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THE SWEDISH NATIONAL
KNEE LIGAMENT REGISTER

Swedish ACL Register.
Annual Report 2016.

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ENHANCING
HEALTH
CARE

16

Contents

3,577 primary operations and 98 revisions.

AKADEMISKA SJUKHUSET ALERIS ORTOPEDI ÄNGELHOLM ALFREDSON TENDON CLINIC ALINGSÅS LASARETT ART CLINIC ART CLINIC GÖTEBORG ARTROCENTER BLEKINGESJUKHUSET BOLLNÄS SJUKHUS CAPIO ARTRO CLINIC CAPIO LUNDBY NÄRSJUKHUS CAPIO LÄKARGRUPPEN I ÖREBRO AB CARLANDSKA ORTOPEDI CENTRALLASARETTET VÄXJÖ CITYAKUTEN PRIVATVÅRD DANDERYDS SJUKHUS DROTTNING SILVIAS BARN OCH UNGDOMSSJUKHUS ELISABETHSJUKHUSET FALU LASARETT FRÖLUNDA SPECIALIST-SJUKHUS FRÖLUNDAORTOPEDEN GÄLLIVARE SJUKHUS GÄVLE SJUKHUS HALMSTADS SJUKHUS HELSINBORGS SJUKHUS HUDIKSVALLS SJUKHUS HÄSSLEHOLMS SJUKHUS HÖGLANDSSJUKHUSET KALMAR SJUKHUS KARLSTAD CENTRALSJUKHUS KAROLINSKA UNIVERSITETSSJUKHUSET KAROLINSKA UNIVERSITETSSJUK-HUSET/ORTOPEDKLINIKEN KUNGSBACKA SJUKHUS KUNGÄLVS SJUKHUS KÄRNSJUKHUSET I SKÖVDE LASARETTET I ENKÖPING LINKÖPINGS HEALTH CARE LINKÖPINGS UNIVERSITETSKLINIK LJUNGBY LASARETT LÄKARHUSET HERMELINEN LÄNSSJUKHUSET RYHOV LÄNSSJUKHUSET SUNDSVALL MEDICIN DIREKT CAPIO MOVEMENT MÄLARSJUKHUSET ESKILSTUNA NORRLANDS UNIVERSITETSSJUKHUS UMEÅ NORRTÄLJE SJUKHUS NU-SJUKVÅRDEN NYKÖPINGS LASARETT ODENPLANS LÄKARHUS ORTHOCENTER I SKÅNE ORTHOCENTER STOCKHOLM ORTHOCENTER/IFK-KLINIKEN ORTOPEDISKA HUSET CAREMA ORTOPEDSPECIALISTERNA OSKARSHAMNS SJUKHUS PERAGO ORTOPEDKLINIK SABBATSBERG NÄRSJUKHUSET SAHLGRENSKA UNIVERSITETSSJUKHUSET SKÅNES UNIVERSITETSSJUKHUS SOLLEFTEÅ SJUKHUS SOPHIAHEMMET SPECIALISTCENTER SCANDINAVIA SPORTS MEDICINE UMEÅ SPORTSMED SUNDERBY SJUKHUS SÖDERMALMS ORTOPEDI SÖDERSJUKHUSET SÖDERTÄLJE SJUKHUS SÖDRA ÄLVSBORGS SJUKHUS VISBY LASARETT VRINNEVISJUKHUSET VÄRNAMO SJUKHUS/ORTOPEDKLINIKEN VÄSTERVIKS SJUKHUS VÄSTERÅS CENTRALLASARETTET VÄSTERÅS ORTOPEDPRAKTIK ÖREBRO USÖ ÖRNSKÖLDSVIKS SJUKHUS

Preface

The incidence of anterior cruciate ligament (ACL) injuries has been reported from a number of studies with a range of between 32-70/100,000 inhabitants/year. Recent Swedish studies based on national data from population-based studies indicate an incidence of around 80/100,000 inhabitants/year. ACL injury is a serious knee injury which, without satisfactory treatment, often helps to prevent young people from continuing to engage in heavy physical work or physical exercise and sport at recreational or elite level. Regardless of the primary treatment, studies have revealed that about 50% of patients present radiological signs of knee arthrosis within 10-15 years after the initial injury.

Treatment can take the form of only rehabilitation or a combination of surgery (ACL reconstruction) followed by rehabilitation. It is estimated that about half of all cruciate ligament injuries are not the subject of surgery for different reasons. An injury frequency of approximately 80 per 100,000 inhabitants in Sweden would mean that some 7,000 individuals suffer anterior cruciate ligament injuries every year and that some 3,500 undergo surgery. Recent studies reveal that around 20% of the patients undergoing surgery require repeat surgery within the space of a few years as a result of complications, first and foremost meniscal and/or cartilage damage, restricted mobility or the failure of the reconstructed cruciate ligament. The results after secondary surgery are probably poorer than after primary surgery. Good results have been reported in the short term after the primary operation, but there are only a few studies that are randomized or have a long follow-up. The number of operations per surgeon is unevenly distributed and about 40% of all surgeons perform fewer than 10 operations a year. A trend towards an increase in the number of operations per surgeon has, however, been seen since the ACL Register began in 2005.

To begin with, the ACL Register was a surgical register, but attempts are now being made to register all the patients with this injury, regardless of surgical or non-surgical treatment. The absolute majority of the patients registered so far have undergone surgery and this annual report therefore includes a preliminary analysis of patient-reported data following non-surgical treatment. We are working to involve physical therapists in this work to a greater degree and we are also planning, in connection with the replacement of IT platforms, to improve our website when it comes to follow-ups after surgery and rehabilitation.

Goals and goal fulfillment

The overall goal of the register is to promote the improved care of individuals with ACL injuries.

Treatment

The goal when treating an individual who has suffered an ACL injury should be a satisfied patient with optimal knee function, a high level of satisfaction and normalized, health-related quality of life. The result should also be long lasting.

In every case, an ACL injury should be treated with structured, purpose-designed rehabilitation. In at least 50% of cases, surgical stabilization of the injured knee is also needed to meet the patient's knee-function requirements (Frobell et al., 2010 & 2013), but which individuals require which treatment has not been scientifically documented. In all probability, a return to a high activity level, first and foremost in contact sports (such as soccer, handball and floorball), will necessitate an increase in the need for surgical treatment.

The main indication for an ACL reconstruction is, however, lasting symptoms in the form of functional instability. This is frequently described as the "knee giving way" or the patient being unable to rely on his/her knee.

Register coverage

The target is 100% coverage of the number of registered operation reports. An annual check is made with the Swedish Board of Health and Welfare's patient register at ID number level. At the present time, more than 90% of all operations are registered.

ACL reconstruction

There are currently about 80 clinics in Sweden that provide orthopedic care. Of these, 70 (unchanged since 2015) have informed the ACL register that they performed ACL surgery in 2016.

Validity of input data

Patient-reported data cannot be validated retrospectively, but they are assumed to be valid, as the patients themselves register them.

The surgical data are fed in by surgeons and the target for the Swedish ACL Register is that at least 95% of all the data that are entered are a direct match with patient notes and surgery reports. This has been confirmed by a previous study.

Dissemination of register data and results

The target is that register data should be readily available to all caregivers and that the annual report from the register should reach all the clinics in Sweden running orthopedic programs. We are also hoping that the annual report will be disseminated at international level by translating it and through participation at different international meetings.

The register is open to all the participating clinics when it comes to their own data. The annual report is distributed to all the orthopedic clinics and their clinical directors in Sweden. In 2010, the annual report was translated into English for the first time and it attracted a great deal of international interest.

Future vision for the Swedish quality register

Every individual who suffers an ACL injury in Sweden is to be included in the Swedish ACL Register and followed up.

An ACL injury has serious consequences for the individual who sustains it. In the short term, the injury causes a reduction in activity levels and, in the longer term, one in every two sufferers develops arthrosis in the injured knee. Treatment can take the form of rehabilitation alone or with the addition of the surgical reconstruction of the damaged ligament. In the short term, many individuals experience a return to satisfactory knee function with the help of the two treatment methods, but we do not know which individuals should avoid surgical treatment and which require it. Nor is there currently any scientific proof that either treatment reduces the risk of future arthrosis.

As a result, an important line of development for the ACL Register is to include all patients with ACL injuries, regardless of how they are treated in the short and long term. In this way, data from the register will be able to spotlight the risk of both short-term and long-term consequences of the injury in relation to the treatment that was given (no treatment, structured rehabilitation alone and surgical reconstruction combined with rehabilitation).

The success and usefulness of a register are dependent on its coverage in terms of both baseline data and follow-up data. We currently have good coverage of the ACL reconstructions that are performed in Sweden (approx. 90% compared with the patient register), but this figure needs to be confirmed in a separate validation process which we shall be presenting during the next year. There is, however, real scope for improvement when it comes to patient-reported follow-up data, as more than half of all patients are lost after five years.

The database is run by Karolinska University Hospital in its capacity as register owner. Future collaboration with other orthopedic registers is a future vision which the steering committee favors. A change of IT platforms has taken place. An improved web version will be presented in 2017.

Areas for improvement and action

Inclusion of all injured individuals regardless of treatment

The register is still a surgery register, even if the aim for several years has also been to include non-operated individuals with ACL injuries.

Recently published incidence data reveal that some 40-50% of all individuals with ACL injuries are treated without surgery. Within the framework of this project, we plan to contact specialist rehab units to evaluate the potential for registering patients via physical therapists offering treatment. Our aim is to involve these physical therapists as informants in the same way surgeons have provided information until now. This should increase the amount of information on specific knee function and a possible return to sports, but, first and foremost, it should increase the flow of patients who have recently sustained injuries and have been treated without surgery.

Preoperative patient-reported data

In the case of patients who undergo surgery, the frequency of patients' self-reported data prior to surgery is slightly more than 70%. There is a large difference between clinics, but the Capio Artro Clinic still has the highest reporting rate for patient-reported preoperative data (> 95%). The steering committee has access to a coordinator who has been tasked with contacting all the clinics to investigate how we can improve the reporting of data. This work is ongoing and the steering committee is optimistic that the frequency of preoperative data reporting will improve in the future. Preoperatively, all clinics should approach 100%, as this is the "last" opportunity to collect all preoperative data. The steering committee is hoping to encourage all county councils and insurance companies not only to participate in the ACL Register but also to guarantee up to 100% preoperative registration (minimum requirement 90%). The Stockholm County Council introduced this in the requirements for orthopedic health-care selection in 2014, but it was subsequently removed in 2016.

Quality of input data

At the present time, the register data are fed in by patients (patient-reported data) and surgeons (surgical data) and we are reliant on the precision of the person responsible for registration when this takes place. The recent validation reveals that the quality of the input data is generally good (the majority with more than 97% agreement compared with patient notes), but it has also identified variables of poorer quality. The steering committee has recently examined all the variables to facilitate registration and to remove variables with poor reliability. New variables have been added.

Data loss

The response rate for patient-reported data on all follow-up visits is low, even if the trend is improving. In collaboration with QRC Stockholm, we have initiated a joint project to increase patient response rates. The follow-up data after two and five years, however, still have a low response rate (approx. 50% and 40%). It is pleasing to report that the 10-year follow-up for 2005 produced a response rate of around 40%. An additional reminder will be sent in 2017 for the 10-year follow-up. Patient-reported data are still followed up through targeted inquiries to patients' home addresses using the conventional postal service, one, two, five and ten years after surgery. The steering committee is looking into the potential for registering these data via the internet to facilitate the processing of data and reduce the time it takes for patients to fill in their data. Measures, such as the opportunity to use social media or mobile applications to maintain contact with patients, have been discussed.

This is, however, associated with some ethical and technical problems which need to be resolved before implementation can take place. Attempts sharply to reduce the loss of data remain a priority area.

Improvement seminar

In collaboration with selected clinics, an improvement seminar is planned in 2017. During the fall of 2017, a pilot project will begin; 10 clinics will meet to discuss the scope for improvement based on the data in the ACL Register.

Each surgeon is able to process the de-identified data in the register using statistical functions that are posted on the website and he/she can also perform calculations on different variables

Coverage and response rate

The Swedish National Board of Health and Welfare registered 3,466 ACL operations (both primary operations and revisions with surgery code NGE41) in 2015. The ACL Register contains 3,794 registered operations for 2014.

Matching at personal ID number level reveals that the ACL Register and the patient register have a total of 4,319 unique ACL operations.

The exact agreement on the number of ACL operations in the two registers was 68.1% in 2015. The reason for the small number of operations in the Swedish National Board of Health and Welfare's patient register is probably due to shortcoming in reports to the register and the fact that the Swedish National Board of Health and Welfare changed its data registration routines in 2015.

Another possible reason could be that an incorrect surgery code (NGE41 has been selected for an arthroscopy, for example). It goes without saying that these differences also reflect shortcomings in coverage. In spite of this, it is estimated that the ACL Register covers more than 90% of all the ACL operations in Sweden. Data for 2016 are not yet available and this comparison has therefore been made with 2015.

Response rate at follow-up

Year	KOOS				EQ5			
	Preop	1 year	2 years	5/10 years	Preop	1 year	2 years	5/10 years
2016	68				64			
2015	72	46			70	45		
2014	71	53			68	52		
2013	75	65	41		72	64	40	
2012	70	61	51		66	60	50	
2011	71	66	52		65	65	51	
2010	70	61	54	28	65	60	53	28
2009	73	61	51	35	70	60	50	35
2008	65	60	48	39	63	62	46	39
2007	57	55	49	39	57	62	48	39
2006	58	51	49	41/31	55	56	50	40/30
2005	57	50	50	38/44	54	50	52	35/44

If the results are to be credible and applicable in a research context, the response rate for patient-reported data should be high. The response rate for the EQ5D is slightly lower than that for the KOOS. .

