Preface

The DFDB is now a national clinical quality monitoring database, making it mandatory for departments to report data. This however does not change the basic concept of the DFDB, that data are owned by the individual department and that the DFDB is a tool for research and quality monitoring and not an administrative tool. DFDB is powered by orthopedic surgeons for orthopedic surgeons.

The data from DFDB has now been utilized for several high quality publications, but we are not seeing the action that one would expect from such a high quality database. We hope that Danish orthopedic surgeons will realize the possibilities that the DFDB provide in terms of research, and make 2017 a year of high impact research provided by DFDB data.

The annual report from the Danish Fracture Database (DFDB) 2016 is the fourth of its kind. It contains data based on over 60.000 fracture related surgeries accumulated since the beginning of DFDB, . The number of reported fractures in 2016 alone were 11.303 adult fractures, 1165 re-operations of adult fractures, 2076 pediatric fractures and 79 re-operations of pediatric fractures.

The purpose of DFDB is web based quality monitoring of fracture related surgery and today these efforts are joined by 21 orthopaedic departments in Denmark, covering close to 90% of the Danish population. The effort to monitor quality of fracture related surgery in Denmark is unique and important: Unique because DFDB is the fracture register with the highest national coverage in the world and important given the high number of surgeries performed each year probably making fracture surgery/traumatology one of the busiest specialties within orthopaedic surgery. Previously it has not been possible to assess nationwide quality of all fracture related surgeries.

We wish to thank all the participating surgeons and departments taking part in this unique and important task. It is truly inspirational to realize the unity DFDB has brought into orthopaedic traumatology in Denmark. Also the continued support from The Danish Orthopaedic Society (DOS) and Danish Orthopaedic Trauma Society (DOT), and the possibility to present the annual report at the DOS Congress is much appreciated.

The annual report is structured as previously with general data overview of registered parameters followed by department specific data, and finally the major body of the report with specific data for each anatomic region, e.g. proximal humerus, distal radius, and proximal femur. This year the area of focus is surgically treated distal radius fractures; 2 years after the publication of national guidelines on the topic, how are we doing, and are we all doing the same? In some areas data for the last year is also presented, these will contain 2016 in the title, this data is gathered from the period 10-07-2015 to 10-07-2016.

A basic principle of the DFDB is that surgeons reporting to the database should get feedback concerning the quality of treatment. This is delivered via e-mail and contains surgeon specific (only to be seen by the individual surgeon), department specific (the surgeon can only see data from his/her own department), and nationwide feedback on the rate of reoperations performed. The level of detail send by e-mail can be configured by the surgeon when logged in to DFDB. It is our hope that with time this feedback from DFDB can support surgeons in making decisions about best practice in fracture related surgery.

Hvidovre, October 17th 2016

Anders Troelsen, Michael Brix, Kirill Gromov, Peter Tengberg

Table on contents

About the Danish Fracture Database

Background and recent development

The aim of the Danish Fracture Database is to monitor the quality of surgical fracture treatment by assessing the rate of revision surgery both in general and for each fracture type specifically. This assessment results in a potential quality improvement through focus on specific fracture types where the quality of treatment is not considered high enough. Lastly, epidemiologic research in fracture surgery will contribute to identify surgical and fracture related prognostic factors for a good or poor outcome of surgery. The use of DFDB provides each participating department the possibility to monitor own data and thus the quality of their fracture treatment. The educational level of both the surgeon and the supervisor is registered and can therefore also be monitored.

Steering Committee

The idea behind DFDB and the registry's recent progress are attributed to Michael Brix and Anders Troelsen. Kirill Gromov contributed substantially to the registry's developmental phase. Michael, Anders and Kirill are today a part of the DFDB steering committee and are responsible for the registry's overall administration, quality monitoring, and research. In addition, each participating department is represented in the steering committee. Both DOT (Danish Orthopaedic Trauma Society) and DOS (Danish Orthopaedic Society) are represented in the steering committee. A minimum of one annual meeting is held in order to correct inexpediencies, increase the usability, and optimize the database through the members' feedback.

Secretariat and daily operations

Each participating department has a controller in daily charge of complete reporting. The daily operation is also supported by a secretariat, which was established last year at the Department of Orthopaedic Surgery, Hvidovre Hospital. The secretariat consists of an administrator and a statistician, Thomas Kallemose.

Together the developers of DFDB and the secretariat has the responsibility and right to development and changes of the registry in cooperation with the provider Procordo Aps.

Research data from DFDB

Each department has the ownership of the data they deliver to DFDB. Anyone who wishes to do a research project on DFDB data must apply for the use of data from each individual department. This is done by following the guidelines on www.dfdb.dk under the header "Om DFDB".

Summary and comments

In this annual report from DFDB we present a general overview of registered data as well as data for specific anatomical regions. The general overview covers basic demographics (age, gender and ASA score) for all primary surgeries as well as reoperations. Anatomical distribution of registered primary surgeries and reoperations as well as indications for reoperations are described. We describe the educational level of the primary surgeon and level of supervision for primary surgeries. Anatomical distribution for primary surgeries for all separate departments participating in the DFDB collaboration is described in the first part of the report.

For definitions and specifications of the different parameters please see Appendix 1.

Demographics

83% of primary procedures were due to adult fractures and 17% due to pediatric fractures.

Age distribution was biphasic, with first peak at age 10-20 and second peak at age 60-90. More males were surgically treated for fractures when age <50, while more female were surgically treated for fractures when age >50. 57% of all registered patients were female.

Anatomical distribution

Proximal femur (35%), distal radius (16%), and malleoli (12%) were the 3 most frequent operated regions for primary adult surgical procedures. Radius/ulna (59%), humerus (22%), and tibia (9%) were the 3 most frequently operated regions for primary paediatric surgical procedures.

Reoperations

Proximal femur (27%), malleoli (20%), distal radius (7%) and tibia shaft (7%) were the 4 most frequently reoperated anatomical regions in adults. Radius/ ulna (49%), humerus (20%) and tibia (17%) were the 3 most frequently reoperated anatomical regions in children. Pain and discomfort due to osteosynthesis material (38%), secondary fracture dislocation (15%), and infection 14%) were the 3 most frequent indications for adult reoperations. Secondary fracture dislocation (40%, pain and discomfort due to osteosynthesis material (23%), and suboptimal osteosynthesis (19%) were the 3 most frequent indications for paediatric reoperations.

Level of education

60% of all primary surgeries were performed by surgeons in training (intern- 5th year resident). Interns, 1st year resident, 2nd year resident, and 3rd year residents performed more procedures under supervision than without supervision, while 4-5th year residents, attending surgeons, and traumatologist performed more procedures without supervision than with supervision

Data limitations

There are some limitations to the data in this report. Essential limitations are:

1) Data completeness for treatment of primary fractures

2) Data completeness for reoperations

Initially, after full implementation of DFDB at the orthopaedic departments in Hvidovre and Odense, an evaluation of data validity and data completeness for treatment of primary fractures and reoperations was performed (Gromov 2013). Two plausible factors to limit data completeness were identified: 1) that the registry had only been implemented for few months, and 2) that both departments are large, with regularly 50-90 possible surgeons. The results of the study showed that the validity of data (the percentage of data that was correct when compared to the best external data source outside of DFDB) was 90-100% for all parameters, and most above 97%. The total degree of completeness for data entry of primary fracture treatment was 88% and for reoperations it was 77%. Thus, there was, at an early point in time after initiation of DFDB, a satisfactory degree of data validity and data completeness under the prevailing circumstances. Similar evaluations of data completeness should be performed continuously.

In addition to reoperations that are not registered at participating departments, data may lack for reoperations performed at non-participating departments where the primary operation was performed and registered at a participating department. The extent of this phenomenon can be investigated by using data from the National Patient Registry (Landspatientregistret, LPR). For this year's report, data was not extracted from LPR with regards to knowing the "true" number of reoperations, why the rates of reoperations and survival curves are underestimated. These rates and curves are presented nonetheless to illustrate the potential of data analysis with the DFDB.

Currently, work is ongoing to validate the primary fracture codes that are registered in the LPR, to know the validity of these codes if they are to be used as a data source for the DFDB. Furthermore, definition and validation of the reoperation codes in LPR to investigate the applicability of the LPR as a data source for the DFDB is ongoing.

Fracture diagnosis in Danish National Patient Registry (NPR) have been investigated by Andersen et al. The overall validity of data was 86%. The NPR diagnosis code was correct in 94% of all cases and the NPR anatomic region was correct in 99% of all cases. In 91% of all cases the operation code was correct and the anatomic region for the operation was correct in 99% of all cases. NPR coding will be used in the future for continuous completeness monitoring of DFDB data.

Data was extracted from DFDB on October 7th 2016.

References

Gromov K, Fristed JV, Brix M, Troelsen A. Completeness and data validity for the Danish Fracture Database. Danish medical journal. 2013 Oct;60 (10):A4712. PubMed PMID: 24083526.

Participating departments

Aabenraa

Aalborg

Aarhus

Bispebjerg

Esbjerg

Farsø

Gentofte

Herlev

Hillerød

Holbæk

Horsens

Hvidovre

Kolding

Køge

Nykøbing Falster

Odense

Randers

Rigshospitalet

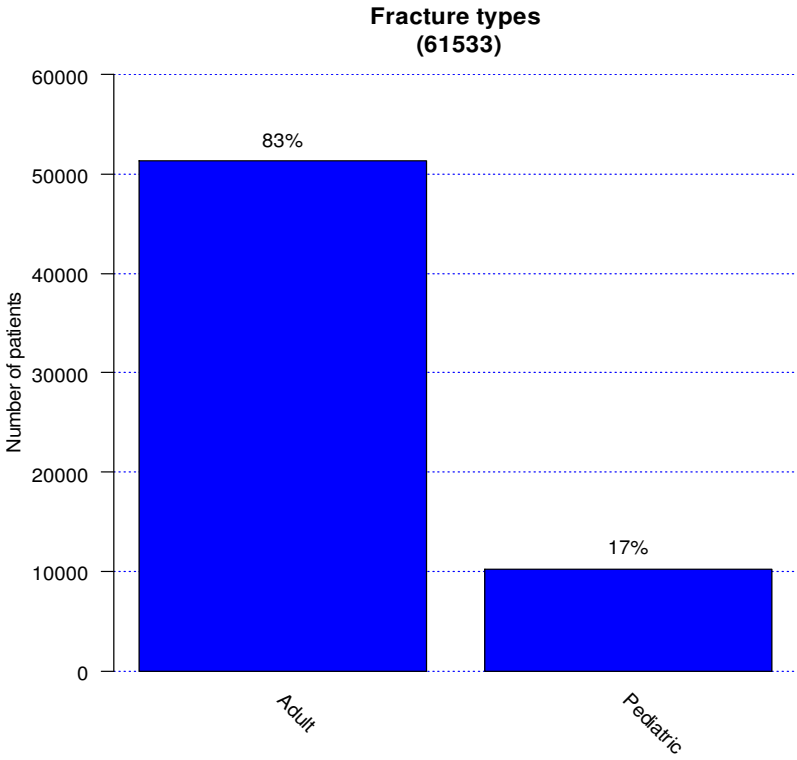
Slagelse

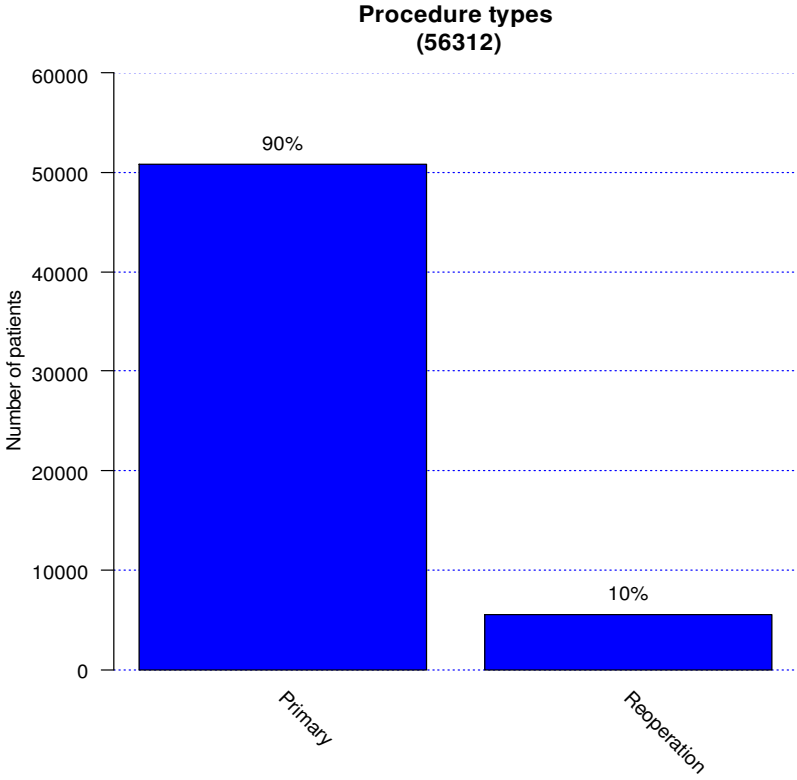
Vejle

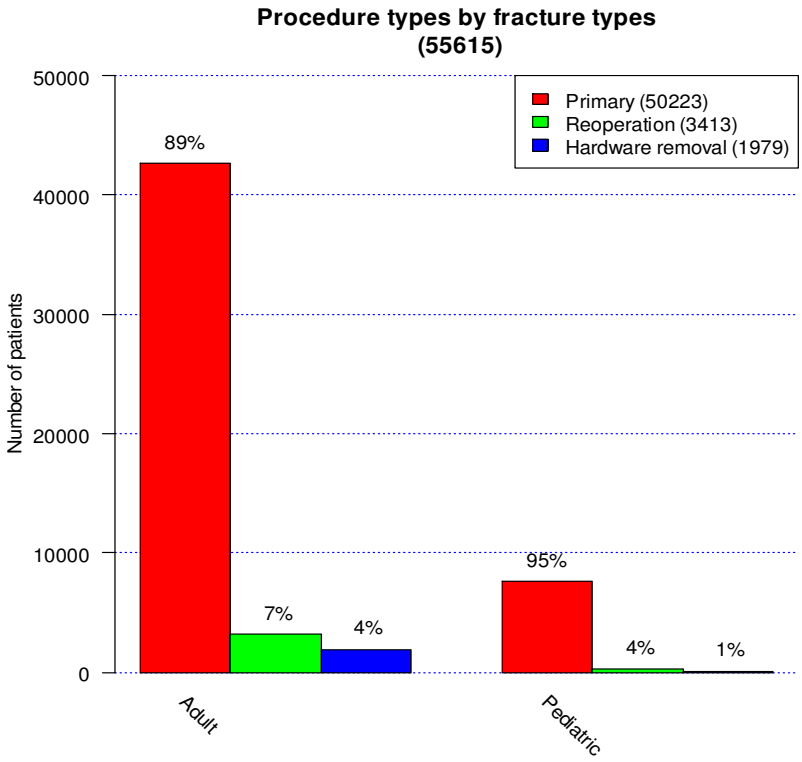
Viborg

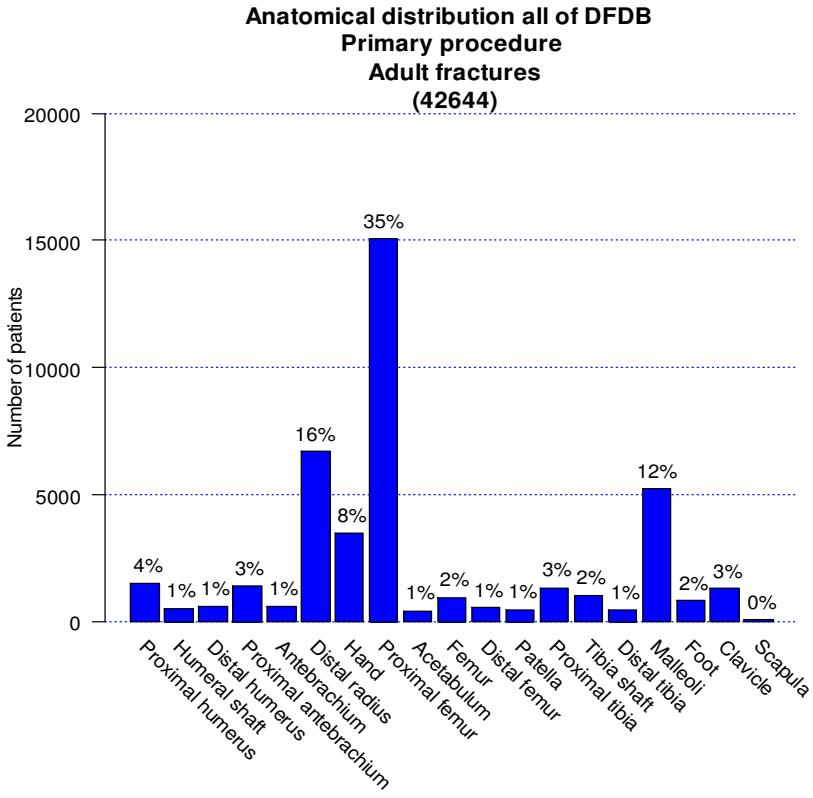
General overview of data

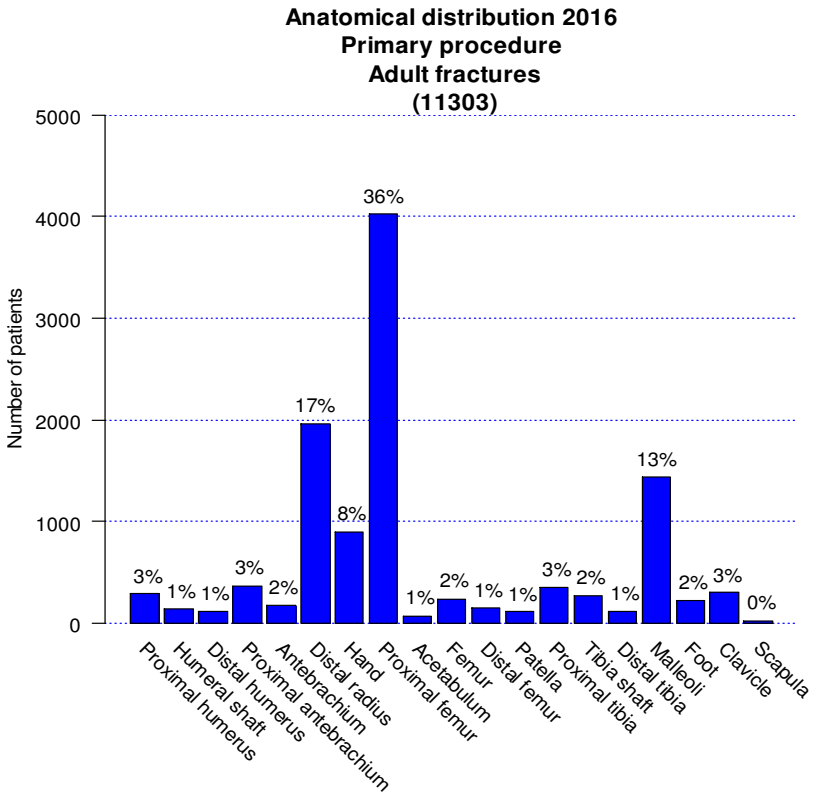
The graphs in this section covers general areas such as surgery type distribution, primary indication for re-operation, and primary surgeon, which uses data from all participating departments.

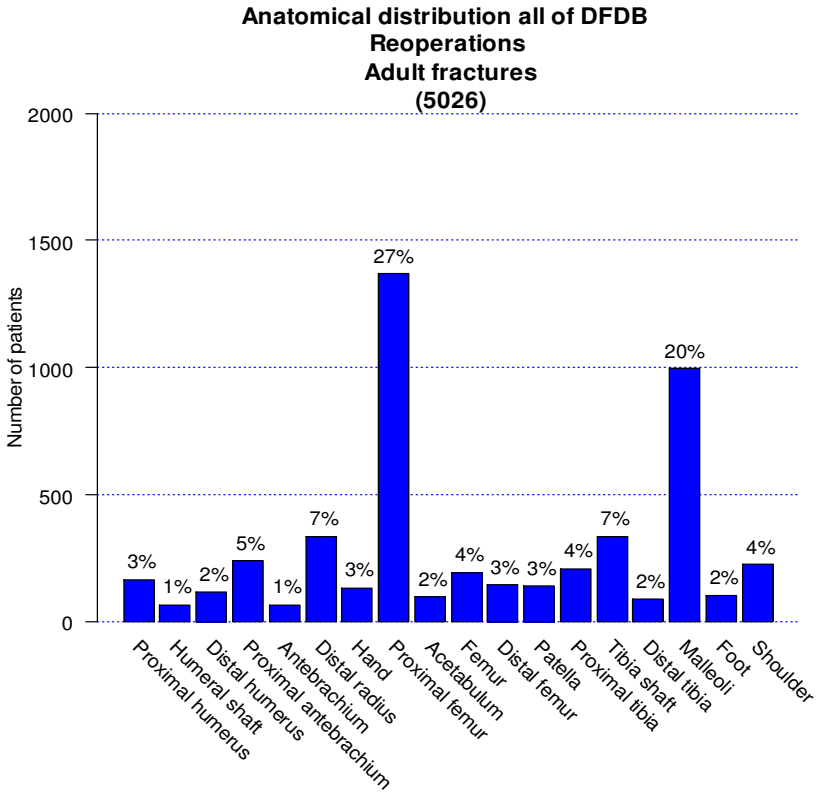


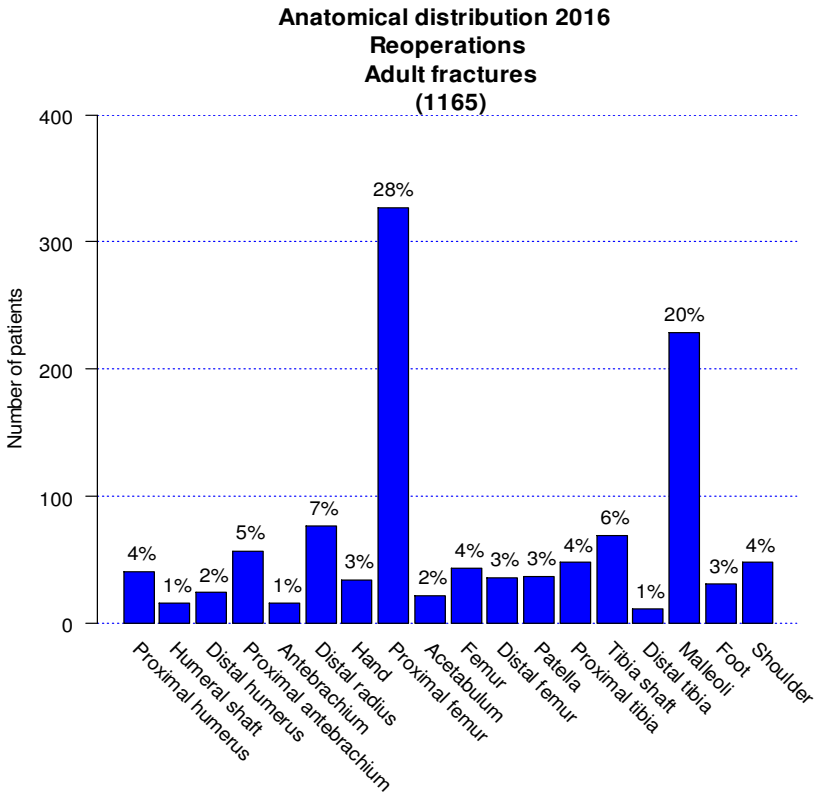


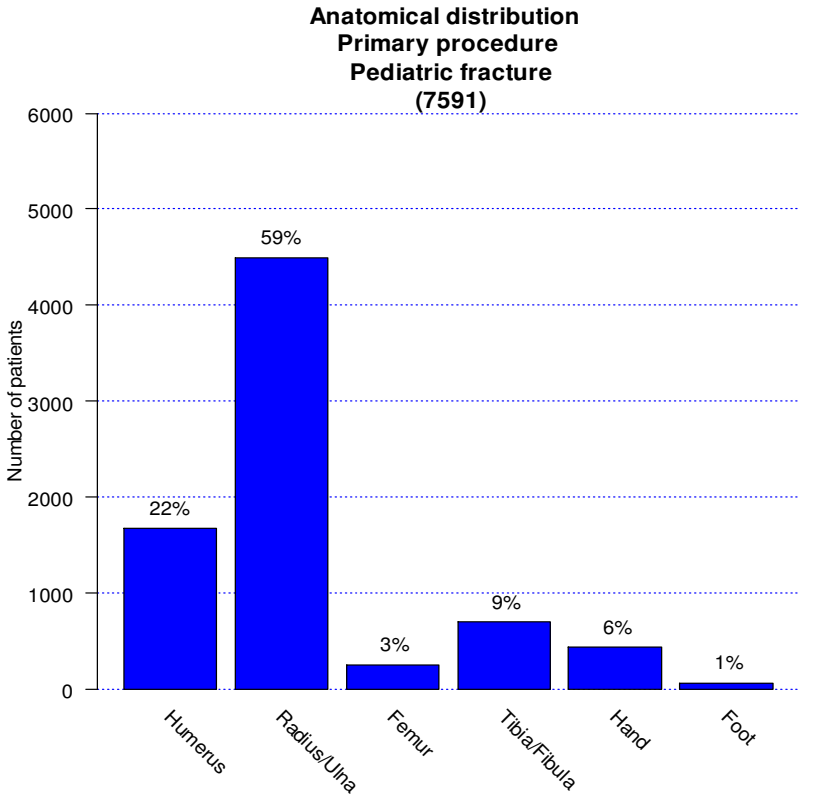

Procedure types by fracture types
(55615)
Primary (50223)
Reoperation (3413)
Hardware removal (1979)
Number of patients
50000
40000
30000
20000
10000
0
89%
7%
4%
95%
4%
1%
Adult
Pediatric

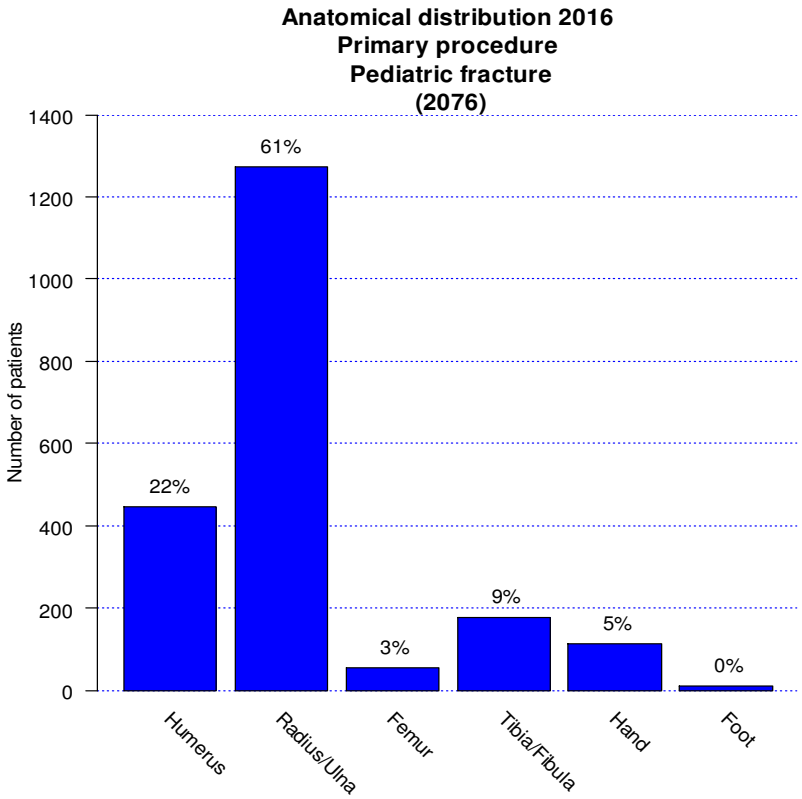

Anatomical distribution all of DFDB
Primary procedure
Adult fractures
(42644)
Number of patients
20000
15000
10000
5000
0
4%
1%
1%
3%
1%
16%
8%
35%
1%
2%
1%
1%
3%
2%
1%
12%
2%
3%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

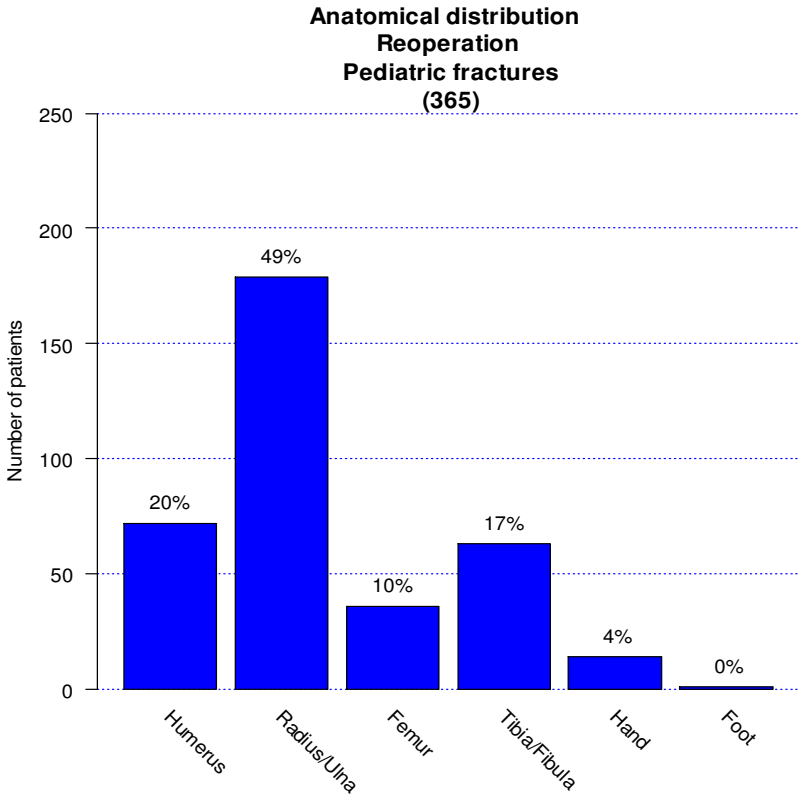

Anatomical distribution 2016
Primary procedure
Adult fractures
(11303)
Number of patients
5000
4000
3000
2000
1000
0
3%
1%
1%
3%
2%
17%
8%
36%
1%
2%
1%
1%
3%
2%
1%
13%
2%
3%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

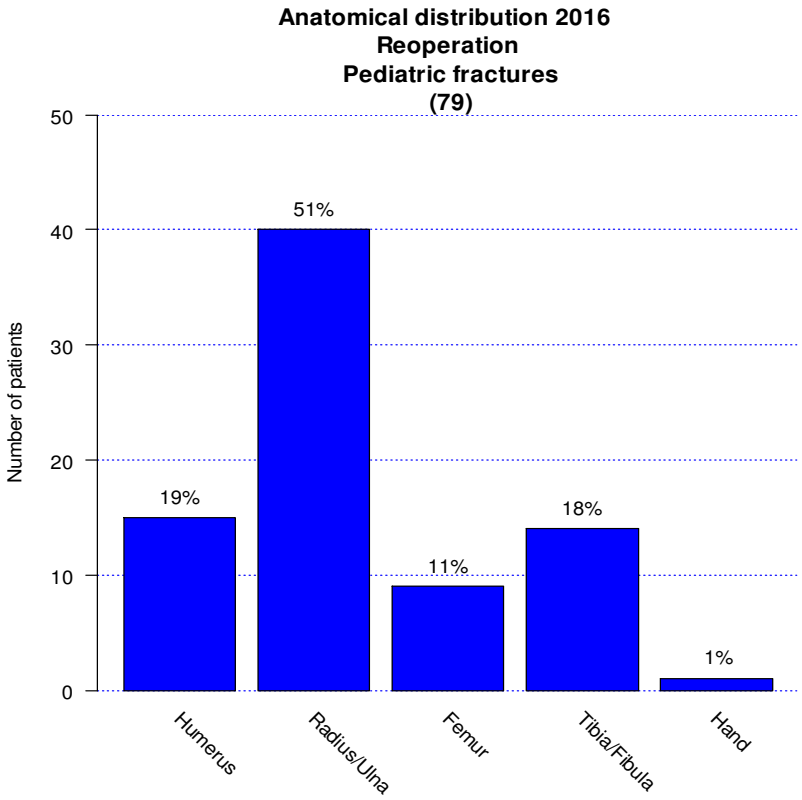

Anatomical distribution all of DFDB
Reoperations
Adult fractures
(5026)
Number of patients
2000
1500
1000
500
0
3%
1%
2%
5%
1%
7%
3%
27%
2%
4%
3%
3%
4%
7%
2%
20%
2%
4%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Shoulder

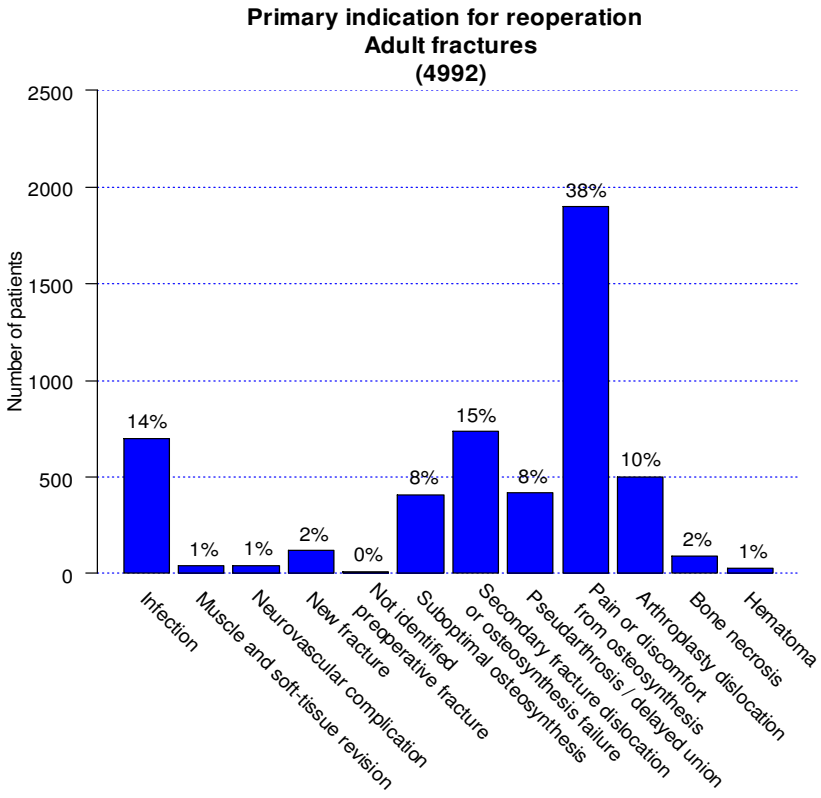

Anatomical distribution 2016
Reoperations
Adult fractures
(1165)
Number of patients
400
300
200
100
0
4%
1%
2%
5%
1%
7%
3%
28%
2%
4%
3%
3%
4%
6%
1%
20%
3%
4%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Shoulder

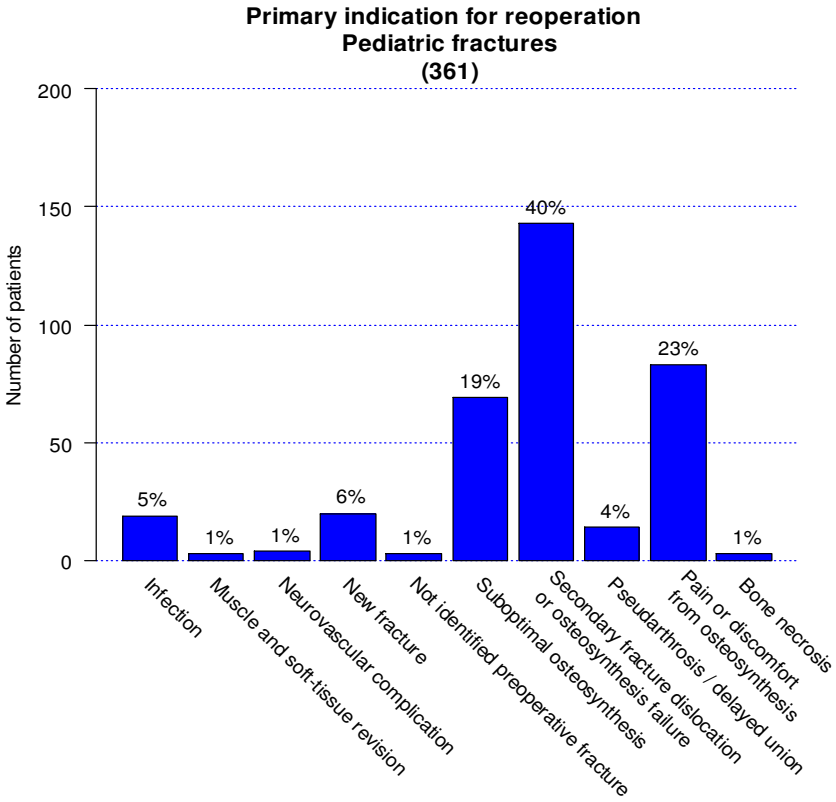

Anatomical distribution
Primary procedure
Pediatric fracture
(7591)
Number of patients
6000
5000
4000
3000
2000
1000
0
22%
59%
3%
9%
6%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

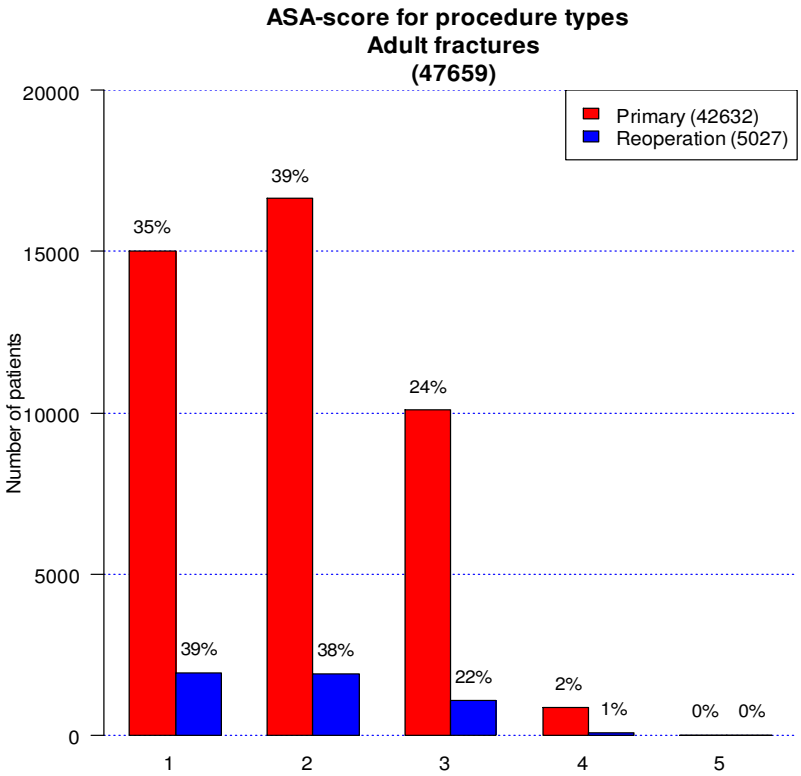

Anatomical distribution 2016
Primary procedure
Pediatric fracture
(2076)
Number of patients
1400
1200
1000
800
600
400
200
0
61%
22%
9%
5%
3%
0%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

