0%)	10 (10%)
Men (41%)	39	0	0	6
Women (59%)	57	5	0	4
Arthrodesis	457(75%)	34 (6%)	23 (4%)	93 (15%)
Men (56%)	263	16	11	49
Women(44%)	194	18	12	44

Appendix 1. The SEFAS questionnaire

<p>1. How would you describe the pain you usually have from the foot/ankle in question?</p> <p>4 <input type="checkbox"/> None 3 <input type="checkbox"/> Very mild 2 <input type="checkbox"/> Mild 1 <input type="checkbox"/> Moderate 0 <input type="checkbox"/> Severe</p>	<p>5. How much has the pain from the foot/ankle in question interfered with your usual work including housework and hobbies?</p> <p>4 <input type="checkbox"/> Not at all 3 <input type="checkbox"/> A bit 2 <input type="checkbox"/> Moderately 1 <input type="checkbox"/> Greatly 0 <input type="checkbox"/> Totally</p>
<p>2. For how long have you been able to walk before severe pain arises from the foot/ ankle in question?</p> <p>4 <input type="checkbox"/> No pain up 30 min. 3 <input type="checkbox"/> 16-30 minutes 2 <input type="checkbox"/> 5-15 minutes 1 <input type="checkbox"/> Around the house only 0 <input type="checkbox"/> Unable to walk at all because of severe pain</p>	<p>6. Have you been limping when walking because of the foot/ankle in question?</p> <p>4 <input type="checkbox"/> No days 3 <input type="checkbox"/> Only one or two days 2 <input type="checkbox"/> Some days 1 <input type="checkbox"/> Most days 0 <input type="checkbox"/> Every day</p>
<p>3. Have you been able to walk on uneven ground?</p> <p>4 <input type="checkbox"/> Yes, easily 3 <input type="checkbox"/> With little_difficulty 2 <input type="checkbox"/> With moderate difficulty 1 <input type="checkbox"/> With extreme_difficulty 0 <input type="checkbox"/> No impossible</p>	<p>7. Have you been able to climb a flight of stairs?</p> <p>4 <input type="checkbox"/> Yes, easily 3 <input type="checkbox"/> With little_difficulty 2 <input type="checkbox"/> With moderate difficulty 1 <input type="checkbox"/> With extreme trouble 0 <input type="checkbox"/> Impossible</p>
<p>4. Have you had to use an orthotic (shoe insert), heel lift or special shoes?</p> <p>4 <input type="checkbox"/> Never 3 <input type="checkbox"/> Occasionally 2 <input type="checkbox"/> Often 1 <input type="checkbox"/> Most of the time 0 <input type="checkbox"/> Always</p>	<p>8. Have you been troubled by pain from the foot/ ankle in question in bed at night?)</p> <p>4 <input type="checkbox"/> No night) 3 <input type="checkbox"/> Only one or two nights 2 <input type="checkbox"/> Some nights 1 <input type="checkbox"/> Most nights 0 <input type="checkbox"/> Every night</p>
<p>9. How much has pain from the foot/ankle in question affected your usual recreational activities?</p> <p>4 <input type="checkbox"/> Not at all 3 <input type="checkbox"/> A bit 2 <input type="checkbox"/> Moderately 1 <input type="checkbox"/> Greatly 0 <input type="checkbox"/> Totally</p>	<p>11. After a meal (sat at a table) how painful has it been for you to stand up from a chair because of the foot/ankle in question?</p> <p>4 <input type="checkbox"/> Not at all painful 3 <input type="checkbox"/> Slightly painful 2 <input type="checkbox"/> Moderately painful 1 <input type="checkbox"/> Very painful 0 <input type="checkbox"/> Unbearable</p>
<p>10. Have you had swelling of your foot?</p> <p>4 <input type="checkbox"/> None at all 3 <input type="checkbox"/> Occasionally 2 <input type="checkbox"/> Often 1 <input type="checkbox"/> Most of the time 0 <input type="checkbox"/> All the time</p>	<p>12. Have you had a severe sudden pain shooting, stabbing or spasms from the foot/ankle in question?</p> <p>4 <input type="checkbox"/> No days 3 <input type="checkbox"/> Only one or two days 2 <input type="checkbox"/> Some day 1 <input type="checkbox"/> Most days 0 <input type="checkbox"/> Every day</p>

The Swedish Ankle Registry

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