Funding the ACL Register

For 2016, EUR 130,000 was allocated. The allocation for 2017 has been slightly reduced and new reductions can be expected in the future. The registrar, Magnus Forssblad, is employed on a part-time basis at the Orthopedic Clinic at Karolinska Hospital. Anna Pappas works as a part-time administrator of the ACL Register.

Remuneration system and ACL operations

In the majority of cases, remuneration for ACL operations in Sweden is based on the DRG (diagnosis-related group) system. An ACL operation without complications is classified as DRG group H100 as day surgery and H13E as in-patient care. This group contains virtually all knee operations, apart from knee arthroplasty and less complex knee surgery in the form of day surgery (H120). The national weighting list also includes a factor of 2 when comparing day surgery with in-patient care. In the case of DRG H100, this dependence on point pricing results in remuneration for day surgery of between EUR 1,000 and 2,000 compared with between EUR 3,000 and 4,500 for in-patient care. The approximate cost price of an ACL operation is estimated at EUR 2,500. The DRG remuneration is based on cost prices from different hospitals and, with the increase in specialization that has taken place in recent years, there are bound to be large differences between the case mix of operations at different hospitals. In its current form, the system is not steering the remuneration towards increased day surgery, for example.

Nor do many private caregivers divulge their cost prices, as a result of the way negotiations are conducted. If they did, the purchaser would have complete insight into the economic situation of the person making the tender and this would then jeopardize the procurement process. In the longer term, a "less flexible" DRG system could also lead caregivers to choose not to perform more difficult operations as a result of inadequate remuneration.

In the Stockholm health-care selection set-up, all types of ACL operation (primary, revisions, multi-injuries) are entitled to the same amount of remuneration, regardless of complexity and cost price. To perform ACL operations within this health-care selection set-up, the surgeons performing these operations must perform at least 25 ACL operations a year, but no follow-up appears to be made.

The differences between county councils when it comes to remuneration pose a large problem and are creating inequality in terms of health care. Each clinic is tied to the same remuneration obtained from its individual county council. In spite of discussions with the SKL, Sweden's Municipalities and County Councils, among others, no initiatives have been taken to change the remuneration for the free health-care selection set-up and foreign patients. A nationwide pricelist would be the obvious alternative.

Organization

The Swedish ACL Register is administered by Karolinska University Hospital and the principal is the board. Magnus Forssblad has been appointed by Karolinska University Hospital and the steering committee as the registrar. The contact person and administrator is Anna Pappas at the Sports Trauma Research and Education Center, Karolinska Institutet, and the Capio Artro Clinic.

In 2016, the steering committee was made up of the following representatives from different regions in Sweden.

- Martin Englund, Associate Professor, Skåne University Hospital
- Karl Eriksson, Associate Professor, Söder Hospital, Stockhom
- Magnus Forssblad, Associate Professor, Karolinska University Hospital and the Sports Trauma Research and Education Center, Karolinska Institutet, Stockholm

- Richard Frobell, Associate Professor, Skåne University Hospital
- Professor Joanna Kvist, Linköping University
- Pär Herbertsson, MD, Orthocenter and Skåne University Hospital
- Professor Jon Karlsson, Sahlgrenska University Hospital, Gothenburg
- Professor Jüri Kartus, NU-Hospital Group, Trollhättan/Uddevalla
- Christina Mikkelssen, MD, Capio Artro Clinic and Sports Trauma Research and Education Center, Karolinska Institutet, Stockholm
- Paul Neuman, MD, Skåne University Hospital
- Kristian Samuelsson, Associate Professor, Sahlgrenska University Hospital, Gothenburg
- Anders Stålman, MD, Capio Artro Clinic and Sports Trauma Research and Education Center, Karolinska Institutet, Stockholm

Henrik Magnsson, a statistician at Linköping University, has been co-opted as a member of the steering committee. Tomas Antonelius, Stockholm, has been consulted as patient representative.

IT organization

The IT operations relating to the Swedish ACL Register are administered by Karolinska University Hospital in a Progress environment, with both a relationship database as the base and a web-based solution for all users (Web Speed). Data operations are administered by Datatrion AB.

Research partnerships

The Swedish ACL Register enables data based on a very large number of individuals to be studied. This is an advantage that increases the safety of research results compared with an individual clinical study which, for various reasons, has problems encompassing such extensive patient material. In the Nordic region, Denmark and Norway have effective national ACL registers which, like the Swedish register, have been established for more than 10 years. To further increase the study population and thereby the accuracy of studies, the steering committee is encouraging national and international collaboration to enable register data to be combined. It is pleasing to report that this has increased in recent years.

Research groups in Stockholm, Gothenburg and Linköping are running several projects in collaboration and they are planning to publish a number of reports over the next few years. Collaboration with Norway and Denmark continues and we can look forward to more studies including all the Nordic ACL patients. Registers have also been set up in other countries and their steering committees get together every year in conjunction with orthopedic meetings. This collaboration has resulted in a number of international initiatives such as ESSKA, ISAKOS and the ACL study group. More reports based on several international registers will also be initiated in the near future.

All the overarching register projects involving data from the Swedish ACL Register are applied for and approved according to formal research agreements in accordance with the framework of the ACL Register.

Register data

The register reports ACL reconstructions in Sweden from January 2005. This information is individually based and the patient's personal ID number automatically shows his/her age and gender. The diagnosis is based on data that are entered manually. During the period 2005-2016, 37,581 primary ACL reconstructions and 2,628 revisions from a total of 90 clinics were registered.

Number of operations per clinic in 2014-2016

Primary ACL and Revision ACL clinic and region 2014, 2015 and 2016

	2014					2015					2016				
	Pri-mary	Revi-sions	To-tal	KOOS		Pri-mary	Revi-sions	To-tal	KOOS		Pri-mary	Revi-sions	To-tal	KOOS	
				Response					Response					Response	
	N	N	N	N	%	N	N	N	N	%	N	N	N	N	%
GREATER STOCKHOLM															
KAROLINSKA UNI-VERSITETSSJUK-HUSET	0	0	0	0	0	0	0	0	0	0	17	0	17	0	0
ARTROCENTER	0	0	0	0	0	0	0	0	0	0	28	4	32	1	3
CITYAKUTEN PRIVATVÅRD	14	1	15	0	0	25	0	25	0	0	0	0	0	0	0
DANDERYDS SJUKHUS	48	3	51	34	67	53	3	56	44	79	33	1	34	11	32
KAROLINSKA UNIVERSITETS-SJUKHUSET / ORTOPEDKLINIKEN	11	0	11	6	55	29	1	30	7	23	28	0	28	6	21
ODENPLANS LÄKARHUS	27	3	30	4	13	5	0	5	1	20	0	0	0	0	0
ORTOPEDISKA HUSET CAREMA	92	3	95	74	78	122	13	135	121	90	108	6	114	93	82
SABBATSBERG NÄR-SJUKHUSET	60	10	70	49	70	28	0	28	24	86	0	0	0	0	0
SÖDERMALMS ORTOPEDI	0	0	0	0	0	7	0	7	6	86	44	2	46	22	48
SÖDERTÄLJE SJUKHUS	11	0	11	0	0	7	0	7	2	29	17	0	17	0	0
SÖDERSJUKHUSET	116	9	125	78	62	126	14	140	108	77	130	11	141	52	37
SOPHIAHEMMET	11	2	13	4	31	7	0	7	5	71	9	2	11	4	36
ORTHOCENTER STOCKHOLM	33	2	35	19	54	46	5	51	50	98	50	6	56	54	96
CAPIO ARTRO CLINIC	678	77	755	740	98	721	78	799	772	97	734	72	806	773	96
Total	1101	110	1211	1008	83	1176	114	1290	1140	88	1198	104	1302	1016	78
SVEALAND + GOTLAND															
AKADEMISKA SJUKHUSET	29	2	31	0	0	50	4	54	4	7	60	1	61	5	8
BOLLNÄS SJUKHUS	0	0	0	0	0	2	0	2	2	100	7	2	9	5	56
LASARETTET I ENKÖPING	32	2	34	0	0	17	0	17	2	12	23	4	27	5	19
ELISABETHSJUK-HUSET	51	4	55	28	51	81	7	88	34	39	57	18	75	32	43
FALU LASARETT	53	1	54	17	31	66	4	70	18	26	38	8	46	8	17
GÄVLE SJUKHUS	49	2	51	35	69	29	1	30	26	87	47	0	47	30	64
HUDIKSVALLS SJUKHUS	32	1	33	31	94	26	1	27	23	85	22	2	24	15	63
KARLSTAD CENTRALSJUKHUS	71	4	75	13	17	70	5	75	17	23	56	8	64	12	19
CAPIO LÄKARGRUPPEN I ÖREBRO AB	65	5	70	69	99	57	6	63	63	100	47	7	54	53	98
MÄLARSJUKHUSET ESKILSTUNA	0	0	0	0	0	7	1	8	2	25	27	2	29	9	31
NORRTÄLJE SJUKHUS	20	0	20	15	75	22	1	23	14	61	16	1	17	6	35

NYKÖPINGS LASARETT	15	0	15	1	7	9	0	9	1	11	10	0	10	2	20
ÖREBRO USÖ	16	2	18	7	39	23	3	26	8	31	54	4	58	15	26
SPECIALISTCENTER SCANDINAVIA	2	0	2	2	100	0	0	0	0	0	0	0	0	0	0
VÄSTERÅS CENTRAL-LASARETTET	11	0	11	8	73	10	1	11	3	27	5	0	5	3	60
VISBY LASARETT	11	0	11	10	91	22	1	23	20	87	21	1	22	18	82
VÄSTERÅS ORTOPEDPRAKTIK	34	0	34	14	41	27	4	31	19	61	24	2	26	18	69
Total	491	23	514	250	49	518	39	557	256	46	514	60	574	236	41
SKÅNE															
ALERIS ORTOPEDI ÄNGELHOLM	8	0	8	4	50	15	1	16	7	44	27	4	31	16	52
HÄSSLEHOLMS SJUKHUS	78	1	79	69	87	84	1	85	74	87	54	4	58	55	95
HELSINGBORGS SJUKHUS	75	3	78	67	86	93	5	98	86	88	96	3	99	76	77
ORTHOCENTER I SKÅNE	25	5	30	23	77	25	3	28	25	89	16	3	19	13	68
SKÅNES UNIVERSITETS-SJUKHUS	213	14	227	174	77	222	18	240	160	67	231	16	247	174	70
Total	399	23	422	337	80	439	28	467	352	75	424	30	454	334	74
HALLAND															
HALMSTADS SJUKHUS	9	0	9	1	11	1	0	1	0	0	0	0	0	0	0
Total	9	0	9	1	11	1	0	1	0	0	0	0	0	0	0
SMÅLAND + BLEKINGE															
KALMAR SJUKHUS	57	3	60	24	40	38	6	44	19	43	44	3	47	13	28
BLEKINGE-SJUKHUSET	18	0	18	9	50	15	0	15	8	53	12	0	12	8	67
LJUNGBY LASARETT	14	0	14	4	29	15	1	16	3	19	12	0	12	1	8
CENTRAL-LASARETTET VÄXJÖ	57	2	59	54	92	45	3	48	44	92	48	4	52	43	83
VÄRNAMO SJUKHUS/ ORTOPEDKLINIKEN	29	0	29	24	83	0	0	0	0	0	0	0	0	0	0
Total	175	5	180	115	64	113	10	123	74	60	116	7	123	65	53
VÄSTRA GÖTALAND + HALLAND															
ALINGSÅS LASARETT	27	3	30	23	77	25	4	29	28	97	27	2	29	25	86
ART CLINIC GÖTEBORG	0	0	0	0	0	11	0	11	7	64	14	1	15	3	20
ART CLINIC	12	0	12	12	100	10	0	10	8	80	15	1	16	11	69
SÖDRA ÄLVSBORGS SJUKHUS	25	0	25	14	56	29	0	29	18	62	18	0	18	8	44
CARLANDSKA ORTOPEDI	0	0	0	0	0	16	0	16	5	31	18	0	18	9	50
DROTTNING SILVIAS BARN OCH UNGDOMSSJUKHUS	1	0	1	0	0	21	0	21	3	14	13	1	14	0	0
FRÖLUNDA-ORTOPEDEN	0	0	0	0	0	3	0	3	0	0	10	0	10	5	50
FRÖLUNDA SPECIALIST-SJUKHUS	35	8	43	32	74	37	1	38	32	84	16	0	16	15	94
ORTHOCENTER/ IFK-KLINIKEN	129	19	148	121	82	148	23	171	153	89	157	14	171	148	87
KUNGSBACKA SJUKHUS (KUB)	79	9	88	64	73	90	7	97	55	57	105	7	112	39	35
KUNGÄLVS SJUKHUS	2	0	2	1	50	10	0	10	5	50	15	0	15	12	80