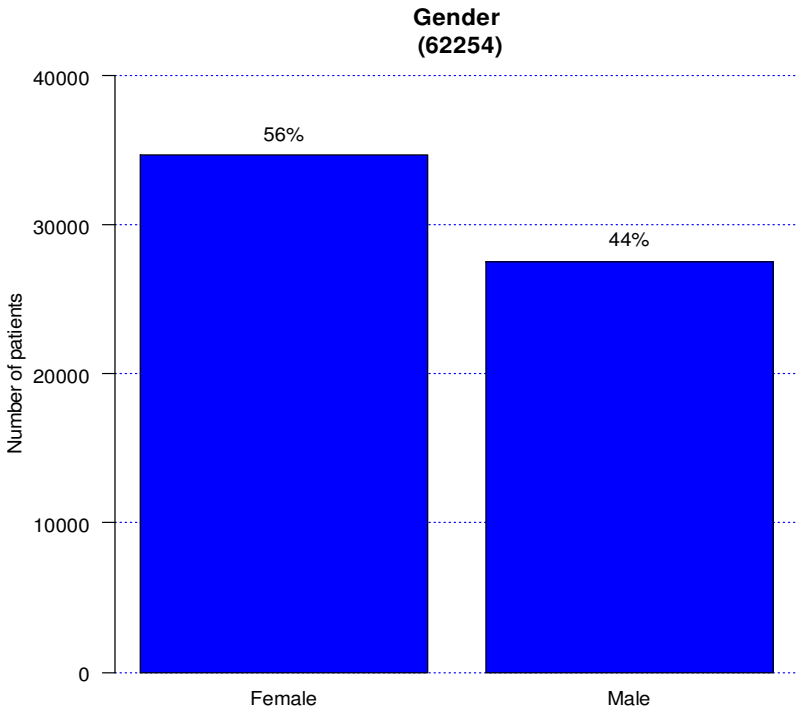

Anatomical distribution
Reoperation
Pediatric fractures
(365)
Number of patients
250
200
150
100
50
0
49%
20%
17%
10%
4%
0%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

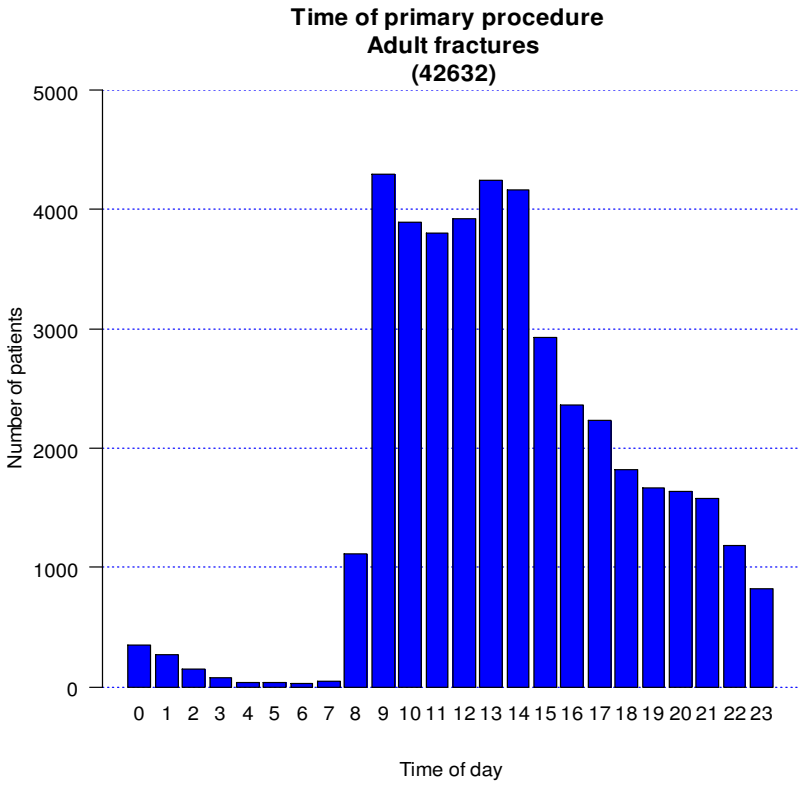

Anatomical distribution 2016
Reoperation
Pediatric fractures
(79)
Number of patients
50
40
30
20
10
0
51%
19%
18%
11%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand

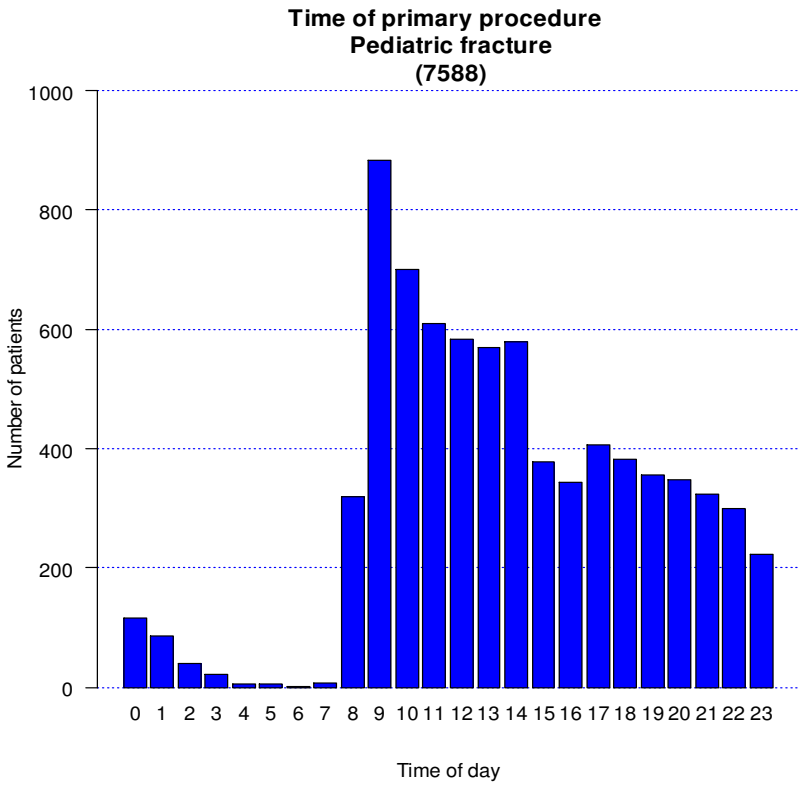

Primary indication for reoperation
Adult fractures
(4992)
Number of patients
2500
2000
1500
1000
500
0
14%
1%
1%
2%
0%
8%
15%
8%
38%
10%
2%
1%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Not identified preoperative fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Arthroplasty dislocation
Bone necrosis
Hematoma

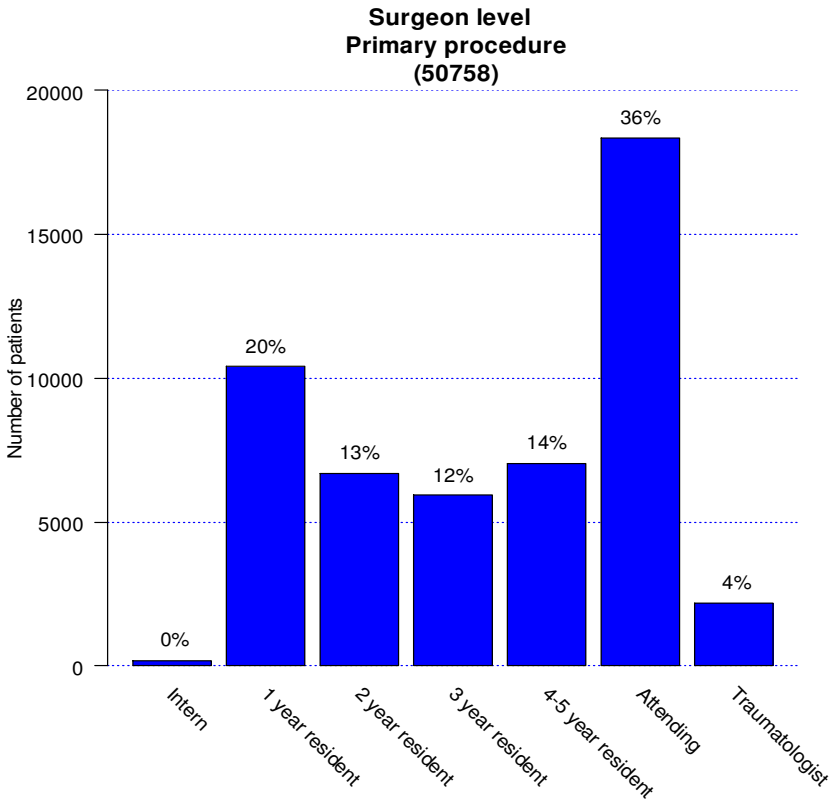

Primary indication for reoperation
Pediatric fractures
(361)
Number of patients
200
150
100
50
0
5%
1%
1%
6%
1%
19%
40%
4%
23%
1%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Not identified preoperative fracture
Suboptimal osteosynthesis
or osteosynthesis failure
Secondary fracture dislocation
Pseudarthrosis / delayed union
Pain or discomfort
from osteosynthesis
Bone necrosis

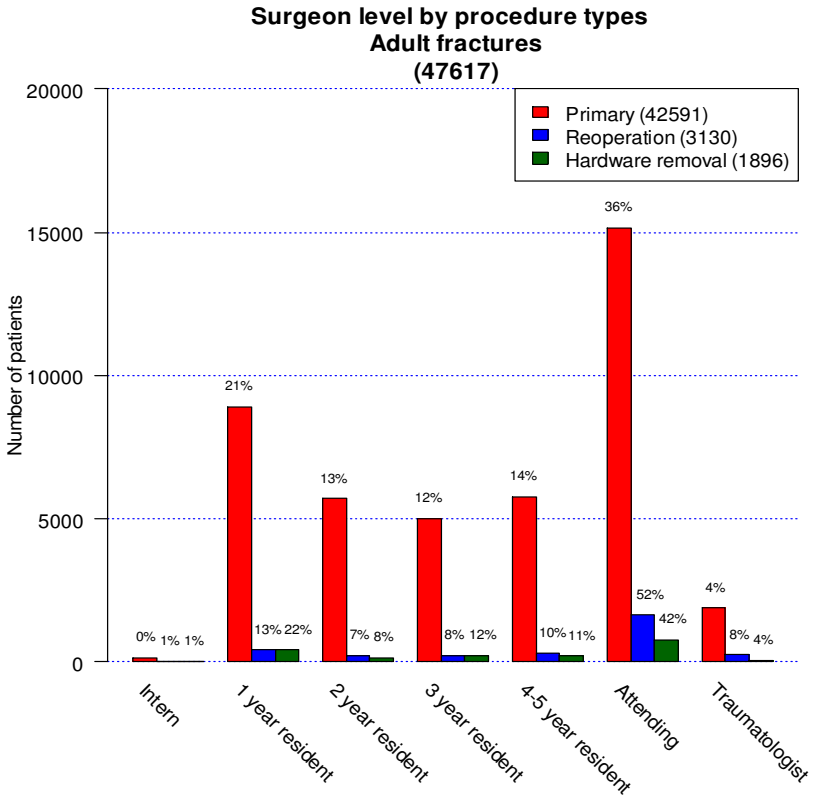

ASA-score for procedure types
Adult fractures
(47659)
Primary (42632)
Reoperation (5027)
Number of patients
20000
15000
10000
5000
0
35%
39%
39%
38%
24%
22%
2%
1%
0%
0%
1
2
3
4
5

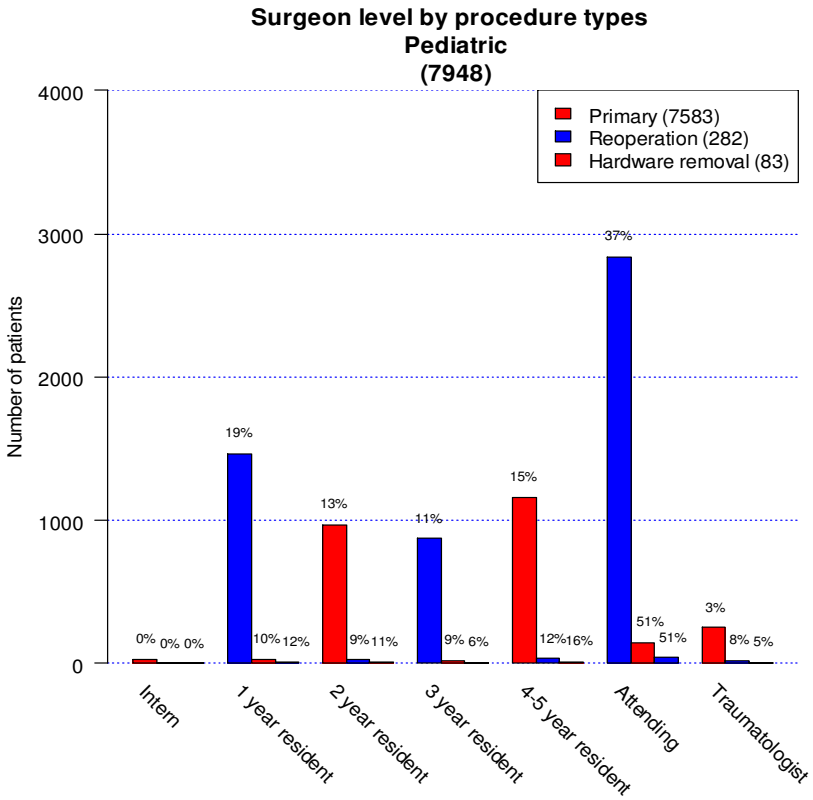

Gender
(62254)
40000
30000
20000
10000
0
Number of patients
56%
44%
Female
Male

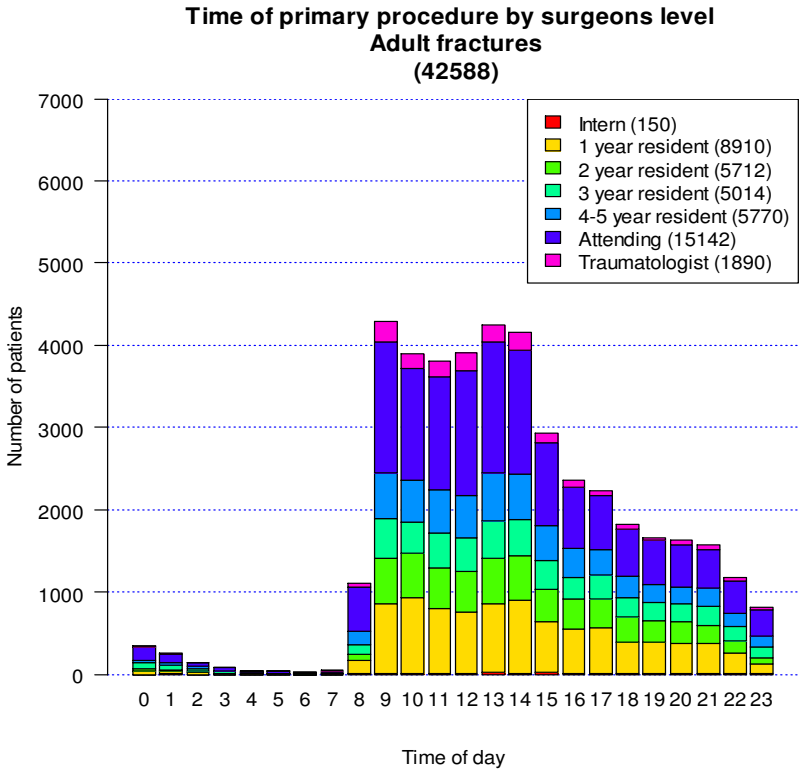

Time of primary procedure
Adult fractures
(42632)
5000
4000
3000
2000
1000
0
Number of patients
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Time of day

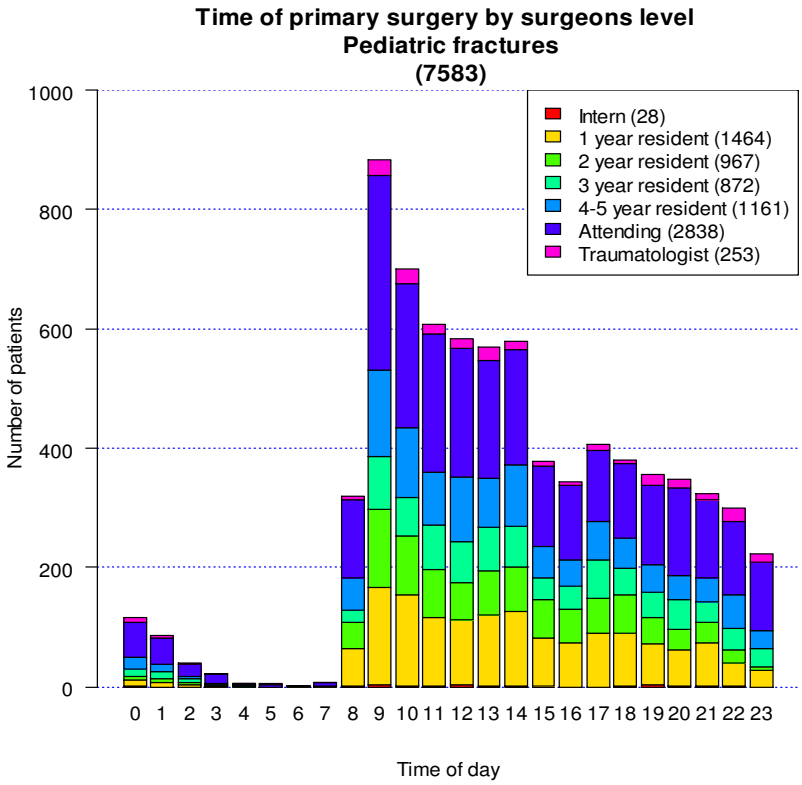

Time of primary procedure
Pediatric fracture
(7588)
Number of patients
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Time of day

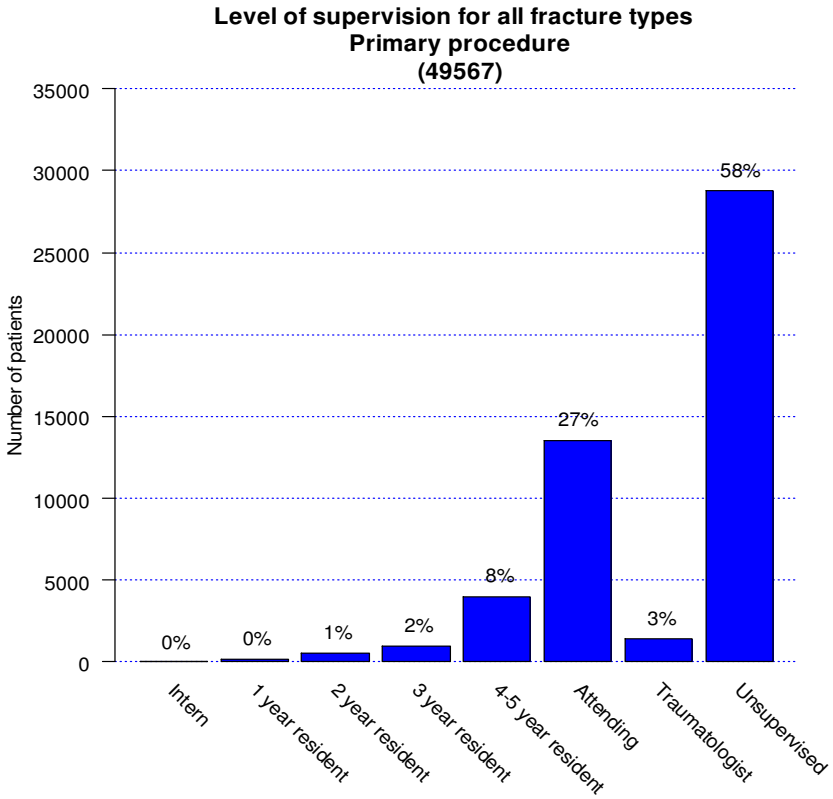

Surgeon level
Primary procedure
(50758)
Number of patients
20000
15000
10000
5000
0
0%
20%
13%
12%
14%
36%
4%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

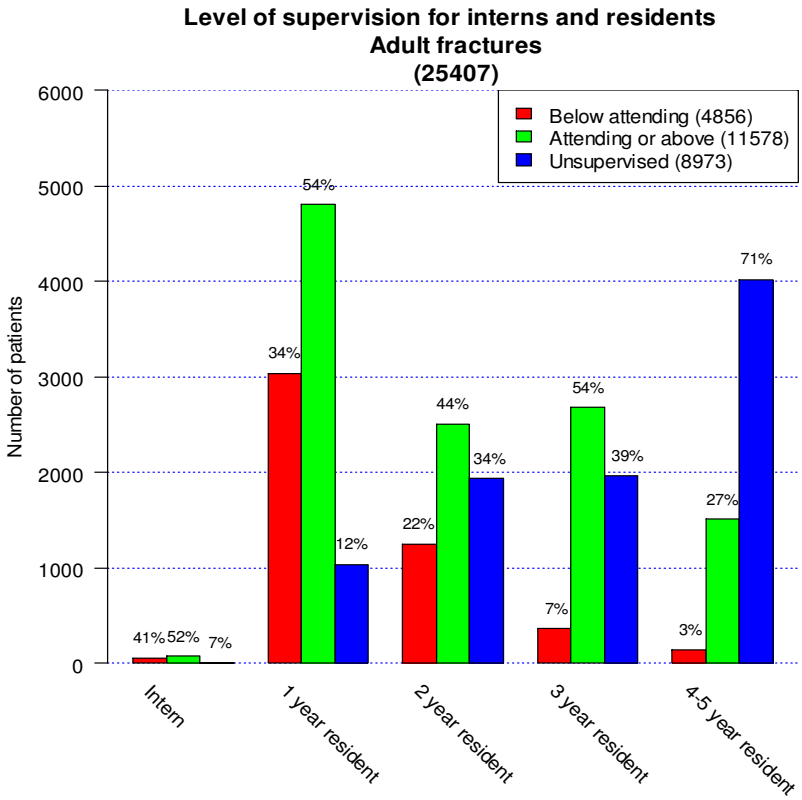

Surgeon level by procedure types
Adult fractures
(47617)
Primary (42591)
Reoperation (3130)
Hardware removal (1896)
Number of patients
20000
15000
10000
5000
0
0% 1% 1%
21% 13% 22%
13% 7% 8%
12% 8% 12%
14% 10% 11%
36% 52% 42%
4% 8% 4%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

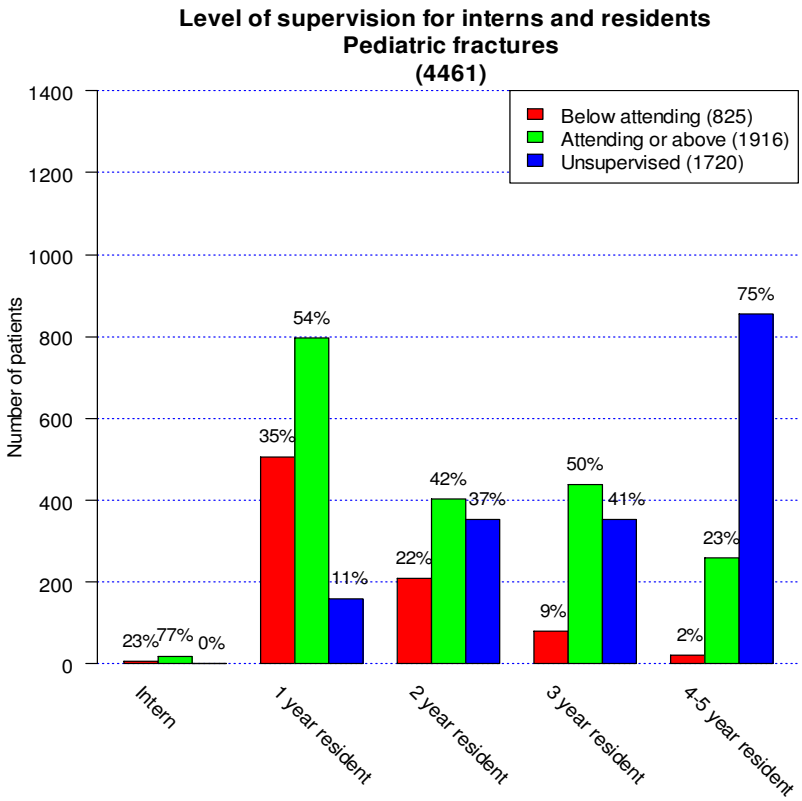

Surgeon level by procedure types
Pediatric
(7948)
Primary (7583)
Reoperation (282)
Hardware removal (83)
Number of patients
4000
3000
2000
1000
0
0% 0% 0%
19% 10% 12%
13% 9% 11%
11% 9% 6%
15% 12% 16%
37% 51% 51%
3% 8% 5%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

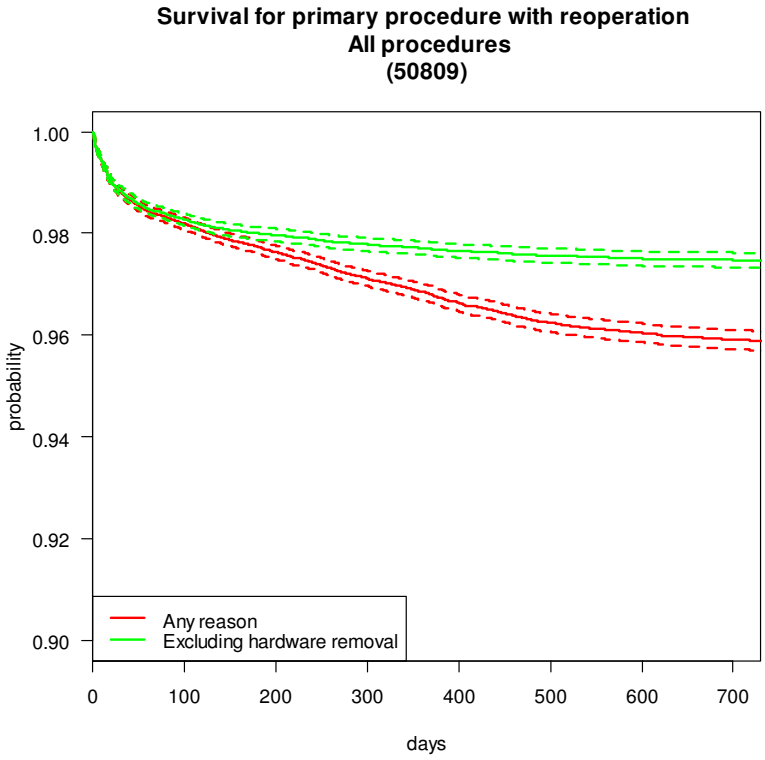

Time of primary procedure by surgeons level
Adult fractures
(42588)
Intern (150)
1 year resident (8910)
2 year resident (5712)
3 year resident (5014)
4-5 year resident (5770)
Attending (15142)
Traumatologist (1890)
Number of patients
0
1000
2000
3000
4000
5000
6000
7000
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Time of day

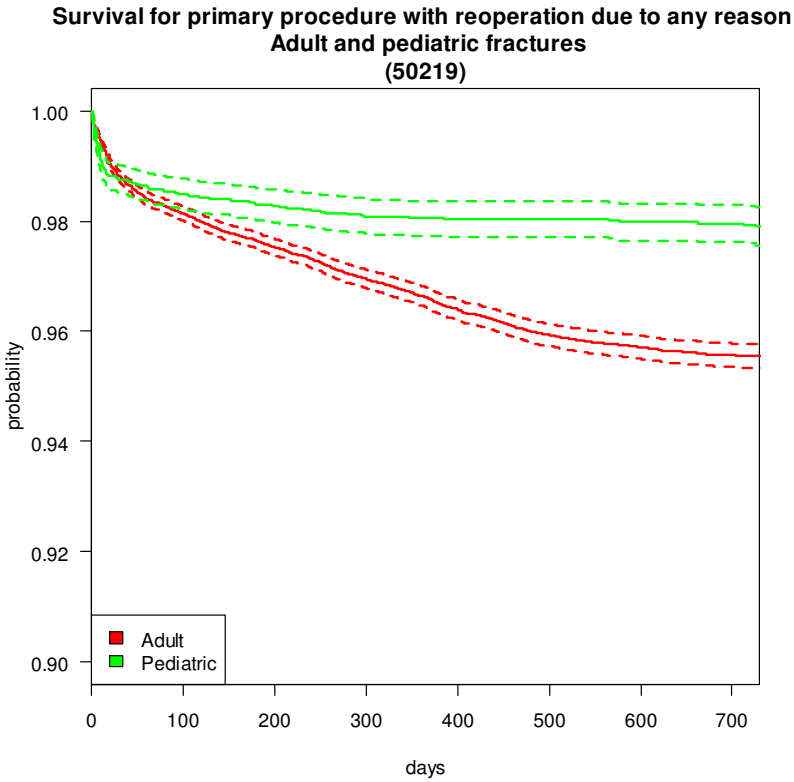

Time of primary surgery by surgeons level
Pediatric fractures
(7583)
Intern (28)
1 year resident (1464)
2 year resident (967)
3 year resident (872)
4-5 year resident (1161)
Attending (2838)
Traumatologist (253)
Number of patients
0
200
400
600
800
1000
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Time of day

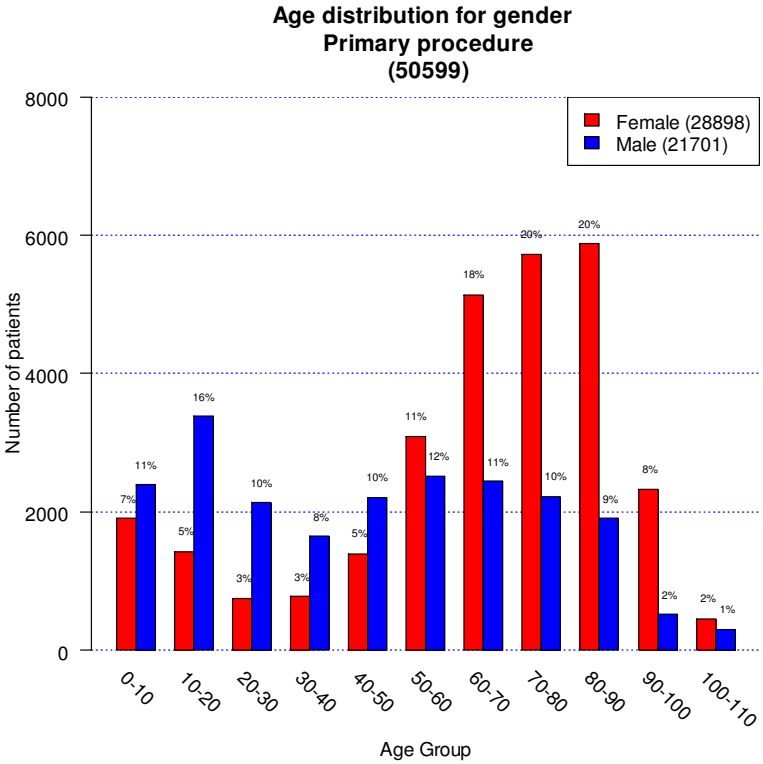

Level of supervision for all fracture types
Primary procedure
(49567)
Number of patients
35000
30000
25000
20000
15000
10000
5000
0
0%
0%
1%
2%
8%
27%
3%
58%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

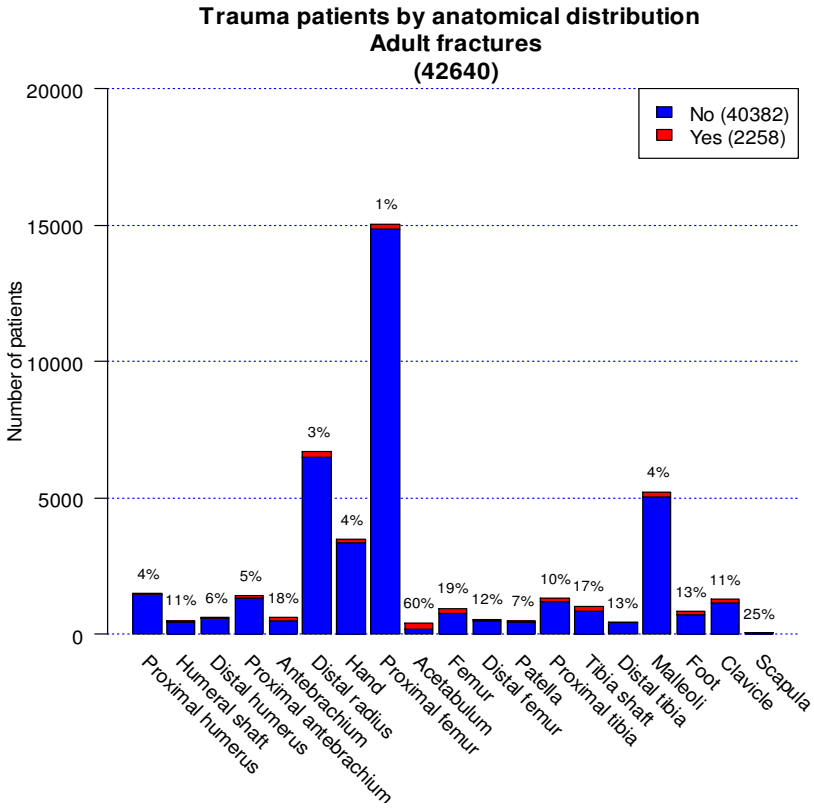

Level of supervision for interns and residents
Adult fractures
(25407)
Below attending (4856)
Attending or above (11578)
Unsupervised (8973)
Number of patients
6000
5000
4000
3000
2000
1000
0
41%
52%
7%
34%
54%
12%
22%
44%
34%
7%
54%
39%
3%
27%
71%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident

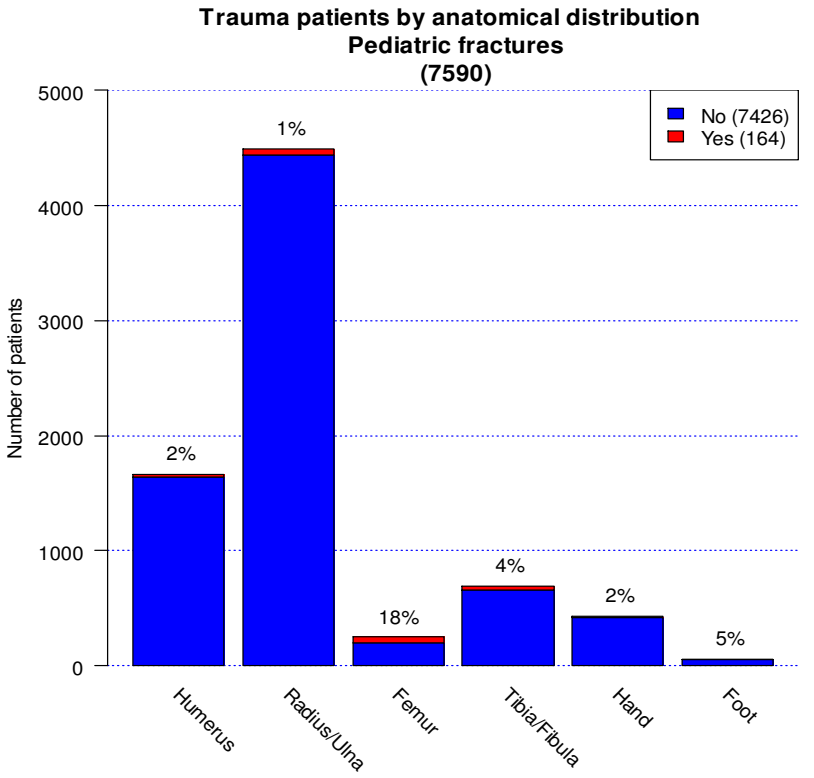

Level of supervision for interns and residents
Pediatric fractures
(4461)
Below attending (825)
Attending or above (1916)
Unsupervised (1720)
Number of patients
1400
1200
1000
800
600
400
200
0
23%
77%
0%
35%
54%
11%
22%
42%
37%
9%
50%
41%
2%
23%
75%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident


Survival for primary procedure with reoperation
All procedures
(50809)
probability
1.00
0.98
0.96
0.94
0.92
0.90
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days


Survival for primary procedure with reoperation due to any reason
Adult and pediatric fractures
(50219)
1.00
0.98
0.96
0.94
0.92
0.90
probability
Adult
Pediatric
0
100
200
300
400
500
600
700
days


Age distribution for gender
Primary procedure
(50599)
8000
6000
4000
2000
0
Number of patients
Female (28898)
Male (21701)
7%
11%
5%
16%
3%
10%
3%
8%
5%
10%
11%
12%
18%
11%
20%
10%
20%
9%
8%
2%
2%
1%
0-10
10-20
20-30
30-40
40-50
50-60
60-70
70-80
80-90
90-100
100-110
Age Group

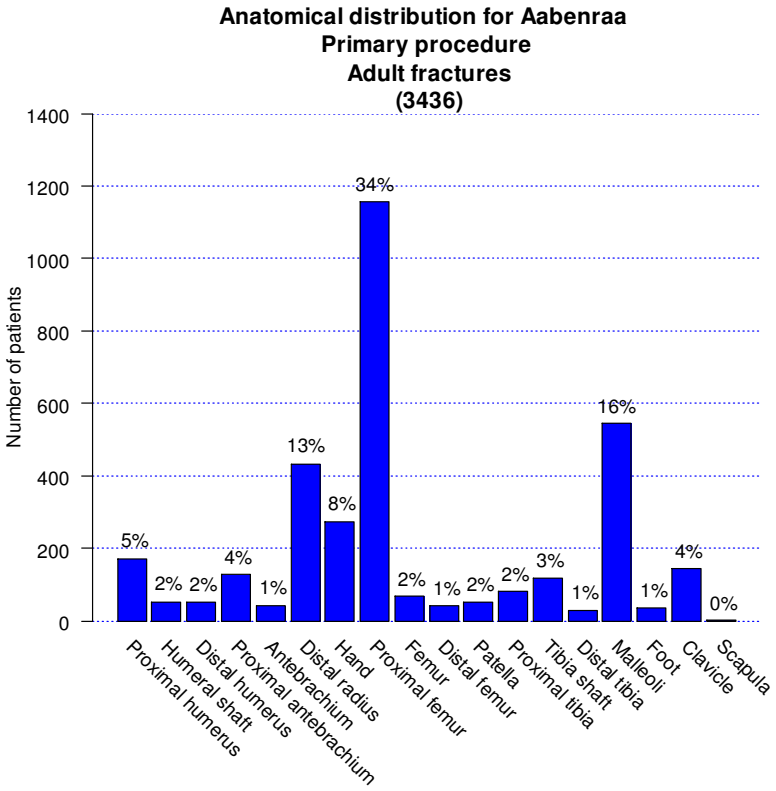

Trauma patients by anatomical distribution
Adult fractures
(42640)
No (40382)
Yes (2258)
Number of patients
20000
15000
10000
5000
0
4%
11%
6%
5%
18%
3%
4%
1%
60%
19%
12%
7%
10%
17%
13%
4%
13%
11%
25%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

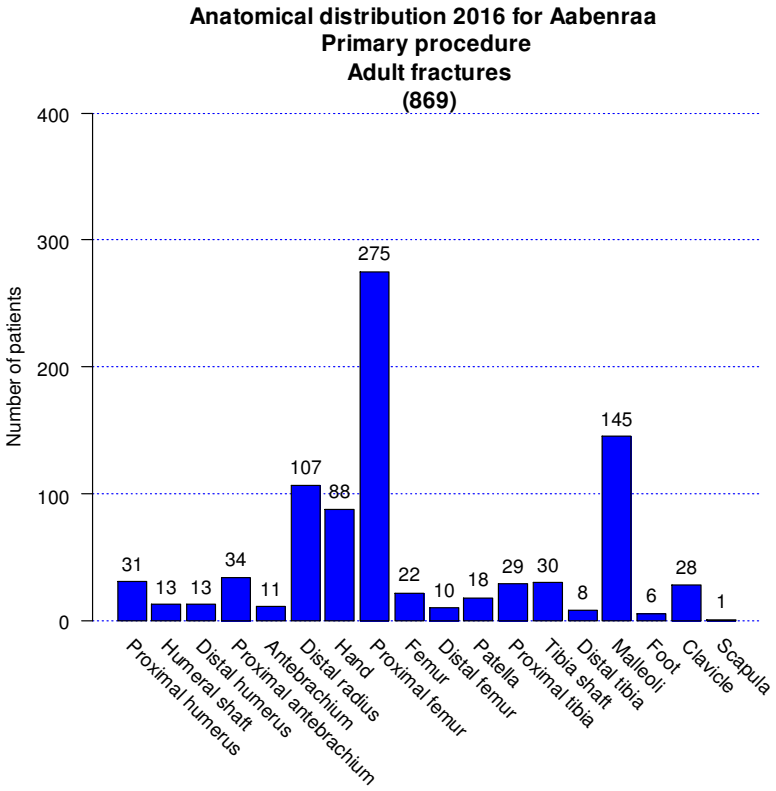

Trauma patients by anatomical distribution
Pediatric fractures
(7590)
No (7426)
Yes (164)
Number of patients
5000
4000
3000
2000
1000
0
2%
1%
18%
4%
2%
5%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

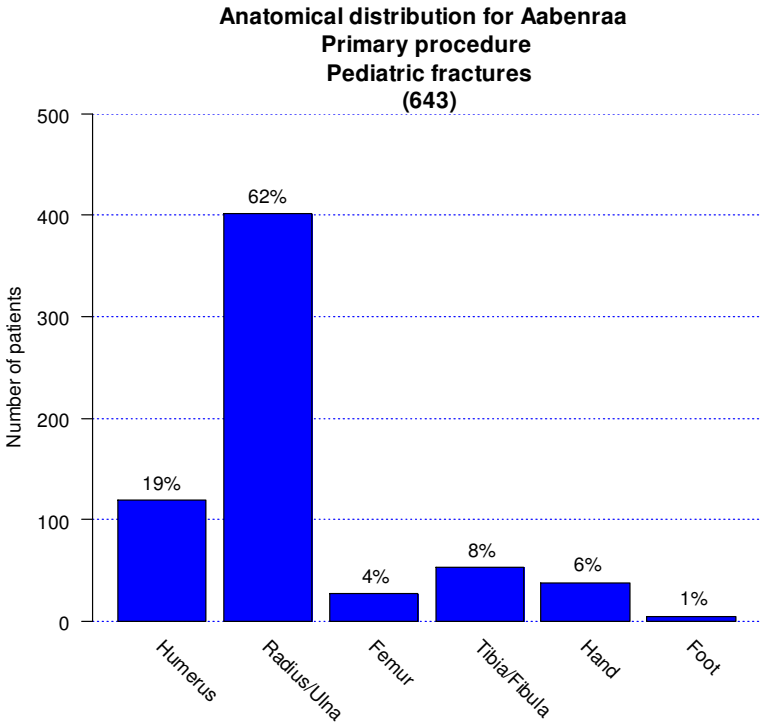
Department specific data

This section provides department specific data for all 21 participating departments. The data covers anatomical distribution for primary procedure for adults and pediatric.

