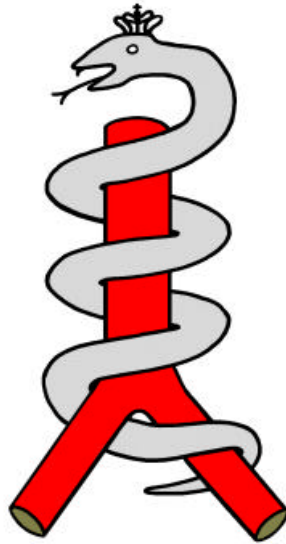


The Danish Vascular Registry

**Landsregistret
Karbbase**

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Annual report 1999

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Introduction

This is the 1999 report of *The Danish Vascular Registry*. Owing to the growing European and international attention towards clinical databases, we have chosen to publish it in English now for the second time.

In Denmark today, vascular services are confined to ten highly specialised departments. *The Danish Vascular Registry (Karbase)* was introduced in 1989 at the University Hospital of Copenhagen, Rigshospitalet, and over the next years accepted by the other vascular departments, giving full coverage of the country in 1993. All ten departments have the same software with local data-collection and –processing. In the years 1993 – 95 it was agreed to publish the first reports with data on the number of vascular procedures and frequency of surgical infections. In 1996, it was agreed to establish a national registry with electronic reporting of all data except the surgeon identification. By now there is agreement on including the level of expertise of the surgeon (trainee, senior registrar and specialist). This is the fourth report since then.

The essential event in the registry is the *primary operation*, defined as an operation with independent significance and follow-up. More than one operation under the same admission, and even same anaesthesia, can be of independent significance, thus leading to its own course and follow-up in the database. To complicate matters further, each *primary operation* can have a number of attached *supplementary operations* without independent significance (e.g. reoperation for bleeding), and one patient can have more than one admission during the year. In 1999, the registry contains information on

4828 patients with
5615 admissions, undertaken
5951 Anaesthesias
6213 primary operations and
792 supplementary operations

Every effort has been made to secure the validity of the presented data. A more comprehensive validation of the registry is still in progress for the 1998 data, and will soon be published.

Hopefully, the information presented in this report will be useful in the continuing discussion among colleagues in vascular surgery, as means to secure and improve a high level of quality in the busy daily clinical life. To further aid this process each department will receive its own local copy of the report, with information of own results to compare with the national data. However, others may find the report interesting as well, i.e. the health authorities, the hospital owners and the vascular patients, as it present updated results on vascular surgery in Denmark.

The Internet has gained growing importance as a mean of making information available to the public. As a consequence, the Danish Vascular Registry has established its own homepage at the address: www.karbase.dk. The present report, as well as the earlier ones, are accessible in electronic form from this place.

In its present form, the report has been adopted by the representatives of the national registry at the meeting in Hillerød may 24th, 2000.

Copenhagen may 25th 2000

Leif Panduro Jensen (lpj@dadlnet.dk)
Chairman of The Danish Vascular Registry

Members and representatives of the Danish Vascular Registry:

Rigshospitalet:	Consultant Jørgen E. Lorentzen
Viborg:	Consultant Torben Vestersgaard-Andersen
Hillerød:	Consultant Ole Michael Nielsen Ph. D.
Århus:	Consultant Jesper Laustsen
Odense:	Consultant Ole Røder
Kolding:	Consultant Jørn Jepsen
Aalborg:	Consultant Allan Kornmaaler Hansen
Slagelse:	Consultant Jørgen Andersen
Gentofte:	Consultant Leif Panduro Jensen
Esbjerg:	Consultant Thorbjörn Jonung Ph. D.

In 1999, the elected board had the following representatives:

Leif Panduro Jensen (chairman)
Jesper Laustsen (secretary)
Allan Kornmaaler Hansen (Treasurer)
Ole Michael Nielsen

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from The Danish Vascular Registry (Karbase)*

For further information, please contact:

Leif Panduro Jensen (lpj@dadlnet.dk)
Consultant, Chairman of The Danish Vascular Registry
Department of Vascular Surgery B
Gentofte University Hospital
DK-2900 Hellerup, Denmark

VASCULAR SURGICAL PROCEDURES

1999

The Danish Vascular Registry

All primary vascular procedures in Denmark 1993 – 1999

Table 1

*NOTE! Reoperations / supplementary operations under the same admission are **not** included
No information was available from Gentofte Hospital for 1994 and 1995.*

	1993	1994	1995	1996	1997	1998	1999
Supraaortic procedure	143	156	155	208	187	198	208
Visceral procedure	36	31	33	55	34	24	28
Aorto/iliac-femoral prosthesis	393	345	356	443	412	404	353
Abdominal Aortic Aneurysm	588	501	569	631	664	649	594
Other aneurysms	155	127	136	169	187	170	190
TEA aortic / iliac	142	100	104	120	124	89	97
TEA other	113	120	139	113	119	147	131
In situ bypass	495	507	628	753	616	592	576
Fem-pop bypass (not in situ)	447	461	473	455	426	385	342
Fem-crural bypass (not in situ)	81	60	101	158	99	97	124
other bypass procedures	353	363	444	313	310	312	297
Embolectomy / thrombectomy	454	405	373	477	445	431	414
Endovascular procedure (PTA)	438	504	629	723	939	970	1010
Reoperation / revision	116	93	160	185	178	166	177
Varicose veins	136	82	133	293	506	603	671
Other operations	609	514	653	702	1048	1013	1001
TEA	385	357	385	425	406	421	420
Bypass vein	604	601	714	1026	763	721	730
Bypass prosthesis	1769	1703	1891	1964	1920	1864	1736
Primary operation	3412	3325	3705	4129	4254	4109	3998
REDO operation	472	368	450	484	479	536	559
Revision etc.	362	333	415	518	647	585	558
ALL	4699	4369	5086	5798	6294	6250	6213

Table 1 has been published in this format since 1993. Since then, the grouping of operations have changed, therefore it cannot be compared with the other tables presented on the following pages.

Primary procedures, 10 departments, 1999

Table 2

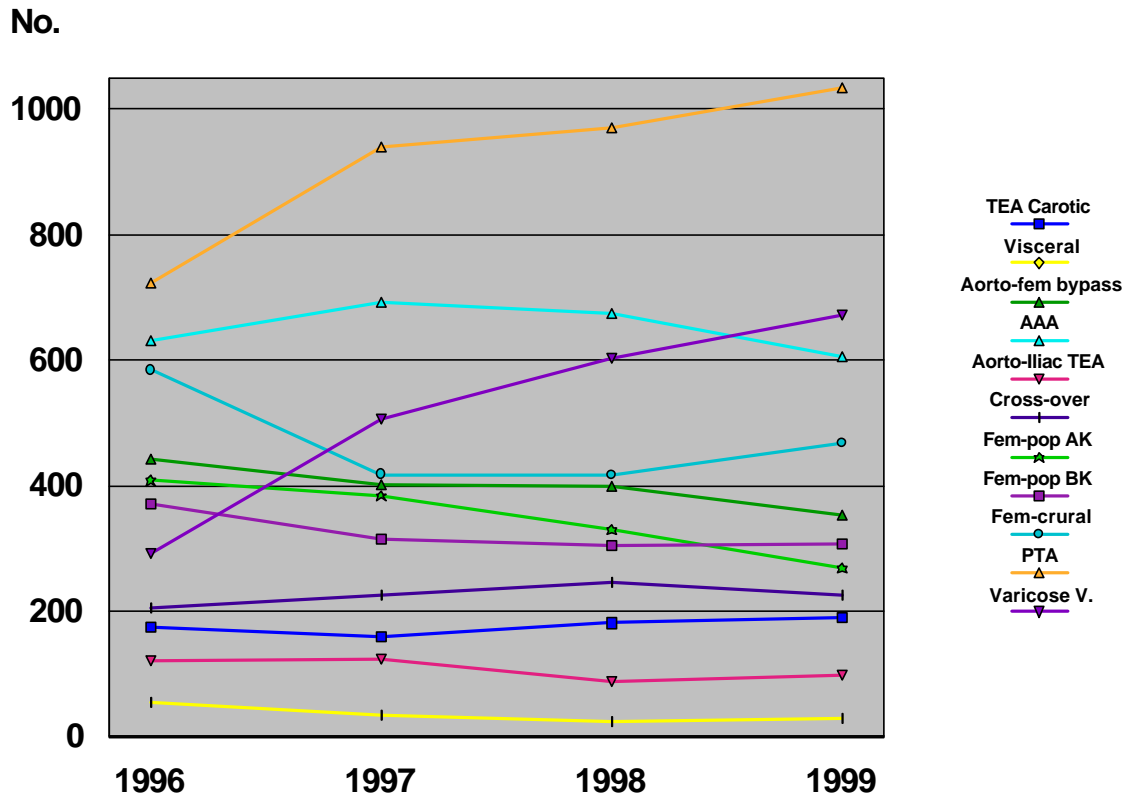
*NOTE! Reoperations / Supplementary operations under the same admission are **not** included*

Procedure	All	Rigshospitalet									
		Gentofte	Hillerød	Slagelse	Odense	Kolding	Esbjerg	Skejby	Viborg	Aalborg	
TEA a. carotis	190	92	0	0	0	39	0	0	15	12	32
Other supraaortic operation	18	4	4	0	0	1	0	0	0	3	6
Visceral operation	28	7	6	1	1	4	0	0	0	3	6
Renal	9	1	3	0	0	0	0	0	0	1	4
Mesenteric	19	6	3	1	1	4	0	0	0	2	2
Aorto/iliac-femoral bypass	351	31	30	11	33	65	25	11	32	44	69
Open surgery	350	31	30	11	33	64	25	11	32	44	69
Endovascular	1	0	0	0	0	1	0	0	0	0	0
Abdominal Aortic Aneurysm	606	70	74	30	65	96	37	17	73	67	77
Open surgery	600	70	74	28	65	92	37	17	73	67	77
Ruptured	230	33	23	13	15	35	16	6	32	26	31
Acute	105	14	15	4	11	17	2	3	11	14	14
Elective	236	23	30	10	37	38	17	7	23	25	26
Other (fibrosis etc.)	29	0	6	1	2	2	2	1	7	2	6
Endovascular	6	0	0	2	0	4	0	0	0	0	0
Other aneurysms	212	34	24	9	19	24	17	7	27	11	40
Aorto-iliac TEA	97	20	17	3	14	7	4	1	10	12	9
Other TEA	131	8	17	19	12	7	18	9	18	11	12
Fem-fem cross-over bypass	225	26	50	25	23	41	14	7	17	5	17
Fem-pop bypass AK	265	21	14	11	21	51	16	13	36	42	40
Prosthesis	249	20	11	7	20	50	15	13	36	41	36
In situ	13	1	3	4	1	1	1	0	0	0	2
Other	3	0	0	0	0	0	0	0	0	1	2
Fem-pop bypass BK	304	53	67	12	37	35	15	20	11	24	30
Prosthesis	65	18	19	3	9	4	1	8	2	0	1
In situ	216	34	45	9	27	25	12	11	8	21	24
Other	23	1	3	0	1	6	2	1	1	3	5
Fem-crural bypass	461	55	72	35	53	68	47	40	33	21	37
Prosthesis	56	1	23	4	4	5	3	7	7	1	1
In situ	340	46	43	28	41	53	33	31	21	18	26
Other	65	8	6	3	8	10	11	2	5	2	10
Other arterial bypass	65	16	4	5	12	8	2	1	7	3	7
Embolectomy/Thrombectomy	414	61	57	28	32	52	30	16	37	58	43
Bypass	94	5	15	6	2	9	11	8	9	12	17
Arteries	320	56	42	22	30	43	19	8	28	46	26
Arterial thrombolysis	202	73	33	10	9	2	0	11	50	12	2
PTA	1010	183	216	88	57	114	65	28	114	78	67
Aorto-iliac	632	87	155	35	45	78	48	13	63	59	49
Femoro-crural	231	64	36	47	3	17	5	10	31	16	2
Bypass	70	18	6	1	5	1	12	5	11	3	8
Other	77	14	19	5	4	18	0	0	9	0	8
Venous procedures	695	68	121	31	4	2	46	18	4	151	250
Varicose veins	671	66	111	29	3	1	44	18	2	150	247
Thrombectomy	4	0	4	0	0	0	0	0	0	0	0
Other (e.g. thrombolysis)	20	2	6	2	1	1	2	0	2	1	3
Reoperations	177	20	21	12	24	31	14	10	17	8	20
Other operations	762	56	64	53	30	54	93	65	45	136	166
All	6213	898	891	383	446	701	443	274	546	701	930

Odense has in addition performed 262 angioaccess operations, not included above.