CAPIO LUNDBY NÄRSJUKHUS	92	2	94	31	33	94	4	98	66	67	102	1	103	72	70
CAPIO MOVEMENT	77	10	87	53	61	74	10	84	52	62	60	12	72	40	56
NU-SJUKVÅRDEN	38	7	45	34	76	68	10	78	55	71	69	12	81	68	84
ORTOPED-SPECIALISTERNA	0	0	0	0	0	0	0	0	0	0	17	0	17	13	76
PERAGO ORTOPED-KLINIK	26	6	32	18	56	13	1	14	4	29	0	0	0	0	0
KÄRNSJUKHUSET I SKÖVDE	8	0	8	0	0	22	0	22	9	41	35	0	35	14	40
SPORTSMED	20	1	21	10	48	20	1	21	4	19	13	0	13	12	92
SAHLGRENSKA UNIVERSITETS-SJUKHUSET	139	14	153	133	87	85	7	92	67	73	131	17	148	131	89
Total	710	79	789	546	69	776	68	844	571	68	835	68	903	625	69
ÖSTERGÖTLAND															
HÖGLANDSSJUK-HUSET	38	1	39	23	59	24	3	27	15	56	0	0	0	0	0
LINKÖPINGS HEALTH CARE	0	0	0	0	0	0	0	0	0	0	1	0	1	1	100
LINKÖPINGS UNIVERSITETS-KLINIK	52	1	53	43	81	40	7	47	33	70	44	2	46	35	76
OSKARSHAMNS SJUKHUS	13	0	13	12	92	17	0	17	16	94	37	0	37	33	89
LÄNSSJUKHUSET RYHOV	54	2	56	26	46	35	3	38	23	61	34	1	35	11	31
VRINNEVI-SJUKHUSET	88	9	97	61	63	77	5	82	51	62	100	5	105	68	65
VÄSTERVIKS SJUKHUS	13	0	13	5	38	17	0	17	8	47	12	0	12	6	50
Total	258	13	271	170	63	210	18	228	146	64	228	8	236	154	65
NORRLAND															
ALFREDSON TENDON CLINIC	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0
GÄLLIVARE SJUKHUS	6	0	6	6	100	6	0	6	3	50	3	0	3	1	33
LÄKARHUSET HERMELINEN	10	0	10	6	60	9	0	9	4	44	6	0	6	4	67
MEDICIN DIREKT	58	7	65	49	75	54	7	61	51	84	75	7	82	53	65
ÖRNSKÖLDSVIKS SJUKHUS	21	1	22	22	100	13	2	15	15	100	10	2	12	12	100
SPORTS MEDICINE UMEÅ	63	8	71	24	34	80	6	86	62	72	36	9	45	36	80
SOLLEFTEÅ SJUKHUS	4	0	4	4	100	2	0	2	1	50	1	0	1	0	0
SUNDERBY SJUKHUS	38	3	41	32	78	48	2	50	22	44	65	3	68	41	60
LÄNSSJUKHUSET SUNDSVALL	8	0	8	0	0	0	0	0	0	0	15	0	15	3	20
NORRLANDS UNIVERSITETS-SJUKHUS, UMEÅ	78	8	86	35	41	59	7	66	22	33	49	0	49	11	22
Total	286	27	313	178	57	271	24	295	180	61	262	21	283	161	57

KOOS = Number of patients responded to preoperative KOOS questionnaire.

Age at surgery

The average age of patients undergoing ACL surgery in 2016 was 27. This age has not changed noticeably since the start of the register in 2005. This can be interpreted as meaning that not only young, active sportsmen and sportswomen but also somewhat older individuals with unstable knees undergo surgery. Women generally have surgery at a younger age than men and this also applied in 2016. During the period 2005-2016, women were always several years younger than men when it came to primary ACL surgery. The probable explanation is that women reach senior levels in ball sports earlier than men and therefore expose themselves to a greater risk of an ACL injury at a younger age. Men are probably also active as sportsmen for a longer period than women.

Over the years, the average age at revision surgery is 25 for women and 28 for men.

Average age for primary reconstructions distributed by gender and year of surgery 2005-2016

Primary												
	Females				Males				Total			
	N	No info	Average age	SD	N	No info	Average age	SD	N	No info	Average age	SD
2005	830	0	26	10	1169	0	28	9	1999	0	27	10
2006	1040	0	26	10	1474	0	28	9	2514	0	27	10
2007	1178	0	25	10	1590	0	28	9	2768	0	27	10
2008	1297	0	26	11	1699	2	28	9	2996	2	27	10
2009	1293	0	25	11	1789	0	28	9	3082	0	27	10
2010	1386	1	25	11	1975	1	28	9	3361	2	27	10
2011	1427	0	26	11	1918	1	28	9	3345	1	27	10
2012	1508	0	26	11	2028	0	27	9	3536	0	27	10
2013	1450	0	26	11	2014	2	28	9	3464	2	27	10
2014	1482	0	27	12	1946	1	28	10	3428	1	28	11
2015	1488	0	27	12	2013	3	28	10	3501	3	28	11
2016	1652	0	27	12	1919	5	28	10	3571	5	28	11
Total	16031	1	26	11	21534	15	28	9	37565	16	27	10

Average age for revisions distributed by gender and year of surgery 2005-2016

Revision												
	Females				Males				Total			
	N	No info	Average age	SD	N	No info	Average age	SD	N	No info	Average age	SD
2005	47	0	24	8	59	0	31	9	106	0	28	9
2006	60	0	28	10	68	0	29	8	128	0	29	9
2007	74	0	28	10	95	0	29	9	169	0	29	9
2008	78	0	27	9	112	1	29	8	190	1	28	9
2009	81	0	24	8	103	0	29	9	184	0	27	9
2010	88	0	26	10	133	0	29	8	221	0	28	9
2011	99	0	25	8	114	0	29	8	213	0	27	9
2012	107	0	24	8	134	0	28	9	241	0	26	9
2013	132	0	25	8	154	0	27	8	286	0	26	8
2014	121	0	25	9	159	0	27	8	280	0	26	9
2015	135	0	25	9	166	0	28	9	301	0	27	9
2016	135	0	26	9	163	0	28	9	298	0	27	9
Total	1157	0	25	9	1460	1	28	9	2617	1	27	9

Gender distribution in ACL operations

It appears that the percentage of women is increasing over the years and, in 2016, 46% were women.

It may seem somewhat surprising that fewer women undergo surgery at an earlier age, as it is also known that women run a far higher risk of sustaining an ACL injury than men. One explanation could be that there are a number of unknown cases among women who voluntarily reduce their activity level, take part in a non-surgical rehabilitation program and thereby never undergo surgical treatment for their ACL injury. Another explanation could be that men are more risk prone than women. It is therefore important in the future also carefully to register and follow up patients with ACL injuries who seek medical care for their injuries but receive only rehabilitation. We can now see that a change has taken place since 2009 when it comes to the gender distribution in connection with primary ACL reconstruction.

The number of revisions in patients with a new ACL injury to the knee that has already undergone surgery or with an unsatisfactory result after the first operation is relatively small compared with the number of primary reconstructions.

Gender distribution for primary reconstructions distributed by year of surgery 2005-2016

Primary						
	Females		Males		Total	
	N	%	N	%	N	%
2005	830	42	1169	58	1999	100
2006	1040	41	1474	59	2514	100
2007	1178	43	1590	57	2768	100
2008	1297	43	1701	57	2998	100
2009	1293	42	1789	58	3082	100
2010	1387	41	1976	59	3363	100
2011	1427	43	1919	57	3346	100
2012	1508	43	2028	57	3536	100
2013	1450	42	2016	58	3466	100
2014	1482	43	1947	57	3429	100
2015	1488	42	2016	58	3504	100
2016	1652	46	1924	54	3576	100
Total	16032	43	21549	57	37581	100

Gender distribution for revisions distributed by year of surgery 2005-2016

Revision						
	Females		Males		Total	
	N	%	N	%	N	%
2005	47	44	59	56	106	100
2006	60	47	68	53	128	100
2007	74	44	95	56	169	100
2008	78	41	113	59	191	100
2009	81	44	103	56	184	100
2010	88	40	133	60	221	100
2011	99	46	114	54	213	100
2012	107	44	134	56	241	100
2013	132	46	154	54	286	100
2014	121	43	159	57	280	100
2015	135	45	166	55	301	100
2016	135	45	163	55	298	100
Total	1157	44	1461	56	2618	100

Activity in connection with injury

Among both men and women, soccer is still the most common activity associated with an ACL injury and this situation does not change from year to year. In 2016, soccer was the cause of ACL injuries in 35% of women and 48% of men.

The second most common activity was downhill skiing for both women and men.

As soccer is the leading cause of ACL injuries, it is interesting that projects including prophylactic training for young people playing soccer are in progress in Sweden. This training is designed to create improved balance and proprioception in the lower extremities, thereby teaching ball-playing youngsters to avoid situations in which an ACL injury could occur.

See the table on the next page.

Activity in connection with injury in primary reconstructions distributed by gender in 2015 and 2016

	2015									2016								
	Females			Males			Total			Females			Males			Total		
	N	Column %	Row %	N	Column %	Row %	N	Column %	Row %	N	Column %	Row %	N	Column %	Row %	N	Column %	Row %
SOCCER	505	34	35	956	47	65	1461	42	100	501	30	35	922	48	65	1423	40	100
FLOORBALL	95	6	32	201	10	68	296	8	100	118	7	40	176	9	60	294	8	100
HANDBALL	108	7	59	75	4	41	183	5	100	124	8	69	55	3	31	179	5	100
BASKETBALL	39	3	54	33	2	46	72	2	100	40	2	58	29	2	42	69	2	100
AMERICAN FOOTBALL/RUGBY	10	1	19	42	2	81	52	1	100	12	1	29	30	2	71	42	1	100
ICE HOCKEY/BANDY	4	0	10	37	2	90	41	1	100	4	0	13	28	1	88	32	1	100
MARTIAL ARTS	22	1	27	59	3	73	81	2	100	35	2	40	52	3	60	87	2	100
WRESTLING	1	0	17	5	0	83	6	0	100	2	0	13	13	1	87	15	0	100
RACKET SPORTS	13	1	41	19	1	59	32	1	100	18	1	51	17	1	49	35	1	100
VOLLEYBALL	11	1	55	9	0	45	20	1	100	12	1	63	7	0	37	19	1	100
ALPINE/TELEMARK	324	22	63	194	10	37	518	15	100	371	22	65	202	10	35	573	16	100
SNOWBOARDING	10	1	56	8	0	44	18	1	100	9	1	38	15	1	63	24	1	100
CROSS-COUNTRY SKIING	5	0	83	1	0	17	6	0	100	0	0	0	2	0	100	2	0	100
SKATEBOARDING	6	0	30	14	1	70	20	1	100	4	0	19	17	1	81	21	1	100
WAKEBOARDING/SURFING	1	0	20	4	0	80	5	0	100	2	0	33	4	0	67	6	0	100
GYMNASTICS	26	2	76	8	0	24	34	1	100	46	3	79	12	1	21	58	2	100
CYCLING	14	1	47	16	1	53	30	1	100	18	1	50	18	1	50	36	1	100
ENDURO/MOTORCROSS	4	0	6	58	3	94	62	2	100	10	1	17	48	2	83	58	2	100
OTHER SPORT RECREATION	37	2	69	17	1	31	54	2	100	44	3	50	44	2	50	88	2	100
EQUESTRIAN SPORT	25	2	100	0	0	0	25	1	100	30	2	100	0	0	0	30	1	100
DANCING	26	2	72	10	0	28	36	1	100	31	2	72	12	1	28	43	1	100
EXERCISE	17	1	52	16	1	48	33	1	100	23	1	79	6	0	21	29	1	100
TRAMPOLINE	12	1	80	3	0	20	15	0	100	8	0	73	3	0	27	11	0	100
OUTDOOR LIFE	26	2	65	14	1	35	40	1	100	22	1	63	13	1	37	35	1	100
TRAFFIC	15	1	28	39	2	72	54	2	100	22	1	40	33	2	60	55	2	100
WORK	14	1	27	37	2	73	51	1	100	18	1	31	40	2	69	58	2	100
OTHER	118	8	46	141	7	54	259	7	100	128	8	50	126	7	50	254	7	100
Total	1488	100	42	2016	100	58	3504	100	100	1652	100	46	1924	100	54	3576	100	100

Duration of surgery and number of surgeons

In Sweden, as in a number of other countries, including the USA, many surgeons perform only a few ACL operations. Of the Swedish ACL surgeons, 64% perform fewer than 30 operations a year. Over the years, there has definitely been an increase in the number of surgeons performing more than 30 operations a year and this is pleasing.

The average duration of surgery for an ACL reconstruction is around 75 minutes for a primary operation and about 100 minutes for a revision.

Number of reconstructions per surgeon distributed by year of surgery 2005-2016

Primary

	Reconstructions per surgeon and year (>=30)					
	< 30 reconstructions/ year		> 30 reconstructions/ year		Total	
	N	%	N	%	N	%
2005	80	76	25	24	105	100
2006	92	73	34	27	126	100
2007	105	74	37	26	142	100
2008	105	70	46	30	151	100
2009	110	74	39	26	149	100
2010	108	70	46	30	154	100
2011	107	69	47	31	154	100
2012	105	69	48	31	153	100
2013	103	65	56	35	159	100
2014	100	66	52	34	152	100
2015	110	68	51	32	161	100
2016	97	64	55	36	152	100

Duration of surgery (mins) for primary reconstructions distributed by year of surgery 2005-2016

	Primary reconstruction				Revision (controlled by side)				Total			
	N	Info miss-ing	Av-erage time (mins)	SD (mins)	N	Info miss-ing	Av-erage time (mins)	SD (mins)	N	Info miss-ing	Av-erage time (mins)	SD (mins)
2005	1787	212	76	27	93	13	90	36	1880	225	77	28
2006	2303	211	76	27	115	13	90	32	2418	224	76	28
2007	2603	165	77	29	155	14	86	31	2758	179	77	29
2008	2759	239	76	28	174	17	87	32	2933	256	77	28
2009	2890	192	76	26	166	18	89	32	3056	210	77	27
2010	3182	181	73	28	211	10	89	34	3393	191	74	28
2011	3218	128	75	29	206	7	88	36	3424	135	76	29
2012	3322	214	74	28	221	20	95	36	3543	234	75	29
2013	3282	184	76	28	273	13	102	41	3555	197	78	30
2014	3269	160	75	29	261	19	96	36	3530	179	76	30
2015	3348	156	73	29	284	17	94	37	3632	173	75	30
2016	3459	118	78	50	288	10	99	43	3747	128	80	50

Time between injury and surgery

Since 2009, the average time between injury and surgery has been between 400 and 500 days. There are no obvious differences between private and public caregivers. What can be seen in both 2015 and 2016 is that Norrland (north of Sweden) has the longest time between injury and surgery, approximately 650 days.