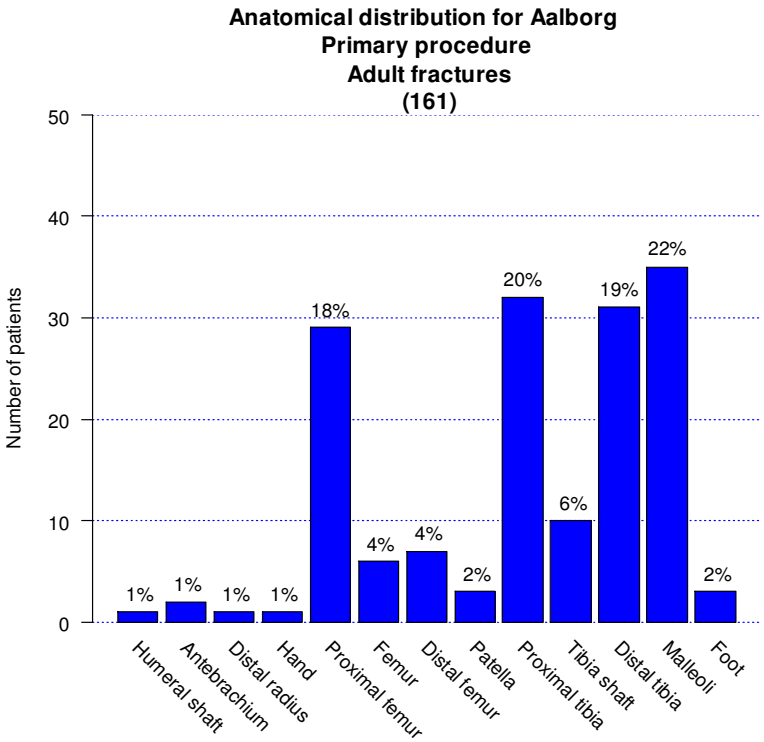
Aabenraa

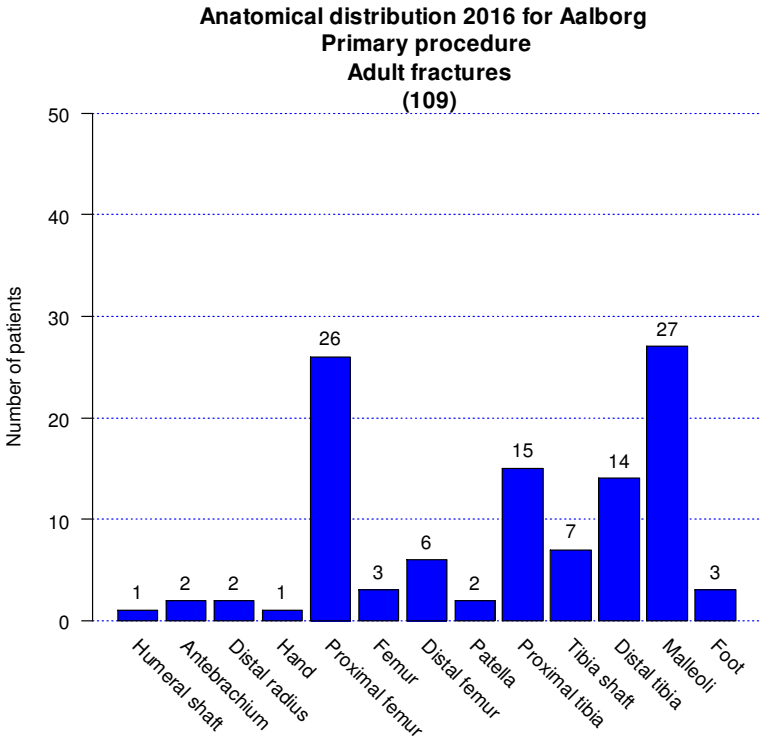


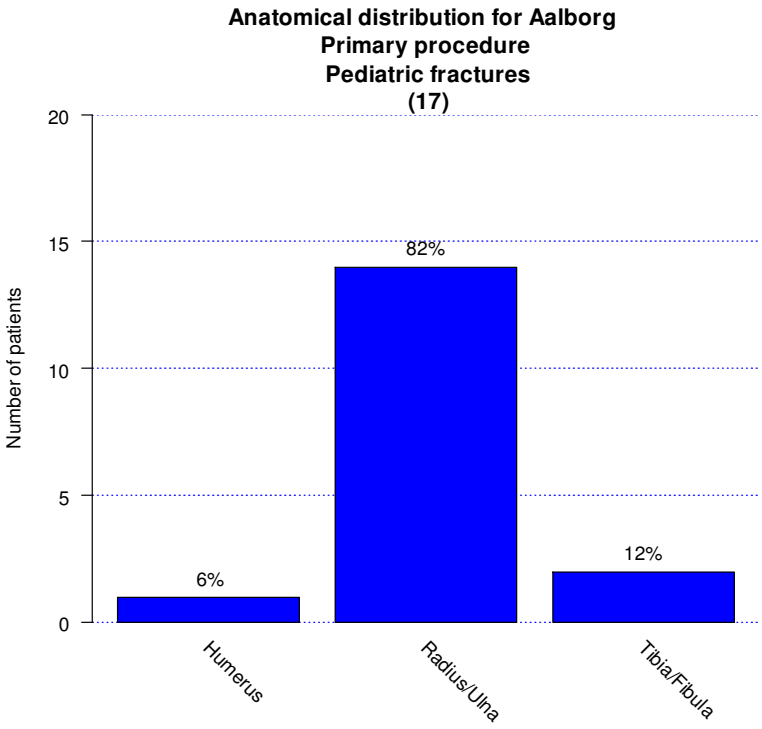



Anatomical distribution for Aabenraa
Primary procedure
Pediatric fractures
(643)
Number of patients
500
400
300
200
100
0
19%
62%
4%
8%
6%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

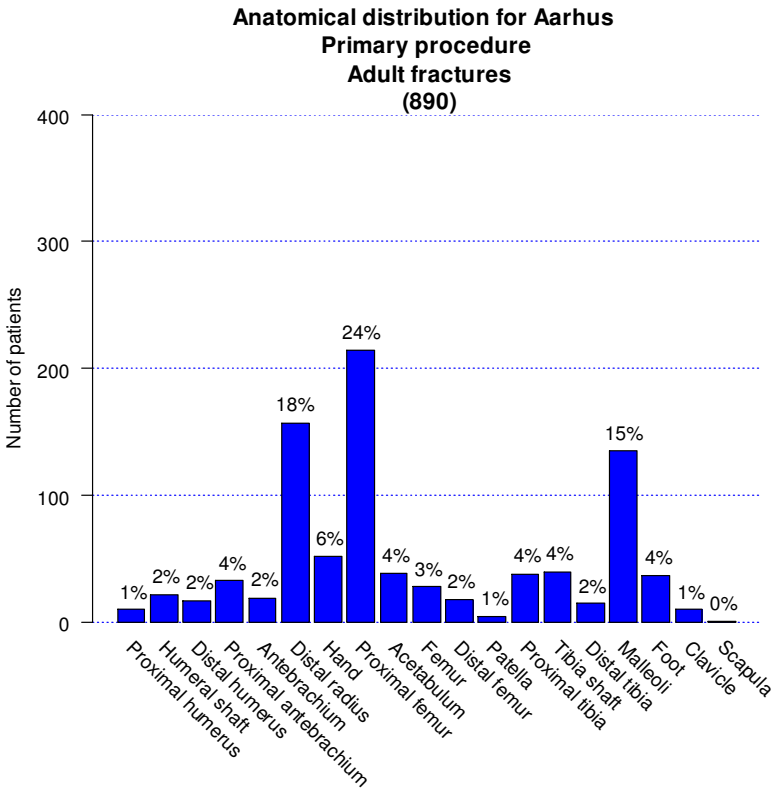
Aalborg

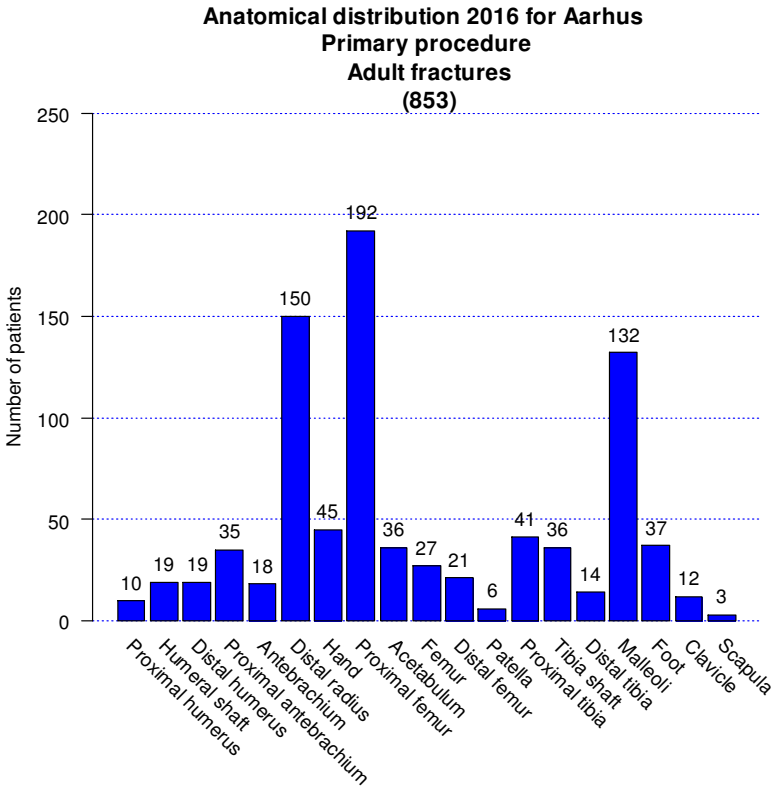

Anatomical distribution for Aalborg
Primary procedure
Adult fractures
(161)
Number of patients
0
10
20
30
40
50
1%
1%
1%
1%
18%
4%
4%
2%
20%
6%
19%
22%
2%
Humeral shaft
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot

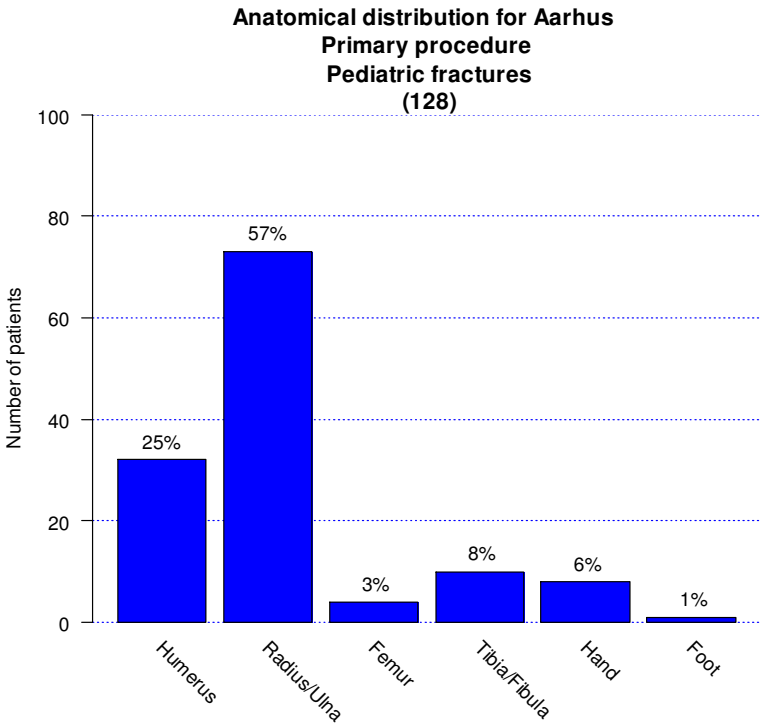

Anatomical distribution 2016 for Aalborg
Primary procedure
Adult fractures
(109)
Number of patients
0
10
20
30
40
50
1
2
2
1
26
3
6
2
15
7
14
27
3
Humeral shaft
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot


Anatomical distribution for Aalborg
Primary procedure
Pediatric fractures
(17)
Number of patients
20
15
10
5
0
6%
82%
12%
Humerus
Radius/Ulna
Tibia/Fibula

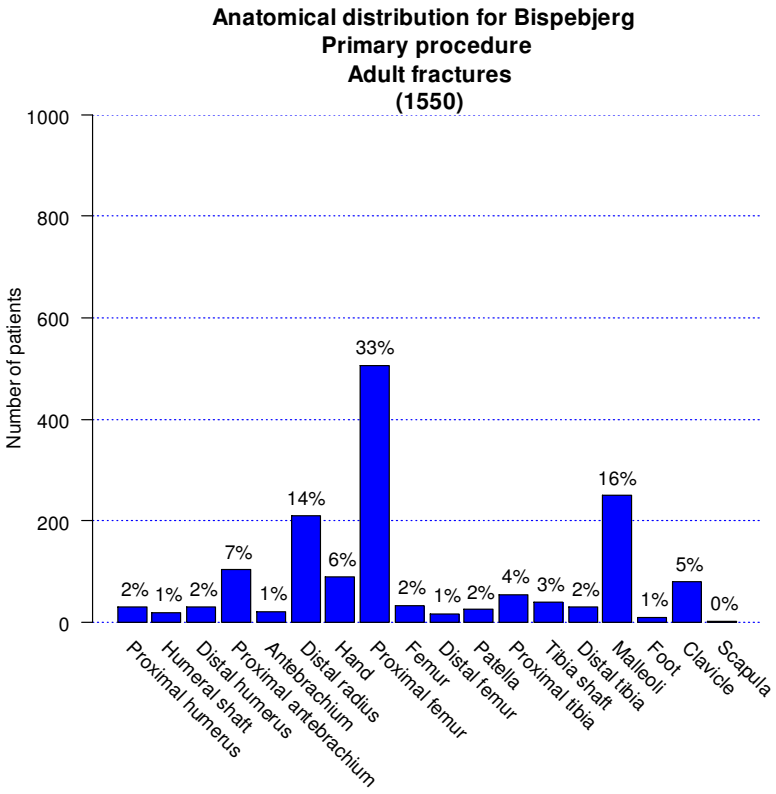
Aarhus

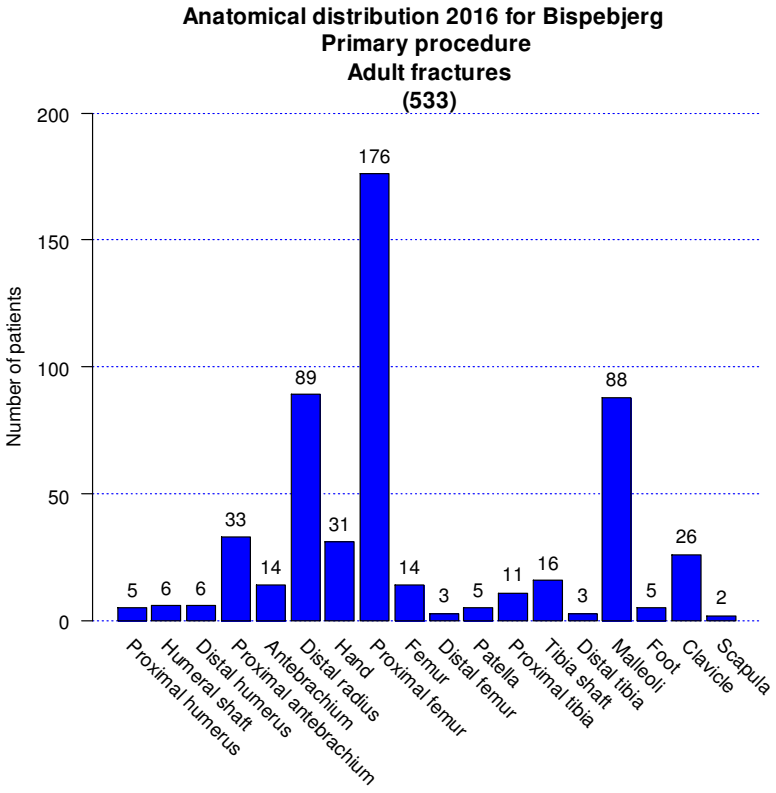

Anatomical distribution for Aarhus
Primary procedure
Adult fractures
(890)
Number of patients
400
300
200
100
0
1%
2%
2%
4%
2%
18%
6%
24%
4%
3%
2%
1%
4%
4%
2%
15%
4%
1%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

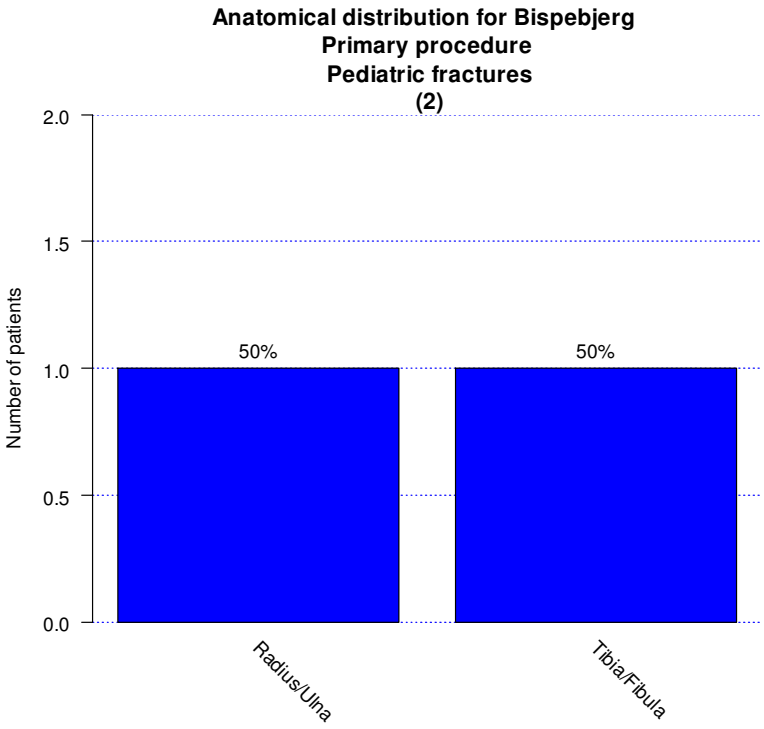

Anatomical distribution 2016 for Aarhus
Primary procedure
Adult fractures
(853)
Number of patients
250
200
150
100
50
0
10
19
19
35
18
150
45
192
36
27
21
6
41
36
14
132
37
12
3
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula


Anatomical distribution for Aarhus
Primary procedure
Pediatric fractures
(128)
Number of patients
100
80
60
40
20
0
25%
57%
3%
8%
6%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

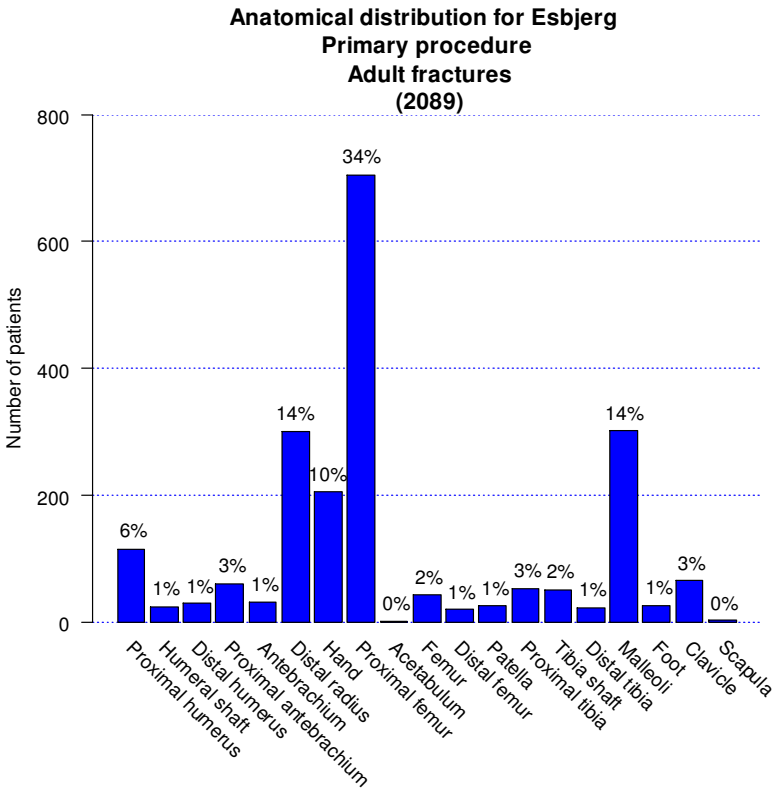
Bispebjerg

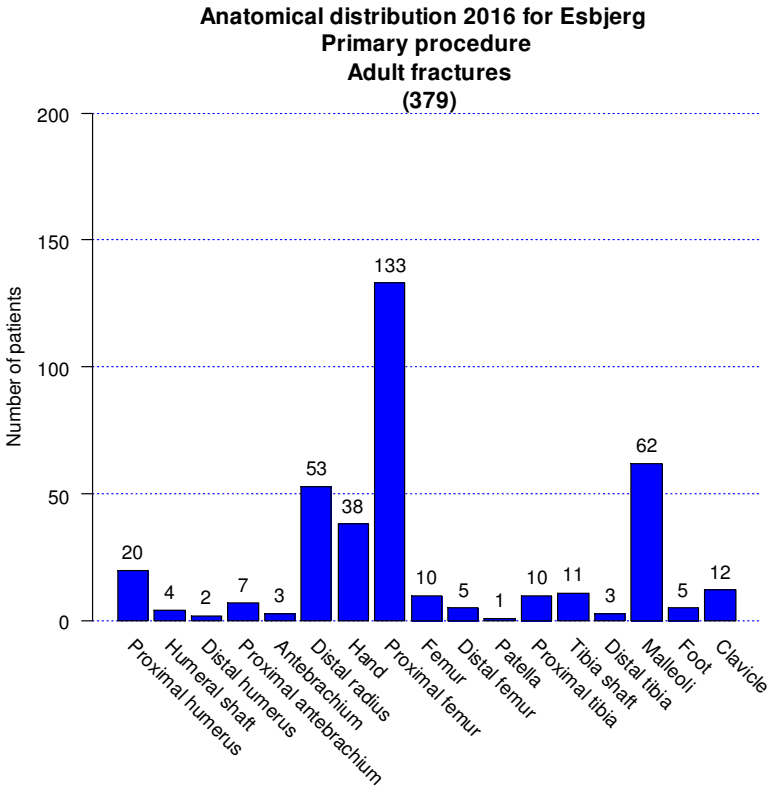

Anatomical distribution for Bispebjerg
Primary procedure
Adult fractures
(1550)
Number of patients
1000
800
600
400
200
0
2%
1%
2%
7%
1%
14%
6%
33%
2%
1%
2%
4%
3%
2%
16%
1%
5%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

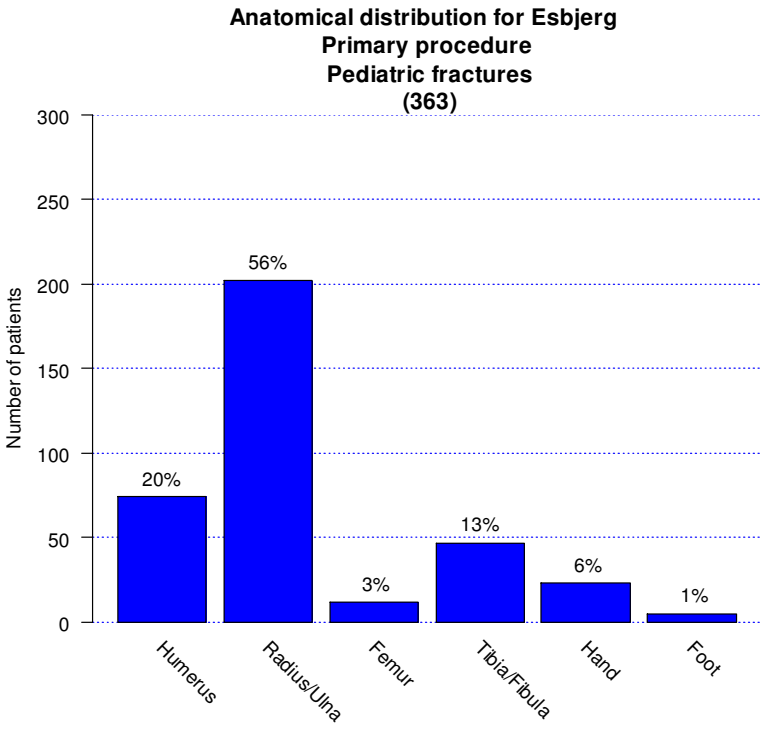

Anatomical distribution 2016 for Bispebjerg
Primary procedure
Adult fractures
(533)
Number of patients
200
150
100
50
0
5
6
6
33
14
89
31
176
14
3
5
11
16
3
88
5
26
2
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

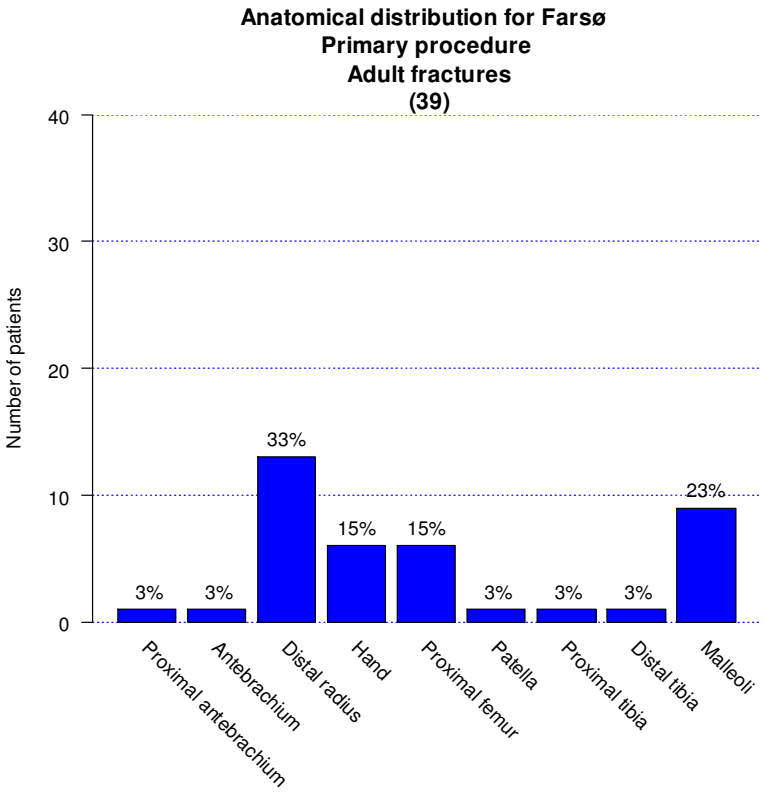

Anatomical distribution for Bispebjerg
Primary procedure
Pediatric fractures
(2)
Number of patients
2.0
1.5
1.0
0.5
0.0
50%
50%
Radius/Ulna
Tibia/Fibula

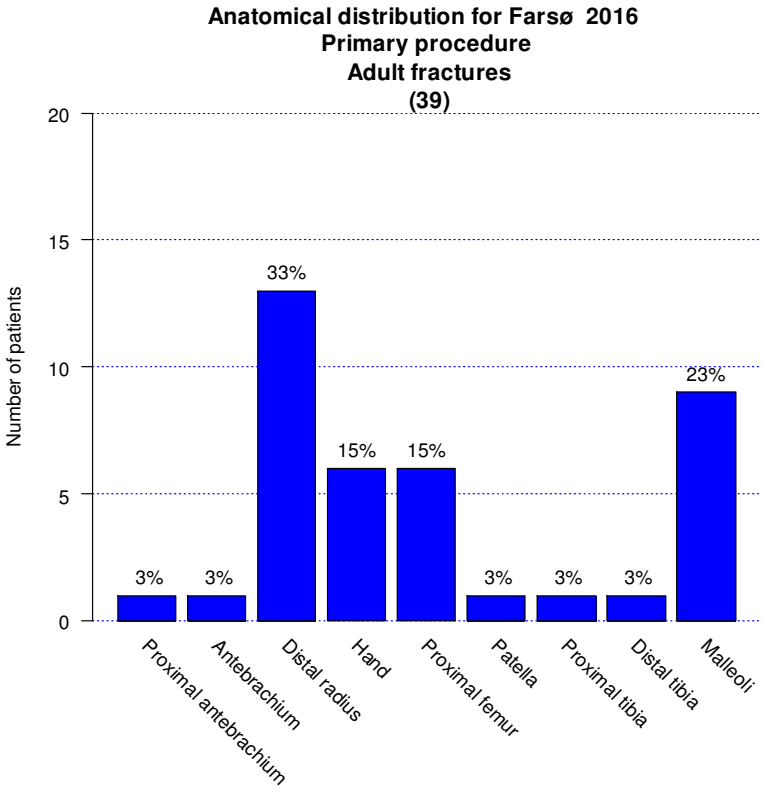
Esbjerg


Anatomical distribution for Esbjerg
Primary procedure
Adult fractures
(2089)
Number of patients
800
600
400
200
0
6%
1%
1%
3%
1%
14%
10%
34%
0%
2%
1%
1%
3%
2%
1%
14%
1%
3%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

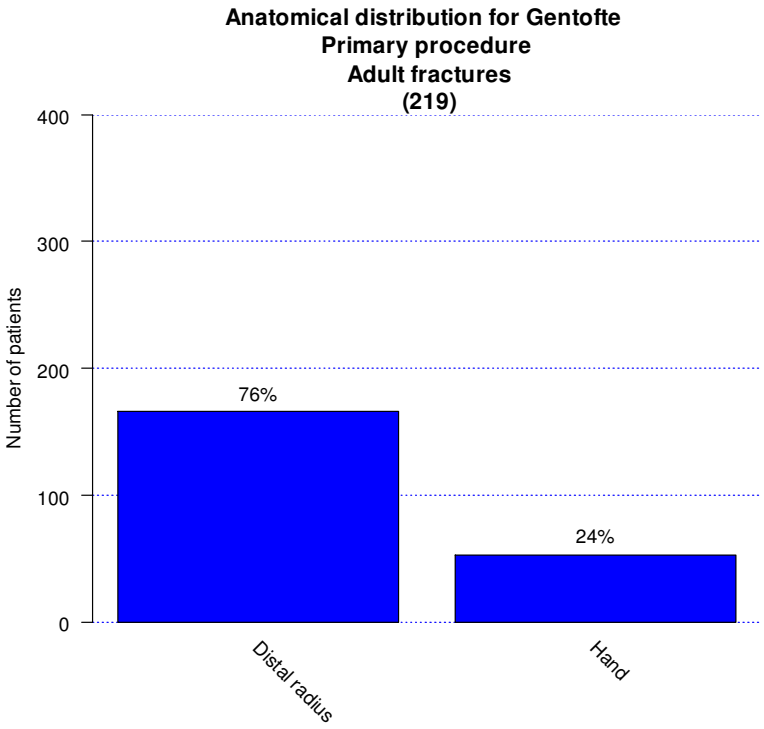

Anatomical distribution 2016 for Esbjerg
Primary procedure
Adult fractures
(379)
Number of patients
200
150
100
50
0
20
4
2
7
3
53
38
133
10
5
1
10
11
3
62
5
12
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle

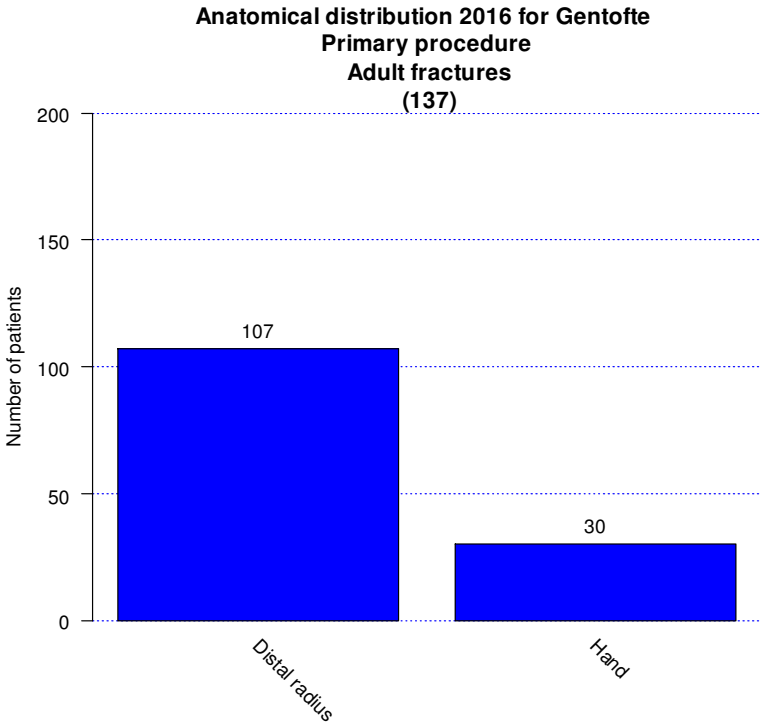

Anatomical distribution for Esbjerg
Primary procedure
Pediatric fractures
(363)
Number of patients
300
250
200
150
100
50
0
20%
56%
3%
13%
6%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

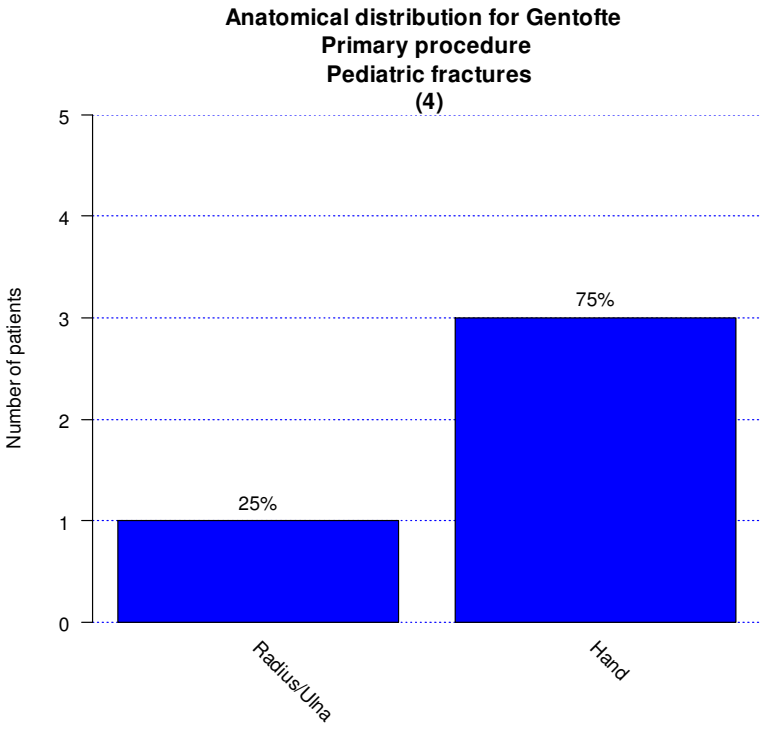

Anatomical distribution for Farsø
Primary procedure
Adult fractures
(39)
Number of patients
40
30
20
10
0
3%
3%
33%
15%
15%
3%
3%
3%
23%
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Patella
Proximal tibia
Distal tibia
Malleoli