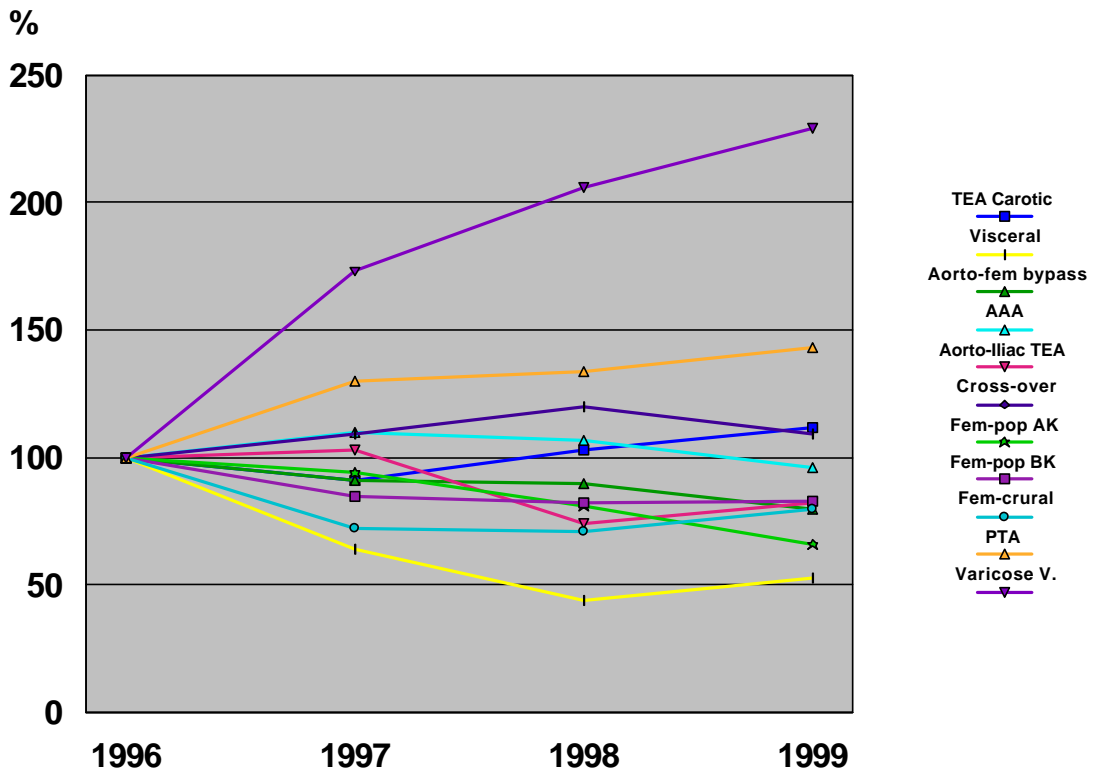
Changes in number of procedures 1996 - 99

Figure 1



Percentual changes in number of procedures 1996-99

Figure 2



Other operations

Table 3

NCSP-code*	Explanation	No.
PBL30	A-v fistula from radial or ulnar artery	122
TPH20	Central venous catheder	85
PBL20	A-v fistula from the brachial artery	72
QDA10	Skin incision on the lower extremity	49
PEC10	Suture of the common femoral artery	26
PEU82	Revision of bypass from the femoral artery	22
TPW99	Other small operation on artery, vein or lymphatic	22
PBU82	Revision of a-v fistula on the upper extremity	18
PEN11	Profundaplasty	18
JAH00	Explorative laparotomy	15
PEA10	Exploration of the common femoral artery	15
PEU81	Ligature of fistula after bypass from femoral artery	15
PFU99	Op.after reconstruction to the distal popliteal artery	15
PFU81	Ligature of fistula after fem-pop bypass	14
KKB10	Excision of retroperitoneal tumour	12
PDU88	Excision of bypass from aorta or iliac artery	11
PFA10	Exploration of the popliteal artery	11
NHQ14	Transmetatarsal amputation	10
PBC20	Suture of the brachial artery	10
PEU99	Op.after reconstruction on the femoral/popliteal artery	10

* NCSP = *Nordic Classification of Surgical Procedures. NOMESCO 1995, ISBN 87-16-11220-2, Internet: www.nom-nos.dk*

The group “Other operations” in [Table 2](#) is presented in detail here for codes with more than 10 occurrences.

Endovascular procedures

Table 4

NCSP-code*	Explanation	No.
PDQ10	Endoprosthesis in infrarenal aorta	6
PDQ30	Endoprosthesis in iliac artery	1
PEQ12	Endoprosthesis in superficial femoral artery	1

* NCSP = *Nordic Classification of Surgical Procedures. NOMESCO 1995, ISBN 87-16-11220-2*

Table 4 offers detailed information on the use of endoprostheses in Denmark. As it can be seen, the use of endoprostheses is still rare, and confined to a few centres ([Table 2](#)).

Percutaneous Transluminal Angioplasty (PTA)

Table 5

NCSP-code*	Explanation	No.	% with stent
PAP20	PTA of the common carotid artery	2	100
PAP21	PTA of the internal carotid artery	8	100
PAP30	PTA of the subclavian artery	10	60
PBP10	PTA of the axillary artery	2	0
PBU83	PTA of a-v fistula on the upper extremity	2	0
PCP40	PTA of the renal artery	42	45
PCP99	PTA of other visceral artery	5	20
PCU83	PTA of the suprarenal aorta/visceral artery	1	0
PDP10	PTA of the infrarenal aorta	19	58
PDP30	PTA of the iliac artery	613	70
PDP50	PTA of the infrarenal aorta/iliac with stent	8	100
PDU83	PTA of bypass from infrarenal aorta/iliac artery	2	50
PEP10	PTA of the common femoral artery	22	9
PEP11	PTA of the deep femoral artery	7	14
PEP12	PTA of the superficial femoral artery	161	16
PEU83	PTA of bypass to the femoral or popliteal artery	39	5
PFP10	PTA of the popliteal artery	26	0
PFP30	PTA of crural or pedal artery	15	0
PFU83	PTA of bypass to crural or pedal artery	26	8

* NCSP = *Nordic Classification of Surgical Procedures. NOMESCO 1995, ISBN 87-16-11220-2*

Table 5 offers detailed information on the use of PTA in Denmark, with information on the use of stents as well.

Vascular core-operations

In 1994 a document[♦] was released from the central health authorities defining the area of vascular surgery, and estimating the need for vascular surgery in the coming years. According to this document, the overall need could be estimated to be 132 – 140 procedures per 100,000 inhabitants. This estimate covers what we have chosen to call *vascular core-operations*, as defined below:

Definition of Vascular Core-operations:

- ❖ All arterial and venous reconstructions, including:
 - Open surgery, endovascular procedures and endoprotheses
 - Embolectomy and thrombectomy
 - Thrombolysis
- ❖ Sympathectomy
- ❖ Operation for Thoracic Outlet Syndrome

Not included:

- ❖ Revision / thrombectomy of reconstructions within 30 days
- ❖ Varicose Veins
- ❖ Angioaccess for haemodialysis, or revision of these
- ❖ Minor reoperations (bleeding etc.), coded by NCSP-codes PWxyy
- ❖ Amputations
- ❖ Biopsies, e.g. the temporal artery

The number of core-operations is presented in Table 6, and more details are given later in the tables of the Danish counties.

[♦] "KARKIRURGI – udvikling og organisation", Sundhedsstyrelsen august 1994

Vascular core-operations

Table 6

Procedure	All	Rigshospitalet									
		Gentofte	Hillerød	Slagelse	Odense	Kolding	Esbjerg	Skejby	Viborg	Aalborg	
TEA a. carotis	190	92	0	0	0	39	0	0	15	12	32
Other supraaortic operation	17	4	4	0	0	0	0	0	0	3	6
Visceral operation	28	7	6	1	1	4	0	0	0	3	6
Renal	9	1	3	0	0	0	0	0	0	1	4
Mesenteric	19	6	3	1	1	4	0	0	0	2	2
Aorto/iliac-femoral bypass	351	31	30	11	33	65	25	11	32	44	69
Open surgery	350	31	30	11	33	64	25	11	32	44	69
Endovascular	1	0	0	0	0	1	0	0	0	0	0
Abdominal Aortic Aneurysm	606	70	74	30	65	96	37	17	73	67	77
Open surgery	600	70	74	28	65	92	37	17	73	67	77
Ruptured	230	33	23	13	15	35	16	6	32	26	31
Acute	105	14	15	4	11	17	2	3	11	14	14
Elective	236	23	30	10	37	38	17	7	23	25	26
Other (fibrosis etc.)	29	0	6	1	2	2	2	1	7	2	6
Endovascular	6	0	0	2	0	4	0	0	0	0	0
Other aneurysms	210	34	24	9	18	24	17	7	27	11	39
Aorto-iliac TEA	97	20	17	3	14	7	4	1	10	12	9
Other TEA	131	8	17	19	12	7	18	9	18	11	12
Fem-fem cross-over bypass	224	26	50	25	23	40	14	7	17	5	17
Fem-pop bypass AK	265	21	14	11	21	51	16	13	36	42	40
Prosthesis	249	20	11	7	20	50	15	13	36	41	36
In situ	13	1	3	4	1	1	1	0	0	0	2
Other	3	0	0	0	0	0	0	0	0	1	2
Fem-pop bypass BK	303	53	67	12	37	35	15	19	11	24	30
Prosthesis	65	18	19	3	9	4	1	8	2	0	1
In situ	215	34	45	9	27	25	12	10	8	21	24
Other	23	1	3	0	1	6	2	1	1	3	5
Fem-crural bypass	460	55	72	35	53	67	47	40	33	21	37
Prosthesis	56	1	23	4	4	5	3	7	7	1	1
In situ	340	46	43	28	41	53	33	31	21	18	26
Other	64	8	6	3	8	9	11	2	5	2	10
Other arterial bypass	64	16	3	5	12	8	2	1	7	3	7
Embolectomy/Thrombectomy	394	60	57	27	32	52	26	10	37	55	38
Bypass	74	4	15	5	2	9	7	2	9	9	12
Arteries	320	56	42	22	30	43	19	8	28	46	26
Arterial thrombolysis	201	73	32	10	9	2	0	11	50	12	2
PTA	1007	183	216	88	57	114	64	28	114	76	67
Aorto-iliac	631	87	155	35	45	78	48	13	63	58	49
Femoro-crural	231	64	36	47	3	17	5	10	31	16	2
Bypass	68	18	6	1	5	1	11	5	11	2	8
Other	77	14	19	5	4	18	0	0	9	0	8
Venous procedures	24	2	10	2	1	1	2	0	2	1	3
Varicose veins	0	0	0	0	0	0	0	0	0	0	0
Thrombectomy	4	0	4	0	0	0	0	0	0	0	0
Other (e.g. thrombolysis)	20	2	6	2	1	1	2	0	2	1	3
Reoperations	0	0	0	0	0	0	0	0	0	0	0
Other operations	238	9	33	7	17	32	31	13	24	24	48
All	4810	764	726	295	405	644	318	187	506	426	539

4810 core-operations corresponds to 90 procedures per 100,000 inhabitants

Eurovasc

In 1996 it was decided in the European Board of Vascular Surgery, Union Européenne des Médecins Spécialistes (UEMS), to establish a common European reporting of vascular procedures, the EURO-VASC. The aim was to get existing vascular registries to report comparable data, and to stimulate the creation of vascular registries in the countries where they still did not exist. This initiative was followed by the VASCUNET collaboration of existing vascular registries in 1997. Since 1997, several registries have reported EUROVASC data, now available on the Internet (<http://www.esvs.org/esvs/eurovasc0199.html>). The Danish Vascular Registry (Karbase) has participated in this collaboration from the beginning.