The reason why there is a relatively long period between injury and surgery throughout Sweden is not known. One reason could be that many patients are not identified at emergency departments or local medical centers after their injury. In other words, they are not given the correct diagnosis at the acute stage. This would be extremely unfortunate, as it would mean that treatment is not given, resulting in a major risk of new and repeated trauma to the knee (which is unstable). Another reason could be that Sweden has embraced a treatment algorithm which means that most patients first receive non-surgical treatment, thereby extending the time to surgery. This is completely in line with the recent discussion that patients with ACL injuries may not always require surgery but can instead eliminate their problems using rehabilitation and activity modification.

Average number of days between injury and surgery distributed by primary/ revision and clinic/region in 2015 and 2016

		Days between injury and surgery											
		Primary reconstruction				Revision (controlled by side)				Total			
		N	Info miss-ing	Av-erage time (days)	SD (days)	N	Info miss-ing	Av-erage time (days)	SD (days)	N	Info miss-ing	Av-erage time (days)	SD (days)
2015	Greater Stockholm	1096	80	421	896	95	19	604	829	1191	99	436	892
	Svealand + Gotland	466	52	510	974	28	11	587	625	494	63	515	957
	Skåne	415	24	606	1045	25	3	699	1387	440	27	611	1066
	Småland + Blekinge	108	5	347	488	7	3	307	369	115	8	345	480
	Västra Götaland + Halland	697	79	454	721	55	13	702	1320	752	92	472	782
	Öster-götland	199	11	444	667	15	3	434	371	214	14	443	650
	Norrland	260	11	631	1362	22	2	660	929	282	13	633	1332
	Total	3242	262	480	921	247	54	620	984	3489	316	490	926
2016	Greater Stockholm	1129	69	429	923	92	12	338	328	1221	81	422	892
	Svealand + Gotland	461	53	539	811	47	13	611	1085	508	66	546	839
	Skåne	394	30	517	843	30	0	429	470	424	30	510	822
	Småland + Blekinge	106	10	409	740	5	2	356	212	111	12	407	724
	Västra Götaland + Halland	788	47	380	668	56	12	667	1316	844	59	399	731
	Öster-götland	213	15	382	656	8	0	410	275	221	15	383	646
	Norrland	259	3	665	1100	21	0	420	504	280	3	647	1068

Percentage of day surgery in relation to in-patient care

The percentage of patients who undergo day surgery is slowly increasing and is now more than 87.5% of the total number of operations, both primary and revisions. In 2005, the corresponding figure was 50.4%.

One reason for performing in-patient surgery could be that long distances in the region prevent patients being discharged the same day. This is, however, contradicted by the fact that Norrland in northern Sweden, where the distances are very long, is characterized by an extremely high percentage of day surgery.

Day surgery distributed by primary/revision and year of surgery 2005-2016

	Primary reconstruction						Revision (controlled by side)						Total					
	(16) Day surgery						(16) Day surgery						(16) Day surgery					
	No		Yes		Total		No		Yes		Total		No		Yes		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
2005	992	50	1007	50	1999	100	52	49	54	51	106	100	1044	50	1061	50	2105	100
2006	1157	46	1357	54	2514	100	56	44	72	56	128	100	1213	46	1429	54	2642	100
2007	1071	39	1697	61	2768	100	82	49	87	51	169	100	1153	39	1784	61	2937	100
2008	778	26	2220	74	2998	100	47	25	144	75	191	100	825	26	2364	74	3189	100
2009	627	20	2455	80	3082	100	47	26	137	74	184	100	674	21	2592	79	3266	100
2010	691	21	2672	79	3363	100	69	31	152	69	221	100	760	21	2824	79	3584	100
2011	591	18	2755	82	3346	100	60	28	153	72	213	100	651	18	2908	82	3559	100
2012	576	16	2960	84	3536	100	64	27	177	73	241	100	640	17	3137	83	3777	100
2013	541	16	2925	84	3466	100	63	22	223	78	286	100	604	16	3148	84	3752	100
2014	512	15	2917	85	3429	100	60	21	220	79	280	100	572	15	3137	85	3709	100
2015	488	14	3016	86	3504	100	58	19	243	81	301	100	546	14	3259	86	3805	100
2016	412	12	3165	88	3577	100	72	24	226	76	298	100	484	12	3391	88	3875	100

ACL reconstruction in children under 15 years of age

It appears that substance ruptures in the ACL of children with open growth zones are increasing. The annual incidence has previously been estimated at 0.5/10,000 children under 15 years of age, but this figure may have doubled. The reason has not been identified, but increased awareness of the fact that children can also sustain this injury, improved MRI diagnostics and increasing performance demands in organized sport involving children and young people have been cited as some of the possible reasons. Even the associated meniscal injuries in association with ACL injuries are thought to be growing in number based on an historical comparison. In a Swedish study from 1996 of children under 15 years of age, 21% had meniscal injuries at the time the ACL injury was diagnosed, while this figure rose to 31% at surgery.

Primary operations in children under 15 years of age distributed by gender and clinic and region in 2014, 2015 and 2016

Primary reconstruction

	CHILDREN UNDER 15 YEARS								
	2014			2015			2016		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
	N	N	N	N	N	N	N	N	N
GREATER STOCKHOLM									
KAROLINSKA UNIVERSITETS-SJUKHUSET	0	0	0	0	0	0	13	2	15
ARTROCENTER	0	0	0	0	0	0	1	0	1
SABBATSBERG NÄRSJUKHUSET	1	0	1	0	0	0	0	0	0
SÖDERSJUKHUSET	0	1	1	0	0	0	0	0	0
ORTHOCENTER STOCKHOLM	1	0	1	0	0	0	4	2	6
CAPIO ARTRO CLINIC	26	14	40	30	20	50	20	11	31
Total	28	15	43	30	20	50	38	15	53
SVEALAND + GOTLAND									
ELISABETHSJUKHUSET	2	0	2	2	0	2	0	0	0
FALU LASARETT	1	0	1	2	0	2	1	1	2
GÄVLE SJUKHUS	1	0	1	0	0	0	0	1	1
HUDIKSVALLS SJUKHUS	1	0	1	0	0	0	0	0	0
KARLSTAD CENTRAL-SJUKHUS	1	1	2	2	1	3	2	0	2
CAPIO LÄKARGRUPPEN I ÖREBRO AB	0	0	0	1	1	2	1	0	1
MÄLARSJUKHUSET ESKILSTUNA	0	0	0	0	0	0	1	0	1
ÖREBRO USÖ	2	0	2	2	0	2	2	1	3
VÄSTERÅS CENTRALLASARETTET	0	0	0	0	1	1	0	0	0
VÄSTERÅS ORTOPEDPRAKTIK	1	1	2	0	0	0	1	1	2
Total	9	2	11	9	3	12	8	4	12
SKÅNE									
HÄSSLEHOLMS SJUKHUS	0	0	0	2	0	2	1	0	1
HELSINGBORGS SJUKHUS	2	0	2	2	1	3	1	0	1

ORTHOCENTER I SKÅNE	0	0	0	0	1	1	0	0	0
SKÅNES UNIVERSITETS-SJUKHUS	4	0	4	1	1	2	9	2	11
Total	6	0	6	5	3	8	11	2	13
SMÅLAND + BLEKINGE									
KALMAR SJUKHUS	3	0	3	1	0	1	0	0	0
LJUNGBY LASARETT	1	0	1	0	0	0	0	0	0
CENTRALLASARETTET VÄXJÖ	2	0	2	2	0	2	3	0	3
VÄRNAMO SJUKHUS/ ORTOPEDKLINIKEN	0	1	1	0	0	0	0	0	0
Total	6	1	7	3	0	3	3	0	3
VÄSTRA GÖTALAND + HALLAND									
ALINGSÅS LASARETT	1	0	1	2	0	2	0	0	0
SÖDRA ÄLVSBORGS SJUKHUS	0	0	0	0	0	0	2	0	2
DROTTNING SILVIAS BARN OCH UNGDOMS-SJUKHUS	1	0	1	10	3	13	5	3	8
ORTHOCENTER/ IFK-KLINIKEN	2	1	3	4	1	5	2	0	2
KUNGSBACKA SJUKHUS	1	0	1	1	0	1	0	1	1
CAPIO LUNDBY NÄRSJUKHUS	2	0	2	2	0	2	2	0	2
CAPIO MOVEMENT	0	0	0	1	0	1	1	1	2
NU-SJUKVÅRDEN	1	0	1	1	0	1	1	1	2
KÄRNSJUKHUSET I SKÖVDE	0	0	0	2	0	2	1	2	3
SAHLGRENSKA UNIVERSITETS-SJUKHUSET	6	3	9	0	0	0	2	0	2
Total	14	4	18	23	4	27	16	8	24
ÖSTERGÖTLAND									
LINKÖPINGS UNIVERSITETSKLINIK	1	0	1	0	0	0	1	0	1
OSKARSHAMNS SJUKHUS	1	0	1	1	0	1	2	0	2
LÄNSSJUKHUSET RYHOV	1	1	2	0	1	1	0	0	0
VÄSTERVIKS SJUKHUS	1	0	1	1	0	1	0	0	0
Total	4	1	5	2	1	3	3	0	3
NORRLAND									
MEDICIN DIREKT	2	0	2	1	0	1	2	0	2
ÖRNSKÖLDSVIKS SJUKHUS	0	0	0	1	0	1	1	0	1
SPORTS MEDICINE UMEÅ	0	0	0	1	1	2	0	1	1
SOLLEFTEÅ SJUKHUS	1	0	1	0	0	0	0	0	0
SUNDERBY SJUKHUS	2	0	2	3	1	4	6	0	6
NORRLANDS UNIVERSITETS-SJUKHUS, UMEÅ	1	0	1	2	1	3	2	0	2
Total	6	0	6	8	3	11	11	1	12

About half the patients had meniscal injuries, half of which were resected and half sutured. Girls accounted for 75% of the patients. The cause of accidents is similarly distributed between boys and girls. Soccer dominates, followed by alpine skiing.

Miscellaneous

The use of the double-tunnel technique as a surgical method continues to decline in Sweden. In 2016, only 11 such operations were performed, which corresponds to 0.3% of all the operations performed. This is probably due to the fact that this method is somewhat more difficult to perform and that randomized studies with a follow-up of up to five years from Sweden, among other countries, reveal that it is not possible to demonstrate any difference in comparisons with the technically more straightforward single-tunnel technique.

In 2016, thromboprophylaxis was administered in 28.6% of all operations. For the past few years, antibiotic prophylaxis has been basically administered in all operations.

Surgical variables

Graft selection

Since the ACL Register was created in 2005, the use of hamstring grafts rose from 80% to 98% in 2012, but, in conjunction with ACL reconstruction, different types of graft can be used. A reduction to 91% has taken place in recent years. By far the most common graft selection is the hamstring tendon, which can comprise the semitendinosus or the semitendinosus and the gracilis tendon. Surgery involving hamstrings is technically straightforward, but it can result in somewhat weaker flexion in the knee, first and foremost during the first year after surgery. When the use of hamstring tendons began, it was standard procedure to double the gracilis and the semitendinosus. Interest is, however, currently increasing in quadrupling the semitendinosus, as cadaver studies have revealed that this is a stronger option. Retaining the gracilis can reduce the problem of reduced flexion to some degree.

As ACL surgery developed during the 1980s and 1990s, using the patellar tendon was the standard method, but it has declined in popularity, probably because it is somewhat more technically complicated and the length of surgery can increase. More postoperative pain and problems with anterior knee pain, primarily during the first two years, have also been mentioned as disadvantages. One advantage when it comes to the patellar tendon is that a bone plug can be used at both ends, thereby guaranteeing the effective healing of the graft in the canal. During the past few years, register studies have indicated that the risk of graft failure and rupture necessitating a revision is somewhat greater, if a hamstring graft is selected. During the past two years, the percentage of hamstring tendon grafts has declined in favor of the patellar tendon and, to some degree, also the quadriceps, even if the absolute figures are still low.

Increasing interest has also been shown in the use of quadriceps grafts. The quadriceps tendon can be used as a free graft or with a bone plug at one end. This can enable a thick graft, which makes it possible to divide the graft, thereby permitting the bone plug to be inserted in the femur, with two attachment points in the tibia. The quadriceps tendon probably results in less anterior knee pain than the patellar tendon. There is speculation about whether the patellar tendon and the quadriceps tendon should be considered more frequently in patient groups in which a greater risk of graft rupture can be anticipated.

The use of allografts is another alternative. In international terms, it is common for allografts to be used in ACL reconstruction. The advantages possibly include the lack of morbidity at the graft retrieval point and shorter surgery times. The disadvantages may include a probably greater risk of graft failure and, first and foremost, the high cost, as an allograft costs more than EUR 2,000 per graft, which is not always reimbursed via the reimbursement system in Sweden. Access to a freezer with a temperature of minus 70°C is also essential. In 2016, 27 allografts were used in primary surgery. Allografts are frequently used as a complement in conjunction with multiple-ligament injuries and revisions.

While hamstring grafts have been the dominant graft in primary ACL reconstruction in Sweden for many years, the patellar tendon is being used increasingly in revision surgery. Allografts and the quadriceps tendon are also frequently used in revision surgery.