Anatomical distribution for Farsø 2016
Primary procedure
Adult fractures
(39)
Number of patients
20
15
10
5
0
3%
3%
33%
15%
15%
3%
3%
3%
23%
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Patella
Proximal tibia
Distal tibia
Malleoli

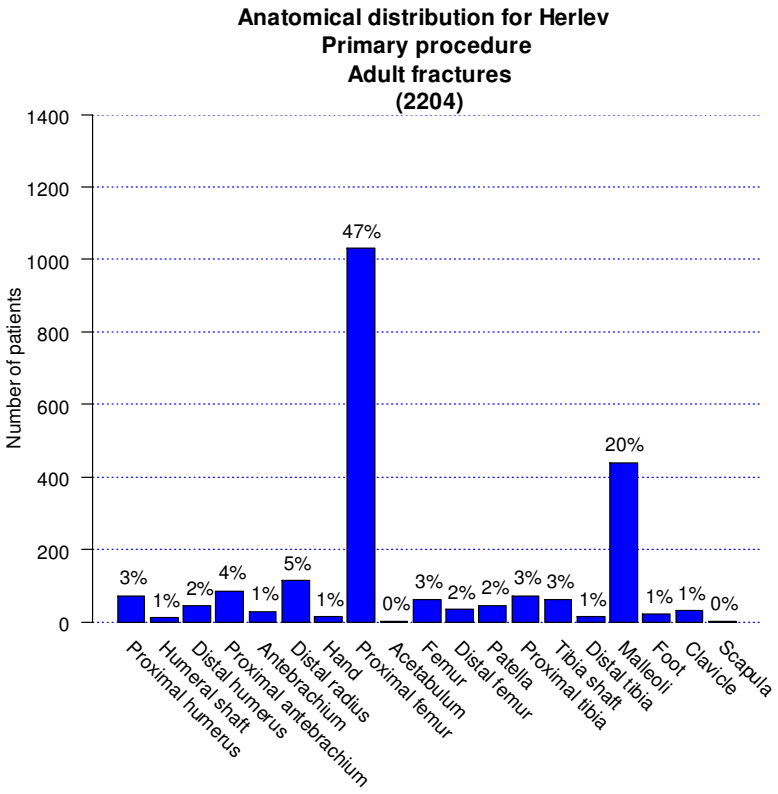
Gentofte

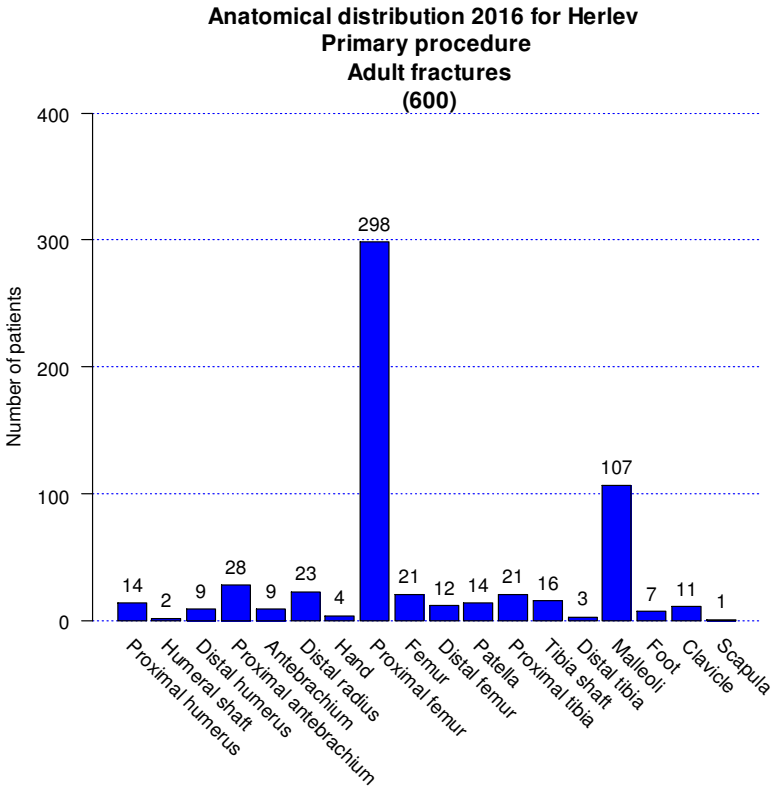

Anatomical distribution for Gentofte
Primary procedure
Adult fractures
(219)
Number of patients
400
300
200
100
0
76%
24%
Distal radius
Hand

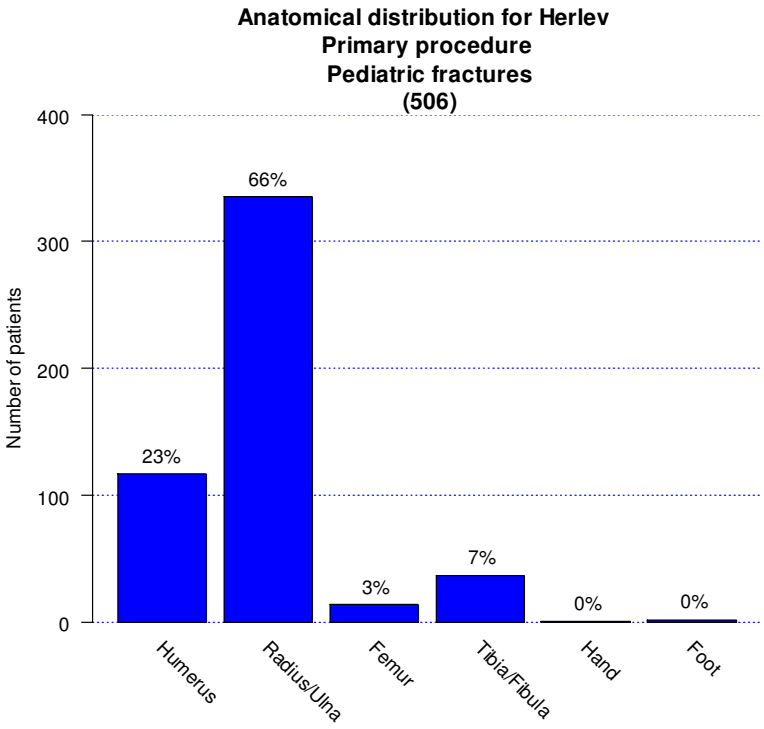

Anatomical distribution 2016 for Gentofte
Primary procedure
Adult fractures
(137)
Number of patients
200
150
100
50
0
107
30
Distal radius
Hand


Anatomical distribution for Gentofte
Primary procedure
Pediatric fractures
(4)
Number of patients
0
1
2
3
4
5
25%
75%
Radius/Ulna
Hand

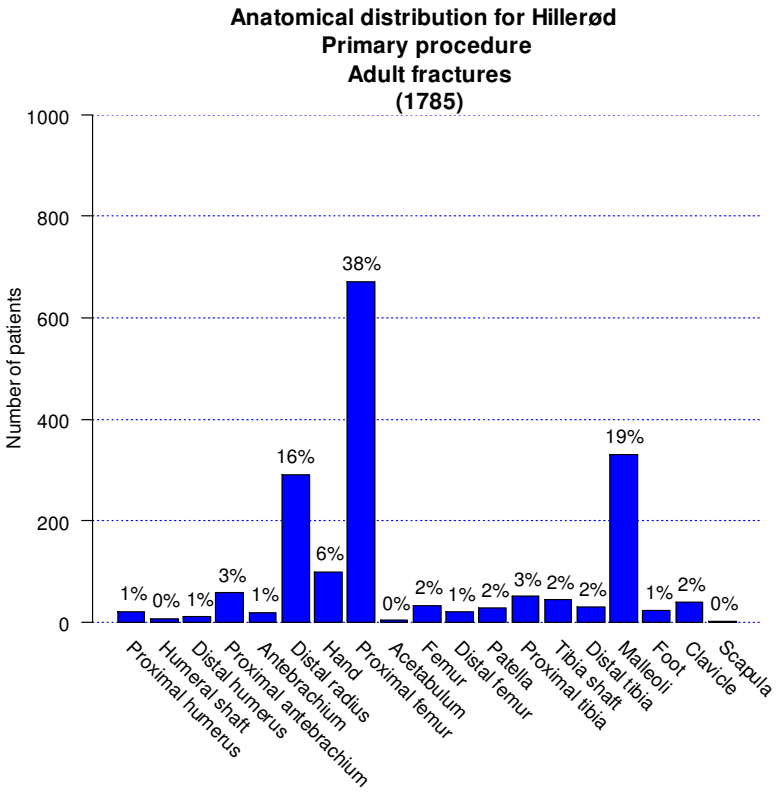
Herlev

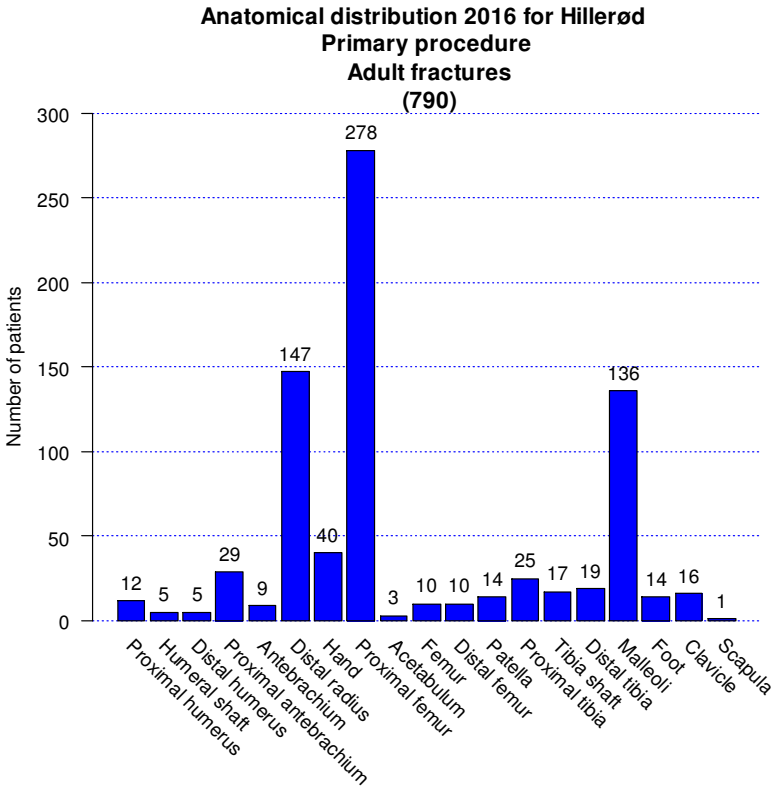

Anatomical distribution for Herlev
Primary procedure
Adult fractures
(2204)
Number of patients
1400
1200
1000
800
600
400
200
0
3%
1%
2%
4%
1%
5%
1%
47%
0%
3%
2%
2%
3%
3%
1%
20%
1%
1%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

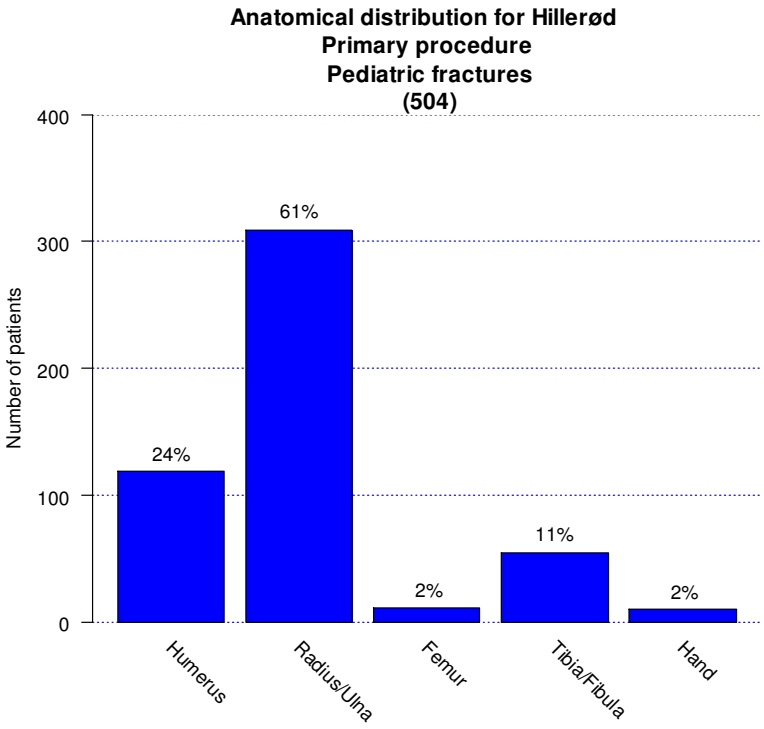

Anatomical distribution 2016 for Herlev
Primary procedure
Adult fractures
(600)
Number of patients
400
300
200
100
0
14
2
9
28
9
23
4
298
21
12
14
21
16
3
107
7
11
1
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula


Anatomical distribution for Herlev
Primary procedure
Pediatric fractures
(506)
Number of patients
400
300
200
100
0
23%
66%
3%
7%
0%
0%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

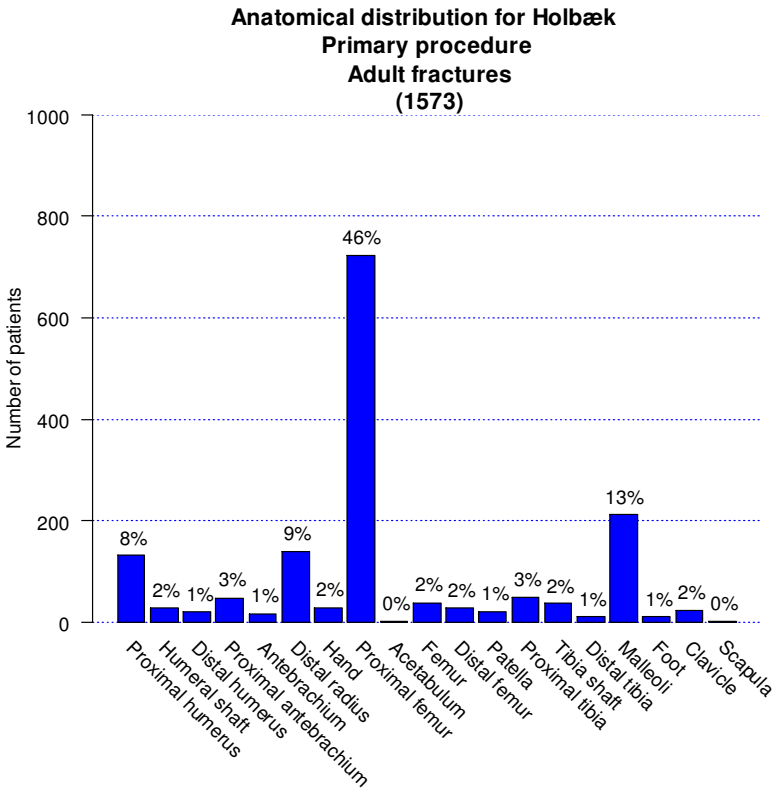
Hillerød

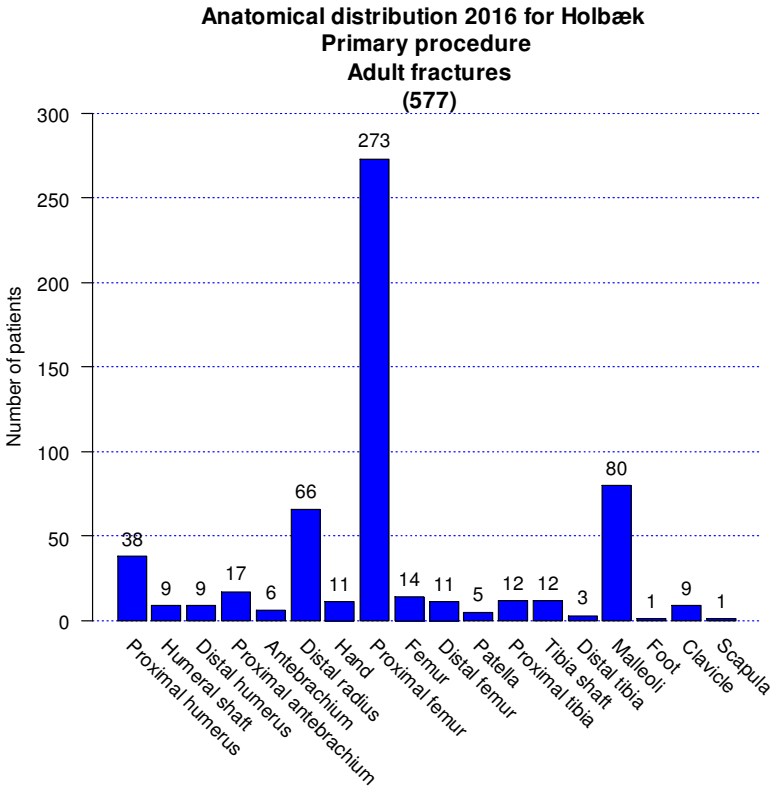

Anatomical distribution for Hillerød
Primary procedure
Adult fractures
(1785)
Number of patients
1000
800
600
400
200
0
1%
0%
1%
3%
1%
16%
6%
38%
0%
2%
1%
2%
3%
2%
2%
19%
1%
2%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

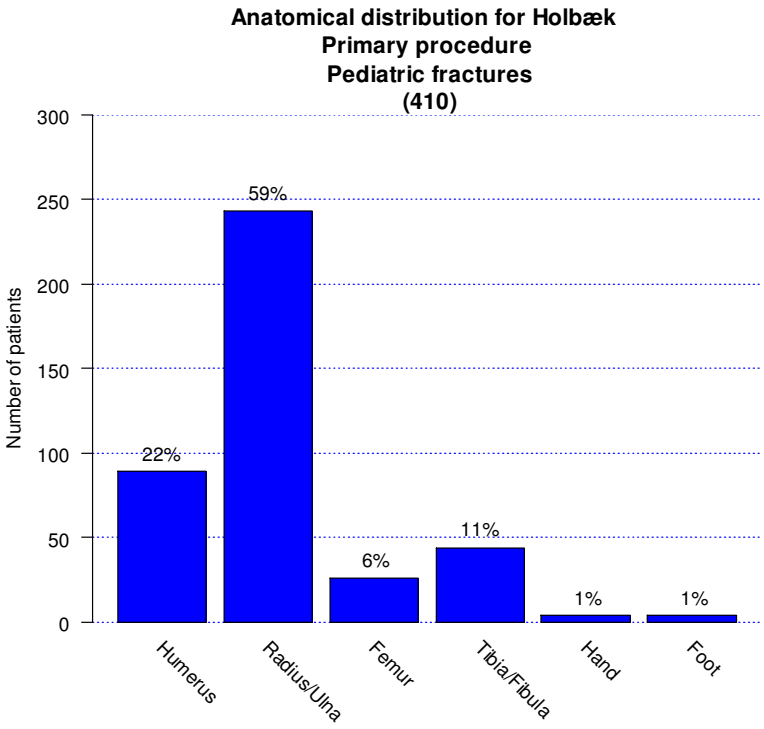

Anatomical distribution 2016 for Hillerød
Primary procedure
Adult fractures
(790)
Number of patients
300
250
200
150
100
50
0
12
5
5
29
9
147
40
278
3
10
10
14
25
17
19
136
14
16
1
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula


Anatomical distribution for Hillerød
Primary procedure
Pediatric fractures
(504)
Number of patients
400
300
200
100
0
24%
61%
2%
11%
2%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand

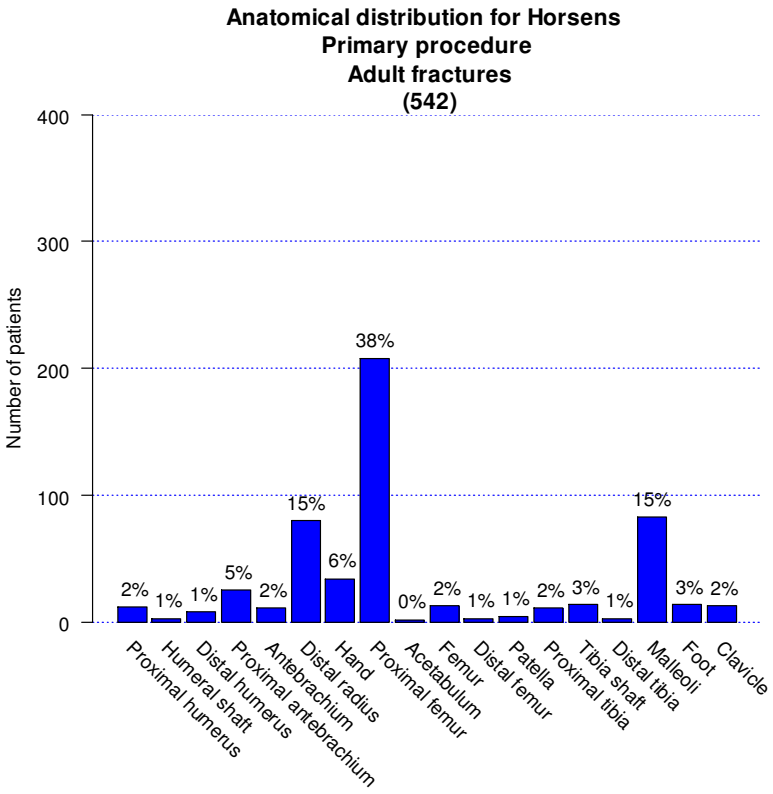
Holbæk

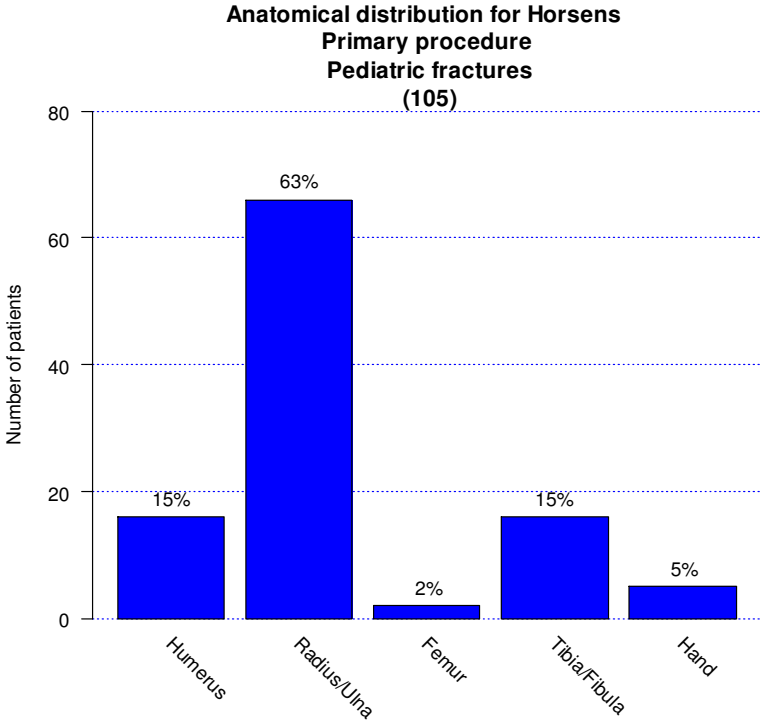

Anatomical distribution for Holbæk
Primary procedure
Adult fractures
(1573)
Number of patients
1000
800
600
400
200
0
8%
2%
1%
3%
1%
9%
2%
46%
0%
2%
2%
1%
3%
2%
1%
13%
1%
2%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula


Anatomical distribution 2016 for Holbæk
Primary procedure
Adult fractures
(577)
Number of patients
300
250
200
150
100
50
0
38
9
9
17
6
66
11
273
14
11
5
12
12
3
80
1
9
1
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

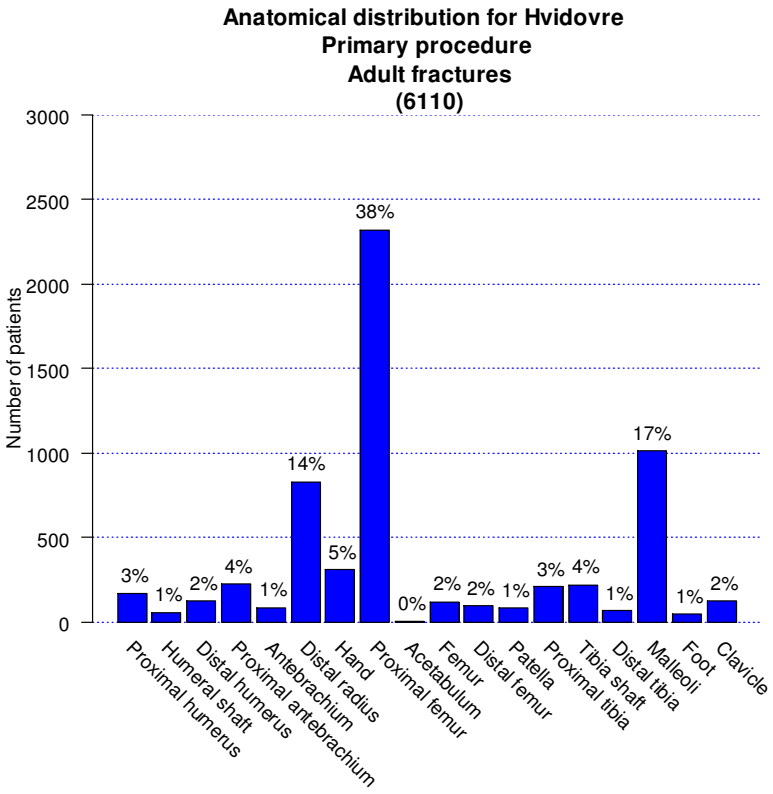

Anatomical distribution for Holbæk
Primary procedure
Pediatric fractures
(410)
Number of patients
300
250
200
150
100
50
0
22%
59%
6%
11%
1%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

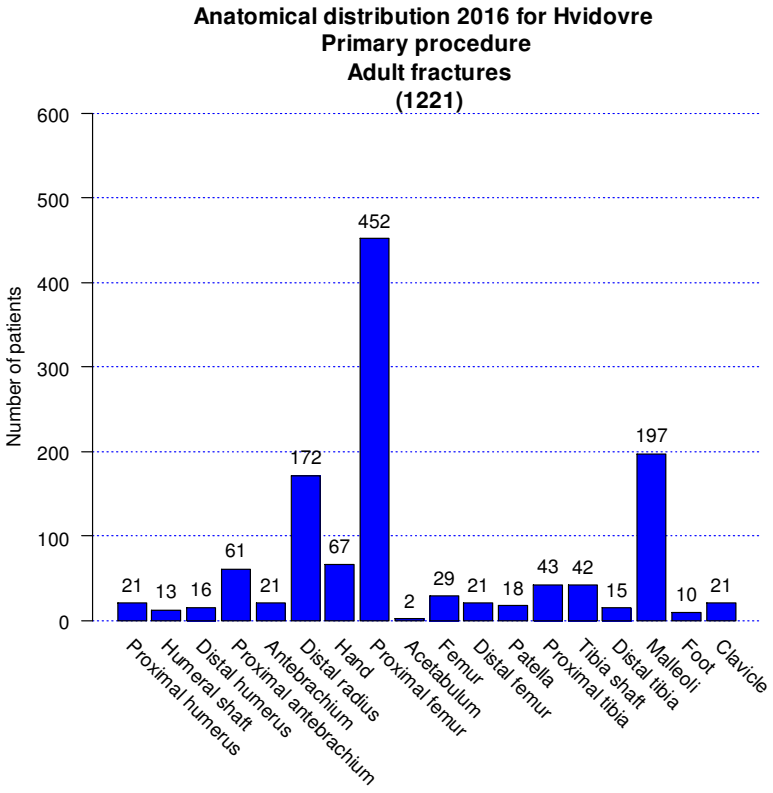
Horsens

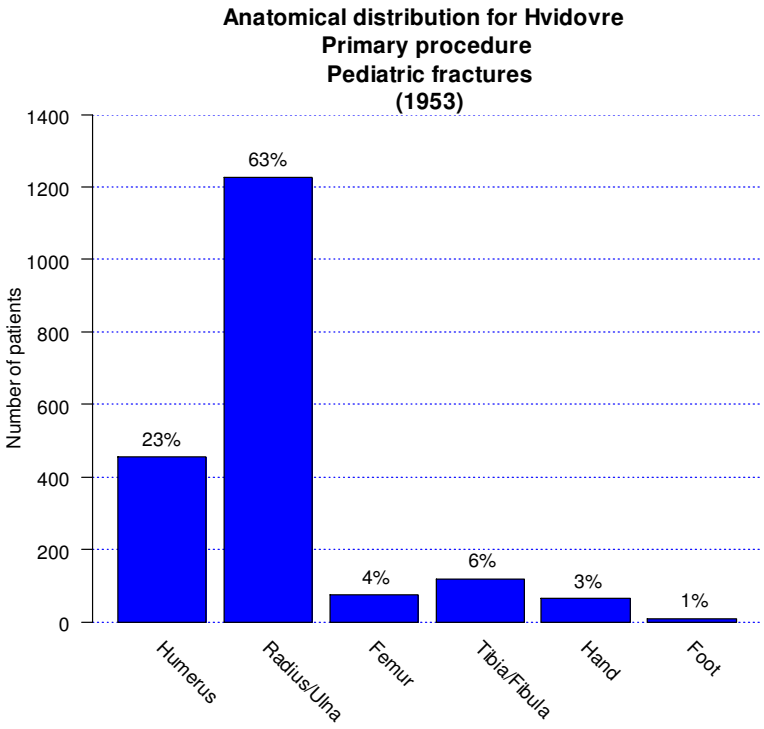

Anatomical distribution for Horsens
Primary procedure
Adult fractures
(542)
Number of patients
400
300
200
100
0
2%
1%
1%
5%
2%
15%
6%
38%
0%
2%
1%
1%
2%
3%
1%
15%
3%
2%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle


Anatomical distribution for Horsens
Primary procedure
Pediatric fractures
(105)
Number of patients
80
60
40
20
0
15%
63%
2%
15%
5%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand

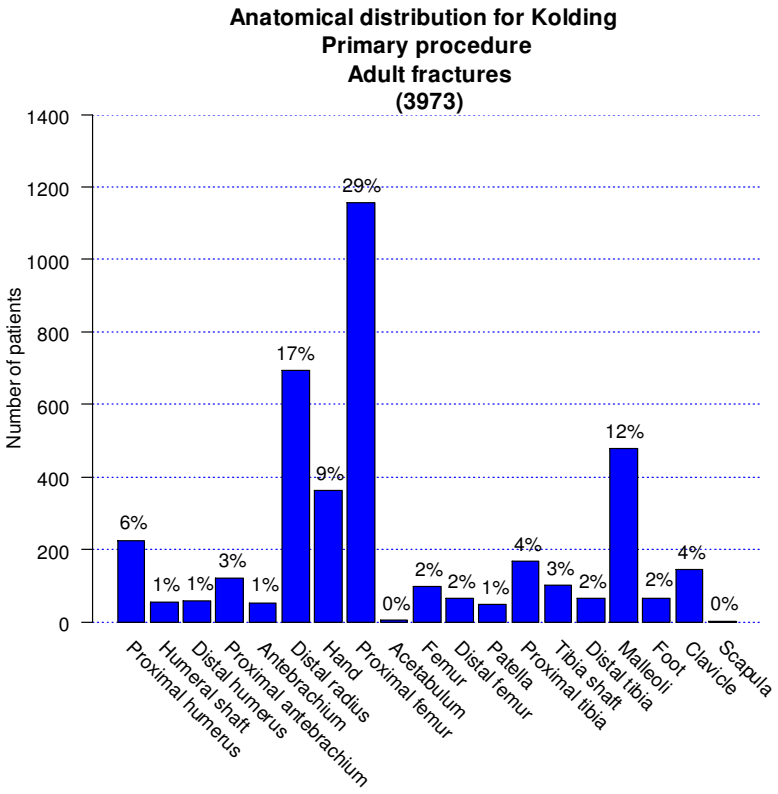
Hvidovre

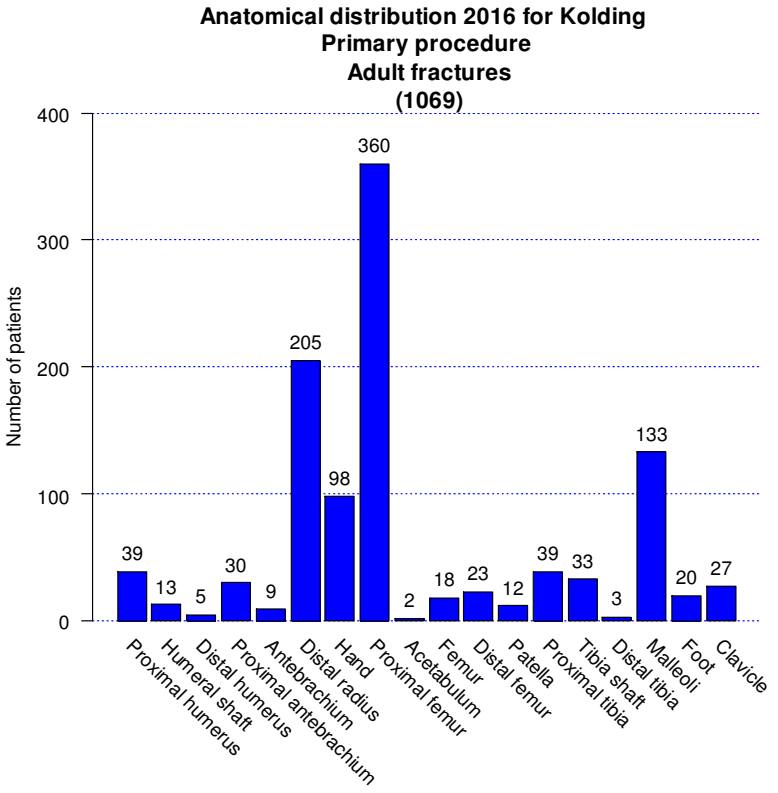

Anatomical distribution for Hvidovre
Primary procedure
Adult fractures
(6110)
Number of patients
3000
2500
2000
1500
1000
500
0
3%
1%
2%
4%
1%
14%
5%
38%
0%
2%
2%
1%
3%
4%
1%
17%
1%
2%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle

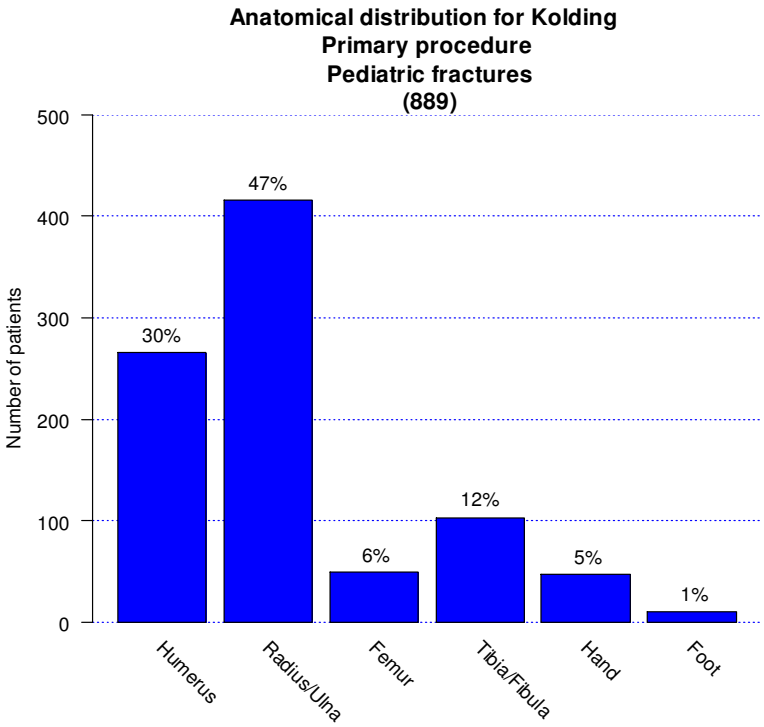

Anatomical distribution 2016 for Hvidovre
Primary procedure
Adult fractures
(1221)
Number of patients
600
500
400
300
200
100
0
21
13
16
61
21
172
67
452
2
29
21
18
43
42
15
197
10
21
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle


Anatomical distribution for Hvidovre
Primary procedure
Pediatric fractures
(1953)
Number of patients
1400
1200
1000
800
600
400
200
0
23%
63%
4%
6%
3%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

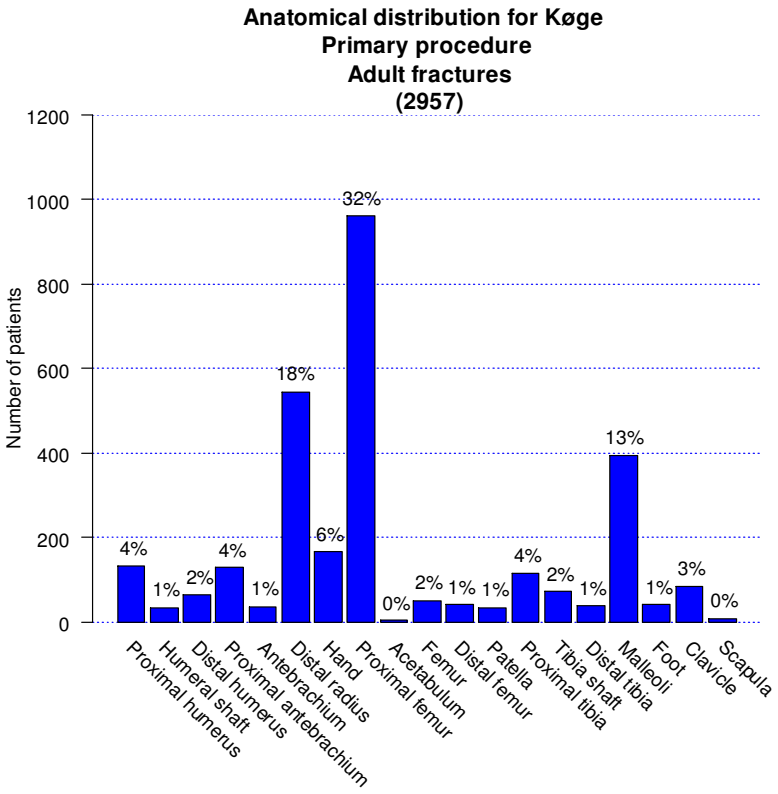
Kolding

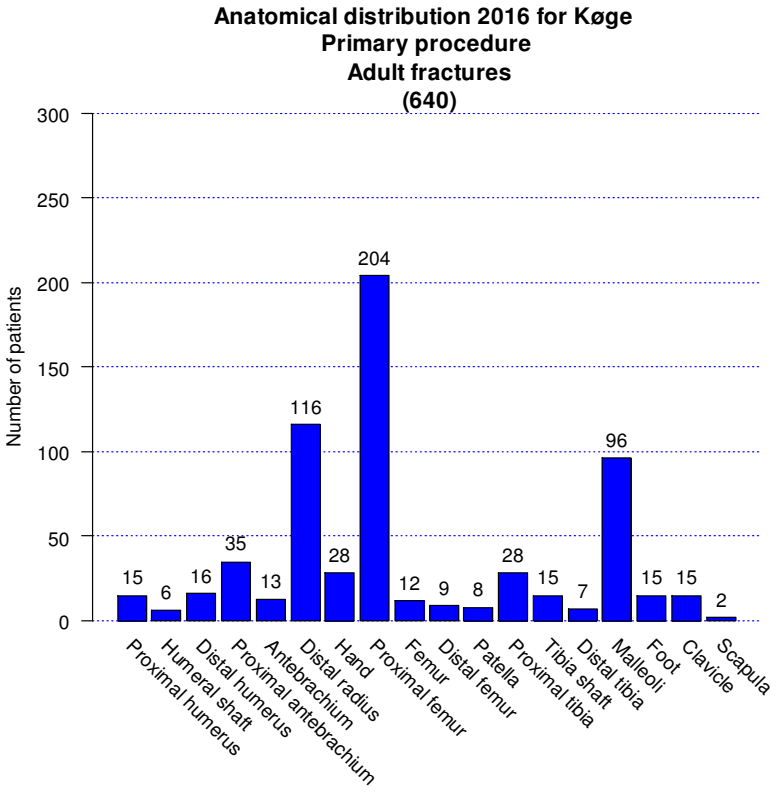

Anatomical distribution for Kolding
Primary procedure
Adult fractures
(3973)
Number of patients
1400
1200
1000
800
600
400
200
0
6%
1%
1%
3%
1%
17%
9%
29%
0%
2%
2%
1%
4%
3%
2%
12%
2%
4%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