Table 7

EUROVASC 1999 Procedure			Rigshospitalet									
	All	Per 100.000	Gentofte	Hillerød	Slagelse	Odense	Kolding	Esbjerg	Århus	Viborg	Aalborg	
A. Open surg. on Carotid art.	190	3.5	92	0	0	0	39	0	0	15	12	32
B. Open surg. for AAA	600	11.1	70	74	28	65	92	37	17	73	67	77
C. Open surg. for COAD	672	12.4	77	97	39	70	112	43	19	59	61	95
D. Open surg. for POAD AK	448	8.3	31	43	33	40	61	49	23	54	55	59
E. Open surg. for POAD BK	774	14.3	110	139	47	91	104	63	60	45	47	68
F. PTA central	634	11.7	87	155	35	45	78	48	14	63	59	50
G. PTA peripheral	296	5.5	82	41	48	8	18	16	14	42	18	9
H. Endoprosthesis for AAA	6	0.1	0	0	2	0	4	0	0	0	0	0
I. Endoprosthesis for COAD	2	0.0	0	0	0	0	1	0	0	1	0	0
J. Endoprosthesis for POAD	1	0.0	0	0	0	0	0	0	0	1	0	0
K. Arterial trauma	25	0.5	6	5	1	4	1	1	3	1	1	2
L. Angioaccess	462	8.5	0	0	0	0	263	45	30	0	54	70

Explanations and comments:

AAA = Abdominal Aortic Aneurysm

COAD = Central Occlusive Arterial Disease

POAD = Peripheral Occlusive Arterial Disease

PTA = Percutaneous Transluminal Angioplasty

Row B: - Laparotomy without reconstruction of aorta is also included (intention to treat)

- Juxtarenal AAA is included as well

Row C: - Femoro-femoral cross-over bypass is included here

Row F: - PTA of the renal and visceral arteries is not included

- PTA of reconstructions is included

Row L: - Only open surgical procedures are included

Length of hospital stay

Table 8

Procedure	No.	Preoperative days	Postoperative days	Admission total days
TEA a. carotis	190	2.1	4.8	6.9
Other supraaortic operation	18	3.7	5.1	8.8
Visceral operation	28	3.0	9.5	12.5
Renal	9	1.3	12.2	13.6
Mesenteric	19	3.8	8.2	12.0
Aorto/iliac-femoral bypass	351	2.7	9.3	12.1
Open surgery	350	2.7	9.3	12.1
Endovascular	1	1.0	1.0	2.0
Abdominal Aortic Aneurysm	606	1.4	9.8	11.2
Open surgery	600	1.4	9.8	11.2
Ruptured	230	0.1	9.1	9.2
Acute	105	1.8	10.1	11.8
Elective	236	2.2	9.8	12.0
Other (fibrosis etc.)	29	3.0	14.4	17.4
Endovascular	6	3.3	4.2	7.5
Other aneurysms	212	2.3	7.9	10.2
Aorto-iliac TEA	97	2.7	8.2	10.9
Other TEA	131	2.5	5.8	8.3
Fem-fem cross-over bypass	225	2.5	7.7	10.2
Fem-pop bypass AK	265	2.5	6.8	9.3
Prosthesis	249	2.5	6.7	9.2
In situ	13	3.5	8.8	12.3
Other	3	1.7	3.0	4.7
Fem-pop bypass BK	304	3.6	10.0	13.6
Prosthesis	65	3.6	11.7	15.3
In situ	216	3.6	9.8	13.4
Other	23	3.3	7.5	10.7
Fem-crural bypass	461	3.7	10.5	14.2
Prosthesis	56	3.7	10.4	14.1
In situ	340	3.8	10.7	14.4
Other	65	3.5	9.4	13.0
Other arterial bypass	65	3.9	8.7	12.7
Embolectomy/Thrombectomy	414	1.0	4.8	5.8
Bypass	94	1.7	7.1	8.8
Arteries	320	0.8	4.2	5.0
Arterial thrombolysis	202	1.0	6.3	7.4
PTA	1010	1.7	2.9	4.6
Aorto-iliac	632	1.5	2.9	4.4
Femoro-crural	231	2.4	3.2	5.6
Bypass	70	1.3	2.5	3.7
Other	77	1.7	2.5	4.3
Venous procedures	695	0.5	1.1	1.6
Varicose veins	671	0.5	0.9	1.4
Thrombectomy	4	1.8	4.5	6.3
Other (e.g. thrombolysis)	20	2.2	4.3	6.5
Reoperations	177	2.0	9.8	11.8
Other operations	762	2.0	3.2	5.2
All - average	6213	2.0	5.9	7.9
All - median	6213	1.0	4.0	6.0

The length of stay for the different groups of operations should be read with care, for several reasons:

- The average length of stay will be prolonged if a few patient have exceptionally long admissions. This is in fact the case above, as the median admission time is substantially lower than the average.

- The different departments do not handle the admissions alike; some will admit the patient for an arteriogram, and then later re-admit for the operation, while other will do it all in one admission, leading to longer preoperative admission time.
- Some departments have the opportunity to transfer the patients to other departments after a few days, while other keep the patients in own department until they are ready for discharge. The former department will of course have shorter postoperative stays than the latter.
- Scheduled patients for major operations on a Monday are always admitted Friday.
- Operations with high early mortality-rates will keep a low postoperative average admission time, thus dragging in the opposite direction of the factors above.

The above figures are therefore probably underestimating the true admission time for each procedure, at least for the major operations.

NUMBER OF VASCULAR PROCEDURES

PER COUNTY (= “AMT”)

IN DENMARK

1999

The Danish Vascular Registry contains information regarding community and county of the patients, allowing for analysis of the frequency of vascular procedures in the different counties. The figures reveal huge differences between different parts of Denmark. The kind interpretation of this fact is that vascular diseases have different prevalence in different parts of the country. One could however choose a more unkind interpretation, i.e. differences in the vascular service offered.

The Vascular Procedures for each county

All calculations are based on the postal code or community-code of each patient, as the basis for establishing in which county the patient is living. It is the primary operation that is used for the calculations, since it is the best indicator of the vascular service in each county.

The number of procedures is converted to numbers per 100,000 inhabitants by division with the population 1 January 1999 for each county. The information was obtained from the homepage of the National County Organisation (“Amtrådsforeningen”) at <http://www.arf.dk/>, under the heading *Statistik*. The number of inhabitants in Greenland and the Faeroe Islands was obtained from:

Greenland: <http://www.greenland-guide.dk/gt/visit/intro-01.htm> (unknown year)

Faeroe Islands: <http://www.puffin.fo/travel/> (1.1.1999)

In the table below, *Denmark* is without Greenland and Faeroe Islands, whereas *All* includes them.

Inhabitants per County (amt) 1st January 1999

	County code	Inhabitants
H:S	13-14	581,309
Københavns amt	15	612,053
Frederiksborg amt	20	363,098
Roskilde amt	25	229,794
Vestsjællands amt	30	293,709
Storstrøms amt	35	258,761
Bornholms amt	40	44,529
Fyns amt	42	471,732
Sønderjyllands amt	50	253,771
Ribe amt	55	224,348
Vejle amt	60	346,182
Ringkøbing amt	65	272,644
Århus amt	70	634,435
Viborg amt	76	233,396
Nordjyllands amt	80	493,816
Greenland	90	55,000
Faeroe Islands	97	45,000
Unknown / other		0
DENMARK		5,313,577
ALL		5,413,577

All procedures, Core-procedures and venous procedures

County	Code	All procedures		Core-procedures		Varicose veins	
		No.	Per 100,000	No.	Per 100,000	No.	Per 100,000
H:S	13-14	682	117	550	95	75	12.9
Københavns amt	15	843	138	713	116	78	12.7
Frederiksborg amt	20	403	111	311	86	32	8.8
Roskilde amt	25	165	72	141	61	14	6.1
Vestsjællands amt	30	243	83	215	73	3	1.0
Storstrøms amt	35	215	83	194	75	6	2.3
Bornholms amt	40	39	88	38	85	1	2.2
Fyns amt	42	476	101	424	90	8	1.7
Sønderjyllands amt	50	189	74	176	69	2	0.8
Ribe amt	55	334	149	240	107	25	11.1
Vejle amt	60	455	131	322	93	51	14.7
Ringkøbing amt	65	274	100	231	85	7	2.6
Århus amt	70	507	80	464	73	13	2.0
Viborg amt	76	428	183	200	86	137	58.7
Nordjyllands amt	80	902	183	541	110	216	43.7
Greenland	90	5	9	5	9	0	0.0
Faeroe Islands	97	14	31	14	31	0	0.0
Unknown / Other		39		31		3	
Denmark		6155	116	4760	90	668	12.6
All		6213	115	4810	89	671	12.4

The total number of operations exceeds the number of core-procedures and varicose veins. The missing operations primarily constitute angioaccess for haemodialysis, minor amputations etc.

In a document from the Danish National Board of Health (Sundhedsstyrelsen)² the need for vascular treatment was estimated on the basis of incidence of diseases and vascular surgical practice in other countries. The cumulated need for vascular procedures has been estimated to be 132 –140 arterial procedures per 100,000 inhabitants. In 1999, the core-procedures constituted 90 per 100,000 inhabitants, which are approximately 33% below the estimated need.

² KARKIRURGI – udvikling og organisation, notat, Sundhedsstyrelsen august 1994

Percutaneous transluminal angioplasty (PTA, balloon-treatment)

County	Code	All PTA		Central PTA		Peripheral PTA	
		No.	Per 100,000	No.	Per 100,000	No.	Per 100,000
H:S	13-14	150	26	71	12	56	9.6
Københavns amt	15	208	34	154	25	36	5.9
Frederiksborg amt	20	86	24	35	10	43	11.8
Roskilde amt	25	21	9	13	6	5	2.2
Vestsjællands amt	30	38	13	25	9	1	0.3
Storstrøms amt	35	24	9	16	6	2	0.8
Bornholms amt	40	13	29	7	16	4	9.0
Fyns amt	42	80	17	61	13	11	2.3
Sønderjyllands amt	50	31	12	17	7	9	3.5
Ribe amt	55	32	14	14	6	10	4.5
Vejle amt	60	63	18	46	13	4	1.2
Ringkøbing amt	65	41	15	30	11	10	3.7
Århus amt	70	107	17	62	10	29	4.6
Viborg amt	76	38	16	29	12	6	2.6
Nordjyllands amt	80	64	13	49	10	2	0.4
Greenland	90	0	0	0	0	0	0.0
Faeroe Islands	97	4	9	2	4	2	4.4
Unknown / Other		10		1		1	
Denmark		996	19	629	12	228	4.3
All		1010	19	632	12	231	4.3

The table includes all PTA-procedures whether stents have been deployed or not. Presumably, not all danish PTA-procedures are included in the figures above, since they some places are performed at radiological departments without direct involvement from the vascular departments.

Carotid trombendarterectomy (TEA)

County	Code	Carotid TEA	
		No.	Per 100,000
H:S	13-14	30	5.2
Københavns amt	15	22	3.6
Frederiksborg amt	20	10	2.8
Roskilde amt	25	7	3.0
Vestsjællands amt	30	15	5.1
Storstrøms amt	35	5	1.9
Bornholms amt	40	2	4.5
Fyns amt	42	17	3.6
Sønderjyllands amt	50	7	2.8
Ribe amt	55	7	3.1
Vejle amt	60	10	2.9
Ringkøbing amt	65	3	1.1
Århus amt	70	13	2.0
Viborg amt	76	9	3.9
Nordjyllands amt	80	32	6.5
Greenland	90	0	0.0
Faeroe Islands	97	1	2.2
Unknown / Other		0	
Denmark		189	3.6
All		190	3.5

This procedure is performed to avoid embolisation to the brain from an atherosclerotic plaque in the carotid artery, thus avoiding death or paresis. In Denmark, only symptomatic patients are operated on. In the recommendations from the central health authorities, the need is estimated to be 4-6 per 100,000 inhabitant, but according to international experience, the need is more likely 8-10 per 100,000 inhabitants. As it can be seen from the table, the actual figures are substantially lower, as they have been for the last years, and there are huge variations between the different counties.

Peripheral bypass procedures

County	Code	All peripheral bypass		For claudication		For critical ischemia	
		No.	Per 100,000	No.	Per 100,000	No.	Per 100,000
H:S	13-14	115	20	7	1.2	97	17
Københavns amt	15	150	25	26	4.2	103	17
Frederiksborg amt	20	62	17	7	1.9	51	14
Roskilde amt	25	26	11	3	1.3	21	9
Vestsjællands amt	30	52	18	3	1.0	46	16
Storstrøms amt	35	44	17	4	1.5	34	13
Bornholms amt	40	4	9	0	0.0	3	7
Fyns amt	42	103	22	20	4.2	71	15
Sønderjyllands amt	50	52	20	14	5.5	32	13
Ribe amt	55	78	35	8	3.6	61	27
Vejle amt	60	74	21	10	2.9	52	15
Ringkøbing amt	65	51	19	18	6.6	28	10
Århus amt	70	75	12	25	3.9	43	7
Viborg amt	76	38	16	13	5.6	19	8
Nordjyllands amt	80	113	23	24	4.9	73	15
Greenland	90	1	2	0	0.0	1	2
Faeroe Islands	97	2	4	0	0.0	1	2
Unknown / Other		2		1		1	
Denmark		1037	20	182	3.4	734	14
All		1042	19	183	3.4	737	14

Patients with peripheral ischaemia can be graded with regard to the presence of intermittent claudication (muscle pain when walking) or critical ischaemia (pain at rest) non-healing ulcers or gangrene. The latter group risk a major amputation within a short period. The incidence of symptomatic atherosclerotic disease in the legs can be estimated to be 9000 per year in Denmark, but only a minority of these progress to the need for an operation each year.