ACL grafts in primary reconstructions distributed by year of surgery 2005-2016

Primary												
	(13) ACL grafts											
	Patellar tendon		Semitendi-nosus		Quadriceps		Allograft		Other		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
2005	360	18	1599	81	0	0	4	0	2	0	1965	100
2006	367	15	2097	85	0	0	2	0	4	0	2470	100
2007	303	11	2401	88	1	0	5	0	4	0	2714	100
2008	165	6	2751	94	0	0	10	0	7	0	2933	100
2009	143	5	2881	95	1	0	8	0	8	0	3041	100
2010	102	3	3140	95	31	1	18	1	15	0	3306	100
2011	73	2	3146	96	24	1	27	1	10	0	3280	100
2012	69	2	3340	96	38	1	15	0	16	0	3478	100
2013	96	3	3249	95	41	1	16	0	20	1	3422	100
2014	125	4	3143	94	51	2	16	0	12	0	3347	100
2015	136	4	3170	94	49	1	24	1	5	0	3384	100
2016	174	5	3158	91	106	3	27	1	15	0	3480	100
Total	2113	6	34075	93	342	1	172	0	118	0	36820	100

ACL grafts in revisions distributed by year of surgery 2005-2016

Revisions												
	(13) ACL grafts											
	Patellar tendon		Semitendi-nosus		Quadriceps		Allograft		Other		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
2005	36	35	66	63	0	0	1	1	1	1	104	100
2006	45	36	78	62	0	0	1	1	2	2	126	100
2007	72	43	87	52	3	2	3	2	1	1	166	100
2008	80	43	102	54	0	0	6	3	0	0	188	100
2009	67	37	94	51	6	3	9	5	7	4	183	100
2010	99	45	87	40	3	1	26	12	3	1	218	100
2011	83	40	91	44	10	5	22	11	1	0	207	100
2012	112	48	73	31	18	8	26	11	4	2	233	100
2013	166	58	73	26	16	6	15	5	14	5	284	100
2014	151	55	83	30	26	9	12	4	5	2	277	100
2015	170	57	85	28	24	8	20	7	0	0	299	100
2016	167	57	70	24	37	13	20	7	1	0	295	100
Total	1248	48	989	38	143	6	161	6	39	2	2580	100

Tibial fixation

The most common form of tibial fixation at the present time is the cortical button and, in 2016, the percentage was 28%. Resorbable screws were used in 24% of operations. The use of resorbable screws has doubled since 2009, but it has declined in recent years. One of the reasons for its use to avoid the removal of fixation material in revisions.

Tibial fixations (categorized) in primary reconstructions distributed by year of surgery 2005-2016

Primary	(12) Tibial fixations (categorized)																			
	Metal screw		Resorba-ble screw		AO screw		Retro-screw		Intrafix		Rigid-fix		Endo-/ Retro-button/ Thighrope		Metalscrew + staple/ osteosu-ture		Annan		Other	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
2005	802	41	0	0	161	8	30	2	544	28	130	7	4	0	211	11	95	5	1977	100
2006	984	39	8	0	180	7	70	3	639	26	191	8	7	0	337	13	81	3	2497	100
2007	1070	39	122	4	263	10	121	4	554	20	202	7	13	0	290	11	86	3	2721	100
2008	930	31	415	14	377	13	95	3	608	21	164	6	14	0	286	10	75	3	2964	100
2009	1027	34	451	15	536	18	58	2	410	13	99	3	12	0	400	13	59	2	3052	100
2010	1107	33	668	20	596	18	86	3	319	10	75	2	11	0	448	13	24	1	3334	100
2011	1026	31	883	27	582	18	53	2	266	8	30	1	58	2	399	12	23	1	3320	100
2012	832	24	1285	37	614	18	19	1	278	8	30	1	55	2	356	10	25	1	3494	100
2013	778	23	1266	37	549	16	6	0	232	7	15	0	250	7	289	8	52	2	3437	100
2014	576	17	1079	32	710	21	2	0	87	3	3	0	680	20	220	6	36	1	3393	100
2015	571	17	891	26	726	21	1	0	76	2	2	0	876	25	190	6	119	3	3452	100
2016	596	17	860	24	742	21	0	0	48	1	0	0	988	28	173	5	117	3	3524	100
Total	###	28	7928	21	6036	16	541	1	4061	11	941	3	2968	8	3599	10	792	2	37165	100

Femoral fixation

The most common form of fixation at the present time is the cortical button, which is used in 88% of all femoral fixations. The use of the Tightrope has risen sharply in the past few years and has overtaken the Endobutton. When the Tightrope is used, the cruciate ligament transplant can be tightened after it has been inserted in the canal and even after it has been fixed distally. The use of cortical buttons has increased every year, from 10% in 2005 to 88% in 2016. The reason for this increase is that the cortical button is easy to use without any alignment instruments. It can be inserted through the medial portal and, unlike the transtibial method, where it is necessary to drill through the lower part of the leg using alignment instruments, the surgeon is not obliged to use the tibial canal. Cortical buttons are also stable and there is no risk that the transplant will move or slip. Interference screws in the femur were used in some 28% of patients in 2005, when the ACL Register was created, but this figure has fallen slightly in recent years and is currently around 7%.

Femral fixations (categorized) in primary reconstructions distributed by year of surgery 2005-2016

Primary	(12) Femoral fixations (categorized)									
	Endo-/ Retrobutton/ Thighrope		Rigid-/ Transfix		Metal screw		Other		Total	
	N	%	N	%	N	%	N	%	N	%
2005	198	10	1213	61	545	28	24	1	1980	100
2006	483	19	1367	55	639	26	12	0	2501	100
2007	635	23	1482	54	605	22	23	1	2745	100

2008	1044	35	1318	44	579	19	34	1	2975	100
2009	1432	47	1001	33	558	18	64	2	3055	100
2010	1999	60	644	19	606	18	87	3	3336	100
2011	2339	70	369	11	513	15	107	3	3328	100
2012	2836	81	183	5	402	11	79	2	3500	100
2013	2995	87	89	3	277	8	80	2	3441	100
2014	2968	87	30	1	331	10	72	2	3401	100
2015	2988	86	21	1	322	9	138	4	3469	100
2016	3100	88	35	1	256	7	135	4	3526	100
Total	23017	62	7752	21	5633	15	855	2	37257	100

Revisions and surgery on the contralateral side

A total of 2,618 (6.6%) revisions were registered in the ACL Register in 2005-2016. No primary surgery has been registered for a number of these as it took place before the ACL was established. If we instead choose to follow the patients whose primary surgery and revision were registered, the figure for revisions is 1,550 (3.9%). Taken as a whole, 1,362 (3.4%) surgeries on the contralateral knee have also been registered during this period. In overall terms, women underwent revisions on a larger scale than men – 6.8% compared with 6.4% for the same knee and 3.7% compared with 3.2% for the contralateral knee. The total average age for revisions in 2016 was 27.1 years, but here, too, there appears to be a gender variation, as the average age for women was 25.6 years, while that for men was 28.3 years. Generally speaking, the report shows that the largest number of revisions are performed on the patient group under the age of 20 years at their first surgery. When it comes to ACL reconstructions on the contralateral knee, the younger population is also overrepresented. The very highest frequency of these operations in found in the patient group with an age range of 21-25 years, where 4.9% of all patients underwent surgery on the contralateral knee.

In almost half (48.4%) of revisions, the patellar tendon is used. This can be explained by the fact that a hamstring graft is by far the most common choice in primary surgery and this graft has therefore probably already been used in the patients requiring a revision. The following table shows the revision frequency within two years of the index operation and the total revision frequency, distributed by graft type at the index operation. The semitendinosus has a slightly higher revision frequency compared with the patellar tendon at two years (2.2% compared with 1.5%) but, as far more patients are given semitendinosus grafts, it is difficult to draw any conclusions about the impact of graft selection on the risk of revision.

ACL index grafts leading to revision within two years (surgery period for ACL index 1 January 2005 to 31 December 2014)

1 January 2005 to 31 December 2014												
	ACL index leading to revision within two years						ACL index leading to revision					
	No revision within two years		Revision within two years		Total		No revision		Revision		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Patellar tendon	1977	98,5	30	1,5	2007	100,0	1922	95,8	85	4,2	2007	100,0
Semitendi-nosus	26842	97,8	608	2,2	27450	100,0	26173	95,3	1277	4,7	27450	100,0
Quadriceps	193	99,0	2	1,0	195	100,0	192	98,5	3	1,5	195	100,0
Allograft	153	98,7	2	1,3	155	100,0	149	96,1	6	3,9	155	100,0
Other	102	93,6	7	6,4	109	100,0	100	91,7	9	8,3	109	100,0
Total	29267	97,8	649	2,2	29916	100,0	28536	95,4	1380	4,6	29916	100,0

The following table presents the number of revisions on the same knee within two years and per clinic. The clinics that are presented are those that initially performed the first operation but not necessarily the revision. The steering committee has chosen to present all the clinics without taking account of the number of primary operations.

ACL index grafts leading to revision within two years distributed by clinic and region (surgery period for ACL index 1 January 2005 to 31 December 2014)

1 January 2005 to 31 December 2014						
	ACL index leading to revision within two years					
	No revision within two years		Revision within two years		Total	
	N	%	N	%	N	%
GREATER STOCKHOLM						
KAROLINSKA UNIVERSITETS-SJUKHUSET	169	98,8	2	1,2	171	100,0
S:T GÖRANS SJUKHUS CAPIO, STOCKHOLM	99	97,1	3	2,9	102	100,0
CITYAKUTEN PRIVATVÅRD	26	100,0	0	0,0	26	100,0
DANDERYDS SJUKHUS	241	97,2	7	2,8	248	100,0
LÖWETS SPECIALIST-MOTTAGNING	238	97,9	5	2,1	243	100,0
KAROLINSKA UNIVERSITETS-SJUKHUSET/ORTOPED-KLINIKEN	581	97,6	14	2,4	595	100,0
NACKA NÄRSJUKHUS	105	98,1	2	1,9	107	100,0
ODENPLANS LÄKARHUS	183	98,4	3	1,6	186	100,0
ORTOPEDISKA HUSET CAREMA	492	97,4	13	2,6	505	100,0
SABBATSBERG NÄRSJUKHUSET	117	98,3	2	1,7	119	100,0
SÖDERMALMS ORTOPEDI	1	100,0	0	0,0	1	100,0
SÖDERTÄLJE SJUKHUS	54	96,4	2	3,6	56	100,0
SÖDERSJUKHUSET	1094	98,0	22	2,0	1116	100,0
SOPHIAHEMMET	37	100,0	0	0,0	37	100,0
ORTHOCENTER STOCKHOLM	270	97,5	7	2,5	277	100,0
CAPIO ARTRO CLINIC	5442	97,6	131	2,4	5573	100,0
Total	9149	97,7	213	2,3	9362	100,0
SVEALAND + GOTLAND						
AKADEMISKA SJUKHUSET	33	91,7	3	8,3	36	100,0
LASARETTET I ENKÖPING	31	93,9	2	6,1	33	100,0
ELISABETHSJUKHUSET	613	98,2	11	1,8	624	100,0
FALU LASARETT	413	98,3	7	1,7	420	100,0
GÄVLE SJUKHUS	309	99,4	2	0,6	311	100,0
HUDIKSVALLS SJUKHUS	243	98,0	5	2,0	248	100,0
KARLSTAD CENTRAL-SJUKHUS	698	98,0	14	2,0	712	100,0
KARLSKOGA LASARETT	11	100,0	0	0,0	11	100,0
CAPIO LÄKARGRUPPEN I ÖREBRO AB	447	95,7	20	4,3	467	100,0
MÄLARSJUKHUSET ESKILSTUNA	344	98,3	6	1,7	350	100,0

NORRTÄLJE SJUKHUS	101	99,0	1	1,0	102	100,0
NYKÖPINGS LASARETT	109	98,2	2	1,8	111	100,0
ÖREBRO USÖ	256	97,3	7	2,7	263	100,0
SAMARITERHEMMETS SJUKHUS	244	99,6	1	0,4	245	100,0
SPECIALISTCENTER SCANDINAVIA	2	100,0	0	0,0	2	100,0
VÄSTERÅS CENTRAL-LASARETTET	234	99,6	1	0,4	235	100,0
VISBY LASARETT	50	98,0	1	2,0	51	100,0
VÄSTERÅS ORTOPED-PRAKTIK	74	96,1	3	3,9	77	100,0
Total	4212	98,0	86	2,0	4298	100,0
SKÅNE						
ALERIS ORTOPEDI ÄNGELHOLM	586	98,7	8	1,3	594	100,0
HÄSSLEHOLMS SJUKHUS	663	98,7	9	1,3	672	100,0
HELSINGBORGS SJUKHUS	316	97,2	9	2,8	325	100,0
LUNDS UNIVERSITET	406	98,5	6	1,5	412	100,0
MALMÖ ALLMÄNNA SJUKHUS	804	97,9	17	2,1	821	100,0
ORTHOCENTER I SKÅNE	60	93,8	4	6,3	64	100,0
SKÅNES UNIVERSITETS-SJUKHUS	995	98,0	20	2,0	1015	100,0
Total	3830	98,1	73	1,9	3903	100,0
HALLAND						
HALMSTADS SJUKHUS	64	95,5	3	4,5	67	100,0
Total	64	95,5	3	4,5	67	100,0
SMÅLAND + BLEKINGE						
KALMAR SJUKHUS	534	97,3	15	2,7	549	100,0
BLEKINGESJUKHUSET	82	100,0	0	0,0	82	100,0
LJUNGBY LASARETT	173	97,7	4	2,3	177	100,0
CENTRALLASARETTET VÄXJÖ	449	98,5	7	1,5	456	100,0
VÄRNAMO SJUKHUS/ ORTOPEDKLINIKEN	74	98,7	1	1,3	75	100,0
Total	1312	98,0	27	2,0	1339	100,0
VÄSTRA GÖTALAND + HALLAND						
ALINGSÅS LASARETT	258	96,3	10	3,7	268	100,0
ART CLINIC	21	100,0	0	0,0	21	100,0
SÖDRA ÄLVSBORGS SJUKHUS	125	98,4	2	1,6	127	100,0
DROTTNING SILVIAS BARN OCH UNGDOMS-SJUKHUS	1	100,0	0	0,0	1	100,0
FRÖLUNDA SPECIALIST-SJUKHUS	202	97,1	6	2,9	208	100,0
ORTHOCENTER/ IFK-KLINIKEN	849	95,5	40	4,5	889	100,0
KUNGSBACKA SJUKHUS	552	97,5	14	2,5	566	100,0
KUNGÄLVS SJUKHUS	114	98,3	2	1,7	116	100,0
CAPIO LUNDBY NÄRSJUKHUS	211	98,6	3	1,4	214	100,0
LIDKÖPINGS SJUKHUS	218	98,6	3	1,4	221	100,0
CAPIO MOVEMENT	926	96,9	30	3,1	956	100,0
NU-SJUKVÅRDEN	998	96,6	35	3,4	1033	100,0