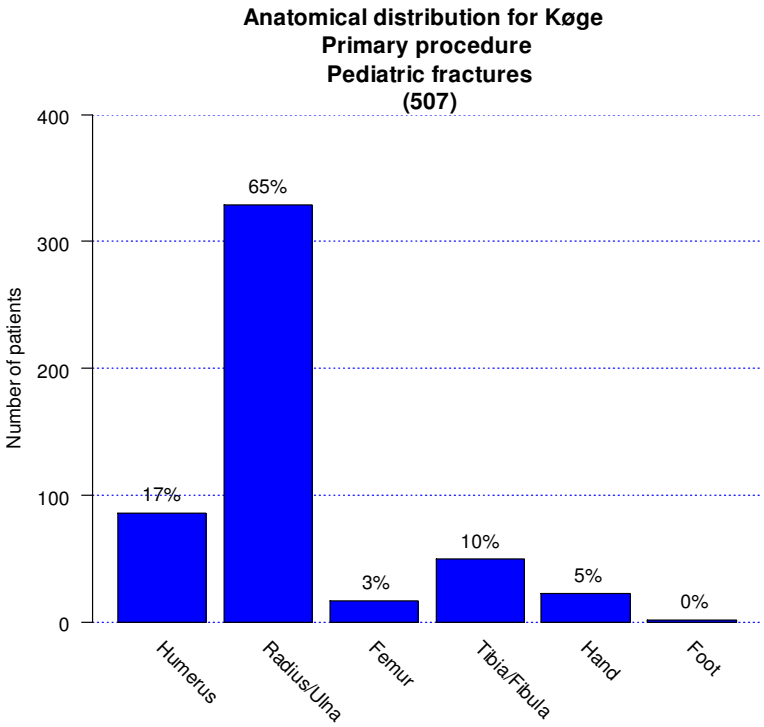

Anatomical distribution 2016 for Kolding
Primary procedure
Adult fractures
(1069)
Number of patients
400
300
200
100
0
39
13
5
30
9
205
98
360
2
18
23
12
39
33
3
133
20
27
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle


Anatomical distribution for Kolding
Primary procedure
Pediatric fractures
(889)
Number of patients
500
400
300
200
100
0
30%
47%
6%
12%
5%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

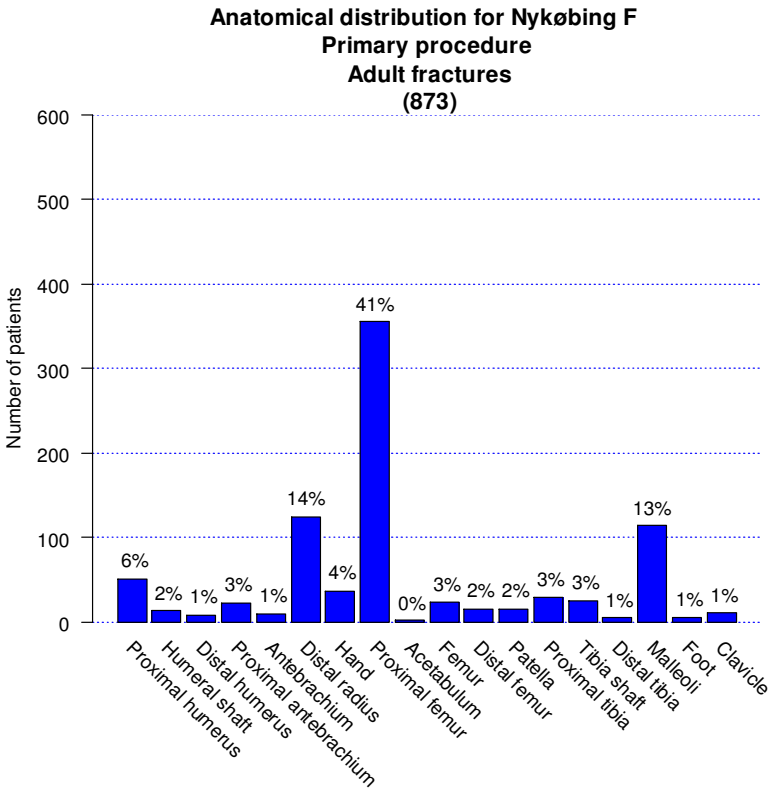
Køge

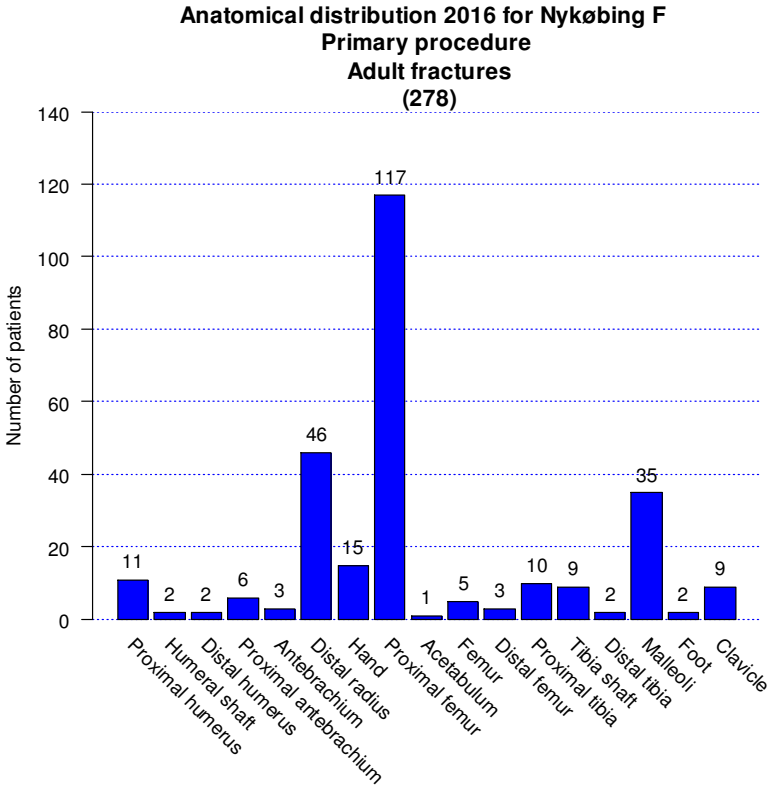

Anatomical distribution for Køge
Primary procedure
Adult fractures
(2957)
Number of patients
1200
1000
800
600
400
200
0
4%
1%
2%
4%
1%
18%
6%
32%
0%
2%
1%
1%
4%
2%
1%
13%
1%
3%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

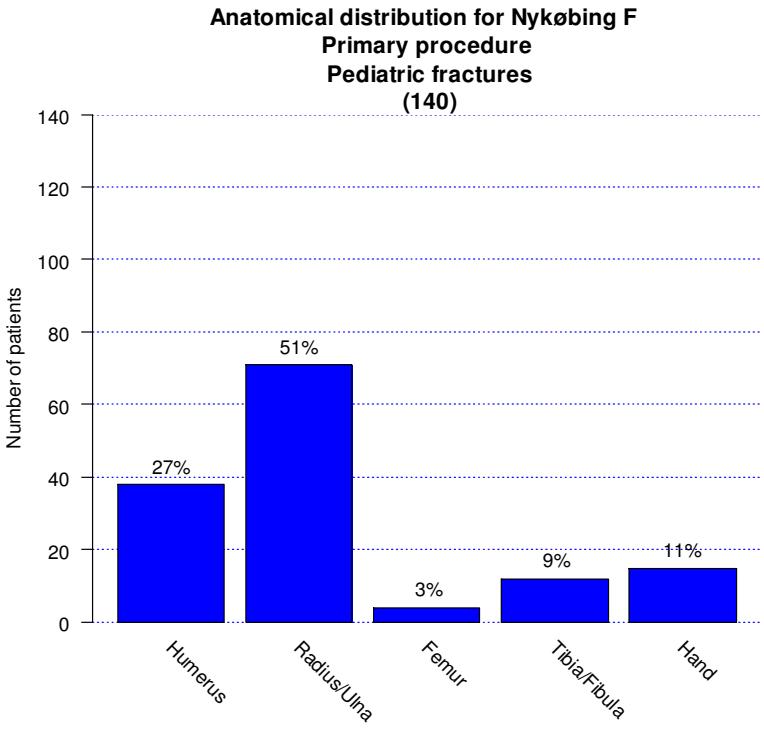

Anatomical distribution 2016 for Køge
Primary procedure
Adult fractures
(640)
Number of patients
300
250
200
150
100
50
0
15
6
16
35
13
116
28
204
12
9
8
28
15
7
96
15
15
2
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula


Anatomical distribution for Køge
Primary procedure
Pediatric fractures
(507)
Number of patients
400
300
200
100
0
65%
17%
10%
3%
5%
0%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

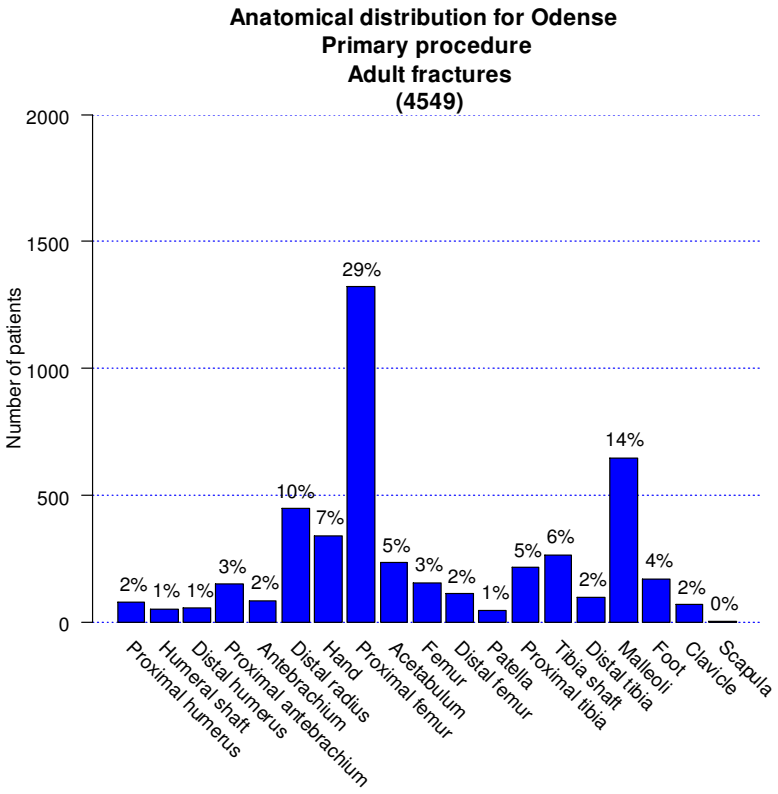
Nykøbing Falster

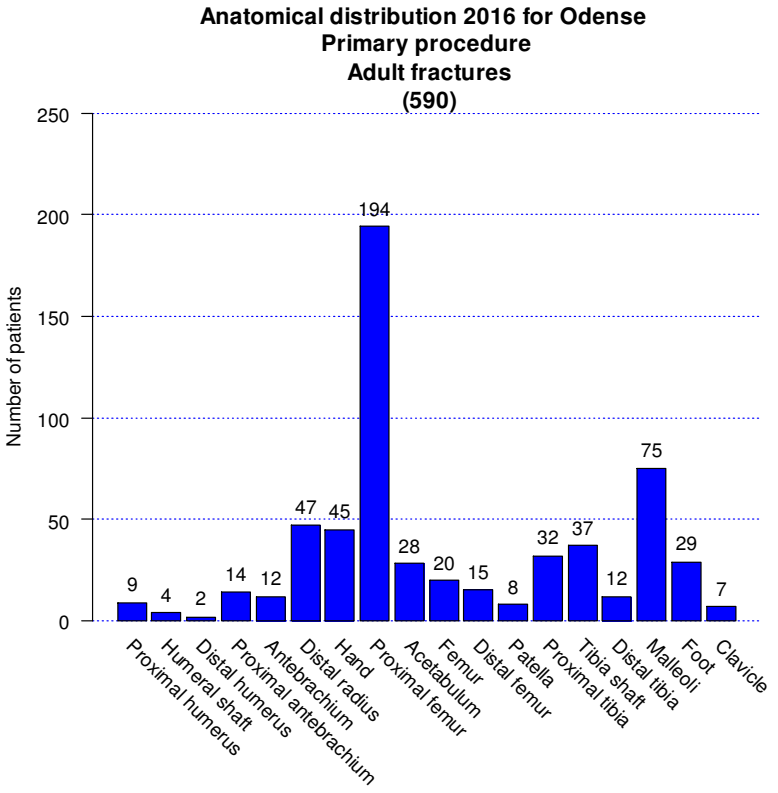


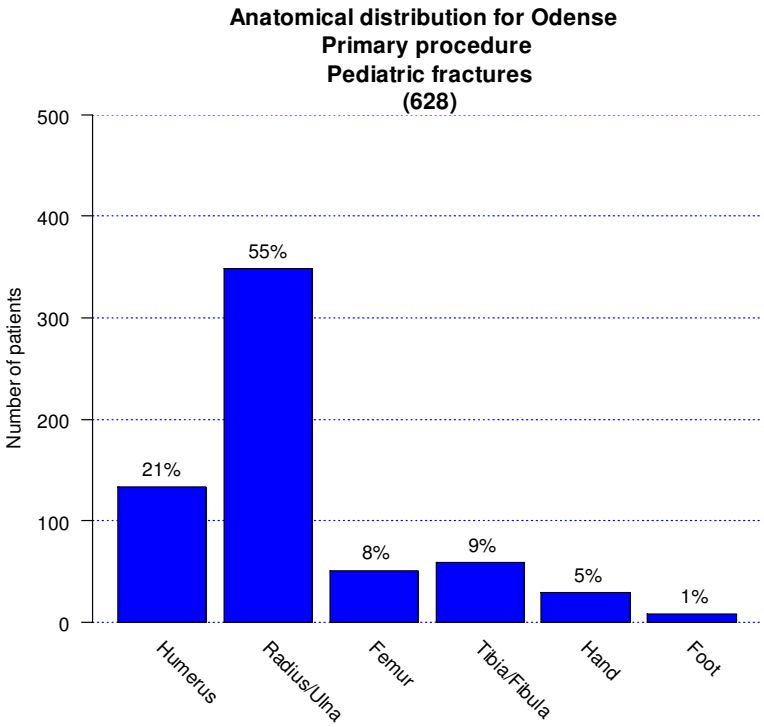



Anatomical distribution for Nykøbing F
Primary procedure
Pediatric fractures
(140)
Number of patients
140
120
100
80
60
40
20
0
27%
51%
3%
9%
11%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand

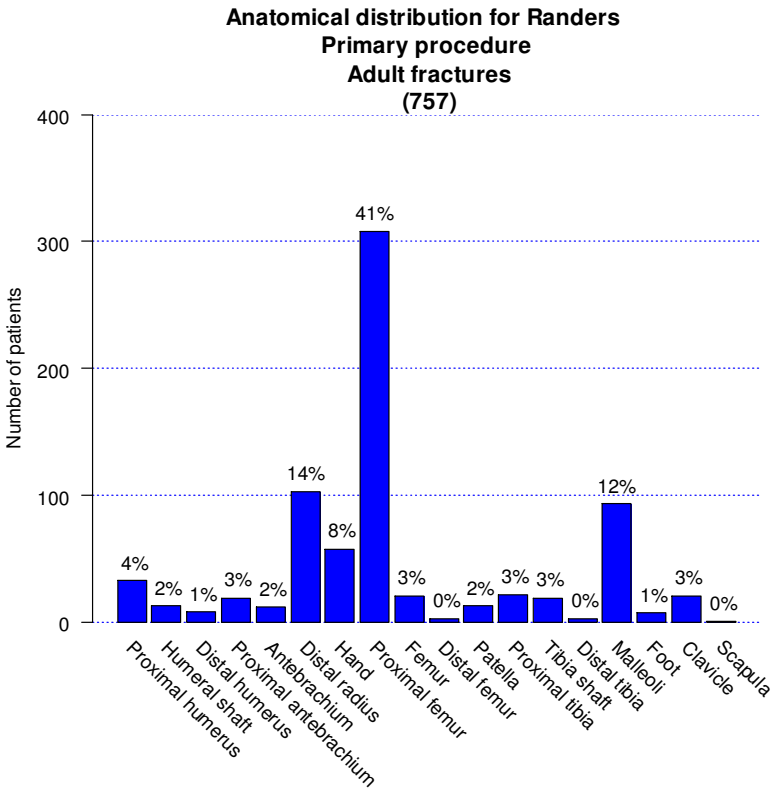
Odense

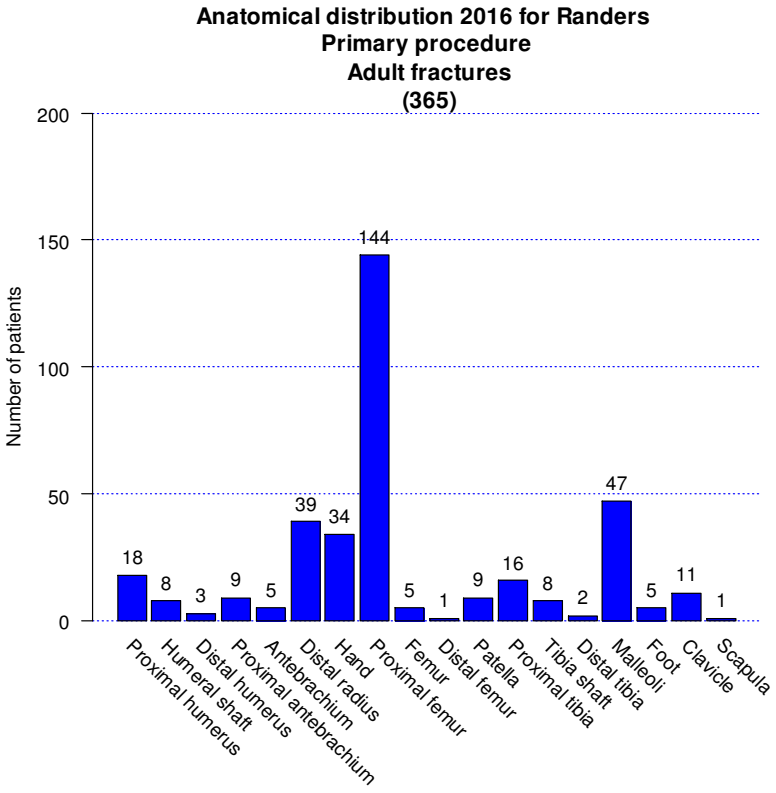

Anatomical distribution for Odense
Primary procedure
Adult fractures
(4549)
Number of patients
2000
1500
1000
500
0
2%
1%
1%
3%
2%
10%
7%
29%
5%
3%
2%
1%
5%
6%
2%
14%
4%
2%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

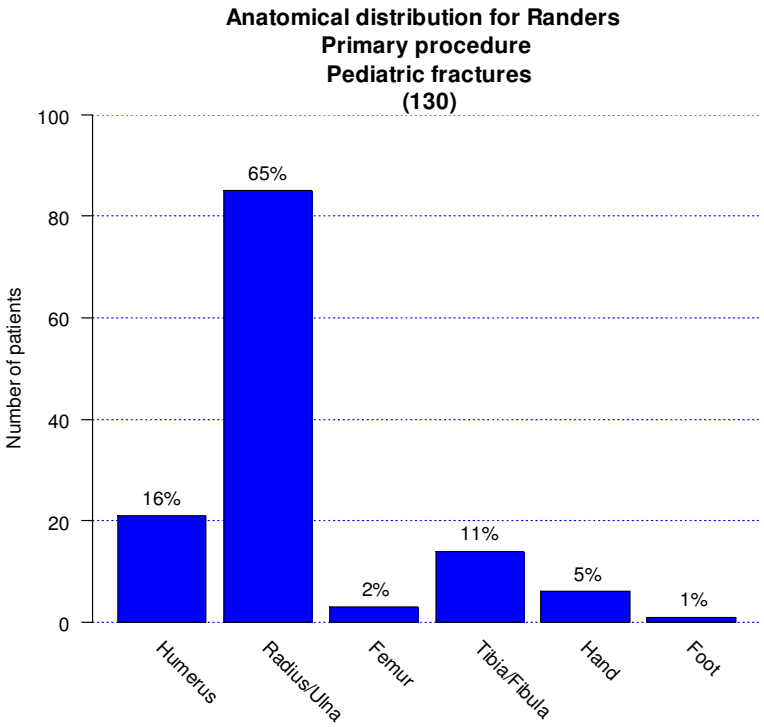

Anatomical distribution 2016 for Odense
Primary procedure
Adult fractures
(590)
Number of patients
250
200
150
100
50
0
9
4
2
14
12
47
45
194
28
20
15
8
32
37
12
75
29
7
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle


Anatomical distribution for Odense
Primary procedure
Pediatric fractures
(628)
Number of patients
500
400
300
200
100
0
21%
55%
8%
9%
5%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

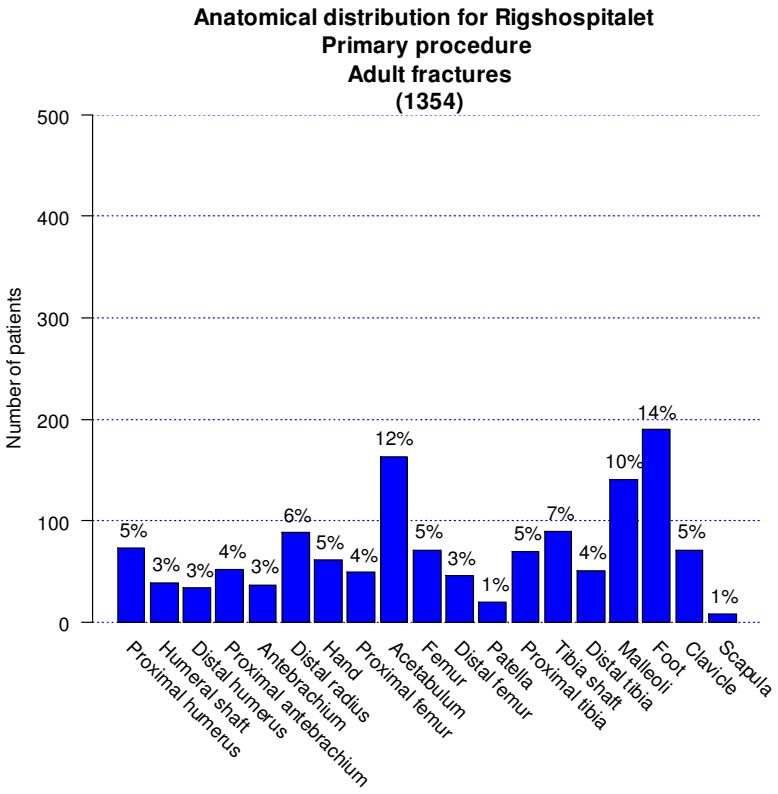
Randers

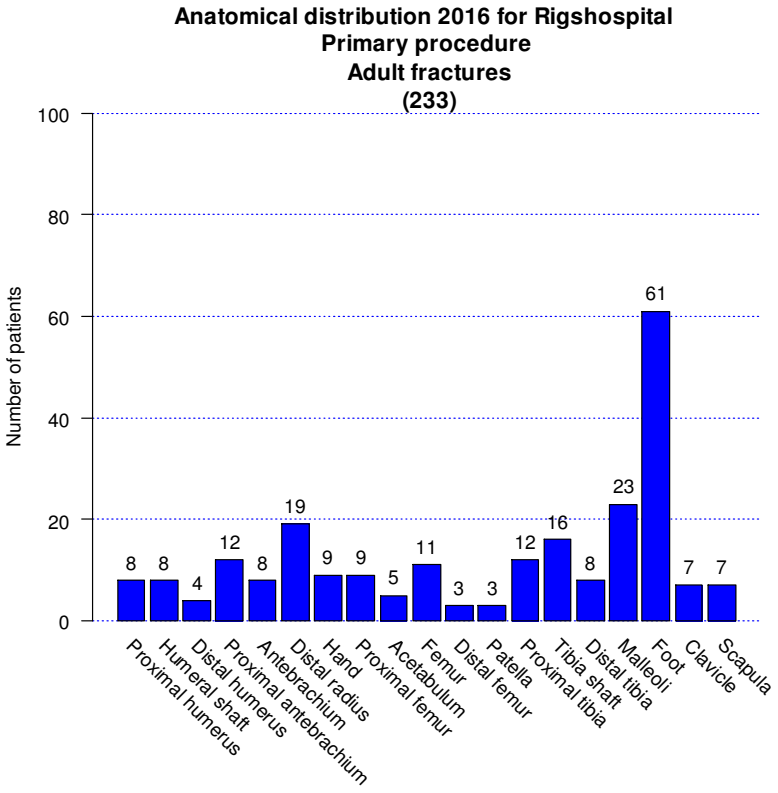

Anatomical distribution for Randers
Primary procedure
Adult fractures
(757)
Number of patients
400
300
200
100
0
4%
2%
1%
3%
2%
14%
8%
41%
3%
0%
2%
3%
3%
0%
12%
1%
3%
0%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

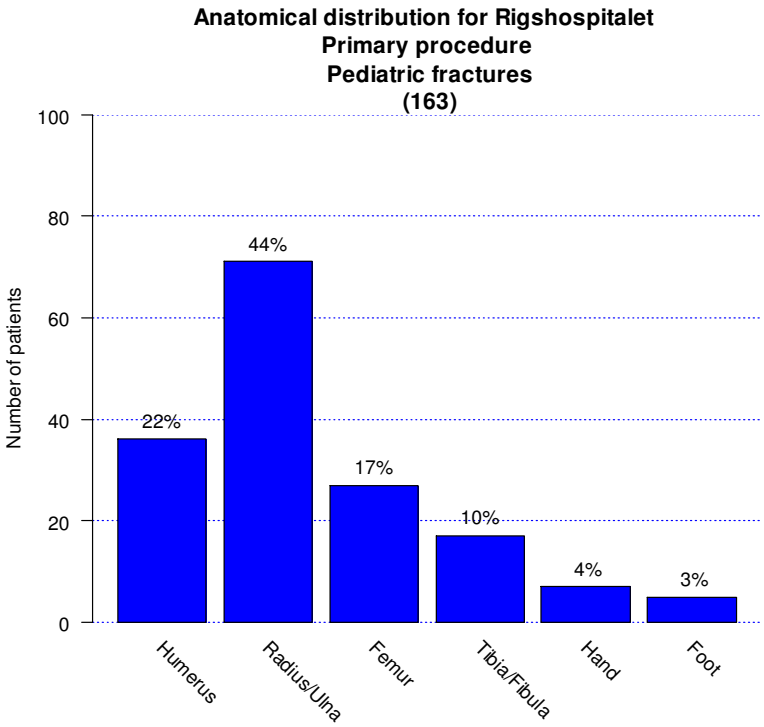

Anatomical distribution 2016 for Randers
Primary procedure
Adult fractures
(365)
Number of patients
200
150
100
50
0
18
8
3
9
5
39
34
144
5
1
9
16
8
2
47
5
11
1
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula


Anatomical distribution for Randers
Primary procedure
Pediatric fractures
(130)
Number of patients
100
80
60
40
20
0
16%
65%
2%
11%
5%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

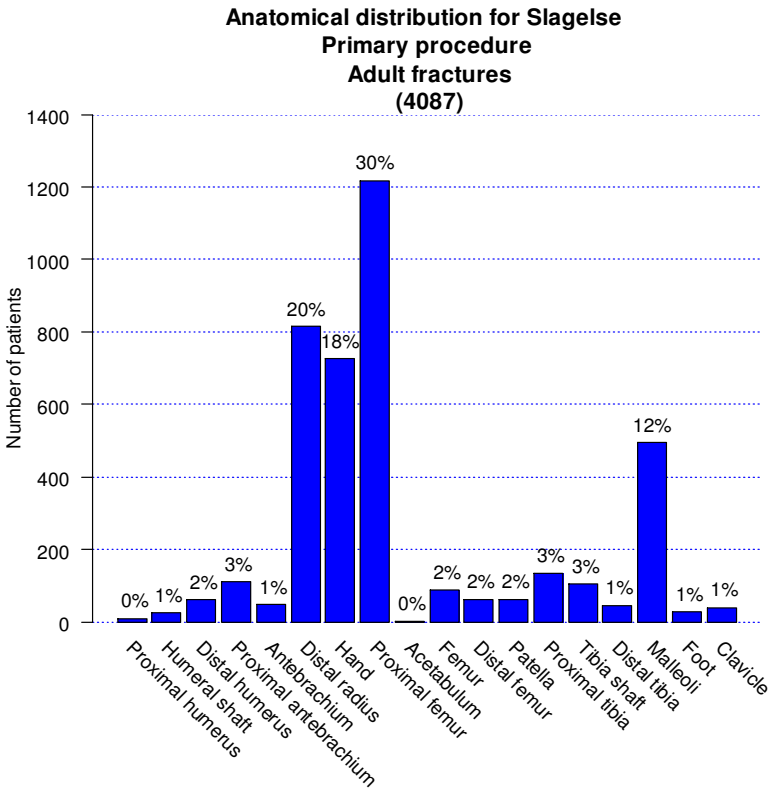
Rigshospitalet

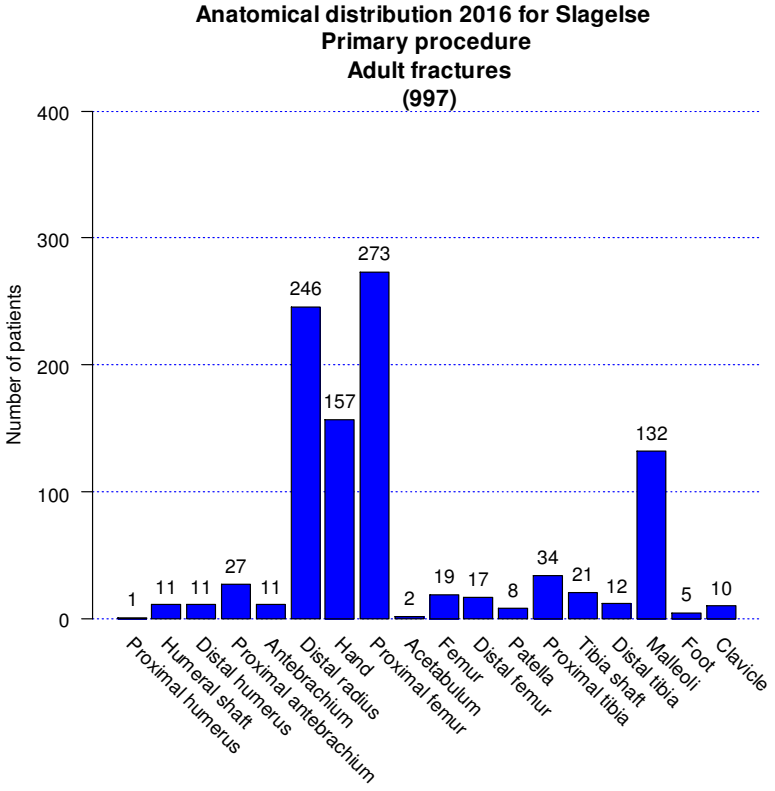


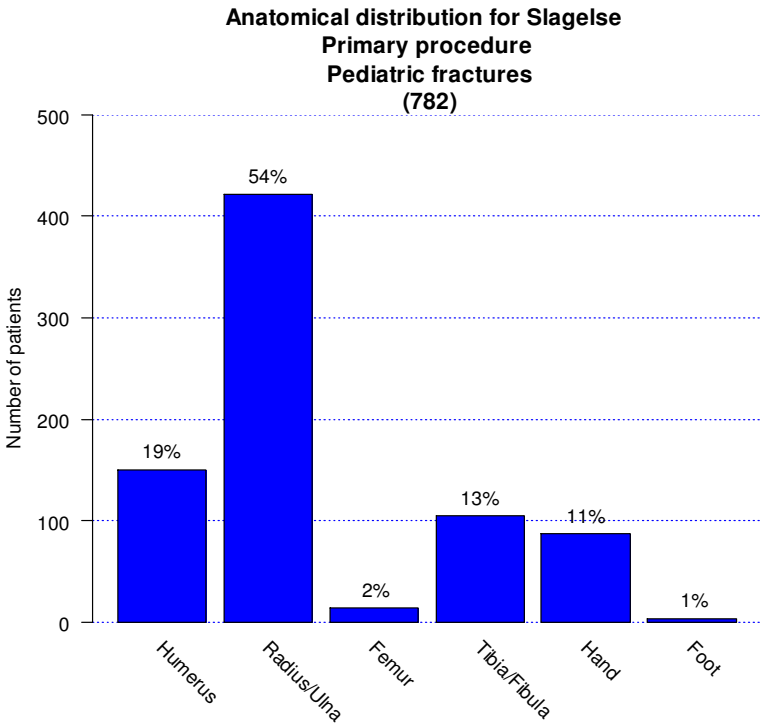



Anatomical distribution for Rigshospitalet
Primary procedure
Pediatric fractures
(163)
Number of patients
100
80
60
40
20
0
22%
44%
17%
10%
4%
3%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

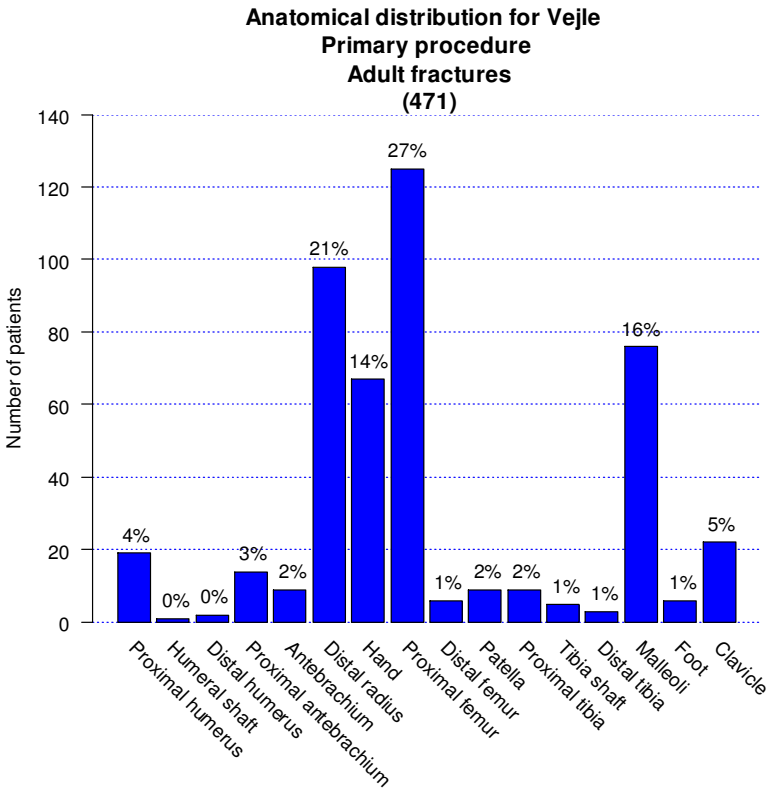
Slagelse

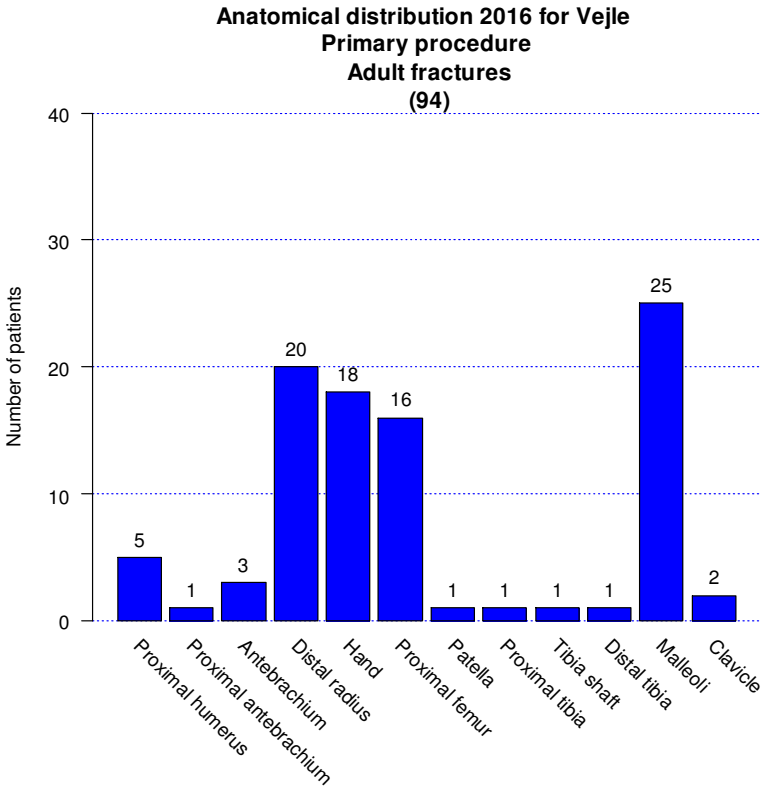

Anatomical distribution for Slagelse
Primary procedure
Adult fractures
(4087)
Number of patients
1400
1200
1000
800
600
400
200
0
0%
1%
2%
3%
1%
20%
18%
30%
0%
2%
2%
2%
3%
3%
1%
12%
1%
1%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle

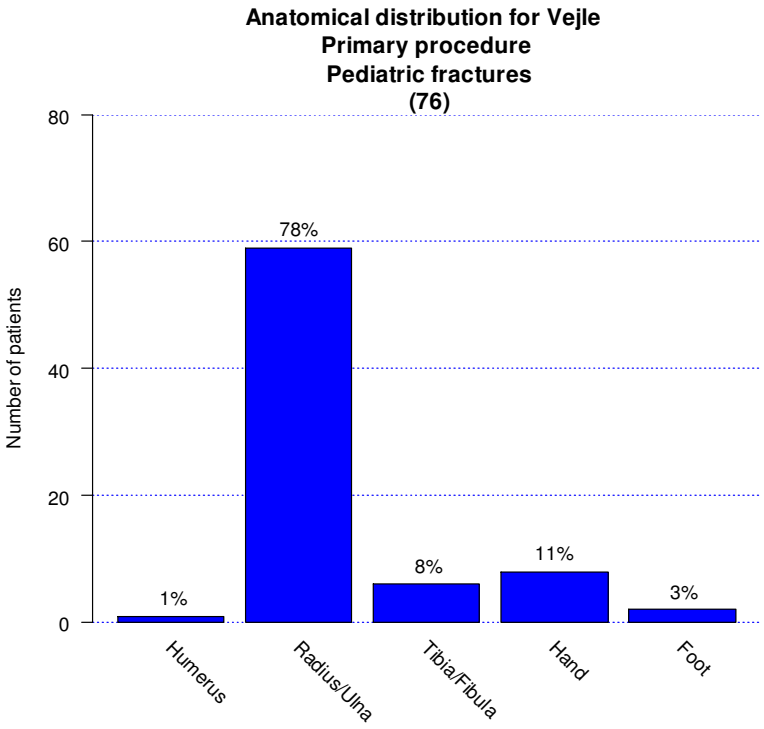

Anatomical distribution 2016 for Slagelse
Primary procedure
Adult fractures
(997)
Number of patients
400
300
200
100
0
1
11
11
27
11
246
157
273
2
19
17
8
34
21
12
132
5
10
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Acetabulum
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle


Anatomical distribution for Slagelse
Primary procedure
Pediatric fractures
(782)
Number of patients
500
400
300
200
100
0
19%
54%
2%
13%
11%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

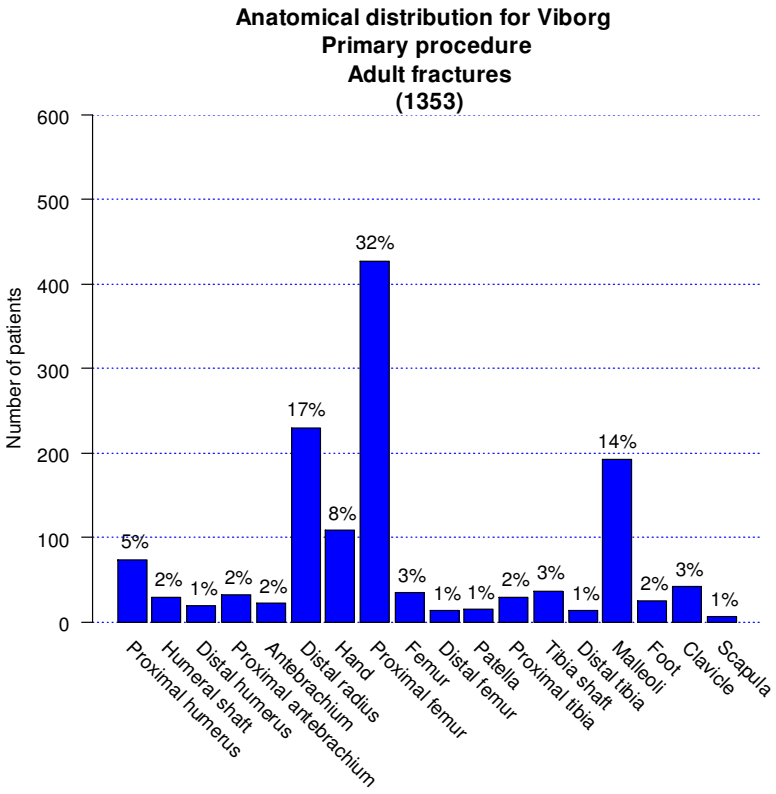
Vejle

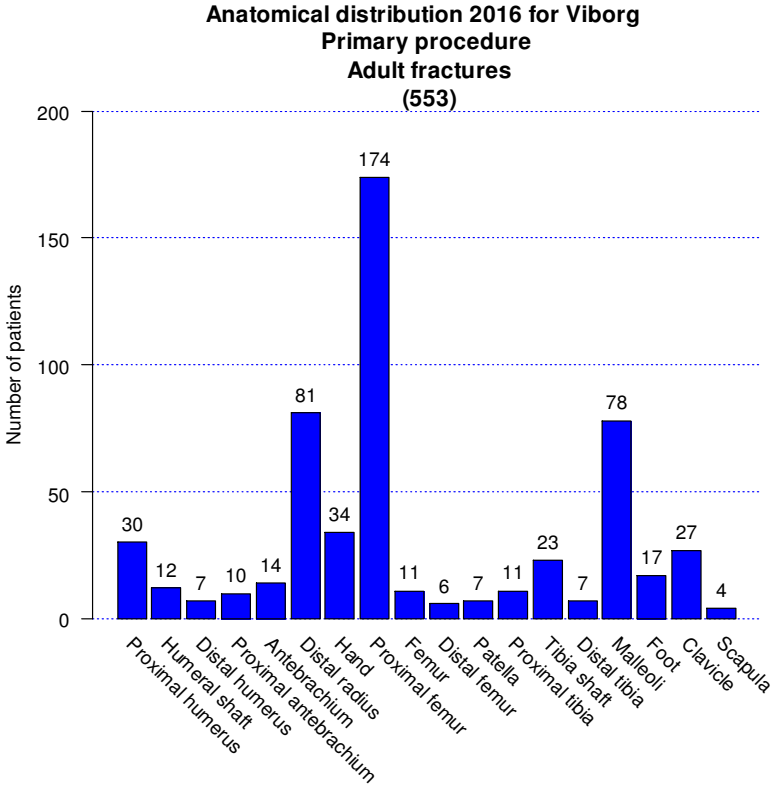

Anatomical distribution for Vejle
Primary procedure
Adult fractures
(471)
Number of patients
140
120
100
80
60
40
20
0
4%
0%
0%
3%
2%
21%
14%
27%
1%
2%
2%
1%
1%
16%
1%
5%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle

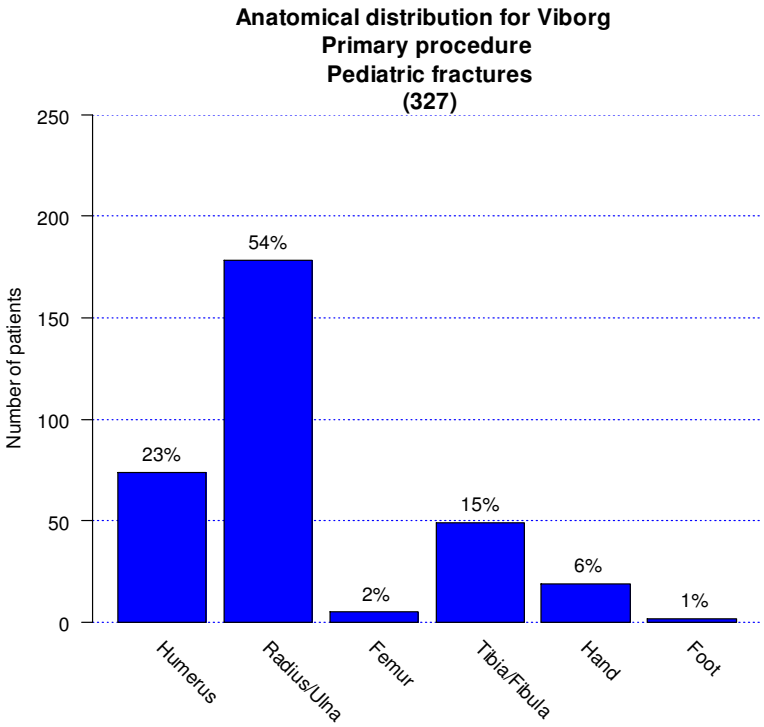

Anatomical distribution 2016 for Vejle
Primary procedure
Adult fractures
(94)
Number of patients
40
30
20
10
0
5
1
3
20
18
16
1
1
1
1
25
2
Proximal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Clavicle


Anatomical distribution for Vejle
Primary procedure
Pediatric fractures
(76)
Number of patients
80
60
40
20
0
78%
1%
8%
11%
3%
Humerus
Radius/Ulna
Tibia/Fibula
Hand
Foot

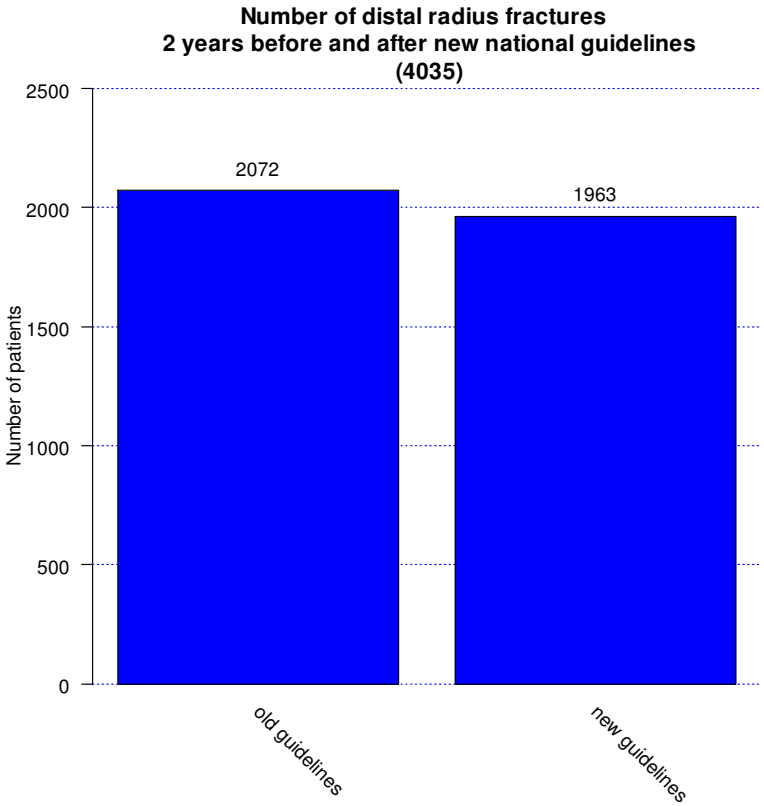
Viborg

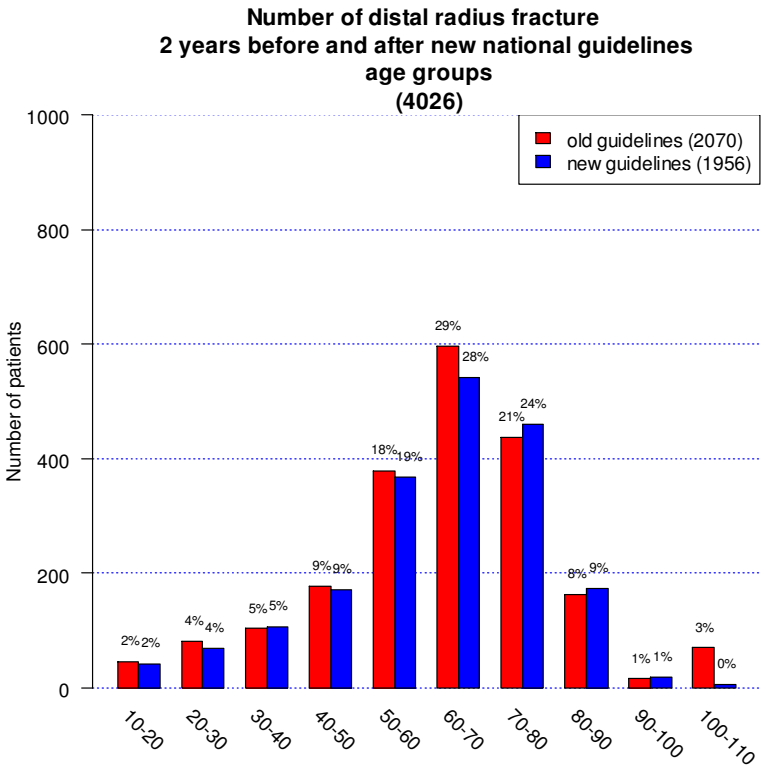

Anatomical distribution for Viborg
Primary procedure
Adult fractures
(1353)
Number of patients
600
500
400
300
200
100
0
5%
2%
1%
2%
2%
17%
8%
32%
3%
1%
1%
2%
3%
1%
14%
2%
3%
1%
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

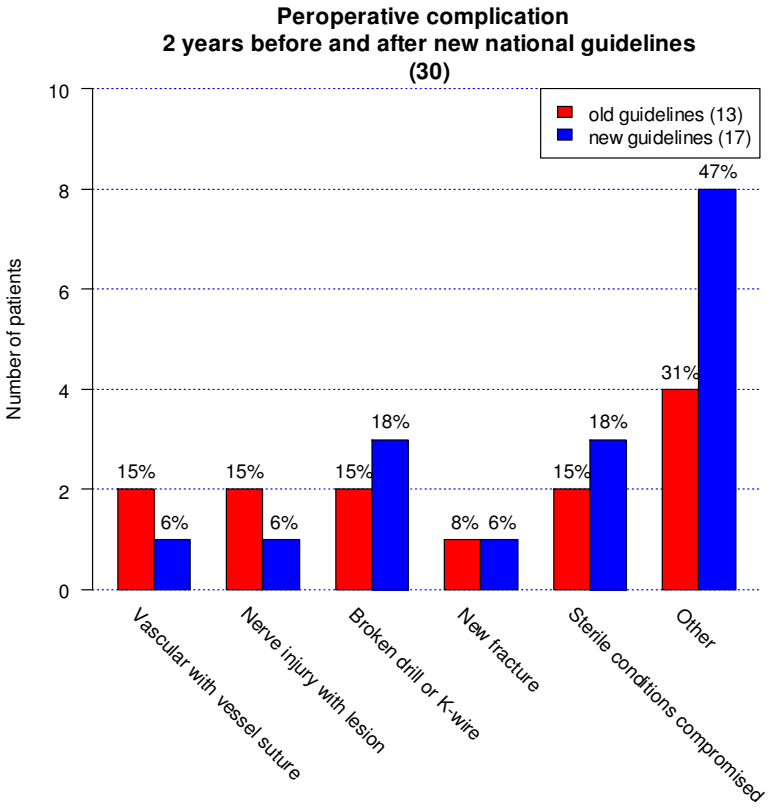

Anatomical distribution 2016 for Viborg
Primary procedure
Adult fractures
(553)
Number of patients
200
150
100
50
0
30
12
7
10
14
81
34
174
11
6
7
11
23
7
78
17
27
4
Proximal humerus
Humeral shaft
Distal humerus
Proximal antebrachium
Antebrachium
Distal radius
Hand
Proximal femur
Femur
Distal femur
Patella
Proximal tibia
Tibia shaft
Distal tibia
Malleoli
Foot
Clavicle
Scapula

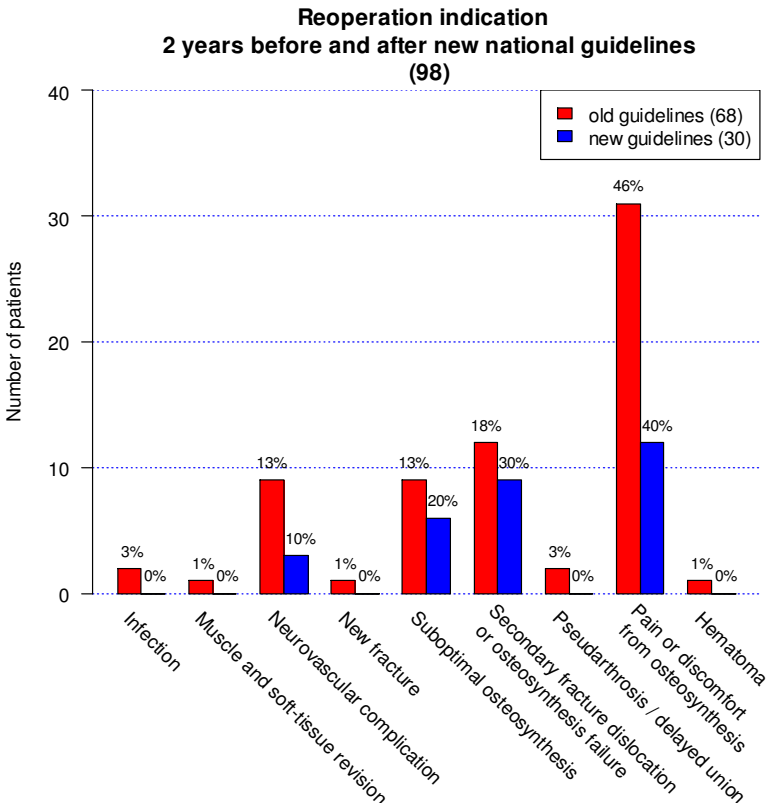

Anatomical distribution for Viborg
Primary procedure
Pediatric fractures
(327)
Number of patients
250
200
150
100
50
0
23%
54%
2%
15%
6%
1%
Humerus
Radius/Ulna
Femur
Tibia/Fibula
Hand
Foot

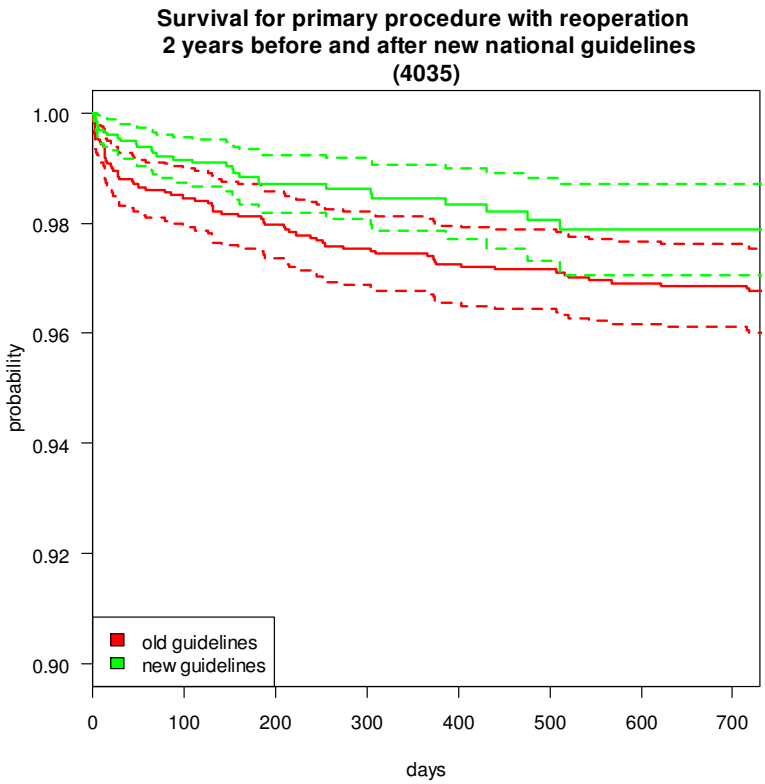
Focus area - New national guidelines for distal radius fractures

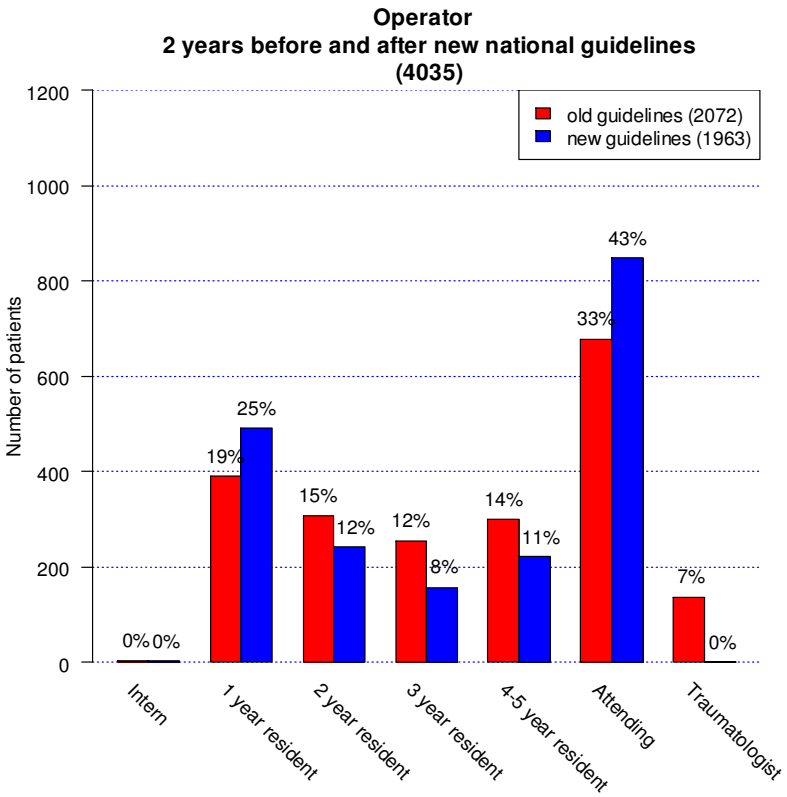


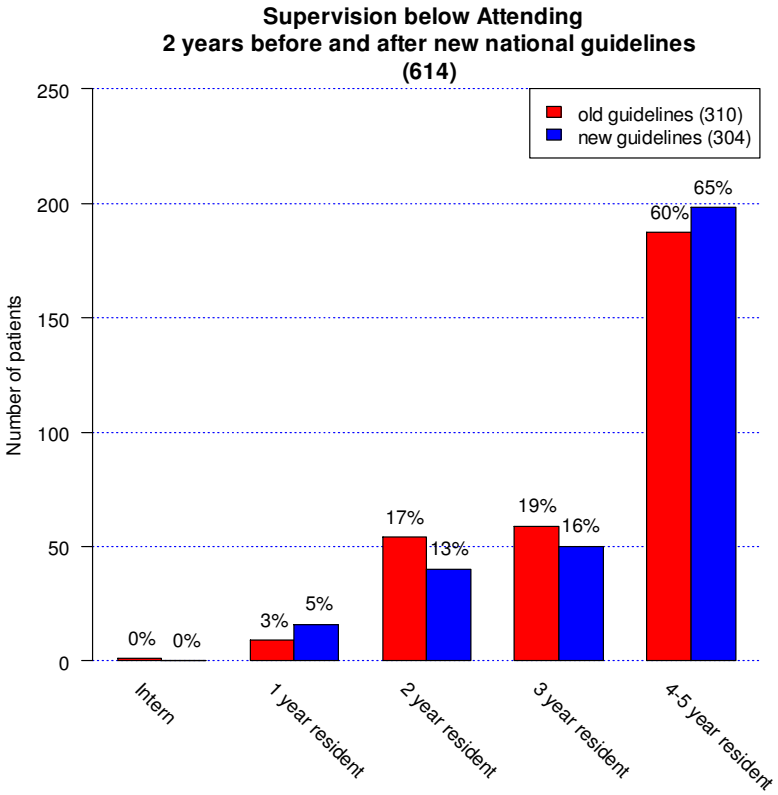


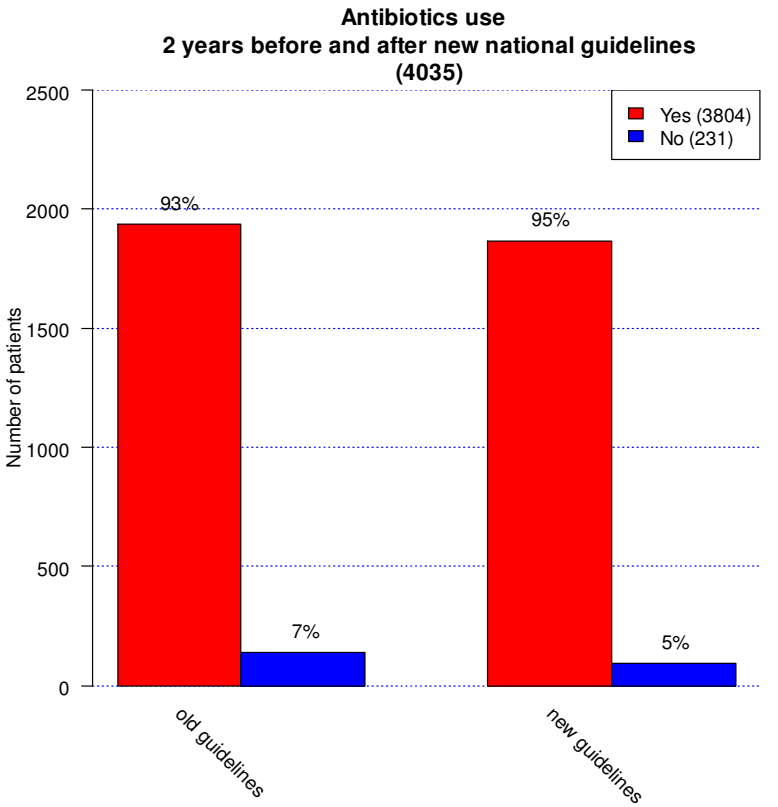

Peroperative complication
2 years before and after new national guidelines
(30)
old guidelines (13)
new guidelines (17)
Number of patients
0
2
4
6
8
10
15%
6%
15%
6%
15%
18%
8%
6%
15%
18%
31%
47%
Vascular with vessel suture
Nerve injury with lesion
Broken drill or K-wire
New fracture
Sterile conditions compromised
Other

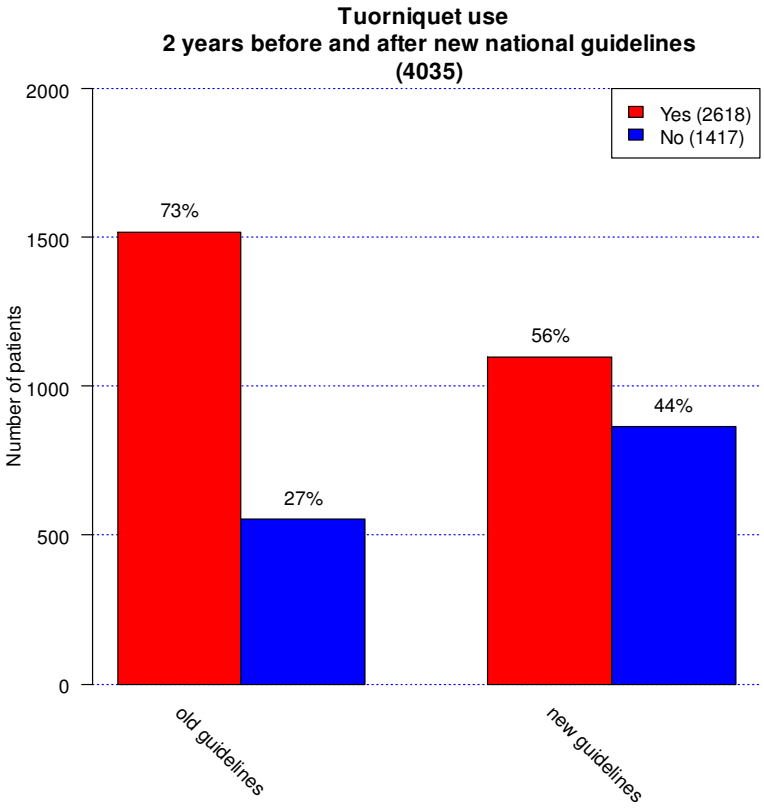

Reoperation indication
2 years before and after new national guidelines
(98)
old guidelines (68)
new guidelines (30)
Number of patients
0
10
20
30
40
3%
0%
1%
0%
13%
10%
1%
0%
13%
20%
18%
30%
3%
0%
46%
40%
1%
0%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Hematoma

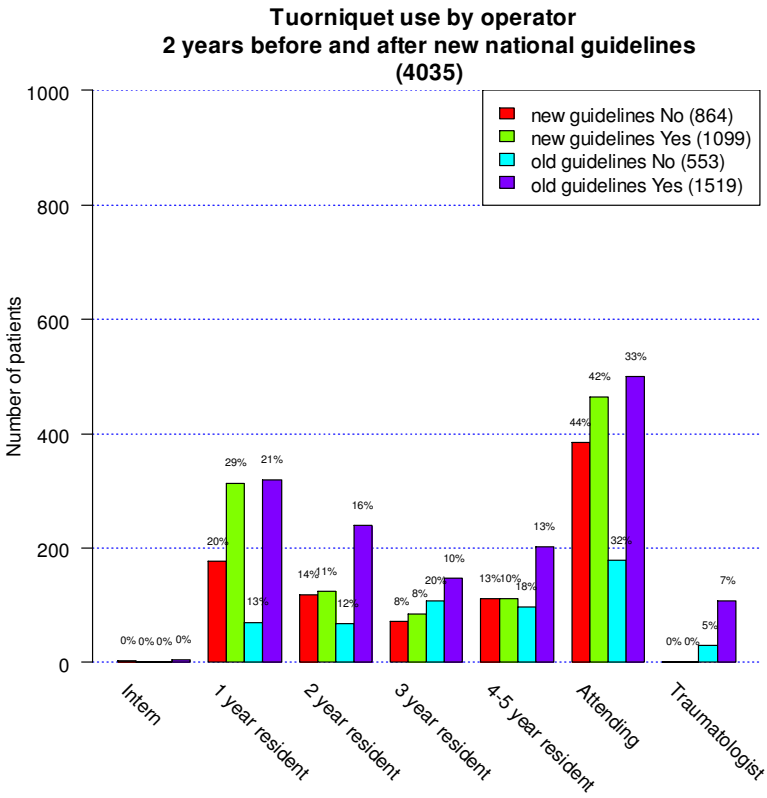

Survival for primary procedure with reoperation
2 years before and after new national guidelines
(4035)
probability
1.00
0.98
0.96
0.94
0.92
0.90
0
100
200
300
400
500
600
700
days
old guidelines
new guidelines


Operator
2 years before and after new national guidelines
(4035)
Number of patients
1200
1000
800
600
400
200
0
old guidelines (2072)
new guidelines (1963)
0%
0%
19%
25%
15%
12%
12%
8%
14%
11%
33%
43%
7%
0%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist


Supervision below Attending
2 years before and after new national guidelines
(614)
old guidelines (310)
new guidelines (304)
Number of patients
250
200
150
100
50
0
0%
0%
3%
5%
17%
13%
19%
16%
60%
65%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident

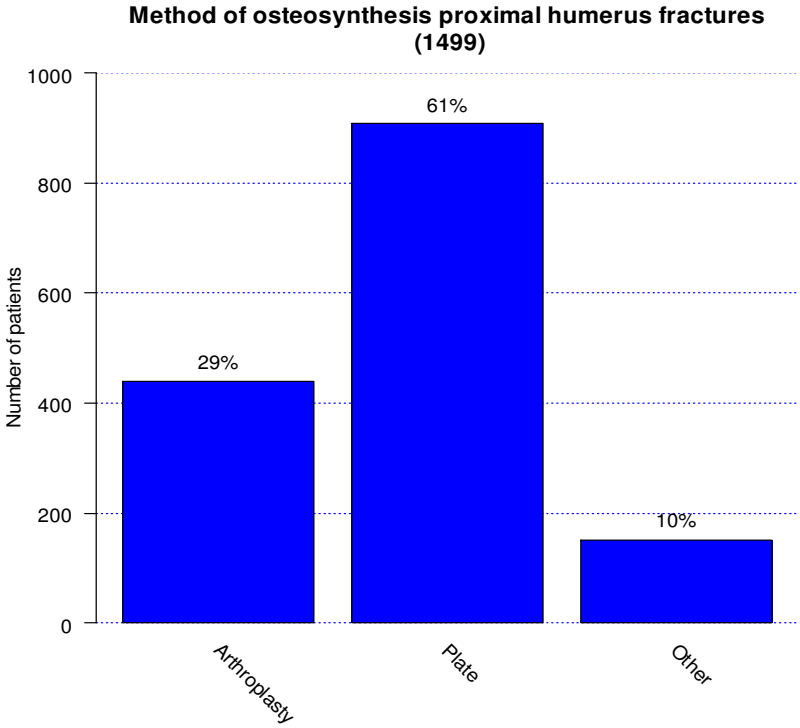

Antibiotics use
2 years before and after new national guidelines
(4035)
Yes (3804)
No (231)
Number of patients
2500
2000
1500
1000
500
0
93%
7%
95%
5%
old guidelines
new guidelines

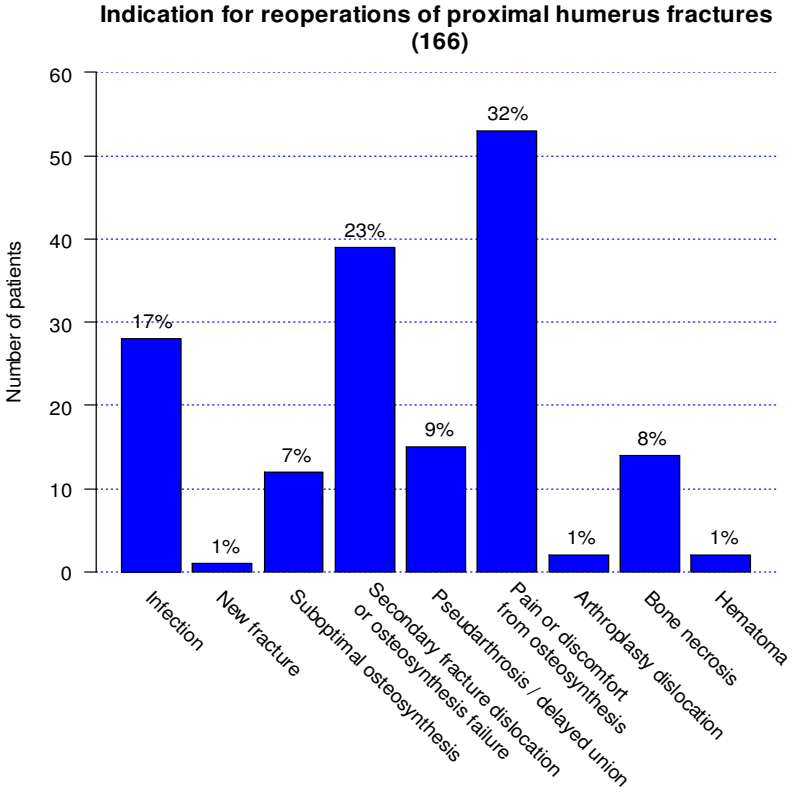

Tuorniquet use
2 years before and after new national guidelines
(4035)
Yes (2618)
No (1417)
Number of patients
2000
1500
1000
500
0
73%
27%
56%
44%
old guidelines
new guidelines

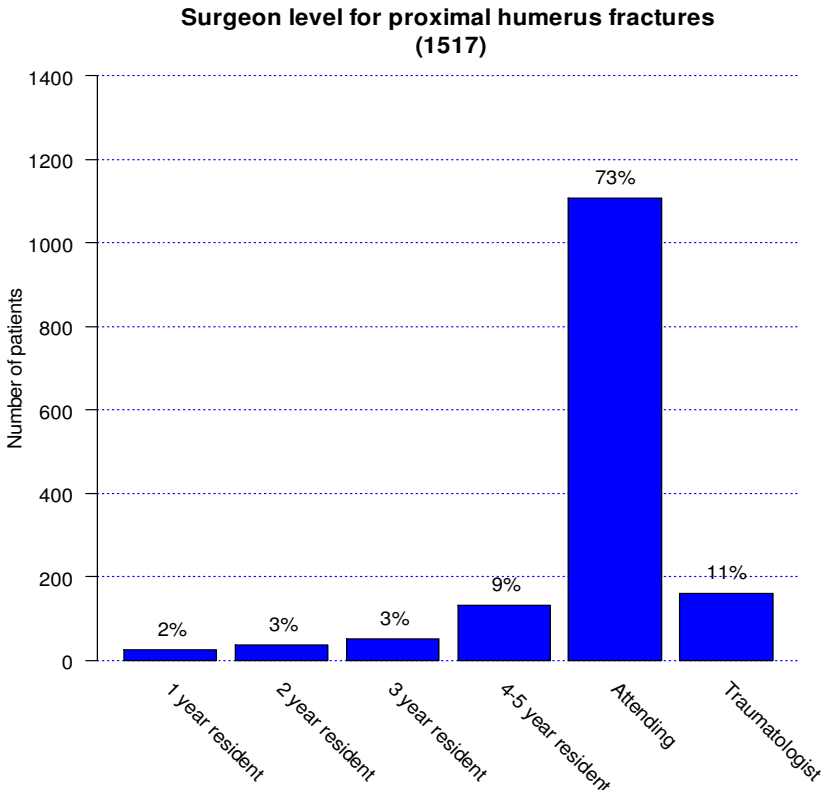

Tuorniquet use by operator
2 years before and after new national guidelines
(4035)
new guidelines No (864)
new guidelines Yes (1099)
old guidelines No (553)
old guidelines Yes (1519)
Number of patients
1000
800
600
400
200
0
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