Abdominal aortic aneurysms (AAA)

County	Code	All aneurysms		Elective operation		Operation for rupture	
		No.	Per 100,000	No.	Per 100,000	No.	Per 100,000
H:S	13-14	43	7	17	2.9	22	3.8
Københavns amt	15	71	12	29	4.7	22	3.6
Frederiksborg amt	20	32	9	12	3.3	14	3.9
Roskilde amt	25	28	12	14	6.1	7	3.0
Vestsjællands amt	30	36	12	20	6.8	10	3.4
Storstrøms amt	35	26	10	10	3.9	9	3.5
Bornholms amt	40	3	7	0	0.0	2	4.5
Fyns amt	42	55	12	20	4.2	24	5.1
Sønderjyllands amt	50	28	11	13	5.1	11	4.3
Ribe amt	55	29	13	12	5.3	9	4.0
Vejle amt	60	39	11	18	5.2	15	4.3
Ringkøbing amt	65	40	15	12	4.4	20	7.3
Århus amt	70	66	10	25	3.9	26	4.1
Viborg amt	76	26	11	12	5.1	6	2.6
Nordjyllands amt	80	77	16	26	5.3	30	6.1
Greenland	90	0	0	0	0.0	0	0.0
Faeroe Islands	97	1	2	1	2.2	0	0.0
Unknown / Other		6		2		4	
Denmark		599	11	240	4.5	227	4.3
All		606	11	243	4.5	231	4.3

Besides the two groups *elective* and *ruptured*, the total figures above for abdominal aneurysm repair includes the groups *acute* and *other* from [Table 2](#).

THE QUALITY OF TREATMENT 1999

The evaluation of various quality aspects of the treatments offered is very complicated. It is of course essential that registration covers reliable and validated indicators, that the indicators are registered in a uniform manner, and that the registration is complete. An evaluation of this process is laborious, but necessary. The Danish Vascular Registry is currently performing such an evaluation on the 1998 data, which will be published soon in a separate report.

The aim of vascular surgery is to prevent amputation, stroke and death from vascular atherosclerotic and aneurysmatic disease, but also to reduce the consequences in the form of pain, immobility and discomfort. In the Danish Vascular Registry several indicators are registered to document this: Amputation, stroke and death. Other quality-indicators are perioperative complications (e.g. surgical wound infection), and social conditions before and after surgery. Not all of these indicators have been sufficiently validated currently, and should therefore be interpreted with caution.

Another factor complicating the interpretation of quality indicators is the diversion in risk factors among the patients; The more ill the patient is before treatment (heart, lungs, etc.) the worse the outcome. There is therefore a need for correction, or explanation, of results regarding the use of risk factors. There is a huge methodological work to be done in this field, but progress is constantly made, allowing for more detailed analyses to be published. Uncorrected data are at best worthless, at worst misleading.

The data on the next pages should be looked at with the above-mentioned words of caution in mind.

Clean operations and surgical wound infections 1999

The figures only include operations classified as clean or potentially contaminated

Procedure	Procedures No.	Superficial Wound Infections		Deep Wound Infections		All Wound Infections	
		No.	%	No.	%	No.	%
TEA a. carotis	190	0		0		0	
Other supraaortic operation	17	1	5.9	0		1	5.9
Visceral operation	26	0		1	3.8	1	3.8
Renal	9	0		1	11.1	1	11.1
Mesenteric	17	0		0		0	
Aorto/iliac-femoral bypass	339	12	3.5	5	1.5	17	5.0
Open surgery	341	12	3.5	5	1.5	17	5.0
Endovascular	1	0		0		0	
Abdominal Aortic Aneurysm	598	11	1.8	6	1.0	17	2.8
Open surgery	592	11	1.9	6	1.0	17	2.9
Ruptured	229	7	3.1	0		7	3.1
Acute	104	1	1.0	1	1.0	2	1.9
Elective	235	3	1.3	4	1.7	7	3.0
Other (fibrosis etc.)	24	0		1	4.2	1	4.2
Endovascular	6	0		0		0	
Other aneurysms	201	4	2.0	7	3.5	11	5.5
Aorto-Iliac TEA	97	1	1.0	0		1	1.0
Other TEA	131	2	1.5	0		2	1.5
Fem-fem cross-over bypass	224	6	2.7	4	1.8	10	4.5
Fem-pop bypass AK	265	10	3.8	4	1.5	14	5.3
Prosthesis	249	9	3.6	4	1.6	13	5.2
In situ	13	1	7.7	0		1	7.7
Other	3	0		0		0	
Fem-pop bypass BK	304	23	7.6	7	2.3	30	9.9
Prosthesis	65	2	3.1	4	6.2	6	9.2
In situ	216	20	9.3	3	1.4	23	10.6
Other	23	1	4.3	0		1	4.3
Fem-crural bypass	457	28	6.1	4	0.9	32	7.0
Prosthesis	54	2	3.7	1	1.9	3	5.6
In situ	338	24	7.1	3	0.9	27	8.0
Other	65	2	3.1	0		2	3.1
Other arterial bypass	63	2	3.2	2	3.2	4	6.3
Embolectomy/Thrombectomy	413	4	1.0	3	0.7	7	1.7
Bypass	94	2	2.1	3	3.2	5	5.3
Arteries	319	2	0.6	0		2	0.6
Arterial thrombolysis	202	1	0.5	0		1	0.5
PTA	1009	0		0		0	
Aorto-Iliac	631	0		0		0	
Femoro-crural	231	0		0		0	
Bypass	70	0		0		0	
Other	77	0		0		0	
Venous procedures	695	5	0.7	1	0.1	6	0.9
Varicose veins	671	5	0.7	1	0.1	6	0.9
Thrombectomy	4	0		0		0	
Other (e.g. thrombolysis)	20	0		0		0	
Reoperations	83	2	2.4	8	9.6	10	12.0
Other operations	647	7	1.1	3	0.5	10	1.5
All	5964	119	2.0	55	0.9	174	2.9

The level of Surgical Wound Infections is acceptable and lives up to international standards.

Primary operations and complications 1998

Procedure	No.	Occlusion within 30 days	Wound complications	General complications
TEA a. carotis	190	0.5	4.7	8.9
Other supraaortic operation	18	0.0	16.7	11.1
Visceral operation	28	0.0	10.7	17.9
Renal	9	0.0	33.3	22.2
Mesenteric	19	0.0	0.0	15.8
Aorto/iliac-femoral bypass	351	2.8	11.4	13.4
Open surgery	350	2.9	11.4	13.4
Endovascular	1	0.0	0.0	0.0
Abdominal Aortic Aneurysm	606	0.3	7.1	31.4
Open surgery	600	0.3	7.2	31.3
Ruptured	230	0.0	4.3	47.4
Acute	105	1.0	6.7	28.6
Elective	236	0.0	9.3	19.5
Other (fibrosis etc.)	29	3.4	13.8	10.3
Endovascular	6	0.0	0.0	33.3
Other aneurysms	212	3.3	16.5	9.0
Aorto-iliac TEA	97	5.2	11.3	5.2
Other TEA	131	3.1	9.2	2.3
Fem-fem cross-over bypass	225	2.7	10.2	9.8
Fem-pop bypass AK	265	4.5	13.6	4.2
Prosthesis	249	4.0	13.7	4.4
In situ	13	15.4	15.4	0.0
Other	3	0.0	0.0	0.0
Fem-pop bypass BK	304	15.8	21.4	9.9
Prosthesis	65	24.6	18.5	13.8
In situ	216	13.4	22.2	9.3
Other	23	13.0	21.7	4.3
Fem-crural bypass	461	13.7	17.8	6.1
Prosthesis	56	12.5	17.9	1.8
In situ	340	11.8	17.9	6.5
Other	65	24.6	16.9	7.7
Other arterial bypass	65	4.6	7.7	12.3
Embolectomy/Thrombectomy	414	10.9	6.5	10.4
Bypass	94	12.8	10.6	9.6
Arteries	320	10.3	5.3	10.6
Arterial thrombolysis	202	13.9	7.4	8.4
PTA	1010	4.4	4.8	1.7
Aorto-iliac	632	2.4	5.4	1.6
Femoro-crural	231	8.7	1.7	1.7
Bypass	70	8.6	10.0	0.0
Other	77	3.9	3.9	3.9
Venous procedures	695	0.4	0.7	0.3
Varicose veins	671	0.0	0.7	0.1
Thrombectomy	4	0.0	0.0	0.0
Other (e.g. thrombolysis)	20	15.0	0.0	5.0
Reoperations	177	3.4	22.6	5.6
Other operations	762	2.6	5.6	3.4
All	6213	4.9	8.8	8.1

30 day mortality before and after correction of data

Procedure	Patients No.	Mortality before correction		Mortality after correction	
		No.	%	No.	%
TEA a. carotis	190	2	1.1	2	1.1
Other supraaortic operation	18	0	0.0	0	0.0
Visceral operation	28	4	14.3	6	21.4
Renal	9	0	0.0	0	0.0
Mesenteric	19	4	21.1	6	31.6
Aorto/iliac-femoral bypass	351	17	4.8	21	6.0
Open surgery	350	17	4.9	21	6.0
Endovascular	1	0	0.0	0	0.0
Abdominal Aortic Aneurysm	606	126	20.8	135	22.3
Open surgery	600	124	20.7	134	22.3
Ruptured	230	105	45.7	112	48.7
Acute	105	10	9.5	11	10.5
Elective	236	8	3.4	9	3.8
Other (fibrosis etc.)	29	1	3.4	2	6.9
Endovascular	6	2	33.3	1	16.7
Other aneurysms	212	3	1.4	4	1.9
Aorto-iliac TEA	97	2	2.1	4	4.1
Other TEA	131	0	0.0	4	3.1
Fem-fem cross-over bypass	225	9	4.0	10	4.4
Fem-pop bypass AK	265	3	1.1	4	1.5
Prosthesis	249	3	1.2	4	1.6
In situ	13	0	0.0	0	0.0
Other	3	0	0.0	0	0.0
Fem-pop bypass BK	304	12	3.9	17	5.6
Prosthesis	65	4	6.2	6	9.2
In situ	216	7	3.2	10	4.6
Other	23	1	4.3	1	4.3
Fem-crural bypass	461	11	2.4	22	4.8
Prosthesis	56	2	3.6	2	3.6
In situ	340	9	2.6	18	5.3
Other	65	0	0.0	2	3.1
Other arterial bypass	65	5	7.7	5	7.7
Embolectomy/Thrombectomy	414	28	6.8	63	15.2
Bypass	94	1	1.1	4	4.3
Arteries	320	27	8.4	59	18.4
Arterial thrombolysis	202	6	3.0	9	4.5
PTA	1010	8	0.8	11	1.1
Aorto-iliac	632	7	1.1	9	1.4
Femoro-crural	231	1	0.4	2	0.9
Bypass	70	0	0.0	0	0.0
Other	77	0	0.0	0	0.0
Venous procedures	695	2	0.3	3	0.4
Varicose veins	671	0	0.0	0	0.0
Thrombectomy	4	1	25.0	1	25.0
Other (e.g. thrombolysis)	20	1	5.0	2	10.0
Reoperations	177	4	2.3	9	5.1
Other operations	762	21	2.8	44	5.8
All	6213	263	4.2	373	6.0

Most postoperative complications occur before discharge, and are therefore easier to register. But some data, like the 30 day mortality, can only be correctly recorded by systematic follow-up. To illustrate the significance of this problem, the above table shows the 30 day mortality reported from the departments, and after correction from the Central Civil Registry. About one-third of all early deaths are missed in the primary registration, primarily placed in groups of operations, that often are made assisting other de-

partments, e.g. embolectomy. This emphasizes the need of data correction from all available data-sources, to improve validity.