PERAGO ORTOPEDKLINIK	103	94,5	6	5,5	109	100,0
KÄRNSJUKHUSET I SKÖVDE	20	95,2	1	4,8	21	100,0
SPORTSMED	49	100,0	0	0,0	49	100,0
SAHLGRENSKA UNIVERSITETS-SJUKHUSET	1437	97,8	32	2,2	1469	100,0
VARBERGS SJUKHUS	273	98,6	4	1,4	277	100,0
Total	6357	97,1	188	2,9	6545	100,0
ÖSTERGÖTLAND						
HÖGLANDSSJUKHUSET	434	98,4	7	1,6	441	100,0
LINKÖPINGS UNIVERSITETSKLINIK	666	99,1	6	0,9	672	100,0
OSKARSHAMNS SJUKHUS	282	100,0	0	0,0	282	100,0
LÄNSSJUKHUSET RYHOV	248	96,5	9	3,5	257	100,0
VRINNEVISJUKHUSET	698	99,1	6	0,9	704	100,0
VÄSTERVIKS SJUKHUS	116	100,0	0	0,0	116	100,0
Total	2444	98,9	28	1,1	2472	100,0
NORRLAND						
GÄLLIVARE SJUKHUS	55	100,0	0	0,0	55	100,0
LÄKARHUSET HERMELINEN	50	96,2	2	3,8	52	100,0
MEDICIN DIREKT	312	97,8	7	2,2	319	100,0
ÖRNSKÖLDSVIKS SJUKHUS	118	99,2	1	0,8	119	100,0
ÖSTERSUNDS SJUKHUS	74	97,4	2	2,6	76	100,0
PITEÅ ÄLVDAL SJUKHUS	70	100,0	0	0,0	70	100,0
SKELLEFTEÅ SJUKHUS	30	100,0	0	0,0	30	100,0
SPORTS MEDICINE UMEÅ	268	97,1	8	2,9	276	100,0
SOLLEFTEÅ SJUKHUS	47	100,0	0	0,0	47	100,0
SUNDERBY SJUKHUS	418	99,5	2	0,5	420	100,0
LÄNSSJUKHUSET SUNDSVALL	59	98,3	1	1,7	60	100,0
NORRLANDS UNIVERSITETSSJUKHUS, UMEÅ	918	98,8	11	1,2	929	100,0
Total	2419	98,6	34	1,4	2453	100,0

Only looking at revisions as an indication of a failed index operation does not tell the whole story, as it is not certain that a patient will undergo a revision in spite of poor knee function. One way of identifying patients who probably do not have a fully functional ACL is to look at the percentage who have given an rating of < 44 in the category for knee-related quality of life on the KOOS two years after the primary operation. The following table shows the response frequency for knee-related quality of life at two years and the percentage with < 44, distributed by clinic.

KOOS knee-related quality of life at two years postop of the ACL index distributed by clinic and region

ACL index 1 January 2005 to 31 December 2014												
	Response frequency for knee-related quality of life (two years postop)						Knee-related quality of life (two years postop)					
	No response		Response		Total		QoL>=44		QoL<44		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
GREATER STOCKHOLM												
KAROLINSKA UNIVERSITETS-SJUKHUSET	68	41,7	95	58,3	163	100,0	83	87,4	12	12,6	95	100,0
S:T GÖRANS SJUKHUS CAPIO, STOCKHOLM	42	43,3	55	56,7	97	100,0	46	83,6	9	16,4	55	100,0
CITYAKUTEN PRIVATVÅRD	16	61,5	10	38,5	26	100,0	7	70,0	3	30,0	10	100,0
DANDERYDS SJUKHUS	146	62,9	86	37,1	232	100,0	54	62,8	32	37,2	86	100,0
LÖWETS SPECIA-LISTMOTTAGNING	104	44,8	128	55,2	232	100,0	104	81,3	24	18,8	128	100,0
KAROLINSKA UNIVERSITETS-SJUKHUSET / ORTOPEDKLINIKEN	312	56,8	237	43,2	549	100,0	170	71,7	67	28,3	237	100,0
NACKA NÄRSJUKHUS	54	52,9	48	47,1	102	100,0	33	68,8	15	31,3	48	100,0
ODENPLANS LÄKARHUS	101	58,4	72	41,6	173	100,0	58	80,6	14	19,4	72	100,0
ORTOPEDISKA HUSET CAREMA	255	54,0	217	46,0	472	100,0	167	77,0	50	23,0	217	100,0
SABBATSBERG NÄRSJUKHUSET	63	58,9	44	41,1	107	100,0	26	59,1	18	40,9	44	100,0
SÖDERMALMS ORTOPEDI	1	100,0	0	0,0	1	100,0	0	0,0	0	0,0	0	0,0
SÖDERTÄLJE SJUKHUS	36	66,7	18	33,3	54	100,0	8	44,4	10	55,6	18	100,0
SÖDERSJUKHUSET	584	57,4	433	42,6	1017	100,0	314	72,5	119	27,5	433	100,0
SOPHIAHEMMET	21	60,0	14	40,0	35	100,0	12	85,7	2	14,3	14	100,0
ORTHOCENTER STOCKHOLM	141	54,4	118	45,6	259	100,0	88	74,6	30	25,4	118	100,0
CAPIO ARTRO CLINIC	2470	48,6	2612	51,4	5082	100,0	2091	80,1	521	19,9	2612	100,0
Total	4414	51,3	4187	48,7	8601	100,0	3261	77,9	926	22,1	4187	100,0
SVEALAND + GOTLAND												
AKADEMISKA SJUKHUSET	21	67,7	10	32,3	31	100,0	7	70,0	3	30,0	10	100,0
LASARETTET I ENKÖPING	25	83,3	5	16,7	30	100,0	3	60,0	2	40,0	5	100,0
ELISABETH-SJUKHUSET	349	60,2	231	39,8	580	100,0	173	74,9	58	25,1	231	100,0
FALU LASARETT	210	52,2	192	47,8	402	100,0	123	64,1	69	35,9	192	100,0
GÄVLE SJUKHUS	169	56,3	131	43,7	300	100,0	75	57,3	56	42,7	131	100,0
HUDIKSVALLS SJUKHUS	137	58,3	98	41,7	235	100,0	70	71,4	28	28,6	98	100,0
KARLSTAD CENTRALSJUKHUS	350	53,1	309	46,9	659	100,0	199	64,4	110	35,6	309	100,0
KARLSKOGA LASARETT	6	54,5	5	45,5	11	100,0	2	40,0	3	60,0	5	100,0
CAPIO LÄKAR-GRUPPEN I ÖREBRO AB	191	45,7	227	54,3	418	100,0	148	65,2	79	34,8	227	100,0

MÄLARSJUKHUSET ESKILSTUNA	170	50,9	164	49,1	334	100,0	109	66,5	55	33,5	164	100,0
NORRTÄLJE SJUKHUS	71	72,4	27	27,6	98	100,0	21	77,8	6	22,2	27	100,0
NYKÖPINGS LASARETT	64	61,0	41	39,0	105	100,0	26	63,4	15	36,6	41	100,0
ÖREBRO USÖ	134	53,6	116	46,4	250	100,0	66	56,9	50	43,1	116	100,0
SAMARITER-HEMMETS SJUKHUS	109	51,9	101	48,1	210	100,0	71	70,3	30	29,7	101	100,0
SPECIALIST-CENTER SCANDI-NAVIA	1	50,0	1	50,0	2	100,0	1	100,0	0	0,0	1	100,0
VÄSTERÅS CEN-TRALLASARETTET	123	55,2	100	44,8	223	100,0	53	53,0	47	47,0	100	100,0
VISBY LASARETT	27	57,4	20	42,6	47	100,0	11	55,0	9	45,0	20	100,0
VÄSTERÅS ORTOPEDPRAKTIK	52	74,3	18	25,7	70	100,0	11	61,1	7	38,9	18	100,0
Total	2209	55,2	1796	44,8	4005	100,0	1169	65,1	627	34,9	1796	100,0
SKÅNE												
ALERIS ORTOPEDI ÄNGELHOLM	321	58,5	228	41,5	549	100,0	173	75,9	55	24,1	228	100,0
HÄSSLEHOLMS SJUKHUS	360	55,9	284	44,1	644	100,0	203	71,5	81	28,5	284	100,0
HELSINGBORGS SJUKHUS	173	56,2	135	43,8	308	100,0	90	66,7	45	33,3	135	100,0
LUNDS UNIVER-SITET	189	48,3	202	51,7	391	100,0	150	74,3	52	25,7	202	100,0
MALMÖ ALLMÄNNA SJUKHUS	396	54,2	335	45,8	731	100,0	212	63,3	123	36,7	335	100,0
ORTHOCENTER I SKÅNE	36	62,1	22	37,9	58	100,0	16	72,7	6	27,3	22	100,0
SKÅNES UNIVER-SITETSSJUKHUS	494	51,8	459	48,2	953	100,0	300	65,4	159	34,6	459	100,0
Total	1969	54,2	1665	45,8	3634	100,0	1144	68,7	521	31,3	1665	100,0
Halland												
HALMSTADS SJUKHUS	28	45,9	33	54,1	61	100,0	23	69,7	10	30,3	33	100,0
Total	28	45,9	33	54,1	61	100,0	23	69,7	10	30,3	33	100,0
SMÅLAND + BLEKINGE												
KALMAR SJUKHUS	284	55,3	230	44,7	514	100,0	175	76,1	55	23,9	230	100,0
BLEKINGE-SJUKHUSET	46	57,5	34	42,5	80	100,0	21	61,8	13	38,2	34	100,0
LJUNGBY LASARETT	85	50,9	82	49,1	167	100,0	65	79,3	17	20,7	82	100,0
CENTRALLASA-RETTET VÄXJÖ	229	53,1	202	46,9	431	100,0	146	72,3	56	27,7	202	100,0
VÄRNAMO SJUK-HUS/ORTOPED-KLINIKEN	50	67,6	24	32,4	74	100,0	16	66,7	8	33,3	24	100,0
Total	694	54,8	572	45,2	1266	100,0	423	74,0	149	26,0	572	100,0
VÄSTRA GÖTALAND + HALLAND												
ALINGSÅS LASARETT	124	50,8	120	49,2	244	100,0	74	61,7	46	38,3	120	100,0
ART CLINIC	10	50,0	10	50,0	20	100,0	8	80,0	2	20,0	10	100,0
SÖDRA ÄLVSBORGS SJUKHUS	69	55,6	55	44,4	124	100,0	32	58,2	23	41,8	55	100,0
DROTTNING SILVIAS BARN OCH UNGDOMS-SJUKHUS	1	100,0	0	0,0	1	100,0	0	0,0	0	0,0	0	0,0