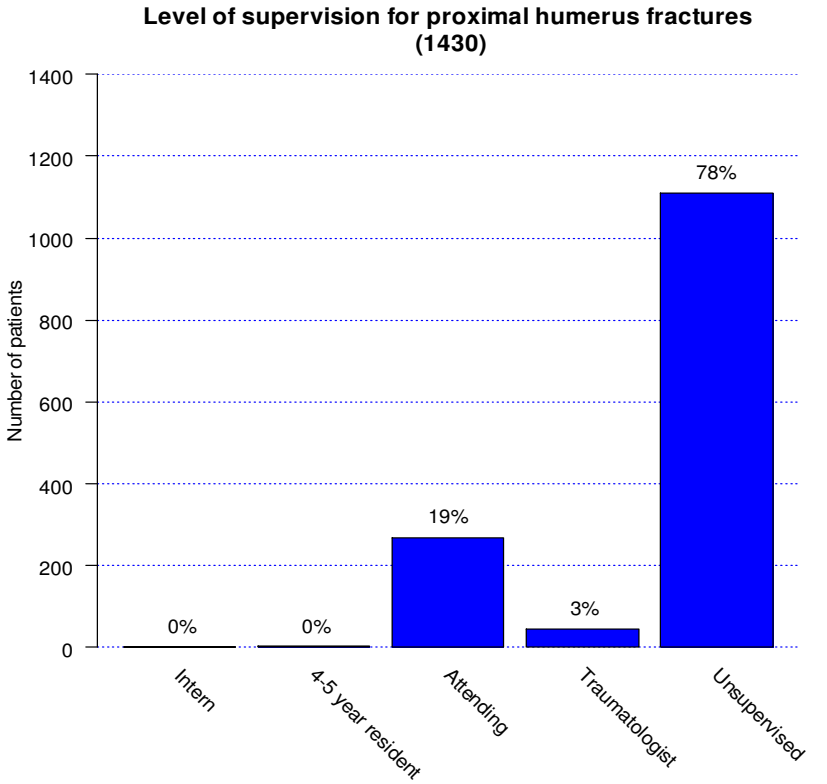
Adult

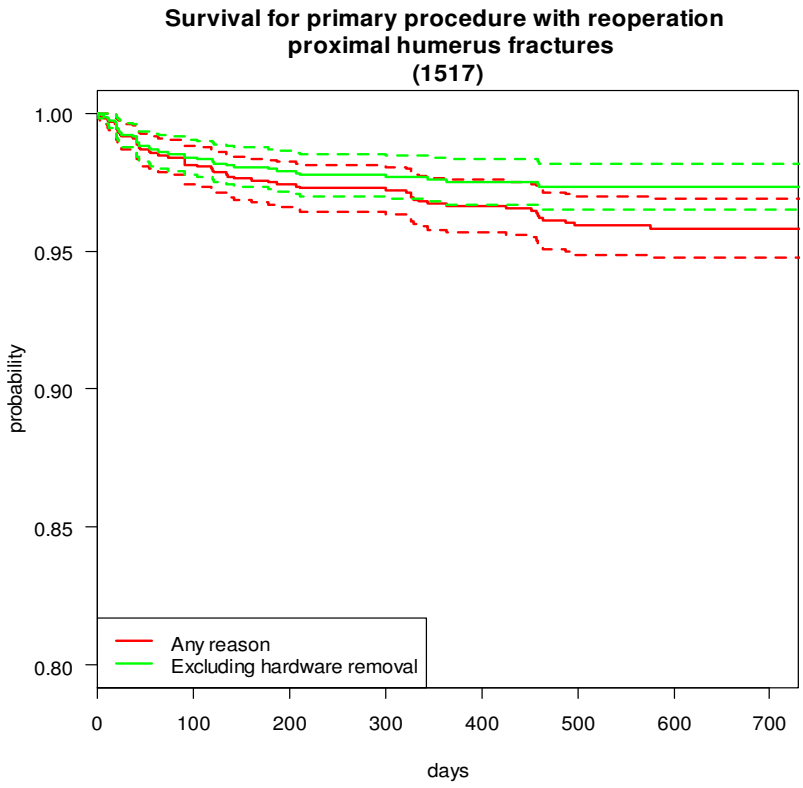
Proximal Humerus

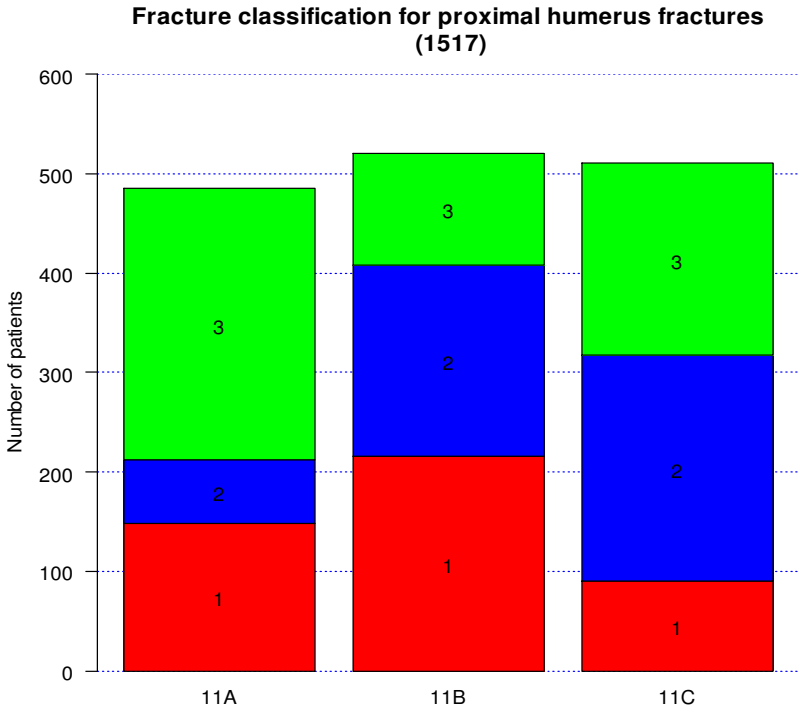




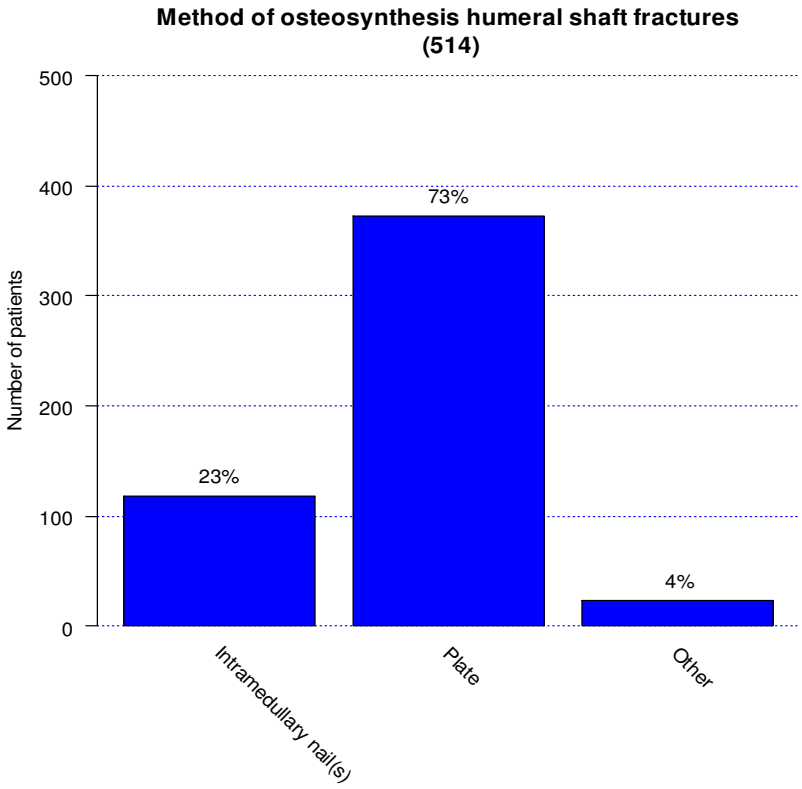

Surgeon level for proximal humerus fractures
(1517)
Number of patients
1400
1200
1000
800
600
400
200
0
2%
3%
3%
9%
73%
11%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

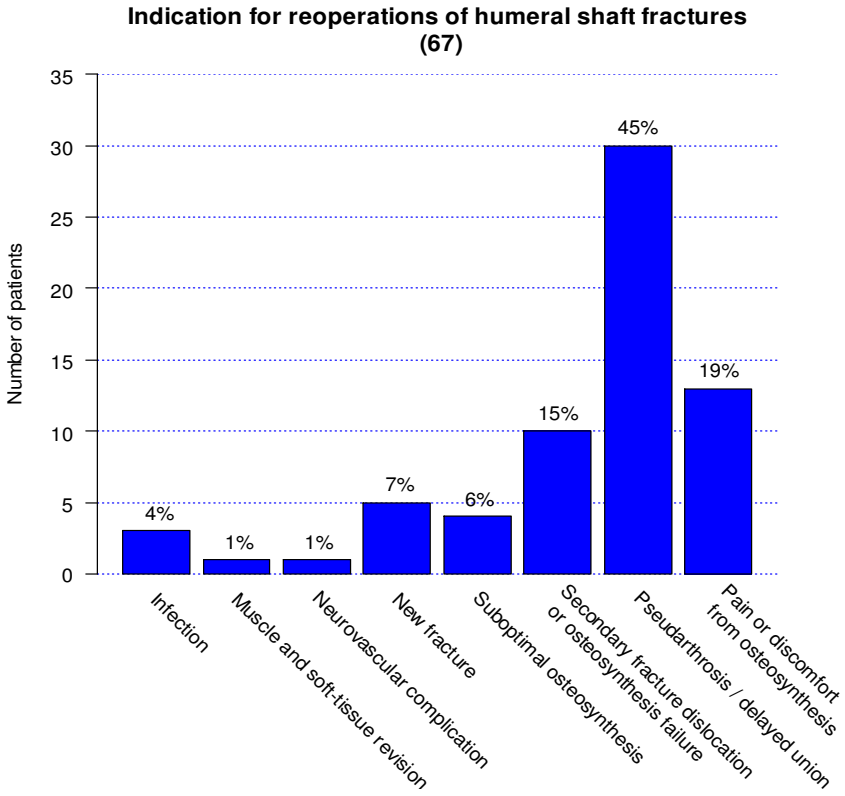

Level of supervision for proximal humerus fractures
(1430)
Number of patients
1400
1200
1000
800
600
400
200
0
0%
0%
19%
3%
78%
Intern
4-5 year resident
Attending
Traumatologist
Unsupervised

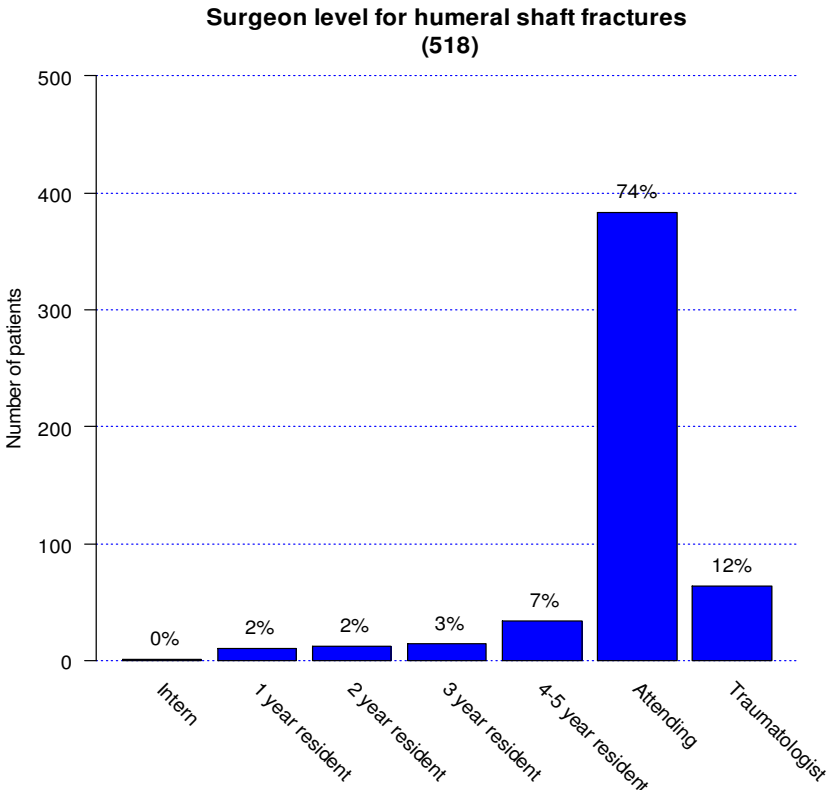

Survival for primary procedure with reoperation
proximal humerus fractures
(1517)
1.00
0.95
0.90
0.85
0.80
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

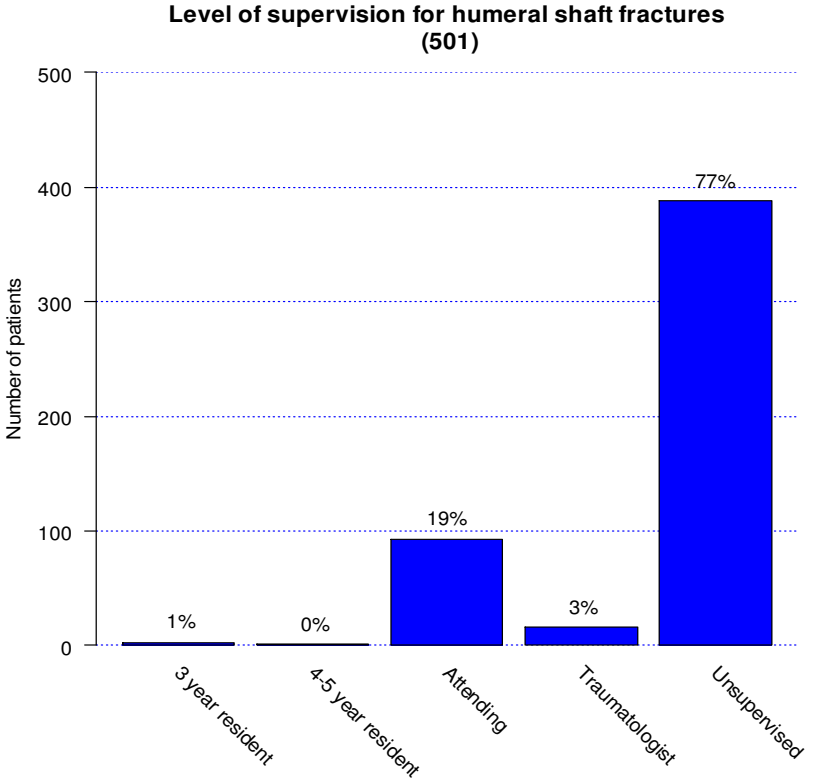

Fracture classification for proximal humerus fractures
(1517)
600
500
400
300
200
100
0
Number of patients
3
2
1
3
2
1
3
2
1
11A
11B
11C

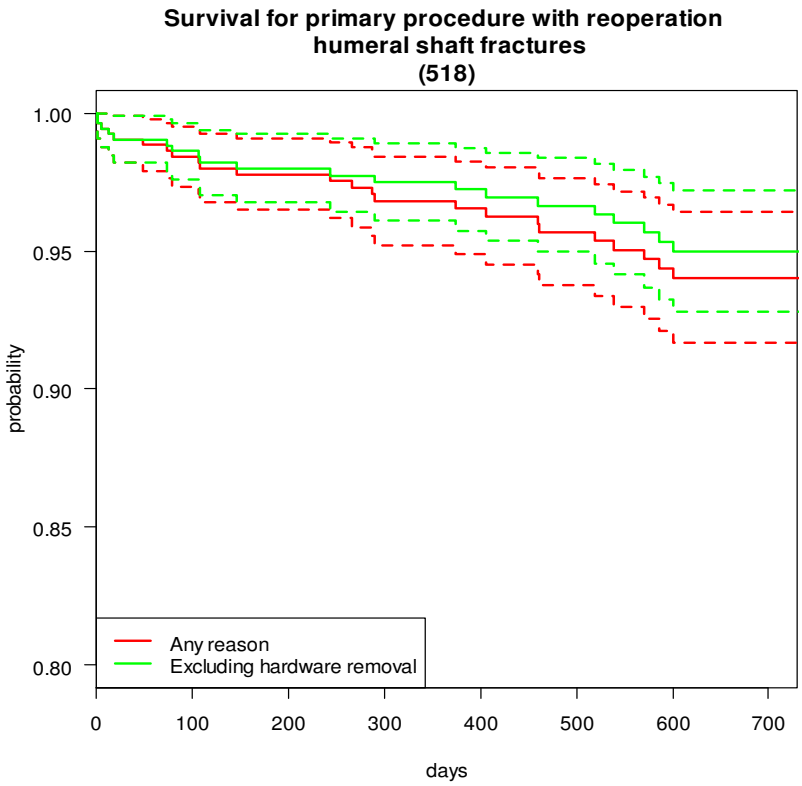
Humeral shaft

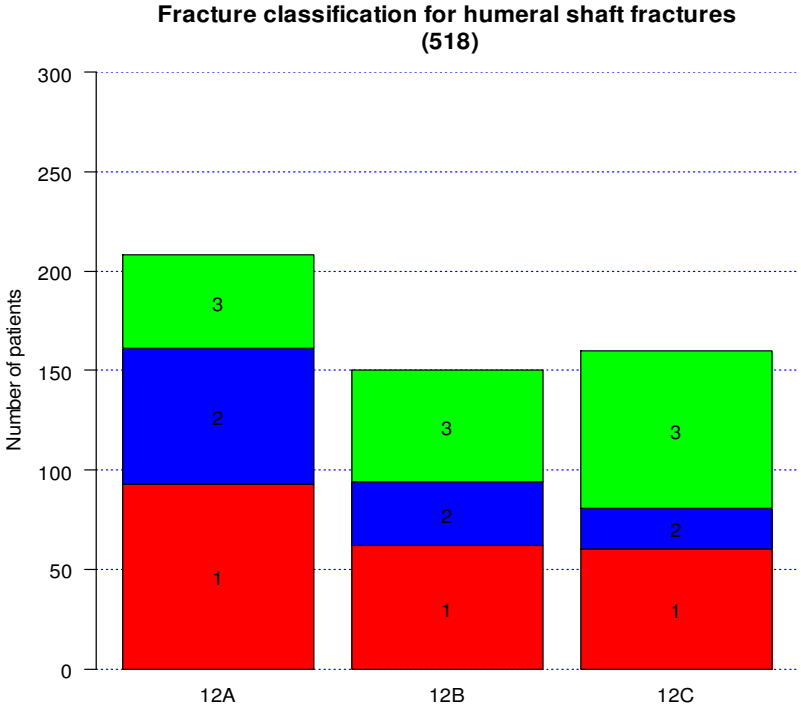




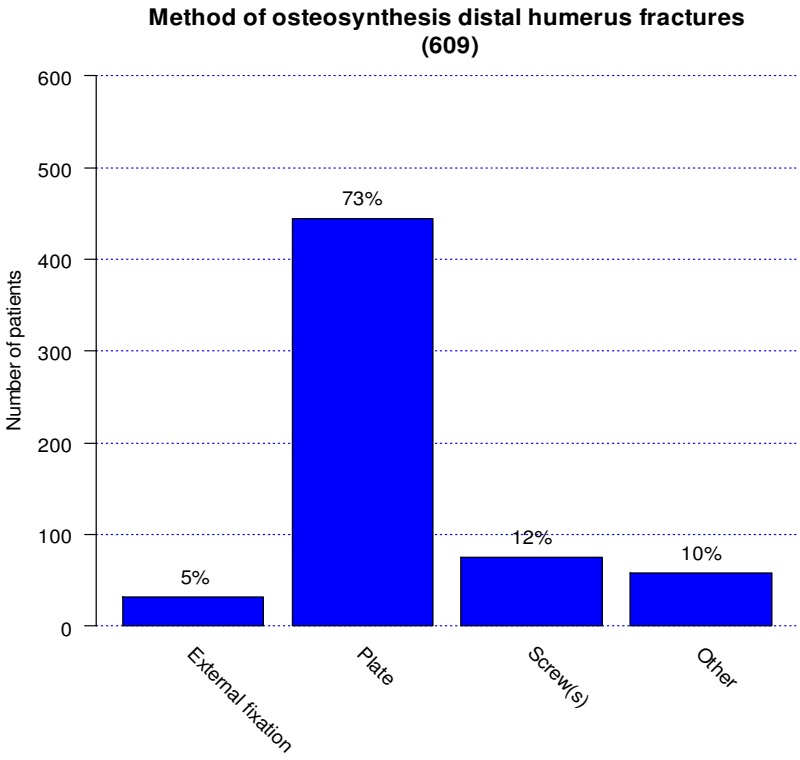

Surgeon level for humeral shaft fractures
(518)
Number of patients
500
400
300
200
100
0
0%
2%
2%
3%
7%
74%
12%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

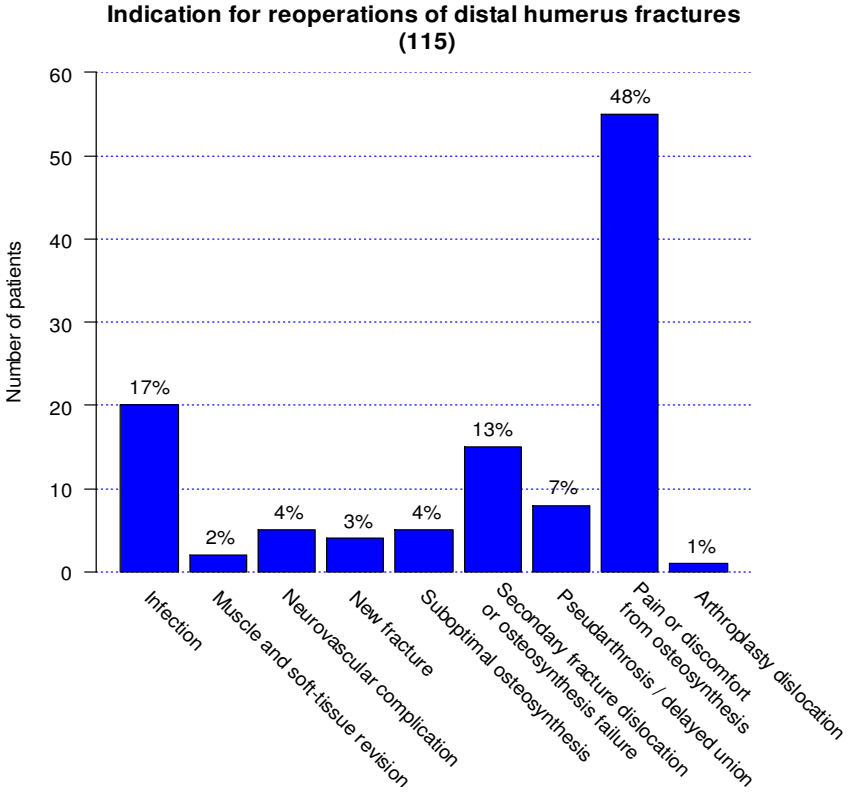

Level of supervision for humeral shaft fractures
(501)
Number of patients
500
400
300
200
100
0
1%
0%
19%
3%
77%
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

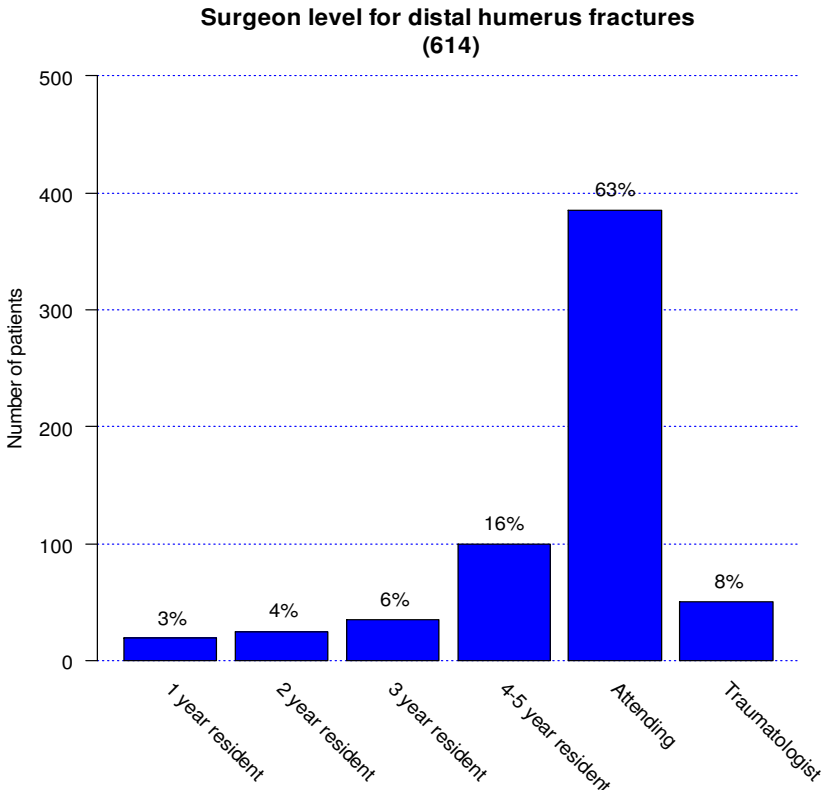

Survival for primary procedure with reoperation
humeral shaft fractures
(518)
probability
1.00
0.95
0.90
0.85
0.80
0
100
200
300
400
500
600
700
days
Any reason
Excluding hardware removal

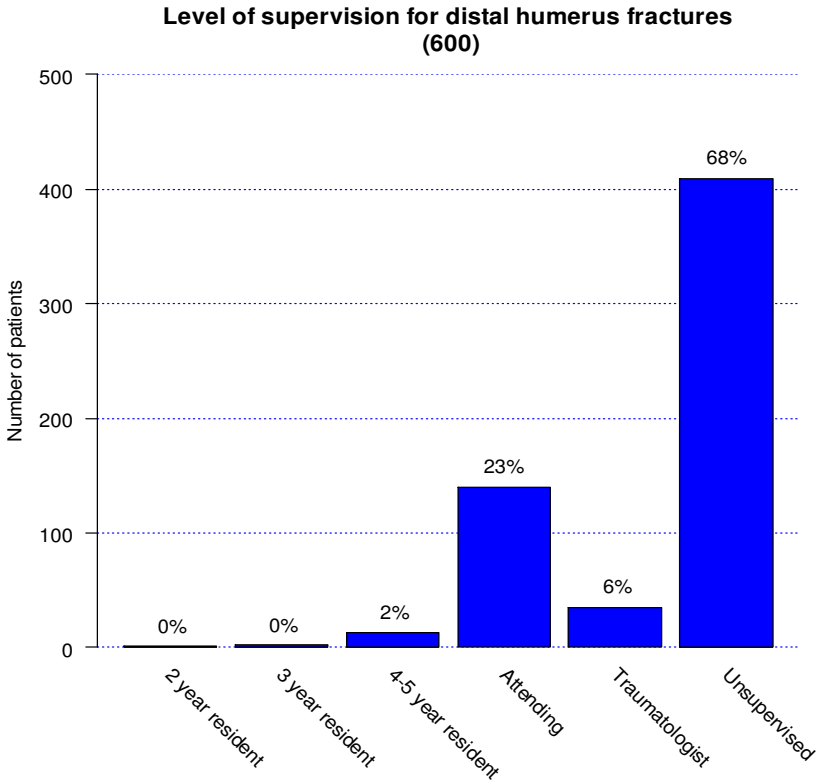

Fracture classification for humeral shaft fractures
(518)
Number of patients
300
250
200
150
100
50
0
3
2
1
3
2
1
3
2
1
12A
12B
12C

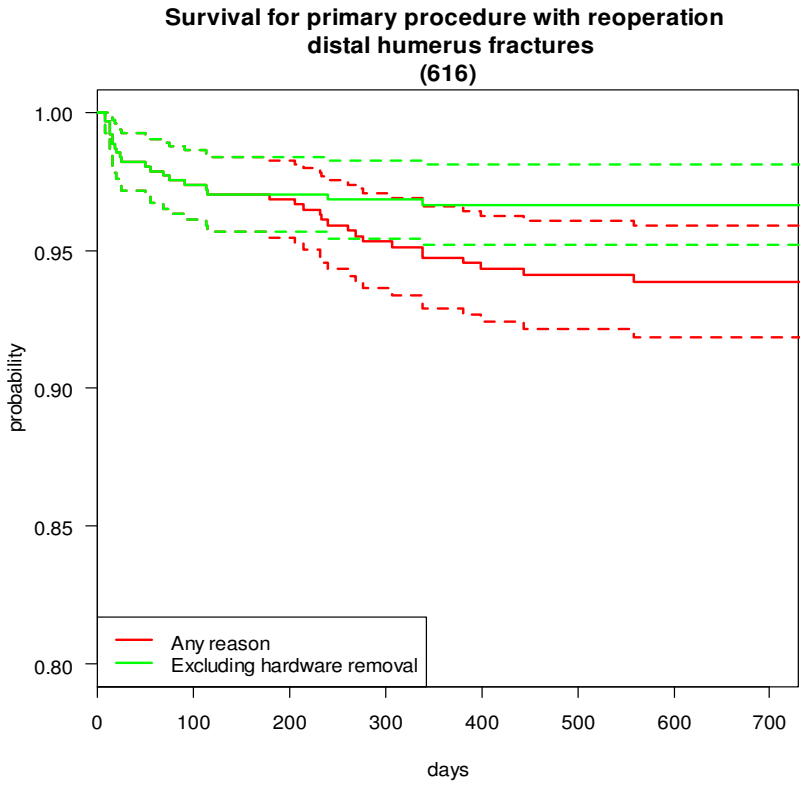
Distal Humerus

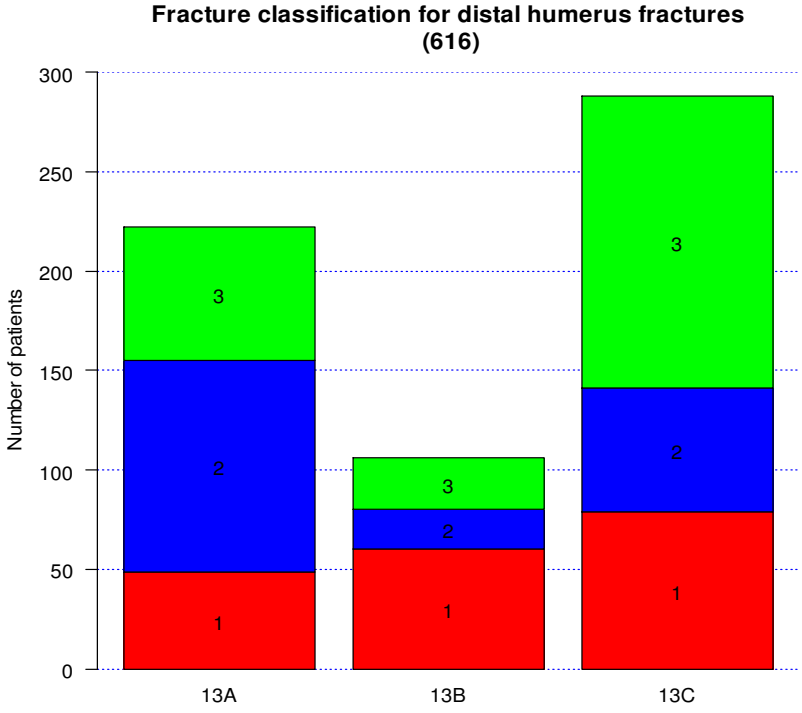




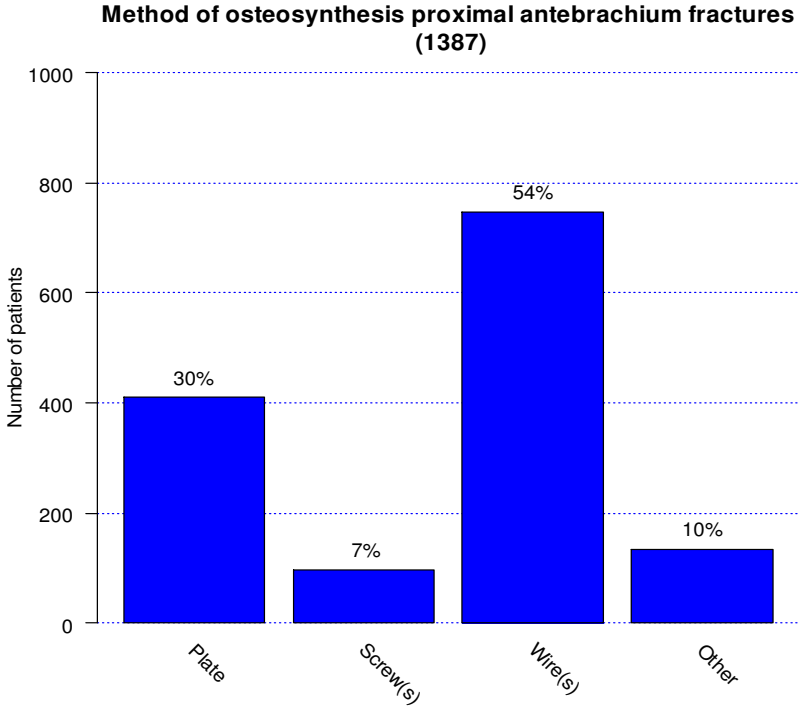

Surgeon level for distal humerus fractures
(614)
Number of patients
500
400
300
200
100
0
3%
4%
6%
16%
63%
8%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

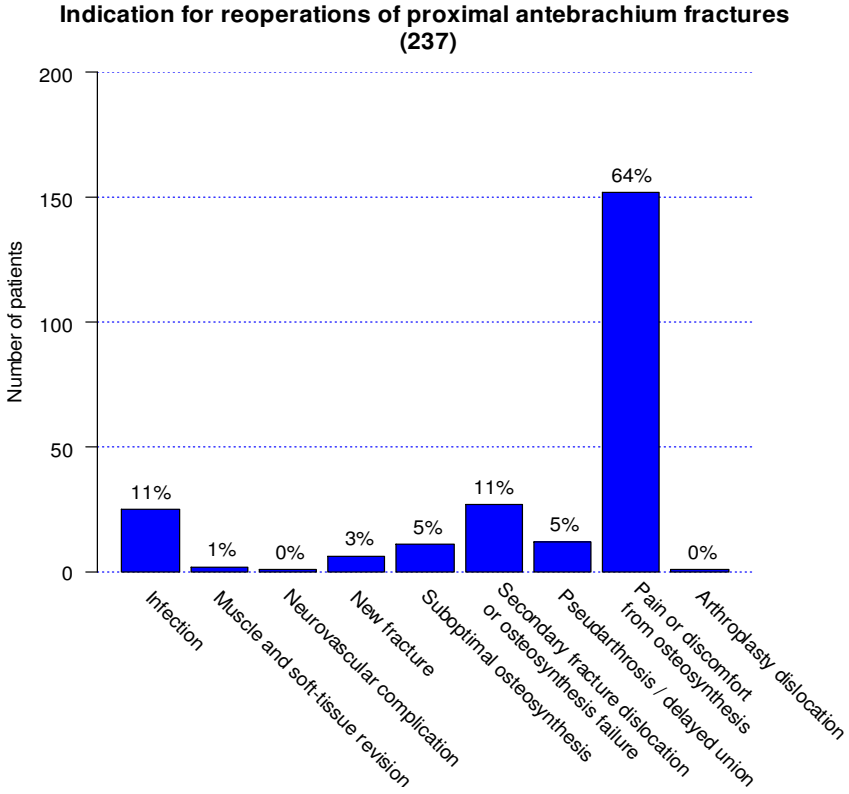

Level of supervision for distal humerus fractures
(600)
Number of patients
500
400
300
200
100
0
0%
0%
2%
23%
6%
68%
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

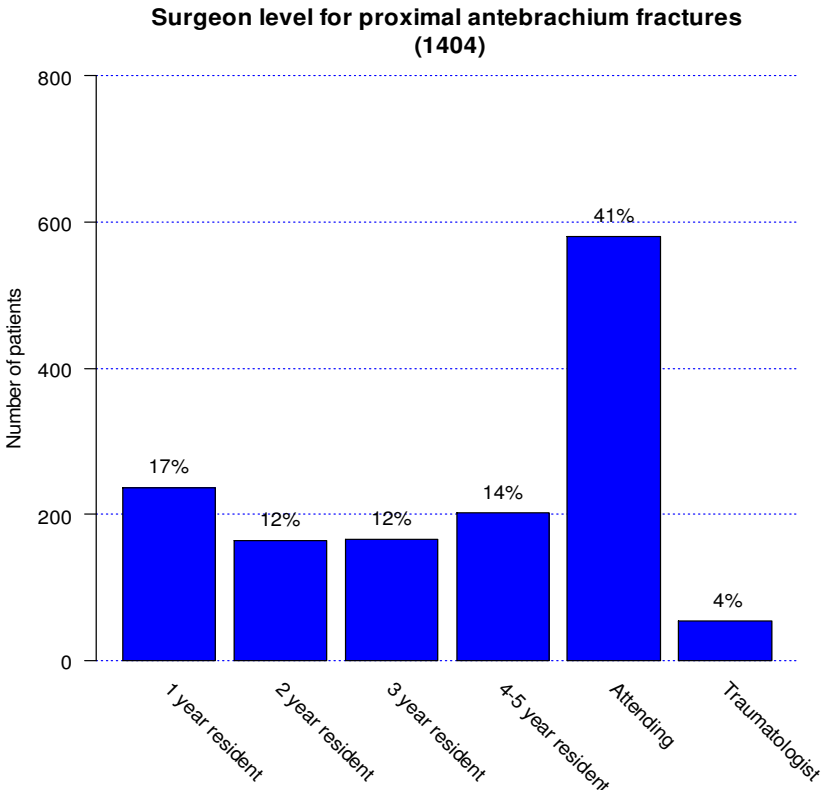

Survival for primary procedure with reoperation
distal humerus fractures
(616)
1.00
0.95
0.90
0.85
0.80
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

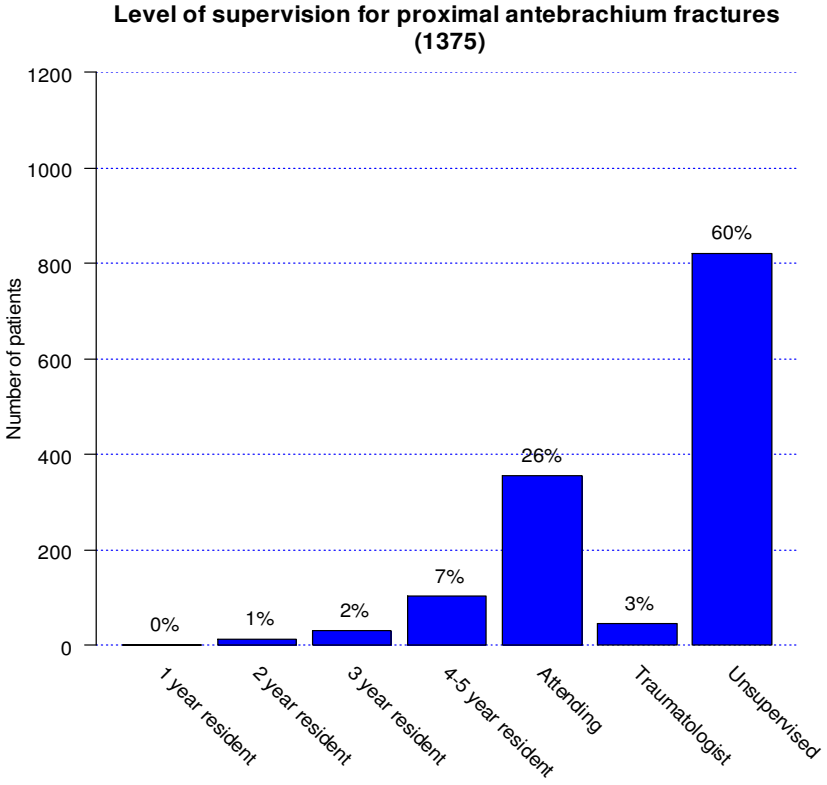

Fracture classification for distal humerus fractures
(616)
300
250
200
150
100
50
0
Number of patients
3
2
1
3
2
1
3
2
1
13A
13B
13C