Presentation of results for the departments

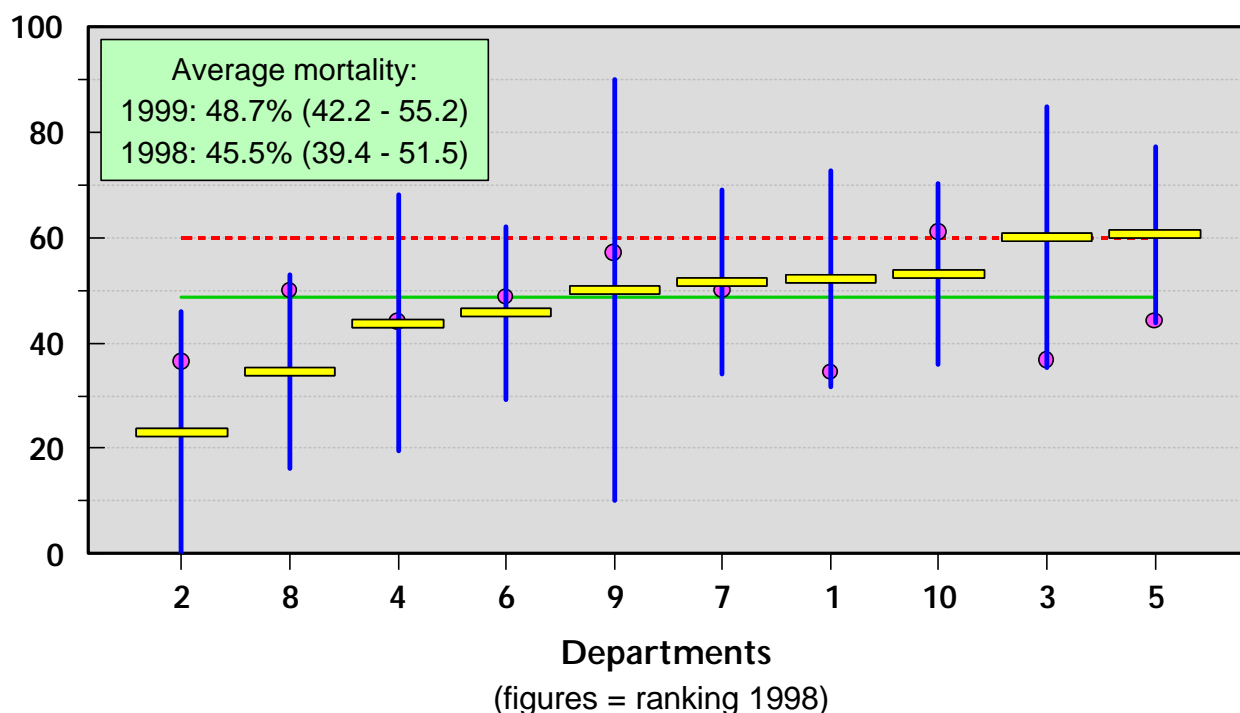
The quality data in this report are also given with results from each department. The name of the department is, however, *not* given, since the focus of the national report is on nation-wide variations rather than the individual departmental result. Each department is given its own result for comparison with results from other department, which leads to the first step in the quality process, the *internal audit*. If results divert significantly from the average, or are significantly worse than the accepted standards, attention should be given to explain and presumably correct the problem. If the poor results tend to be repeated over the years, it may lead to *external audit* initiated from the department itself or the board of the Danish Vascular Registry. In addition to the obvious explanation that bad results are a consequence of poor performance, reported bad results can emerge from improper understanding of the definitions of the dataset, improper data handling, missing follow-up or factors related to risk factors and patient selection. Although the interpretation of data can get very complicated, it is still of great importance to publish the inter-department variation for the sake of auditing. Of course, it should be kept in mind that variations are inevitable according to the rules of statistics. When 10 departments are compared, there will always be five below and five above average, even if all are performing excellently.

To the public (patients) these data on variation are of lesser interest; here the important question is whether the department lives up to established levels of good standards or not. Few standards have been established in vascular surgery, but some will be presented in the next pages.

The following figures are structured in the same way: The result of each department is marked with a short horizontal (yellow) line, and the departments are ranked from best to worse. The 95% statistical confidence limit is marked with a vertical (blue) line, indicating the limits of reliability for each result. A (green) horizontal line marks the average result, and when known, a (red) horizontal line marks the established standard for good performance. Finally, a (purple) dot marks the result from 1998 for comparison with this years result, and the ranking of the department in 1998 is given on the x-axis. This year, the mortality data are corrected from the Civil Registry System.

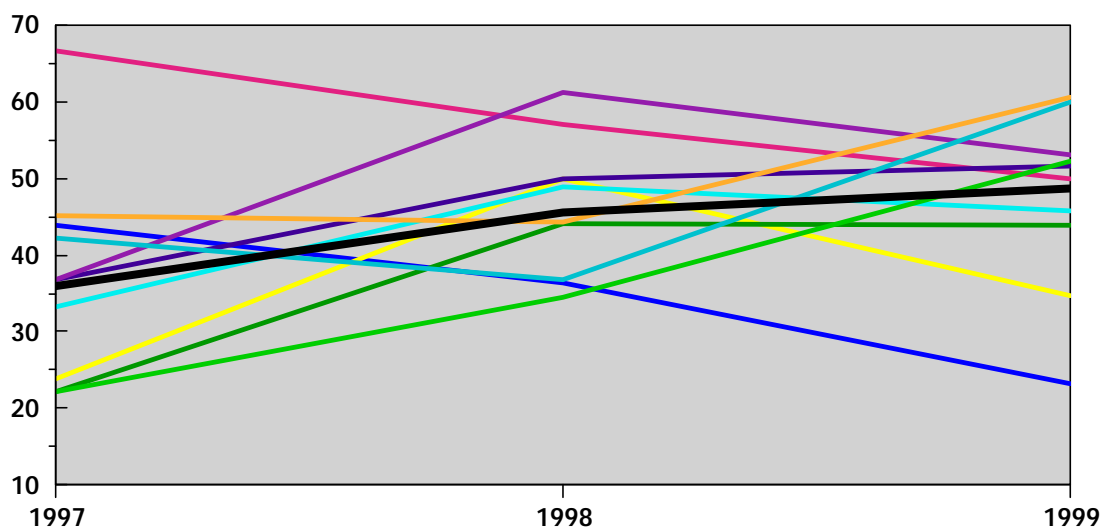
30 day mortality for operation of Ruptured Abdominal Aortic Aneurysm

Mortality %



Patients dying during the operation are included, but not patients who died before the operation could be initiated. Untreated, this condition bears 100% mortality within hours or days. The Scandinavian standard for treatment of this disease is mortality below 60%³, and the national average of 49% is well below. All departments seem to have satisfactory results.

Comparing the results with those from the last 2 years reveals some interesting facts regarding variation. Below is shown the variation in mortality rate for each department from 1997 to 1999.



Changes in mortality (average in black)

The departmental mortality and ranking has shifted tremendously, but without any overall trend, probably mainly due to random variation in mortality, which is mathematically expressed by the statistical variation in the first figure. Statistical variation occurs, and should be accepted in the interpretation of data.

How should data be presented to the public then, if statistical variation is a major explanation for the diversities seen in the results? It seems more reasonable to present data in a uniform manner, excluding the random statistical variations, e. g. comparing the result of each department with the standard and average. Only if the confidence limits fall beyond the standard or average, should the department be considered deviant. In the case of ruptured aneurysms, this would lead to the following presentation:

	<i>Average = 46% mortality</i>			<i>Standard = below 60% mortality</i>		
	<i>Worse than average</i>	<i>Average</i>	<i>Better than average</i>	<i>Worse than the standard</i>	<i>Lives up to the standard</i>	<i>Better than the standard</i>
Department 1		X			X	
Department 2			X			X
Department 3		X			X	
Department 4		X			X	
Department 5		X			X	
Department 6		X			X	
Department 7		X			X	
Department 8		X				X
Department 9		X			X	
Department 10		X			X	
National		X			X	

Departments numbered according to rank in 1998

Again, this presentation should be judged with caution. The two departments with seemingly better results may not actual offer any better treatment than the rest, but may have better results due to patient selection and distribution of risk factors. Only a thorough audit process can reveal the influential factors, and should in the end lead to publication of risk-adjusted data.

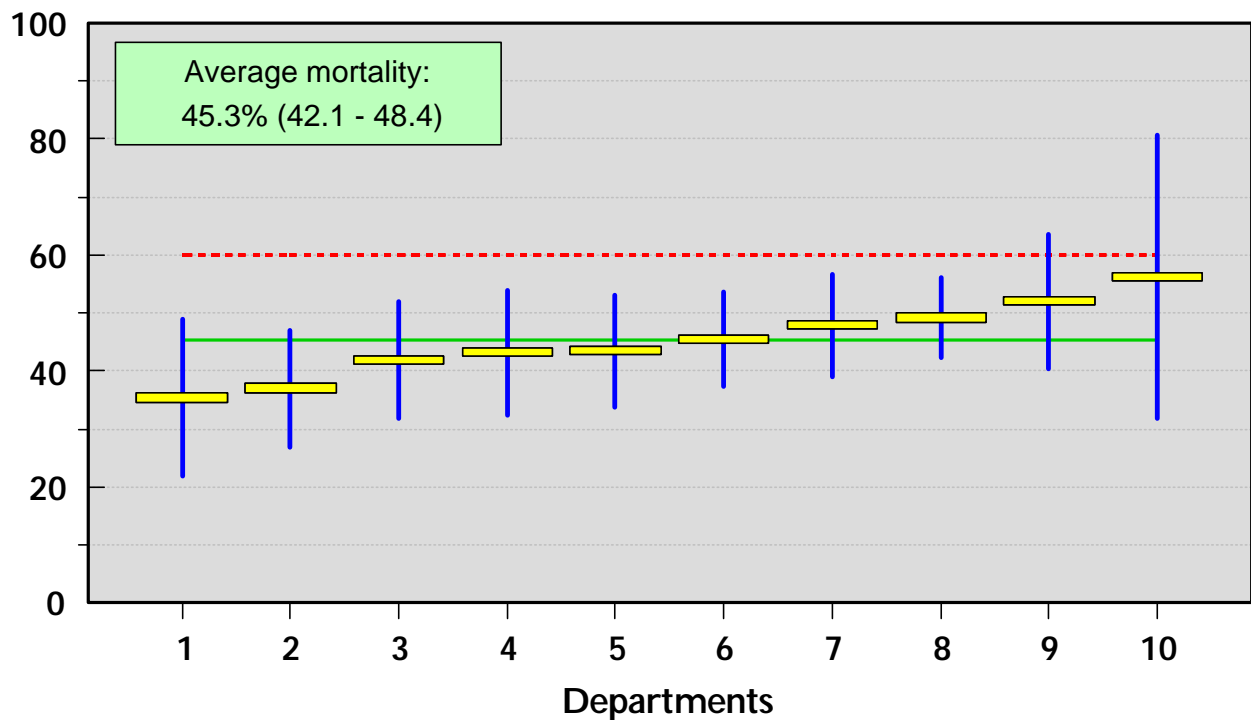
³ Bergqvist D et al. Nordisk Medicin 1994; 109: 10: 256-7

This table could be presented with the actual names of the departments, and in its internet version allow for comments from each department, e.g. explaining the result of an internal or external audit in case of poor results.

The Danish Vascular Registry has in its present form been collecting data since 1996. As stated above, Statistical variations may be a major explanation for the shown variations. This variation is reduced, as the number of operations increases. It could therefore be of interest to calculate the departmental mortality over the full 4 years period, as shown below. Due to the longer period of data collection, though, there is a risk that the data become more historical, maybe not reflecting the results of today's practice. In the area of *open surgery for abdominal aortic aneurysms* the treatment and indications have not changed substantially over the last years, allowing for the compilation below:

30 day mortality for operation of ruptured Abdominal Aortic Aneurysm 1996 – 99

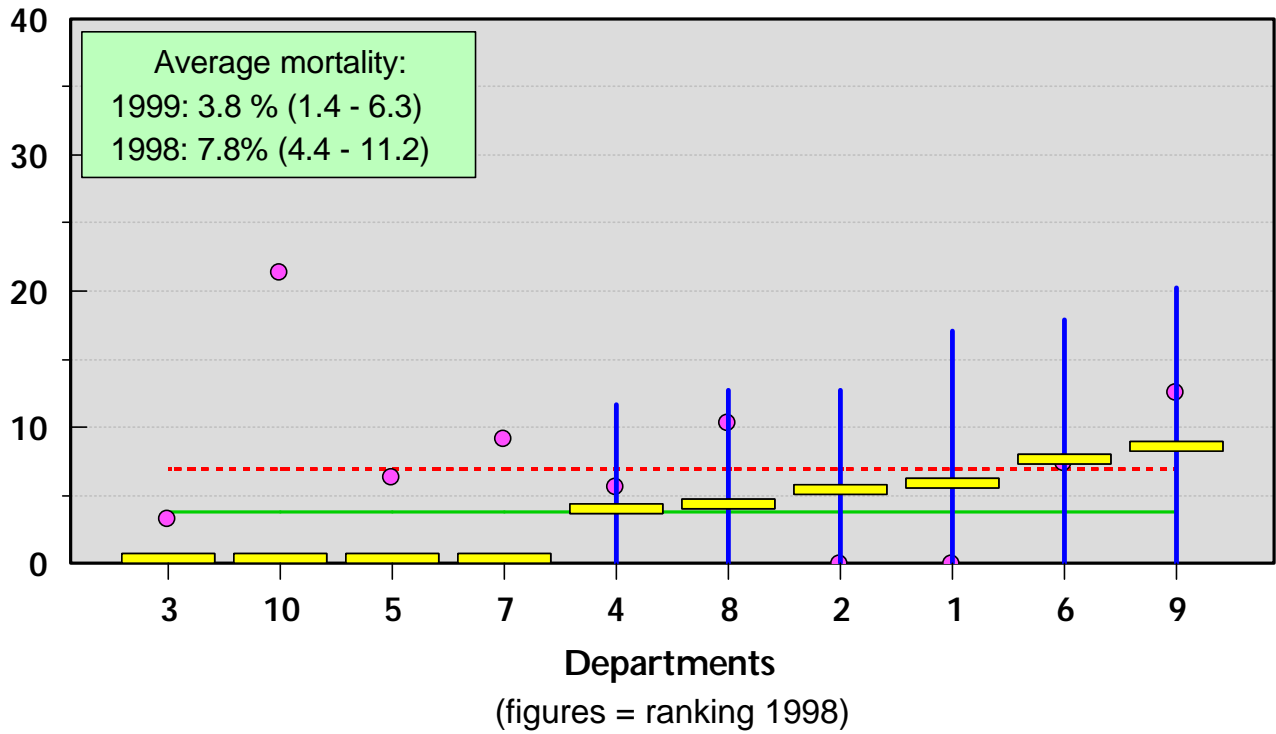
Mortality %



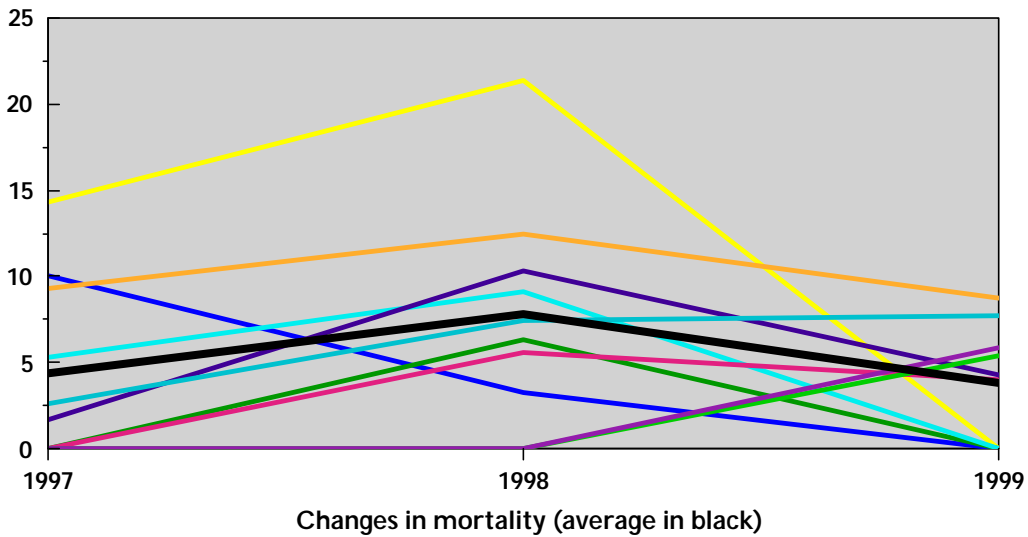
As seen, the variations narrows around the average, and the confidence limits becomes smaller.

30 day mortality for operation of Elective Abdominal Aortic Aneurysm

Mortality %



The variation in mortality for the last three years look like this:



The average mortality was disturbingly above the standard in 1998, but in 1999 is back at a very fine level, well below the nordic standard. Department no. 10 has had unsatisfactory results for 2 years in 1997 and 1998, and has therefore conducted an internal audit, in accordance with the accepted guidelines for the registry. The result of this audit was, that the high mortality could be explained by several factors: poor patient selection, factors related to the first few postoperative days and unexpected deaths after discharge. Correctable factors was changed, and as can be seen above, this department has had very fine results in 1999. Again, huge variations are seen among departments over the last 3 years.

The table for public presentation and comparison would look like this:

	<i>Average = 3.8% mortality</i>			<i>Standard = below 7% mortality</i>		
	<i>Worse than average</i>	<i>Average</i>	<i>Better than average</i>	<i>Worse than the standard</i>	<i>Lives up to the standard</i>	<i>Better than the standard</i>
Department 1		X			X	
Department 2		X			X	
Department 3			X			X
Department 4		X			X	
Department 5			X			X
Department 6		X			X	
Department 7			X			X
Department 8		X			X	
Department 9		X			X	
Department 10			X			X
National		X			X	

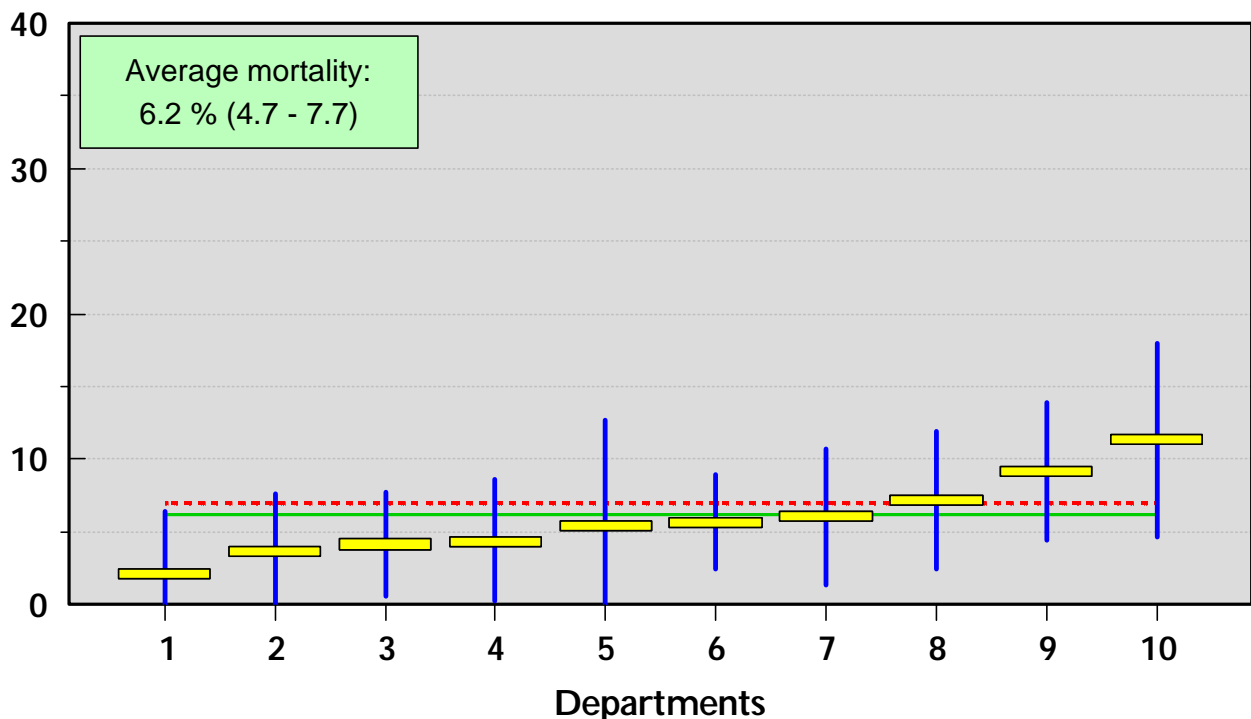
Departments numbered according to rank in 1998

The confidence limits for the four departments with zero mortality cannot be calculated, but even one death would still keep them better than the standard.

Again, the data can be calculated for the last four years, as shown below. Again, the departments become more centred around the average, and the confidence limits narrows.

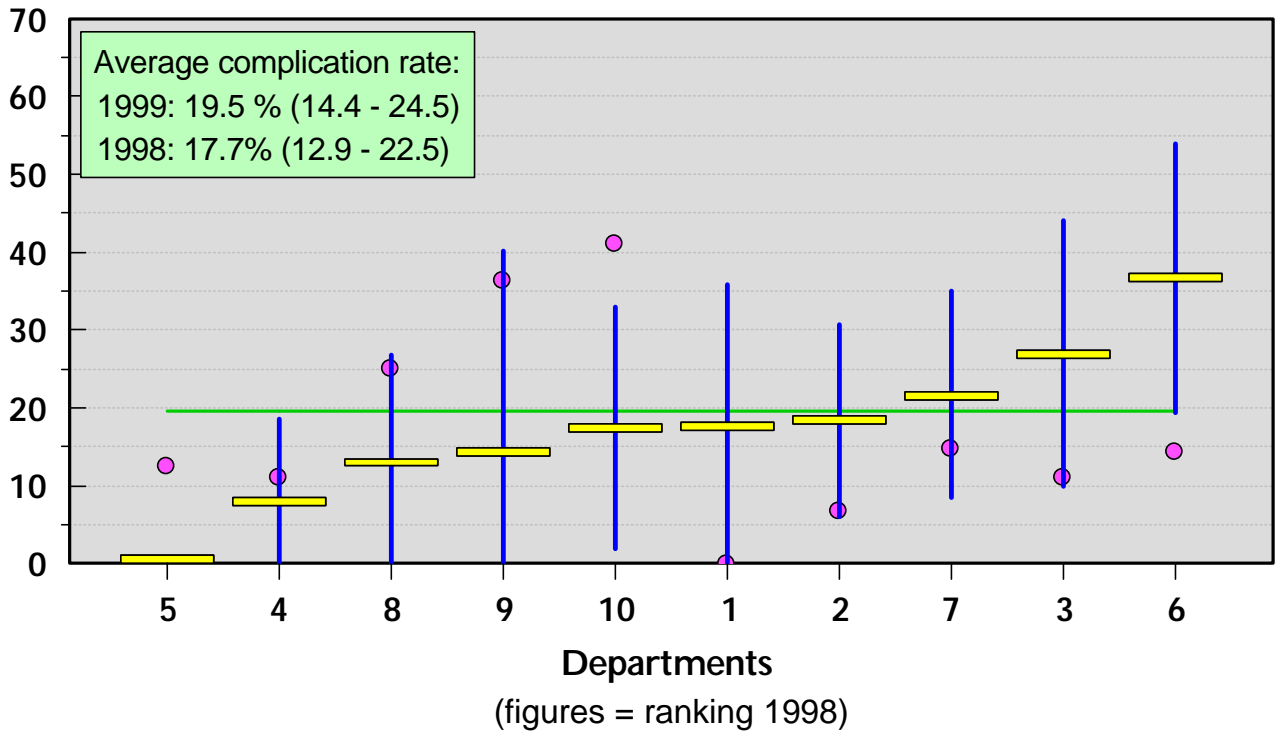
30 day mortality for operation of Elective Abdominal Aortic Aneurysm 1996 - 99

Mortality %

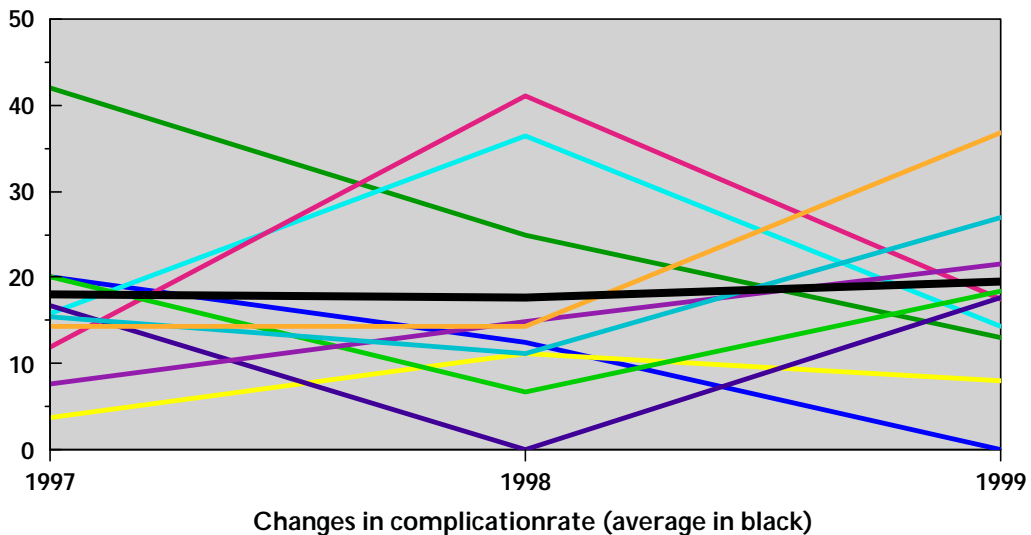


General complications of Operation for Elective Abdominal Aortic Aneurysm

Complication rate %



Elective surgery for AAA cannot be performed without a certain mortality and morbidity, despite the many efforts to reduce it. The general complications illustrated above consist mainly of cardiac, pulmonary and renal complications and stroke. The last 2 years, a department placed significantly higher than the rest, and this is seen again this year. All three years have been different departments. Again, the departments have made huge shifts in rank, but still within statistical uncertainty, and the pattern of variation for the last three years reveals no significant trend for any department:



In the public tabular format the data looks like this:

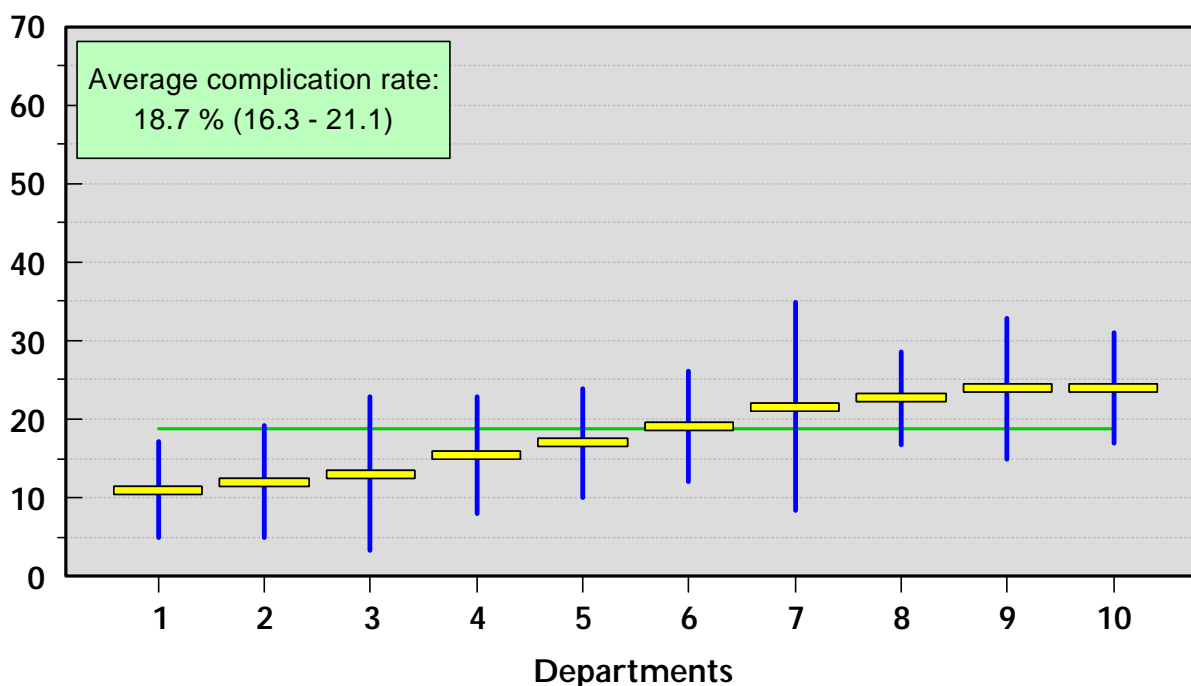
	Average = 19.5% general complication rate			Standard = <i>not available</i>		
	Worse than average	Average	Better than average	Worse than the standard	Lives up to the standard	Better than the standard
Department 1		X				
Department 2		X				
Department 3		X				
Department 4			X			
Department 5			X			
Department 6		X				
Department 7		X				
Department 8		X				
Department 9		X				
Department 10		X				
National		X				

Departments numbered according to rank in 1998

When the data are compiled for the last four years, the huge variations seen in the yearly reporting vanishes, maybe indicating, that one year is a too short period to evaluate complications:

General complications of Operation for Elective Abdominal Aortic Aneurysm 1996 - 99

Complication rate %



Causes of variation

As it has been stated above, several factors can influence the outcome of the individual patient, and comparison of results from departments (or surgeons) should be made with caution and with adjustment for the most significant risk factors. Some factors are inherent in the patients themselves, and cannot be avoided. Sometimes the risk factors can be (partially) corrected with optimisation of preoperative treatment, or they may, at the least, give rise to a more precise evaluation of the risk for the patient and lead to a better patient selection. This problem has been addressed in the 1998 report from the Danish Vascular Registry, found on the Internet at www.karbase.dk.

REGISTRY FORMS AND DATASET

The following pages show the datasheets used in the Danish Vascular Registry. Although the text is in Danish, it is mostly understandable, since it is international in its nature using a common medical language.

LANDSREGISTRET KARBASE

Navn: _____
 CPR: _____
 Kommune/postnr.: _____
 Indlæggelsesdato: _____
 Indlæggelsestidspunkt: _____

(Prægeplade / Label)

<u>ANAMNESE</u>	(Journalsskrivende læge)	uvist
Indlagt	1 2 3	9
1 akut		
2 subakut		
3 planlagt		
Tobak	0 1 2	9
0 ikke ryger		
1 tidligere ryger		
2 ryger		
Socialt	1 2 3 4	9
1 erhvervsaktiv el dermed ligestillet		
2 alderspensionist		
3 efterløn, førtidspension		
4 langtidssygemeldt		
Plejebehov	1 2 3 4	9
1 selvhjælpen		
2 klarer sig med hjemmehjælp		
3 beskyttet bolig		
4 plejehjem,hospital		
Diabetes	0 1 2 3 4	9
0 nej		
1 diætbehandlet		
2 tabletbehandlet		
3 insulinbehandlet		
4 insulinbehandlet, juvenil debut		
Cerebralt	0 1 2	9
0 nej		
1 amaurosis fugax/TIA		
2 stroke		
Hypertension	0 1 2 3 4	9
0 nej		
1 let styrbar, 1 stof		
2 2 stofs behandling		
3 > 2 stofsbehandling		
4 ubehandlet		
Kardialt	0 1 2 3 4	9
0 ingen symptomer		
1 arytmie, AMI > 6 mdr siden		
2 AP og / eller hjertemedicin		
3 ustabil AP,inkomp.Mb cordis, AMI < 6 mdr		
4 tidl hjerteopereret uden aktuelle sympt.		
Pulmonalt	0 1 2	9
0 ingen		
1 let funktionsdyspnoe		
2 svær dyspnoe		
Andet	0 1 2 3 8 9	
0 intet		
1 alkoholforbrug >5 gst. dgl.		
2 aktuel cancersygdom; 3 dialyse		
8 andet:.....		
Tidligere amputation	0 1 2 3 4 9	
0 nej;		
1 høj tå/forfod; 2 høj crus/femur		
3 ve tå/forfod; 4 ve crus/femur		
	Højre	Venstre
Sgmt. syst. blodtryk (mmHg)	_____	_____
angives P for puls bliver index 100	_____	_____
	%	%
- Index		
- Niveau	1 2 3	
1 ankel		
2 tå		
3 arm		

PRÆOPERATIVT (Udfyldes af operatøren/epikriseskrivende)

Tidl karkirurgi (incl. PTA) 0 1 2 3 4 5 6 8 9

0 nej

1 supraaortalt

2 visceralt/renalt

3 aorto-iliaco-femoralt

4 hø.infraingvinalt

5 ve.infraingvinalt

6 embolektomi

8 anden karrelateret kirurgi

Hvis JA udfyld Follow-up skema for hvert indgreb

Behandlingside:

H højre side, V venstre side

B begge sider; A alt andet

H V B A

Behandlingsindikation

(vælg 1-3 alternativer)

01 akut ekstremitets iskæmi

02 amaurosis fugax

03 aneurysme - asymptomatisk

04 aneurysme - symptomgivende

05 aneurysme - rumperet

06 aneurysme - tromboseret

07 aneurysme - pseudo-

08 aneurysme - mykotisk

09 aneurysme - dissektion

13 blødning, hæmatom

14 infektion

15 intestinal iskæmi, angina abd.

16 funktionsbetinget iskæmi

17 kronisk iskæmi - hvilesmerter

18 kronisk iskæmi - sår

19 kronisk iskæmi - gangræn

20 renovaskulær hypertension

21 stroke

22 thoracic outlet syndrome

23 transitorisk iskæmisk attack (TIA)

24 traume

25 trombose af karrekonstruktion

26 uræmi

27 varicer

28 vasospasme (Raynaud)

29 venetrombose

30 truende rekonstruktions svigt

31 permanent central venøs

adgang

50 sårkomplikation

51 fascieruptur

52 ileus

53 tarmiskæmi

54 aorto-intestinal fistel

55 protese infektion

56 kompartment syndrom

57 langvarig intubation

58 retroperitoneal fibrose

88 andet: (skriv hvad)

Hæmoglobin:

Hgb anføres i mmol/l

Total-kolesterol:

anføres i mmol/l

Creatinin:

se-creatinin i mmol/l

HDL-kolesterol:

anføres i mmol/l

Vægt:

anføres i kg

Højde:

anføres i cm

KONSERVATIV BEHANDLING (Epikriseskrivende læge - udfyld også "PRÆOPERATIVT")

HVORFOR

1 teknisk inoperabel; 2 dårlig AT

3 teknisk op., men ikke indikation

4 obs pro - ej befundet; 5 arteriografi

6 operation aflyst pga. manglende kapacitet

8 anden årsag - skriv hvilken!

1 2 3 4 5 6 8 9

HVILKEN

0 ingen

1 medicinsk behandling

2 formaliseret gangtræning

8 andet - skriv!

0 1 2 8 9

EVT. DØDSÅRSAG

0 levende; 1 cardiel; 2 cerebrovaskulær;

3 uræmi; 4 blødning

5 MOF; 6 tarngangræn

7 neoplasme; 8 andet; 9 ukendt årsag

0 1 2 3 4 5 6 7 8 9

UDSKRIVNINGS- /DØSDATO:

Vejledende procedurekoder,

hvis koden ikke er på listen henvises til

Sundhedsstyrelsens klassifikation

OPERATIONSKODER

Bypass

Husk tillægskode for bypass materiale

PAH25	bypass fra a. carotis til a. subclavia
PAH30	bypass fra a. subclavia
PBH10	bypass fra a. axillaris
PBH20	bypass fra a. brachialis
PBH99	bypass fra anden arterie i OE (radialis/ulnaris)
PGH23	axillo-bifemoral bypass
PGH22	axillo-femoral bypass
PCH10	bypass fra aorta abdominalis (supracoeliakalt-juxtarenalt)
PCH20	bypass fra truncus coeliacus
PCH30	bypass fra a. mesenterica superior
PCH40	bypass fra a. renalis
PCH99	bypass fra anden visceral arterie (mes. inf.)
PDH20	aorto-iliakal bypass
PDH21	aorto-biliakal bypass
PDH22	aorto-iliakal/femoral bypass, kontralateralt
PDH23	aorto-femoral bypass
PDH24	aorto-bifemoral bypass
PDH30	iliaca bypass
PDH35	iliaco-femoral bypass.
PGH40	femoro-femoral bypass
PEH20	bypass fra a. femoralis til a. poplitea over knæ
PEH30	bypass fra a. femoralis til a. poplitea under knæ
PFH10	bypass fra a. poplitea til a. poplitea
PFH23	bypass fra a. femoralis/poplitea til truncus tibiofibulare
PFH24	bypass fra a. femoralis/poplitea til a. tibialis posterior proximalt
PFH25	bypass fra a. femoralis/poplitea til a. tibialis posterior distalt
PFH29	bypass fra a. femoralis/poplitea til a. plantaris pedis
PFH26	bypass fra a. femoralis/poplitea til a. peronealis proximalt
PFH27	bypass fra a. femoralis/poplitea til a. peronealis distalt
PFH21	bypass fra a. femoralis/poplitea til a. tibialis anterior proximalt
PFH22	bypass fra a. femoralis/poplitea til a. tibialis anterior distalt
PFH28	bypass fra a. femoralis/poplitea til a. dorsalis pedis

Fjernelse af bypass

PGU88	fjernelse af axillo-femoral/bifemoral bypass
PDU88	fjernelse af bypass fra aorta infrarenalis / iliaca
PGU88	fjernelse af femoro-femoral bypass
PEU88	fjernelse af bypass fra a. femoralis til a. poplitea over knæ

Operativ revision af infraligamentære bypass operationer

forlængelse kodes som ny operation

PEU74	trombektomi/embolektomi af bypass fra a. fem. til a. poplitea
PEU81	ligatur af fistel ved bypass fra a. femoralis til a. poplitea
PEU82	plastik på bypass fra a. femoralis
PEU89	ligatur af bypass fra a. femoralis
PEU99	Anden OP efter tidl. rekonstruktion fra a. femoralis til a. poplitea
PFU74	trombektomi/embolektomi af bypass fra femoralis/poplitea til cruskar
PFU81	ligatur af fistel ved bypass fra a.femoralis/poplitea til cruskar
PFU82	plastik på bypass fra a. femoralis/poplitea til cruskar (ikke oprettet)
PFU89	ligatur af bypass fra a. femoralis/poplitea til cruskar
PFU99	Anden OP efter tidl. rekonstruktion fra a.femoralis/poplitea til cruskar

Operation for aneurisme

PCC99	aneurismeoperation på anden visceral arterie
PDG10	aneurismeoperation på infrarenale aorta
PDG20	aneurismeoperation med aorto-iliakal bypass
PDG21	aneurismeoperation med aorto-biliakal bypass
PDG22	aneurismeoperation med aorto-iliaca/femoral bypass kontralateral
PDG23	aneurismeoperation med aorto-femoral bypass
PDG24	aneurismeoperation med aorto-bifemoral bypass
PDG30	aneurismeoperation på a. iliaca
PDG35	aneurismeoperation med iliaco-femoral bypass
PDG99	aneurismeoperation på a. iliaca med anden bypass
PEG10	aneurismeoperation på a. femoralis communis
PEG11	aneurismeoperation på a. profunda femoris
PEG12	aneurismeoperation på a. femoralis superficialis
PDF10	aneurismeoperation på a. poplitea

TEA

PAF20	TEA a. carotidis communis
PAF21	TEA a. carotidis interna
PAF22	TEA a. carotidis externa
PAF30	TEA a. subclavia
PCF40	TEA a. renalis
PDF10	TEA infrarenale aorta
PDF15	TEA aorta-iliaca
PDF30	TEA a. iliaca
PDF35	TEA iliaca-femoralt
PEF10	TEA a. femoralis communis
PEF11	TEA a. profunda femoris
PEF12	TEA a. femoralis superficialis

Exploration af arterie

PBA20	exploration af a. brachialis
PEA10	exploration af a. femoralis com.
PEA11	exploration af a. prof. femoris
PEA12	exploration af a. femoralis sup.
PFA10	exploration af a. poplitea

Ligatur af arterie

PCB99	ligatur af anden visceral arterie (mes. inf.)
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Ligatur af bypass

PEU89	ligatur af iliaco-fem bypass
PFU89	ligatur af bypass fra a. fem /a. popl

Sutur af arterie

PBC10	sutur af a. axillaris
PBC20	sutur af a. brachialis
PBC30	sutur af a. radialis eller ulnaris
PBC99	sutur af anden arterie i overekstremiteten
PDC30	sutur af a. iliaca
PEC10	sutur af a. femoralis communis
PEC11	sutur af profunda femoris
PEC12	sutur af a. femoralis superfic.
PFC10	sutur af a. poplitea

Transposition af arterie

PAJ30	transpositio a. subclavia
PCJ99	transpositio af anden visceral arterie (mes. inf.)