FRÖLUNDA SPECIALISTSJUKHUS	99	51,6	93	48,4	192	100,0	66	71,0	27	29,0	93	100,0
ORTHOCENTER/ IFK-KLINIKEN	372	46,6	426	53,4	798	100,0	319	74,9	107	25,1	426	100,0
KUNGSBACKA SJUKHUS	264	50,6	258	49,4	522	100,0	194	75,2	64	24,8	258	100,0
KUNGÄLVS SJUKHUS	43	38,4	69	61,6	112	100,0	45	65,2	24	34,8	69	100,0
CAPIO LUNDBY NÄRSJUKHUS	115	55,3	93	44,7	208	100,0	63	67,7	30	32,3	93	100,0
LIDKÖPINGS SJUKHUS	106	49,8	107	50,2	213	100,0	62	57,9	45	42,1	107	100,0
CAPIO MOVEMENT	455	51,2	433	48,8	888	100,0	292	67,4	141	32,6	433	100,0
NU-SJUKVÅRDEN	407	44,9	499	55,1	906	100,0	359	71,9	140	28,1	499	100,0
PERAGO ORTOPEDKLINIK	51	51,0	49	49,0	100	100,0	39	79,6	10	20,4	49	100,0
KÄRNSJUKHUSET I SKÖVDE	8	42,1	11	57,9	19	100,0	8	72,7	3	27,3	11	100,0
SPORTSMED	19	42,2	26	57,8	45	100,0	19	73,1	7	26,9	26	100,0
SAHLGRENSKA UNIVERSITETSSJUKHUSET	681	51,6	639	48,4	1320	100,0	417	65,3	222	34,7	639	100,0
VARBERGS SJUKHUS	122	45,4	147	54,6	269	100,0	101	68,7	46	31,3	147	100,0
Total	2946	49,3	3035	50,7	5981	100,0	2098	69,1	937	30,9	3035	100,0
ÖSTERGÖTLAND												
HÖGLANDSSJUKHUSET	197	46,7	225	53,3	422	100,0	164	72,9	61	27,1	225	100,0
LINKÖPINGS UNIVERSITETSKLINIK	349	54,8	288	45,2	637	100,0	179	62,2	109	37,8	288	100,0
OSKARSHAMNS SJUKHUS	135	49,1	140	50,9	275	100,0	97	69,3	43	30,7	140	100,0
LÄNSSJUKHUSET RYHOV	123	51,7	115	48,3	238	100,0	72	62,6	43	37,4	115	100,0
VRINNEVISJUKHUSET	363	54,2	307	45,8	670	100,0	196	63,8	111	36,2	307	100,0
VÄSTERVIKS SJUKHUS	62	54,9	51	45,1	113	100,0	31	60,8	20	39,2	51	100,0
Total	1229	52,2	1126	47,8	2355	100,0	739	65,6	387	34,4	1126	100,0
NORRLAND												
GÄLLIVARE SJUKHUS	18	33,3	36	66,7	54	100,0	27	75,0	9	25,0	36	100,0
LÄKARHUSET HERMELINEN	24	49,0	25	51,0	49	100,0	20	80,0	5	20,0	25	100,0
MEDICIN DIREKT	155	51,0	149	49,0	304	100,0	102	68,5	47	31,5	149	100,0
ÖRNSKÖLDSVIKS SJUKHUS	56	48,3	60	51,7	116	100,0	30	50,0	30	50,0	60	100,0
ÖSTERSUNDS SJUKHUS	41	57,7	30	42,3	71	100,0	19	63,3	11	36,7	30	100,0
PITEÅ ÄLVDAL SJUKHUS	36	51,4	34	48,6	70	100,0	24	70,6	10	29,4	34	100,0
SKELLEFTEÅ SJUKHUS	17	56,7	13	43,3	30	100,0	9	69,2	4	30,8	13	100,0
SPORTS MEDICINE UMEÅ	140	54,7	116	45,3	256	100,0	81	69,8	35	30,2	116	100,0
SOLLEFTEÅ SJUKHUS	30	65,2	16	34,8	46	100,0	8	50,0	8	50,0	16	100,0
SUNDERBY SJUKHUS	221	54,6	184	45,4	405	100,0	116	63,0	68	37,0	184	100,0

LÄNSSJUKHUSET SUNDSVALL	37	63,8	21	36,2	58	100,0	12	57,1	9	42,9	21	100,0
NORRLANDS UNIVERSITETS-SJUKHUS, UMEÅ	448	51,7	419	48,3	867	100,0	287	68,5	132	31,5	419	100,0
Total	1223	52,6	1103	47,4	2326	100,0	735	66,6	368	33,4	1103	100,0

Multiligament injuries

Even if the majority of injuries registered in the ACL Register are ACL injuries, multiligament and isolated injuries to other ligaments are also registered. The extent to which these injuries are registered is not monitored and we are therefore unable to specify the percentage of these injuries this report encompasses. In all, 86 multiligament injuries were registered in 2016, corresponding to 2.4% of all operations. By far the most common combination was the reconstruction of the ACL with an injury to the medial cruciate ligament (MCL), where 38 operations were performed. Only four operations instead comprised the ACL and lateral collateral ligament (LCL). On three occasions, there was a combined injury to the both the ACL and posterior cruciate ligament (PCL) and, on two occasions, there was an extremely extensive injury involving the ACL, PCL, MCL, LCL and the "outer rear complex" posterolateral cruciate (PLC).

When it came to isolated injuries to the other ligaments, without any injury to the ACL, an isolated PCL injury was the dominant type, with 12 reconstructions in 2016. An isolated MCL injury was reported in two cases, an isolated LCL injury in one case and an isolated PLC injury in one case.

The following table shows how multi-ligament injuries presented during the past three years.

Multiligament injuries year of surgery 2014, 2015 and 2016

Primary reconstruction

					2014	2015	2016
ACL	---	---	---	---	3324	3404	3477
ACL	---	MCL	---	---	49	28	38
---	PCL	---	---	---	12	23	12
ACL	---	---	LCL	PLC	10	8	12
ACL	---	---	LCL	---	7	10	4
ACL	PCL	---	---	---	5	6	3
ACL	PCL	---	LCL	PLC	1	3	3
---	---	MCL	---	---	1	0	2
---	PCL	MCL	---	---	5	2	2
ACL	---	---	---	PLC	0	1	2
ACL	PCL	MCL	LCL	PLC	1	1	2
---	---	---	LCL	---	1	0	1
---	---	MCL	---	PLC	0	0	1
---	PCL	---	---	PLC	0	1	1
ACL	---	MCL	LCL	PLC	1	0	1
ACL	PCL	---	LCL	---	3	1	1
ACL	PCL	MCL	---	---	4	3	1
---	PCL	---	LCL	---	0	3	0
---	PCL	---	LCL	PLC	2	3	0
ACL	PCL	---	---	PLC	1	1	0

The following table shows the combinations of all multiligament injuries that were registered in conjunction with primary surgery in the ACL Register.

Multiligament injuries during the period 2005-2016 (primary reconstructions)

Primary reconstruction 1 January 2005-31 December 2016

ACL	---	---	---	---	36587
ACL	---	MCL	---	---	345
---	PCL	---	---	---	176
ACL	---	---	LCL	---	91
ACL	---	---	LCL	PLC	72
ACL	PCL	---	---	---	64
ACL	PCL	MCL	---	---	43
---	PCL	MCL	---	---	25
ACL	PCL	---	LCL	PLC	25
ACL	---	---	---	PLC	19
---	PCL	---	LCL	PLC	14
ACL	PCL	---	LCL	---	13
---	PCL	---	LCL	---	10
---	PCL	---	---	PLC	8
ACL	PCL	---	---	PLC	7
ACL	PCL	MCL	LCL	PLC	6
ACL	---	MCL	LCL	PLC	5
---	---	MCL	LCL	---	4
ACL	---	MCL	LCL	---	4
---	---	---	---	PLC	3
---	PCL	MCL	LCL	PLC	3
---	---	---	LCL	---	2
---	---	MCL	---	PLC	1
ACL	---	MCL	---	PLC	1
ACL	PCL	MCL	---	PLC	1

Meniscal sutures

The register data from 2005 to 2016 from the whole of Sweden clearly demonstrate that there has been an increase in the number of cases of meniscal suturing in conjunction with an ACL reconstruction. The frequency has successively increased from 3.9% to 13.3% when both primary and revision ACL surgery are included. There was no real difference in the frequency of meniscal suturing between primary ACL reconstructions and revisions between 2005 and 2016.

There are large differences between different clinics/regions when reporting the number of meniscal suturing cases to the register. It is completely logical for clinics treating children and adolescents with ACL injuries, for example, to have a higher frequency of meniscal suturing. This applies to clinics including the Astrid Lindgren Children's Hospital (34%) and the Queen Silvia Children's Hospital (40%).

A worrying number of clinics report a frequency of 0% or close to 0% of meniscal suture cases, which appears to be indefensible based on the current consensus relating to the occurrence and treatment of these injuries at the present time. It is probably possible to suture a meniscal injury in purely technical surgical terms in as many as a quarter of all ACL reconstructions, but there is no strict consensus and no established selection criteria and more research therefore needs to be focused on following this up in the future.

Patient-reported function and quality of life (PROM)

All patients are asked to complete two questionnaires, the KOOS and the EQ5D.

The KOOS (Knee injury and Osteoarthritis Outcome Score) is a knee-specific instrument for evaluating the patient's perception of his/her knees and knee-related problems. The instrument evaluates five aspects: pain, other symptoms, such as swelling, joint mobility and mechanical symptoms, functional impairment in connection with daily activities, functional impairment in connection with sport and recreational activities and knee-related quality of life.

The EQ5D is a questionnaire on non-illness-specific health-related quality of life. It comprises five questions with three alternative answers. Each question covers a separate dimension: mobility, hygiene, main activities, pain/problems and fear/depression. The results are presented as an index, a quality of life weighting between 0 (death) and 1 (complete health. A negative index is also possible and it then indicates a state of health worse than death. This self-rated health status is also assessed using a thermometer-like scale, the EQ5D-VAS, with the end-points of "worst conceivable health status" (assessed as 0) and "best conceivable health status" (assessed as 100).

Prior to surgery, the patients experience an impairment in their self-rated function. The steering committee sees a clear-cut improvement in self-rated knee function one year after surgery, followed by a successive improvement two and five years after surgery. A comparison with reference data from 118 soccer players with healthy knees reveals that patients do not achieve normal function one, two or five years after surgery. The greatest differences between patients before and after surgery and the reference group can be seen in the aspects of "functional impairment in connection with sport and recreational activities" and "knee-related quality of life". The results for 2016 do not differ markedly from those in previous years.

The following tables show the data for the KOOS, clinic by clinic, two years postoperatively. We have only included patients aged between 20 and 30 who underwent surgery with hamstring grafts in 2007-2014. The first table presents an average value for the first dimensions of the KOOS, i.e. pain, other symptoms, such as swelling, joint mobility and mechanical symptoms, and functional impairment in connection with daily activities. In a similar way, the second table presents the average value for the last two dimensions of the KOOS, i.e. functional impairment in connection with sport and recreational activities and knee-related quality of life.

KOOS pain, symptoms and ADL (mean value) two years postoperatively distributed by clinic and region (year of surgery 2007-2014)

Primary hamstring graft 2007-2014 for the age range of 20-30 years

	Age at surgery		Mean value KOOS pain, symptoms and ADL (two years postoperatively)		Anticipated drop-out due to new surgery
	Number of ops	Average age	Number of responses	KOOS	Total
GREATER STOCKHOLM					
CITYAKUTEN PRIVATVÅRD	14	27,1	4	90,6	0
DANDERYDS SJUKHUS	79	24,6	20	77,3	4
LÖWETS SPECIALIST-MOTTAGNING	87	24,2	43	86,9	2
KAROLINSKA UNIVERSITETSSJUKHUSET/ ORTOPEDKLINIKEN	175	24,8	77	84,3	3
NACKA NÄRSJUKHUS	28	25,5	9	88,1	2
ODENPLANS LÄKARHUS	78	24,4	27	84,3	5

ORTOPEDISKA HUSET CAREMA	134	24,2	49	85,3	6
SABBATSBERG NÄRSJUKHUSET	22	25,2	10	79,7	0
SÖDERTÄLJE SJUKHUS	23	24,6	5	76,9	1
SÖDERSJUKHUSET	378	24,6	142	84,3	12
SOPHIAHEMMET	9	25,1	2	70,6	1
ORTHOCENTER STOCKHOLM	78	24,1	30	83,6	4
CAPIO ARTRO CLINIC	1427	24,9	609	87,3	67
SVEALAND + GOTLAND					
AKADEMISKA SJUKHUSET	18	23,1	4	88,9	1
LASARETTET I ENKÖPING	16	24,0	2	61,7	0
ELISABETHSJUKHUSET	265	23,9	91	87,6	8
FALU LASARETT	137	24,6	53	80,9	5
GÄVLE SJUKHUS	103	23,7	45	79,8	2
HUDIKSVALLS SJUKHUS	106	23,2	38	79,0	1
KARLSTAD CENTRALSJUKHUS	166	24,2	75	78,7	5
CAPIO LÄKARGRUPPEN I ÖREBRO AB	148	23,9	68	82,9	5
MÄLARSJUKHUSET ESKILSTUNA	103	23,8	46	85,5	0
NORRTÄLJE SJUKHUS	45	24,9	9	88,1	1
NYKÖPINGS LASARETT	37	23,7	12	80,0	1
ÖREBRO USÖ	93	24,1	37	80,5	2
SAMARITERHEMMETS SJUKHUS	46	23,2	18	82,0	0
VÄSTERÅS CENTRAL-LASARETTET	75	23,7	26	81,8	0
VISBY LASARETT	19	24,6	6	87,9	0
VÄSTERÅS ORTOPEDPRAKTIK	35	23,8	5	91,1	3
SKÅNE					
ALERIS ORTOPEDI ÄNGELHOLM	118	23,5	46	83,9	4
HÄSSLEHOLMS SJUKHUS	256	23,8	122	83,3	4
HELSINGBORGS SJUKHUS	115	23,9	37	76,6	4
LUNDS UNIVERSITET	98	23,9	52	85,2	1
MALMÖ ALLMÄNNA SJUKHUS	183	24,6	81	81,6	6
ORTHOCENTER I SKÅNE	25	24,4	13	83,2	0
SKÅNES UNIVERSITETS-SJUKHUS	403	24,2	159	79,7	8
HALLAND					
HALMSTADS SJUKHUS	26	24,2	6	74,7	3
SMÅLAND + BLEKINGE					
KALMAR SJUKHUS	196	24,1	82	83,3	6
BLEKINGESJUKHUSET	33	24,0	9	81,0	0
LJUNGBY LASARETT	82	23,0	37	83,8	2
CENTRALLASARETTET VÄXJÖ	146	23,8	57	85,8	4
VÄRNAMO SJUKHUS/ORTO-PEDKLINIKEN	33	23,9	9	78,3	1
VÄSTRA GÖTALAND + HALLAND					
ALINGSÅS LASARETT	79	23,9	34	82,6	3
ART CLINIC	9	23,2	2	98,4	0
SÖDRA ÄLVSBORGS SJUKHUS	58	23,7	23	77,7	2
FRÖLUNDA SPECIALIST-SJUKHUS	85	24,4	38	82,4	5