Plastik på arterie

PEN11	plastik på a. profunda femoris
-------	--------------------------------

PTA

Hvis der er lagt stent anvendes også tillægskoden ZPD30

PAP30	PTA a. subclavia
PCP40	PTA a. renalis
PCP99	PTA anden visceral arterie
PDP10	PTA infrarenale aorta
PDP30	PTA a. iliaca
PEP10	PTA a. femoralis communis
PEP11	PTA a. profunda femoris
PEP12	PTA a. femoralis superficialis
PEP10	PTA a. poplitea
PEP30	PTA crus eller fodarterie
PBU83	PTA A-V fistel på OE
PCU83	PTA bypass på suprarenale aorta + viscerale arterier
PDU83	PTA bypass fra infrarenale aorta og a. iliaca
PEU83	PTA bypass fra a. femoralis til poplitea over/under knæet
PEU83	PTA bypass fra a. femoralis og dens grene
PFU83	PTA bypass fra a. femoralis/a. poplitea/crusarterier

Endovaskulær protese

Evt. supplerende PTA skal ikke kodes selvstændigt

P*Q** endovaskulært implantat i

P*U84 endovaskulært implantat i bypass på

Injektion af lægemiddel eller embolisering (f. eks. THROMBOLYSE)

Husk tillægskode for lægemiddel ex. thrombolytisk agens

PDT 10	Inj. af lægemiddel eller embolisering af infrarenale aorta
PET 20	Inj. af lægemiddel eller embolisering i bypass fra a.fem. til a. pop.
PFT 20	Inj. af lægemiddel eller embolisering i bypass fra a.fem. til crusart.

Trombektomi / embolektomi af arterie / bypass

PBE10	trombektomi/embolektomi a. axillaris
PGU74	trombektomi/embolektomi af axillo-bifemoral/femoral bypass
PBE20	trombektomi/embolektomi a. brachialis
PBE30	trombektomi/embolektomi a. radialis/ulnaris
PCE99	trombektomi/embolektomi af anden visceral arterie
PDE10	trombektomi/embolektomi af infrarenale aorta
PDU74	trombektomi/embolektomi af bifurkationsprotese
PDE30	trombektomi/embolektomi a. iliaca
PEE10	trombektomi/embolektomi a. femoralis communis
PEE11	trombektomi/embolektomi a. profunda femoris
PEE12	trombektomi/embolektomi a. femoralis superficialis
PGU74	trombektomi/embolektomi af cross-over bypass
PFU74	trombektomi/embolektomi af femoro-popl. bypass
PFU74	trombektomi/embolektomi af femoro-distal bypass sv.t. anatomikoden
PFE10	trombektomi/embolektomi af a. poplitea
PFE30	trombektomi/embolektomi af cruralcar

Kommentarer:

Vejledende procedurekoder,

hvis koden ikke er på listen henvises til

Sundhedsstyrelsens klassifikation

Venekirurgi

PHB10	ligatur af v. saphena magna
PHB12	ligatur af v. saphena parva
PHB13	ligatur af perforanter på crus
PHB14	ligatur af perforanter på femur
PHD10	resektion af v. saphena magna
PHD11	resektion af stella venosa
PHD12	resektion af v. saphena parva
PHD15	resektion af kommunikanter på crus og femur
PHD99	resektion af anden vene
PHE22	trombektomi af v. femoralis
PHE23	trombektomi af v. iliaca
PHE30	trombektomi af v. cava inferior
PHE31	trombektomi af v. renalis
PHE99	trombektomi af anden vene

Reoperationer

Revision af bypass kodes med koder for dette

JWA00	sutur af sårruptur efter laparotomi
PWA00	sutur af sårruptur perifert
PWB00	reoperation for overfladisk sårinfektion
PWC00	reoperation for dyb infektion
PWD00	reoperation for overfladisk blødning
PWE00	reoperation for dyb blødning
PWH00	reoperation for lymfocele
PWW99	sårrevision

Sårrevision

QDA10	incision af absces på UE inkl. fod
QDB00	sutur af hud på UE inkl. fod
QDE00	excision af hud på UE inkl. fod
QDG20	revision af ulcus på UE inkl. fod

Diverse forekommende operationer

PBL20	Anlæggelse af a-v fistel fra a. brachialis
PBL30	Anlæggelse af a-v fistel fra a. radialis eller a. ulnaris
ADA20	sympatectomia thoracalis
ADA30	sympatectomia lumbalis
GAE40	resectio costae (incl. excisio costa cervicalis)
GBB00	tracheostomia
JAH00	laparotomia explorativa
JMA10	splenectomia
KAC00	nephrectomia
KAJ00	nephrostomia
KBH50	ureterolysis
KKB10	excisio tumoris retroperitonealis
KKW96	andre operationer på retroperitonealt væv
NGM09	fasciotomia cruris
NHQ17	amputatio digiti pedis partialis
NHQ16	amputatio digiti pedis totalis
NHQ14	amputatio transmetatarsalis
QDA10	incision af absces
QDB00	sutur af hud på UE
QDC00	operativ fjernelse af gentamycinkugler på femur
TPH20	centralt kateter (Broviac, Hickmann, Porth-a-kath, mv.)
TPW99	Anden mindre operation (fjernelse af Hickmann kateter, mv.)

Tillægskoder/materialekoder

ZPM00	intet implantat
ZPM10	autolog vendt vene eller venepatch
ZPM20	autolog in-situ vene
ZPM30	autolog arterie
ZPM40	dacron
ZPM50	biologisk homograft
ZPM60	biologisk heterograft
ZPM70	PTFE
ZPM80	sammensat graft
ZPM98	andet specificeret materiale
ZPM99	andet uspecificeret materiale
ZPD12	arteriovenøs extern shunt eller anden shunt til/fra karsystemet
ZPD20	vena cava filter
ZPD30	endovaskulær stent, angiv desuden fabrikat/materiale 1 - 9
ZPD40	embolisationsmateriale
ZPD41	skleroserende agens
ZPD50	trombolytisk agens
ZPD51	vasomotorisk agens

OPERATION (Udfyldes af operatøren, HUSK "PREOPERATIVT")

Opkode 1 _____ matr.kode 1 _____

Opkode 2 _____ matr.kode 2 _____

Opkode 3 _____ matr.kode 3 _____

Hvis opkode 2 og 3 er selvstændige indgreb skal de indtastes separat på nye skemaer.

Protese navn og type: _____
(for kunststof)

Akut/elektiv:

- 1 OP start akut < 2 timer efter incl.
2 OP start akut > 2 timer efter incl.
3 Elektiv

1 2 3

Assistanceoperation:

- 0 Nej
1 Ja

0 1

Operationstype:

- 1 primær karkirurgisk rekonstruktion
2 primær kar operation, hvor der tidligere er opereret proximalt eller distalt for aktuelle
3 sekundær rekonstruktion (redo) dvs. patienten er tidligere opereret i samme segment
4 trombektomi/revision af bestående rekonstrukt.
5 operation for komplikation til karkirurgi

1 2 3 4 5 8

8 alle andre operationer

Hvis op-type er 2,3,4 el 5,
Primære operationsdato:

og kode

Ikke materialekode

Aktuelle operations dato:

Operations start og slut:

Kirurger:

initialer på operatør og assistenter.

Blodtab:

skønnet blodtab i ml

Perop blodtransfusioner:

Antal SAGM port./ antal autotransf.

Anæstesi:

- 0 ingen
1 generel anæstesi alene
2 epidural/spinal anæstesi alene
3 generel + epidural/spinal i kombination
4 lokal analgesi
8 andet

0 1 2 3 4 8

Incision:

- 0 ingen abdominal/
thorakal operation
1 midtlinie laparotomi
2 tvær laparotomi
3 retroperitoneal adgang
4 thoraco-abdominal adgang
5 thoracotomi

0 1 2 3 4 5


Sårets renhedsgrad:

- 1 rent
2 potentielt kontamineret
3 kontamineret
4 pus

1 2 3 4

Followup Dato: _____

Navn: _____
 CPR: _____

	Højre	Venstre	Bilateralt / andet
Operations dato: _____	_____	_____	_____
Operations kode: _____	_____	_____	_____
Rekonstruktionens åbenhed/ patency: 0 lukket; 1 åben 8 ikke rekonstrueret; 9 uvist	0 1 8 9	0 1 8 9	0 1 8 9
Hvis rekonstruktionen er lukket eller er genåbnet <u>siden sidste kontrol</u>	_____	_____	_____
Dato for okklusion: _____	_____	_____	_____
Behandling: 0 ingen; 1 trombektomi; 2 trombektomi samt revision; 3 ny rekonstruktion = redo.	0 1 2 3	0 1 2 3	0 1 2 3
Sgmt. syst. blodtryk (mmHg) angives P for puls bliver index 100	_____	_____	
Index _____%	_____%	_____%	
Niveau 1 ankel; 2 tå; 3 arm	1 2 3	1 2 3	
Ekstremitetsstatus: 1 bevaret, ingen symptomer; 2 claudikatio; 3 hvilesmerter 4 gangræn/ikke helende sår; 5 amputeret;	1 2 3 4 5 8 9	1 2 3 4 5 8 9	
Hvis patienten efter udskrivelse/siden sidst er amputeret angives	_____	_____	
Amputationsdato: _____	_____	_____	
Niveau: 0 ingen; 1 tå el forfod; 2 crus; 3 knæeks.; 4 femur.	0 1 2 3 4 8 9	0 1 2 3 4 8 9	
Sår status: 0 ingen sår; 1 mgl. heling af operationssår; 2 nye iskæmiske sår i rel. til operationen opstået; 3 præop. iskæmiske sår resteret.	0 1 2 3 9	0 1 2 3 9	0 1 2 3 9
Infektion i operationssåret opstået efter udskrivelse	_____	_____	_____
Dato: _____	_____	_____	_____
Type: 0 ingen; 1 overfladisk el subcutan infektion; 2 dyb infection incl. graftinfektion.	0 1 2 8 9	0 1 2 8 9	0 1 2 8 9
Bakterietype: 0 steril; 1 Staph aureus; 2 Staph epidermidis; 3 gramneg. stave; 4 anaerob; 5 blandingsflora 8 andet; 9 uvist	0 1 2 3 4 5 8 9	0 1 2 3 4 5 8 9	0 1 2 3 4 5 8 9

Social status:
 1 erhvervsaktiv, el dermed ligestillet
 2 alderspensionist;
 3 førtidspens el efterløn
 4 langtidssygemeldt
 1 2 3 4 9

Plejebehov:
 1 selvhjulpen
 2 klarer sig med hjemme hjælp
 3 beskyttet bolig ;
 4 plejehjem el hospital.
 1 2 3 4 9

**Død efter udskrivelsen/siden
sidste kontrol - Dato:**

Årsag:
 0 levende; 1 cardiel;
 2 cerebrovaskulær;
 3 uræmi; 4 blødning
 5 MOF; 6 tarmgangræn
 7 neoplasme; 8 andet;
 9 ukendt årsag
 0 1 2 3 4 5 6 7 8 9