ORTHOCENTER/ IFK-KLINIKEN	277	24,4	122	85,2	17
KUNGSBACKA SJUKHUS	227	24,1	92	82,7	15
KUNGÄLVS SJUKHUS	31	24,0	14	83,8	0
CAPIO LUNDBY NÄRSJUKHUS	83	25,1	36	86,5	2
LIDKÖPINGS SJUKHUS	92	24,0	43	77,8	2
CAPIO MOVEMENT	342	24,0	144	83,6	16
NU-SJUKVÅRDEN	255	24,3	115	83,6	15
PERAGO ORTOPEDKLINIK	45	24,5	15	82,0	3
KÄRNSJUKHUSET I SKÖVDE	11	23,4	5	79,8	0
SPORTSMED	14	25,7	8	84,4	0
SAHLGRENSKA UNIVERSITETSSJUKHUSET	476	24,3	200	85,0	17
VARBERGS SJUKHUS	54	24,1	27	83,4	0
ÖSTERGÖTLAND					
HÖGLANDSSJUKHUSET	135	24,5	65	84,4	3
LINKÖPINGS UNIVERSITETSKLINIK	221	23,9	91	81,1	0
OSKARSHAMNS SJUKHUS	89	23,6	42	83,4	1
LÄNSSJUKHUSET RYHOV	97	24,3	41	84,8	5
VRINNEVISJUKHUSET	277	23,9	105	81,9	3
VÄSTERVIKS SJUKHUS	55	23,3	18	75,6	1
NORRLAND					
GÄLLIVARE SJUKHUS	1	28,0	0		0
LÄKARHUSET HERMELINEN	15	24,2	9	87,5	0
MEDICIN DIREKT	96	24,5	35	86,0	2
ÖRNSKÖLDSVIKS SJUKHUS	27	23,6	11	75,2	0
ÖSTERSUNDS SJUKHUS	16	24,4	7	85,1	1
PITEÅ ÄLVDAL SJUKHUS	19	24,4	8	89,6	0
SKELLEFTEÅ SJUKHUS	1	20,0	0		0
SPORTS MEDICINE UMEÅ	117	24,3	47	83,2	1
SOLLEFTEÅ SJUKHUS	23	24,2	10	73,3	0
SUNDERBY SJUKHUS	128	24,0	54	83,5	1
LÄNSSJUKHUSET SUNDSVALL	29	23,9	8	82,3	2
NORRLANDS UNIVERSITETS-SJUKHUS, UMEÅ	321	24,0	134	85,1	7

KOOS function and knee-related quality of life (mean value) two years post-operatively distributed by clinic and region (year of surgery 2007-2014)

Primary hamstring graft 2007-2014 for the age range of 20-30 years

	Age at surgery		Mean value KOOS function and knee-related quality of life (two years postoperatively)		Anticipated drop-out due to new surgery
	Number of ops	Average age	Number of responses	KOOS	Total
STOR STOCKHOLM					
CITYAKUTEN PRIVATVÅRD	14	27,1	4	63,6	0
DANDERYDS SJUKHUS	79	24,6	20	54,4	4
LÖWETS SPECIALIST-MOTTAGNING	87	24,2	43	68,7	2
KAROLINSKA UNIVERSI-TETSSJUKHUSET / ORTO-PEDKLINIKEN	175	24,8	77	61,7	3

NACKA NÄRSJUKHUS	28	25,5	9	78,3	2
ODENPLANS LÄKARHUS	78	24,4	27	63,5	5
ORTOPEDISKA HUSET CAREMA	134	24,2	49	63,2	6
SABBATSBERG NÄRSJUKHUSET	22	25,2	10	52,1	0
SÖDERTÄLJE SJUKHUS	23	24,6	5	47,6	1
SÖDERSJUKHUSET	378	24,6	142	63,2	12
SOPHIAHEMMET	9	25,1	2	47,2	1
ORTHOCENTER STOCKHOLM	78	24,1	30	64,3	4
CAPIO ARTRO CLINIC	1427	24,9	609	68,2	67
SVEALAND + GOTLAND					
AKADEMISKA SJUKHUSET	18	23,1	4	65,9	1
LASARETTET I ENKÖPING	16	24,0	2	27,2	0
ELISABETHSJUKHUSET	265	23,9	91	67,7	8
FALU LASARETT	137	24,6	53	57,5	5
GÄVLE SJUKHUS	103	23,7	45	55,8	2
HUDIKSVALLS SJUKHUS	106	23,2	38	57,5	1
KARLSTAD CENTRALSJUKHUS	166	24,2	75	56,0	5
CAPIO LÄKARGRUPPEN I ÖREBRO AB	148	23,9	68	61,8	5
MÄLARSJUKHUSET ESKILSTUNA	103	23,8	46	64,1	0
NORRTÄLJE SJUKHUS	45	24,9	9	66,9	1
NYKÖPINGS LASARETT	37	23,7	12	58,5	1
ÖREBRO USÖ	93	24,1	37	57,9	2
SAMARITERHEMMETS SJUKHUS	46	23,2	18	63,7	0
VÄSTERÅS CENTRAL-LASARETTET	75	23,7	26	57,5	0
VISBY LASARETT	19	24,6	6	68,2	0
VÄSTERÅS ORTOPEDPRAKTIK	35	23,8	5	70,5	3
SKÅNE					
ALERIS ORTOPEDI ÄNGELHOLM	118	23,5	46	59,0	4
HÄSSLEHOLMS SJUKHUS	256	23,8	122	62,7	4
HELSINGBORGS SJUKHUS	115	23,9	37	55,1	4
LUNDS UNIVERSITET	98	23,9	52	64,0	1
MALMÖ ALLMÄNNA SJUKHUS	183	24,6	81	57,7	6
ORTHOCENTER I SKÅNE	25	24,4	13	67,2	0
SKÅNES UNIVERSITETS-SJUKHUS	403	24,2	159	55,4	8
HALLAND					
HALMSTADS SJUKHUS	26	24,2	6	45,0	3
SMÅLAND + BLEKINGE					
KALMAR SJUKHUS	196	24,1	82	61,9	6
BLEKINGESJUKHUSET	33	24,0	9	51,9	0
LJUNGBY LASARETT	82	23,0	37	63,5	2
CENTRALLASARETTET VÄXJÖ	146	23,8	57	65,2	4
VÄRNAMO SJUKHUS/ ORTOPEDKLINIKEN	33	23,9	9	53,5	1
VÄSTRA GÖTALAND + HALLAND					
ALINGSÅS LASARETT	79	23,9	34	53,9	3
ART CLINIC	9	23,2	2	84,4	0
SÖDRA ÄLVSBORGS SJUKHUS	58	23,7	23	50,3	2

FRÖLUNDA SPECIALIST-SJUKHUS	85	24,4	38	59,7	5
ORTHOCENTER/ IFK-KLINIKEN	277	24,4	122	67,6	17
KUNGSBACKA SJUKHUS	227	24,1	92	60,7	15
KUNGÄLVS SJUKHUS	31	24,0	14	59,9	0
CAPIO LUNDBY NÄRSJUKHUS	83	25,1	36	66,4	2
LIDKÖPINGS SJUKHUS	92	24,0	43	50,3	2
CAPIO MOVEMENT	342	24,0	144	62,8	16
NU-SJUKVÅRDEN	255	24,3	115	61,6	15
PERAGO ORTOPEDKLINIK	45	24,5	15	62,3	3
KÄRNSJUKHUSET I SKÖVDE	11	23,4	5	59,8	0
SPORTSMED	14	25,7	8	57,3	0
SAHLGRENSKA UNIVERSITETSSJUKHUSET	476	24,3	200	62,4	17
VARBERGS SJUKHUS	54	24,1	27	58,5	0
ÖSTERGÖTLAND					
HÖGLANDSSJUKHUSET	135	24,5	65	65,7	3
LINKÖPINGS UNIVERSITETSKLINIK	221	23,9	91	56,0	0
OSKARSHAMNS SJUKHUS	89	23,6	42	59,6	1
LÄNSSJUKHUSET RYHOV	97	24,3	41	63,5	5
VRINNEVISJUKHUSET	277	23,9	105	58,9	3
VÄSTERVIKS SJUKHUS	55	23,3	18	53,5	1
NORRLAND					
GÄLLIVARE SJUKHUS	1	28,0	0		0
LÄKARHUSET HERMELINEN	15	24,2	9	63,3	0
MEDICIN DIREKT	96	24,5	35	65,0	2
ÖRNSKÖLDSVIKS SJUKHUS	27	23,6	11	43,0	0
ÖSTERSUNDS SJUKHUS	16	24,4	7	57,6	1
PITEÅ ÄLVDAL SJUKHUS	19	24,4	8	67,9	0
SKELLEFTEÅ SJUKHUS	1	20,0	0		0
SPORTS MEDICINE UMEÅ	117	24,3	47	61,7	1
SOLLEFTEÅ SJUKHUS	23	24,2	10	50,6	0
SUNDERBY SJUKHUS	128	24,0	54	63,3	1
LÄNSSJUKHUSET SUNDSVALL	29	23,9	8	58,8	2
NORRLANDS UNIVERSITETS-SJUKHUS, UMEÅ	321	24,0	134	61,7	7

Unreconstructed ACL injuries

In 2014-2015, a research project was conducted in which we compared the self-reported knee function and quality of life of patients who underwent ACL reconstruction and patients with an ACL injury which was not reconstructed. Since the register was set up, all patients with an ACL injury have been able to answer the KOOS and EQ5D questionnaires. For the analysis, the data they have filled in have been categorized in four time intervals: within six month after the injury (baseline, n = 306) and one year (n = 350), two years (n = 358) and five years (n = 114) after the injury. Depending on when the injury occurred, follow-up questionnaires have been sent to these patients in an attempt to obtain answers on a number of follow-up occasions. In all, there were 879 unique patients (some answered questionnaires on several occasions) and approximately 56% of all patients were men. To enable comparisons with patients who have undergone a reconstruction, four equally large groups of patients of the same gender and corresponding ages and the same activity in conjunction with the injury, who answered prior to the reconstruction (baseline, some three months after the injury and no more than three months prior to the reconstruction) and one, two and five years after the reconstruction, have been identified.

The results reveal that, at baseline, patients who did not undergo reconstruction reported slightly poorer function in their knees (KOOS symptoms, pain, daily activities and sport, on average four to five points lower) and poorer health-related quality of life measured by the EQ5D index. The results were similar at the one- and two-year follow-ups, where patients who did not undergo reconstruction reported poorer function in connection with sport and quality of life (average difference at one year 12.4 points and 13.2 points respectively and, at two years, 4.5 and 6.9 points). At the five-year follow-up, patients who did not undergo reconstruction reported somewhat lower values.

When interpreting these results, it must be remembered that the register only follows up a limited number of patients who do not undergo reconstruction. According to epidemiologic studies, it can be expected that some 3,000 patients who sustain an ACL every year choose not to undergo a reconstruction. This would mean that our follow-up is based on fewer than 20% of all patients.

Septic arthritis following ACL surgery

The incidence of septic arthritis following ACL reconstruction varies, 0.25-1.7%. In an ongoing research project, data from the Swedish ACL Register have been combined with data from the Swedish Board of Health and Welfare's patient and drug register. All ACLs between 2006 and 2013 have been included.

The preliminary results reveal an incidence of 1.2% (n = 325) with a majority of men (72%). The average time to diagnosis was 17.6 days. Continuing analysis will identify potential risk factors such as age, BMI, graft selection, simultaneous procedure and surgery time.

Antibiotic prophylaxis

Antibiotics are basically administered in connection with all surgery (99.2%). The most common choice of drug is Cloxacillin (95.2%), followed by Clindamycin (2.4%) and Cefuroxim (1.2%). In 71% of operations, one dose of antibiotics is administered. The remaining patients receive two or more doses.

Discussion

The Swedish ACL Register was started in 2005 and it is estimated that it now covers more than 90% of all the ACL operations performed in Sweden. ACL reconstruction improves both function and knee-related quality of life compared with the situation prior to surgery, but there are still limitations after ACL surgery. Patients with an ACL injury who undergo stabilization surgery do not achieve the same function as an uninjured, age-matched population. Self-reported, patient-perceived quality indicators reveal that these patients experience a deterioration in quality of life one, two, five and 10 years after surgery and that it is primarily related to restricted knee-related quality of life.

The steering committee is discussing a number of improvement projects. This is necessary in order to improve the applicability of the register. The project with the highest priority aims to transform the ACL Register from a surgery register to a diagnosis register. It is already possible to register untreated patients with an ACL injury, but a real effort needs to be made to improve reporting.

The response rate to questionnaires has improved in recent years. The steering committee believes that national collaboration with web portals and the improved registration of e-mail addresses, for example, would further facilitate this process and would also contribute to increased reporting and reduced costs.

The steering committee also feels that there is a need for continuous training for ACL surgeons in Sweden, especially those that perform fewer than 10 operations a year.

Conclusions

One important conclusion from the analyses conducted in previous years is that smoking has a negative effect on the result of an ACL reconstruction. The steering committee therefore recommends that patients should be informed of the negative impact of smoking prior to possible surgery.

The national ACL Register is collaborating with other orthopedic registers and with a number of other quality registers. The aim is to help in the development of simplified methods for the collection and feedback of data. The ACL Register's steering committee would like to express its gratitude for excellent collaboration during the past year. It is clear that collaboration relating to the follow-up of patient-perceived health is becoming increasingly interactive, which is leading to constructive in-depth studies. The steering committee welcomes comments and views on this annual report and looks forward to continued good collaboration.

The register would like to thank all the participating clinics and users. Without your contributions, this kind of register cannot survive.

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