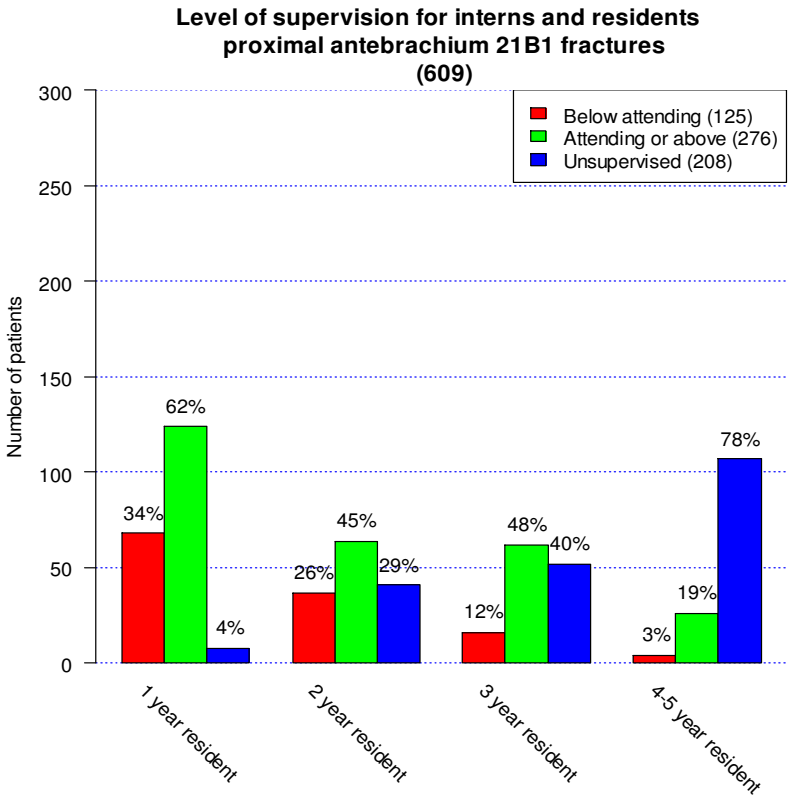
Proximal antebrachium

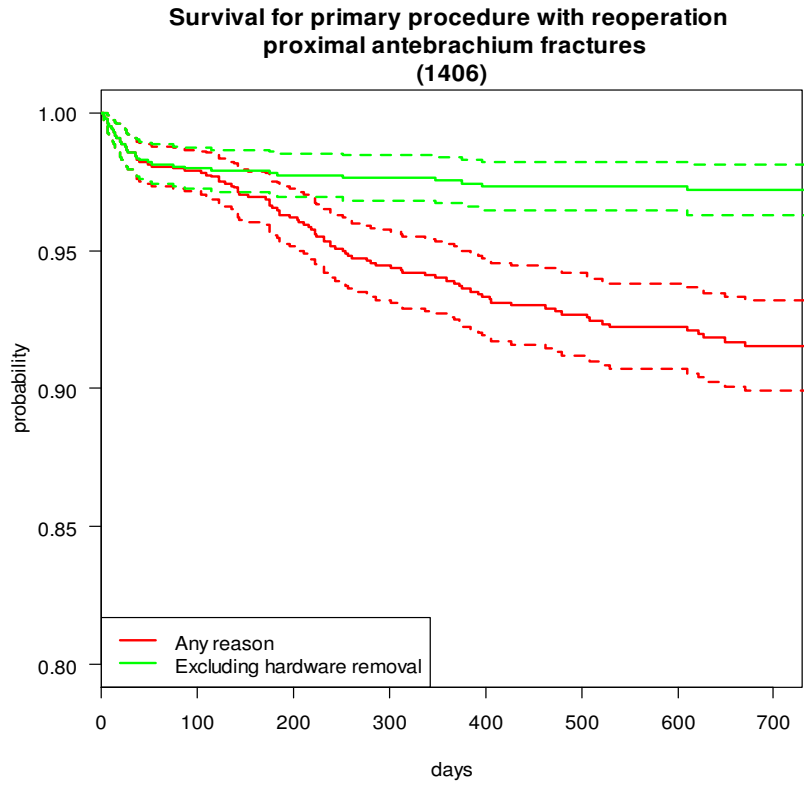


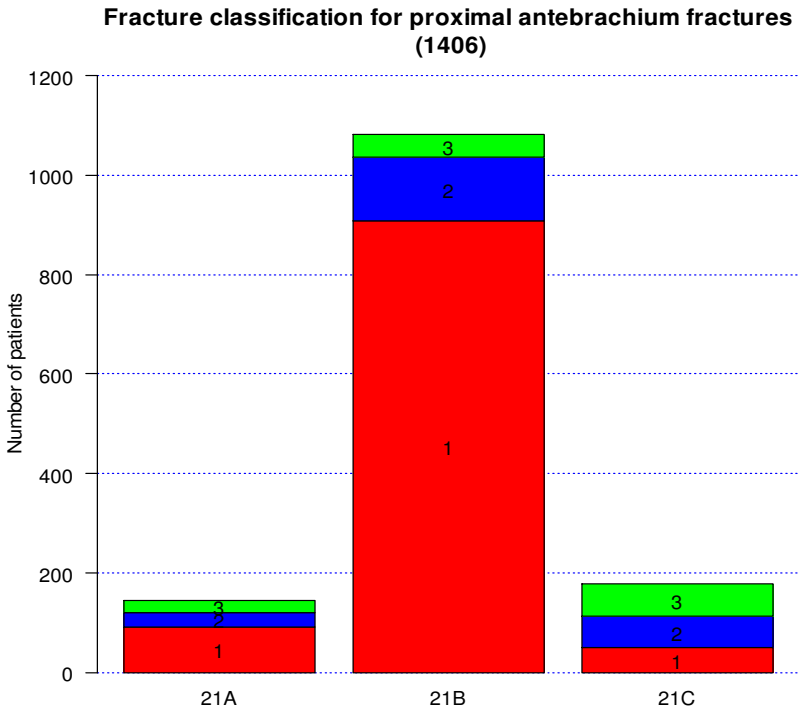



Surgeon level for proximal antebrachium fractures
(1404)
Number of patients
800
600
400
200
0
17%
12%
12%
14%
41%
4%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

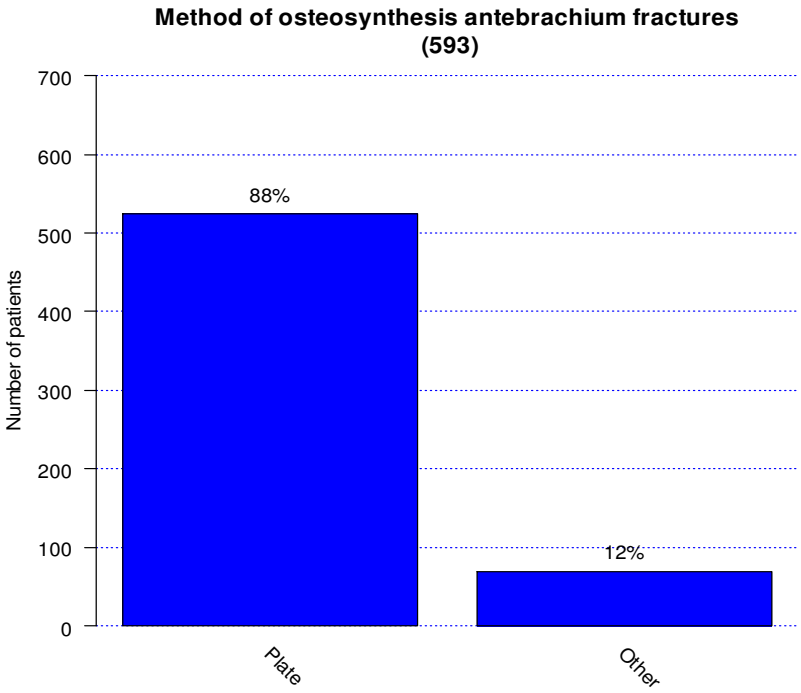

Level of supervision for proximal antebrachium fractures
(1375)
Number of patients
1200
1000
800
600
400
200
0
0%
1%
2%
7%
26%
3%
60%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

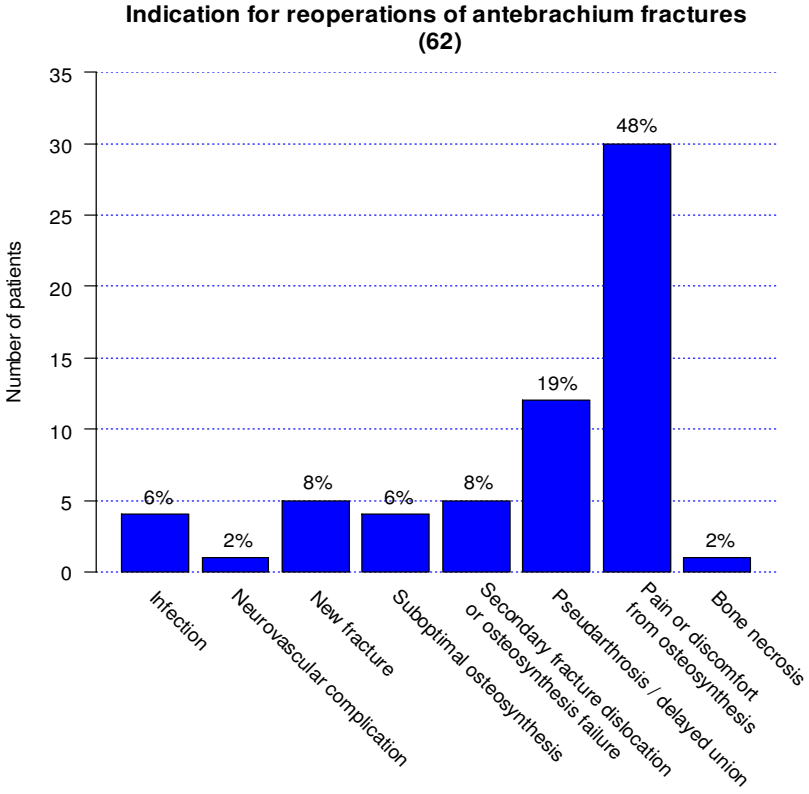

Level of supervision for interns and residents
proximal antebrachium 21B1 fractures
(609)
Below attending (125)
Attending or above (276)
Unsupervised (208)
Number of patients
300
250
200
150
100
50
0
34%
62%
4%
26%
45%
29%
12%
48%
40%
3%
19%
78%
1 year resident
2 year resident
3 year resident
4-5 year resident

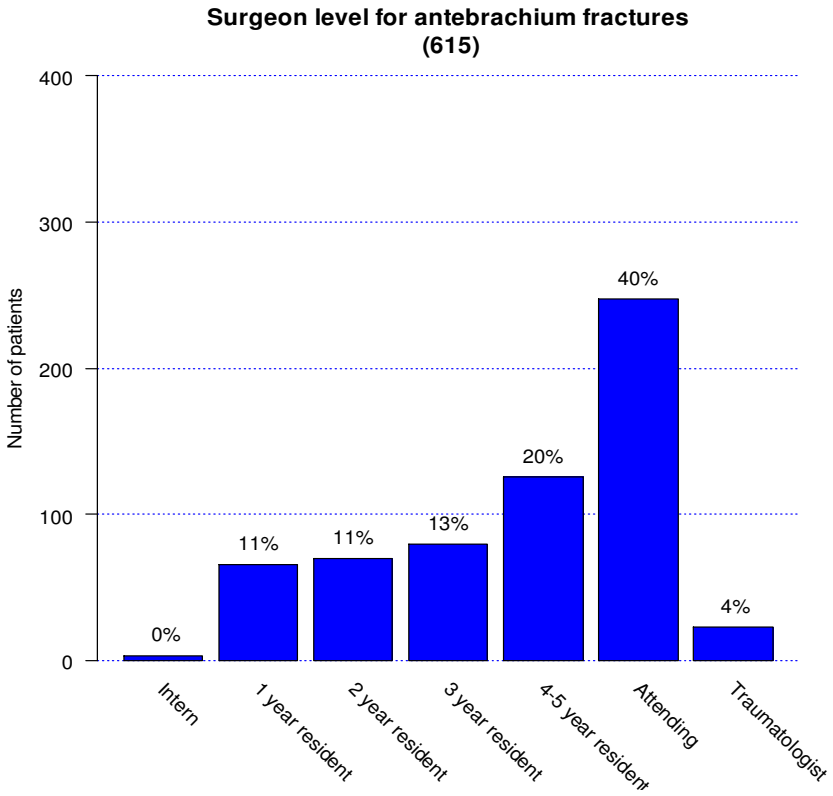

Survival for primary procedure with reoperation
proximal antebrachium fractures
(1406)
probability
1.00
0.95
0.90
0.85
0.80
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

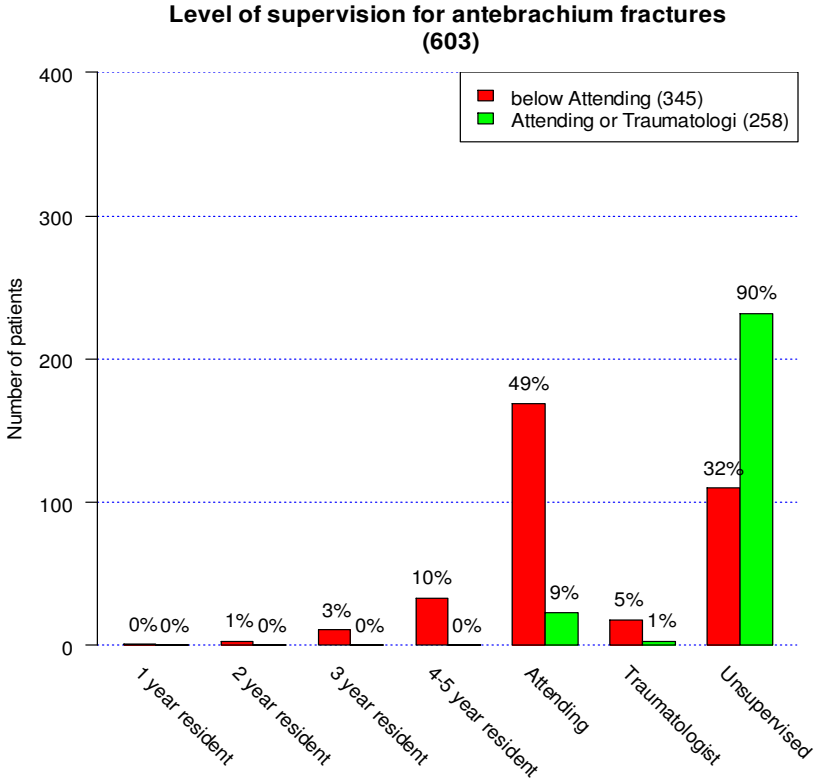

Fracture classification for proximal antebrachium fractures
(1406)
Number of patients
1200
1000
800
600
400
200
0
3
2
1
21A
21B
21C

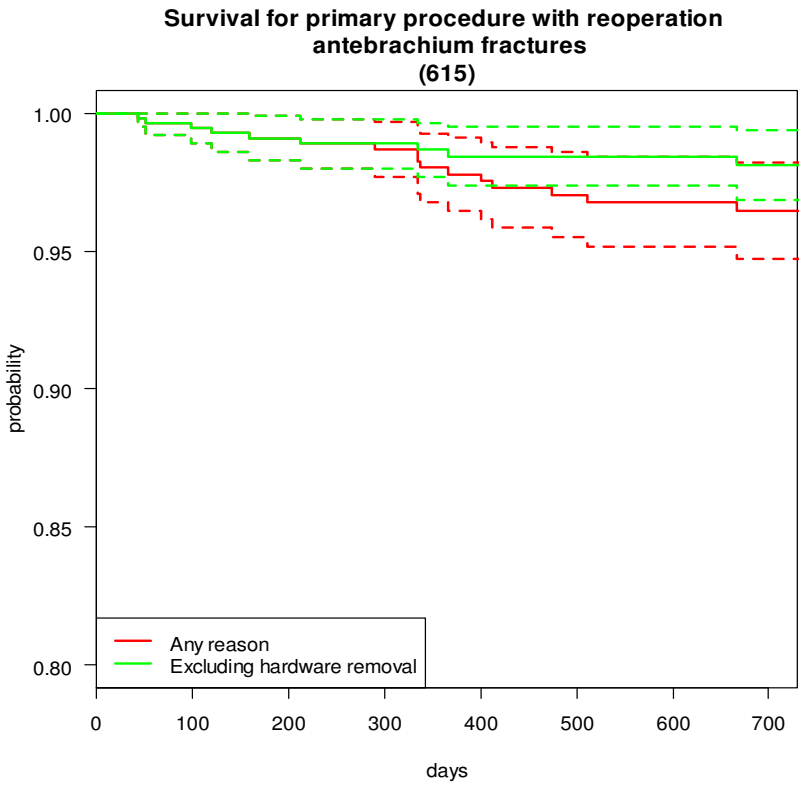
Antebrachium

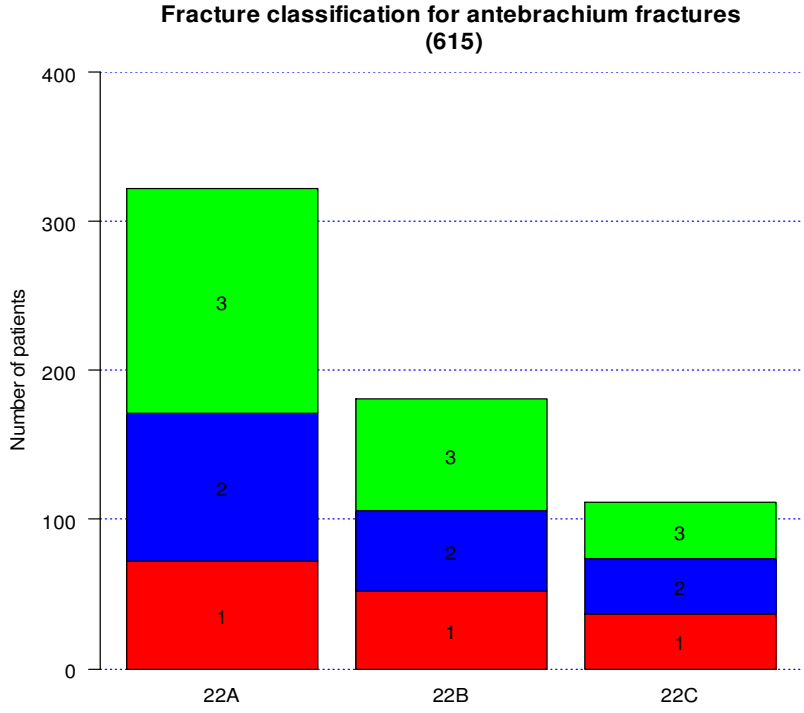




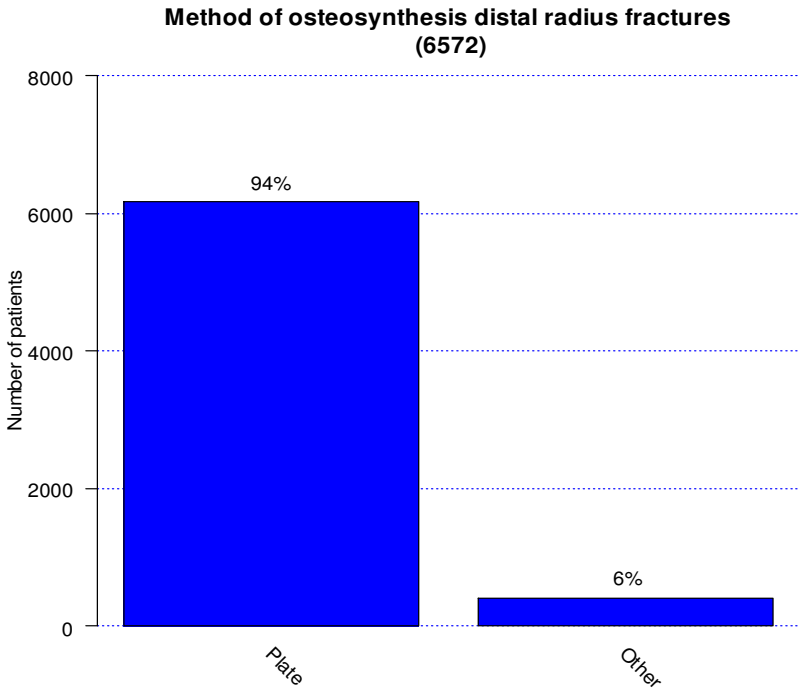

Surgeon level for antebrachium fractures
(615)
Number of patients
400
300
200
100
0
0%
11%
11%
13%
20%
40%
4%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

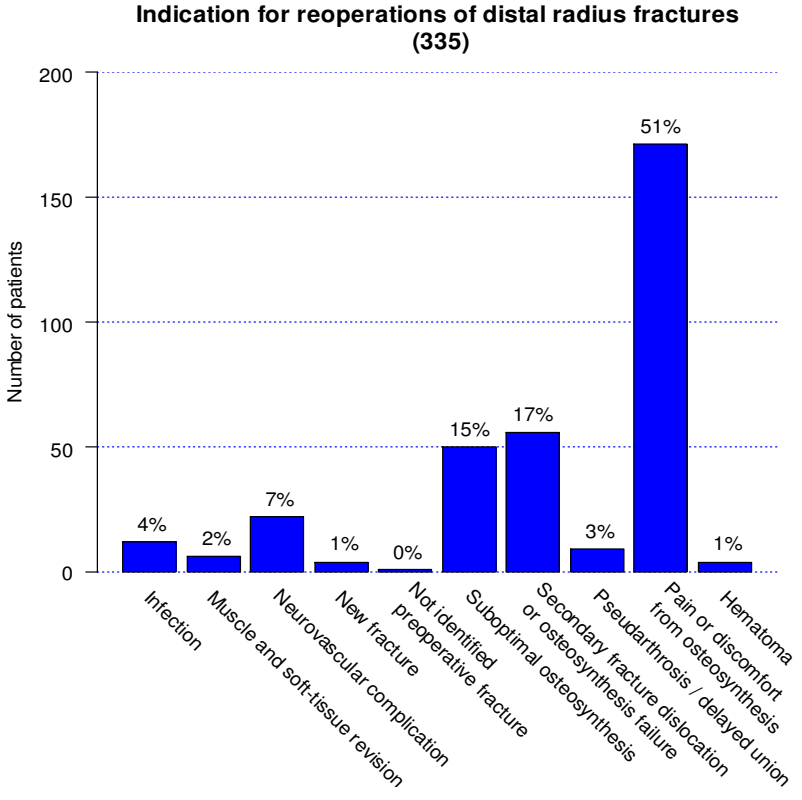

Level of supervision for antebrachium fractures
(603)
below Attending (345)
Attending or Traumatologi (258)
Number of patients
400
300
200
100
0
0% 0%
1% 0%
3% 0%
10% 0%
49% 9%
5% 1%
32% 90%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

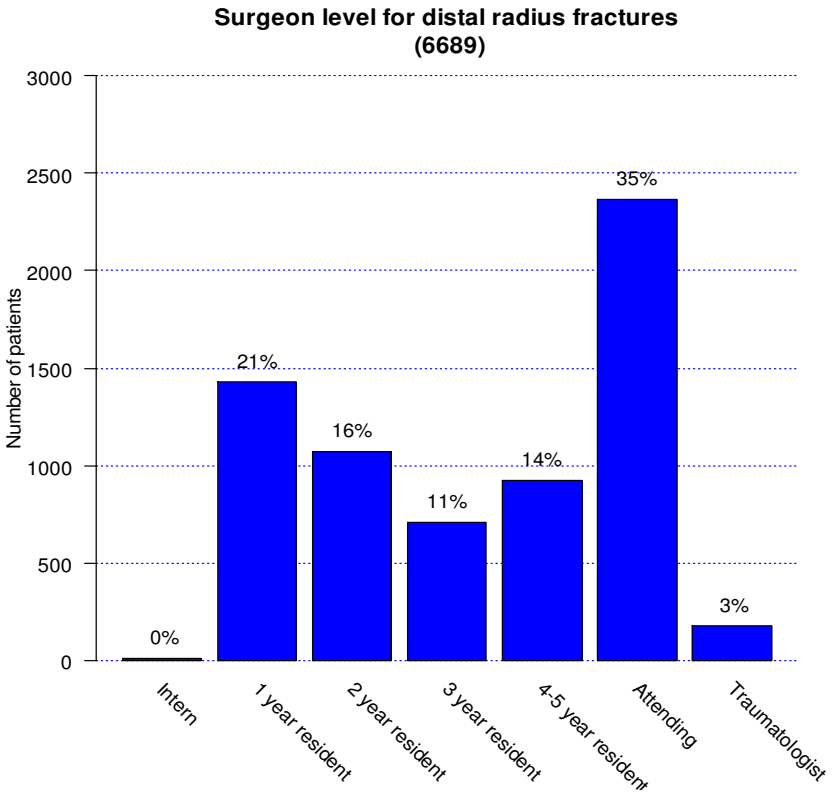

Survival for primary procedure with reoperation
antebrachium fractures
(615)
probability
1.00
0.95
0.90
0.85
0.80
0
100
200
300
400
500
600
700
days
Any reason
Excluding hardware removal

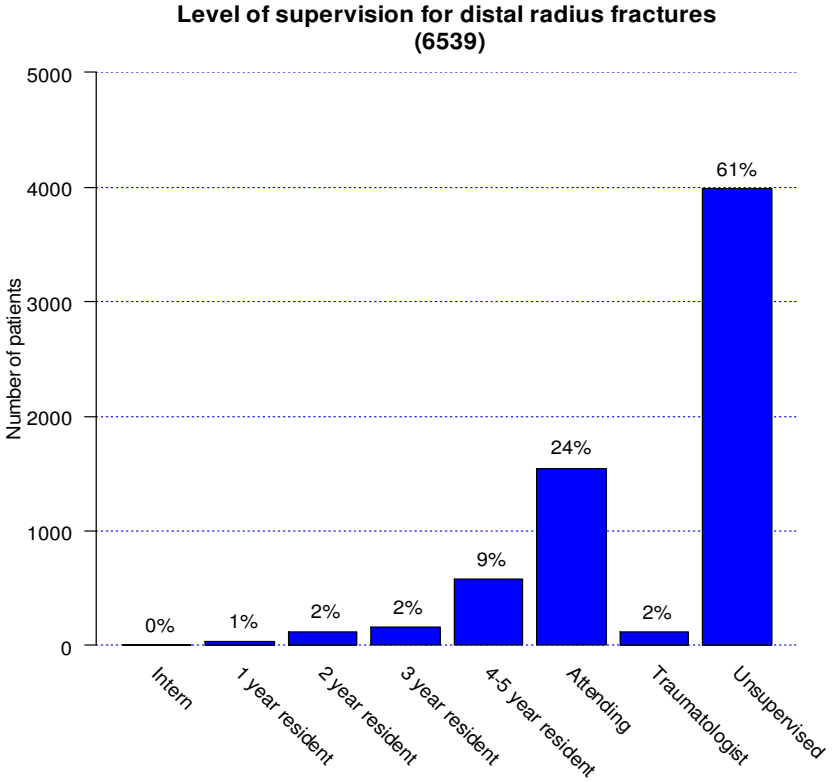

Fracture classification for antebrachium fractures
(615)
Number of patients
400
300
200
100
0
3
2
1
3
2
1
3
2
1
22A
22B
22C

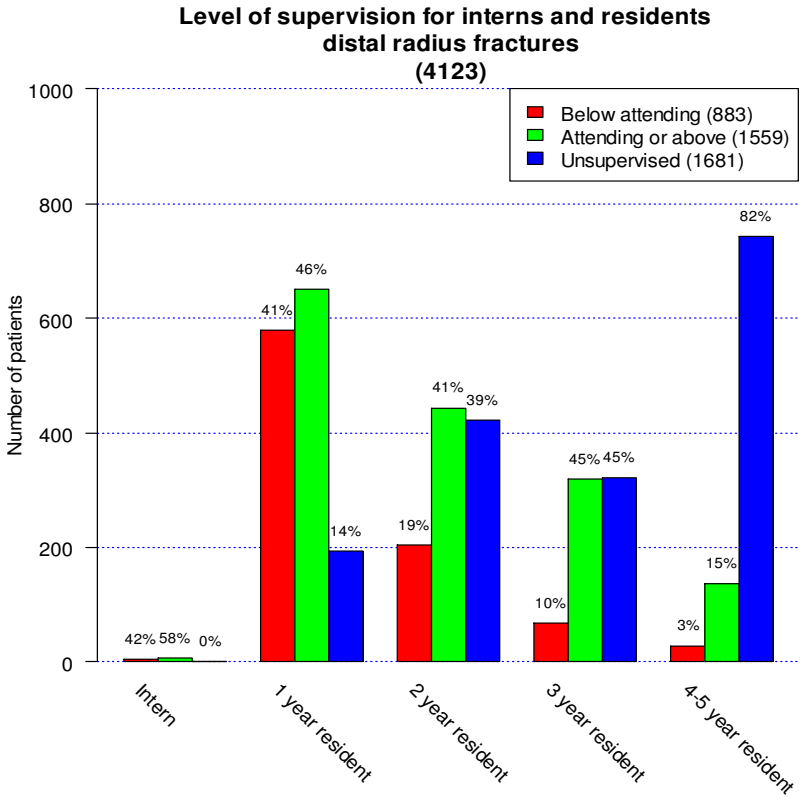
Distal radius

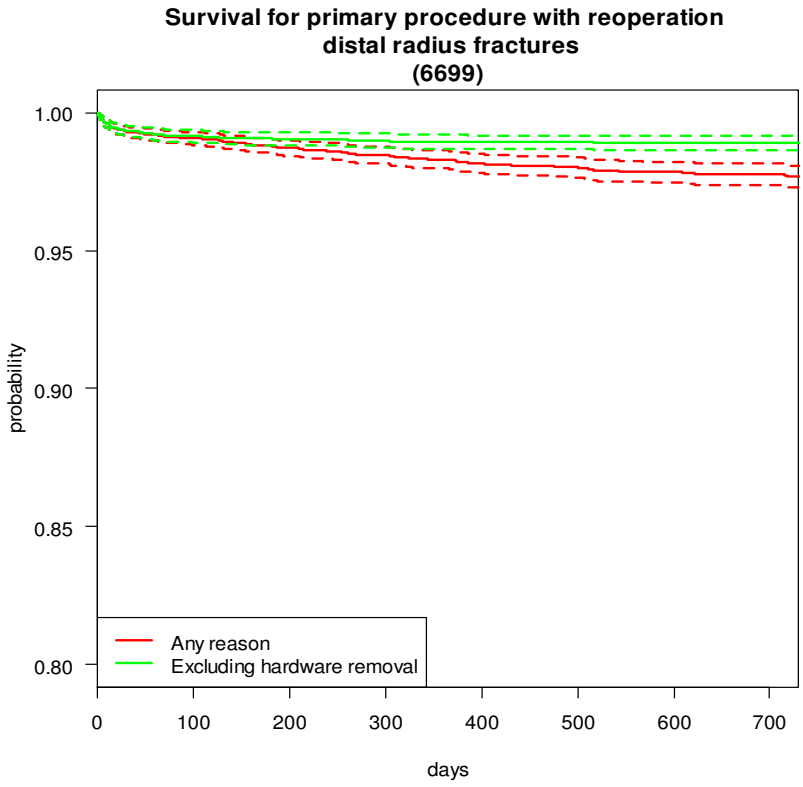


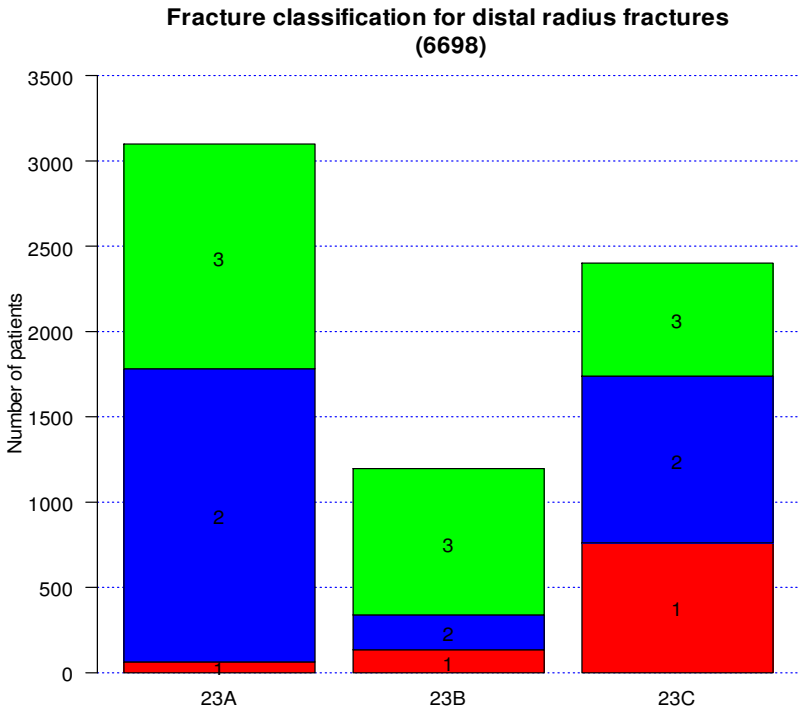



Surgeon level for distal radius fractures
(6689)
Number of patients
3000
2500
2000
1500
1000
500
0
0%
21%
16%
11%
14%
35%
3%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

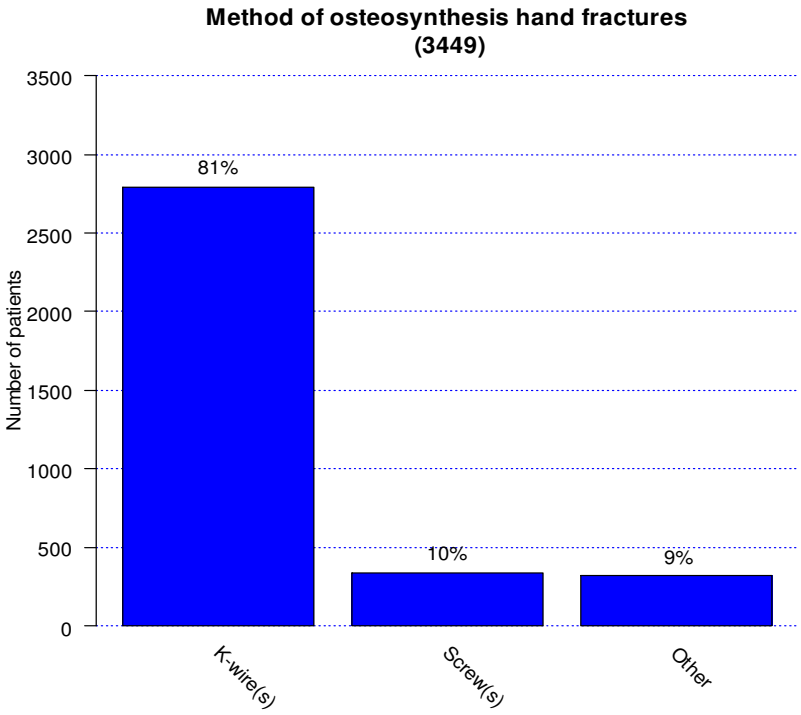

Level of supervision for distal radius fractures
(6539)
Number of patients
5000
4000
3000
2000
1000
0
0%
1%
2%
2%
9%
24%
2%
61%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

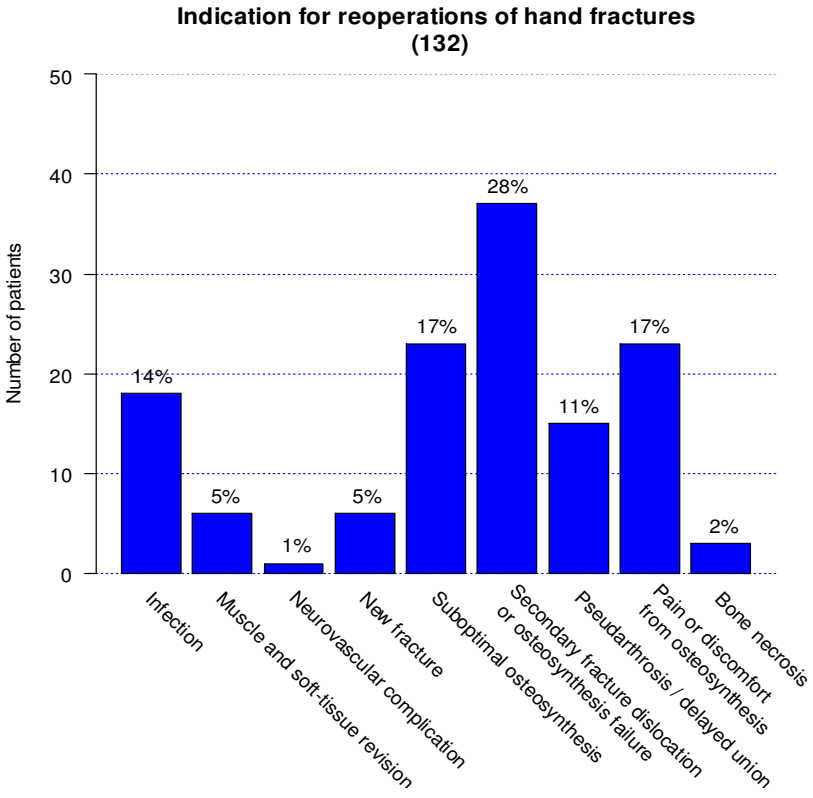

Level of supervision for interns and residents
distal radius fractures
(4123)
Below attending (883)
Attending or above (1559)
Unsupervised (1681)
Number of patients
1000
800
600
400
200
0
42%
58%
0%
41%
46%
14%
19%
41%
39%
10%
45%
45%
3%
15%
82%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident

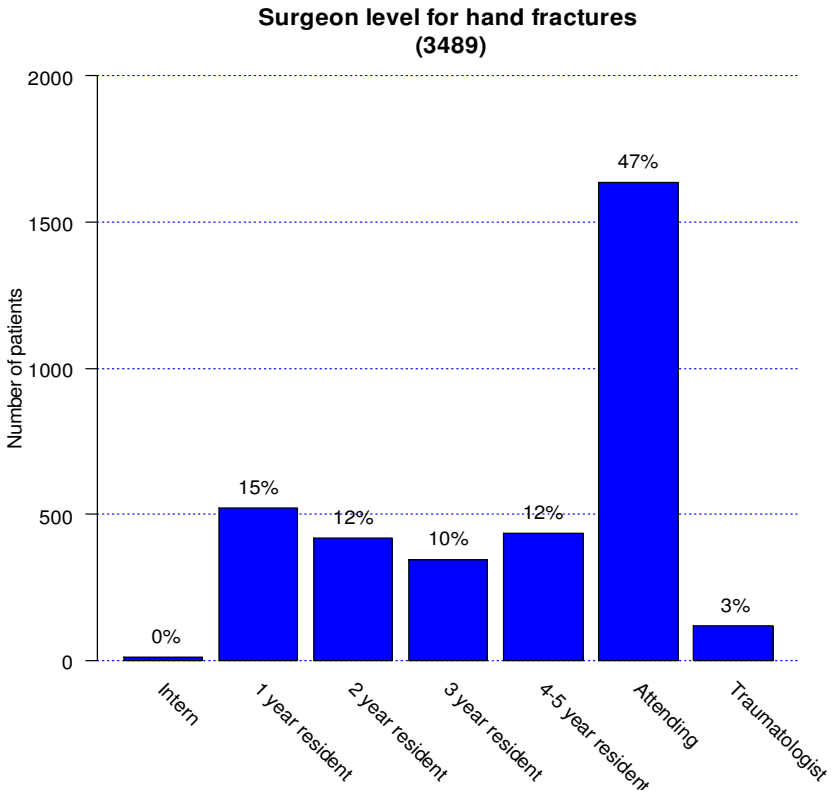

Survival for primary procedure with reoperation
distal radius fractures
(6699)
probability
1.00
0.95
0.90
0.85
0.80
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

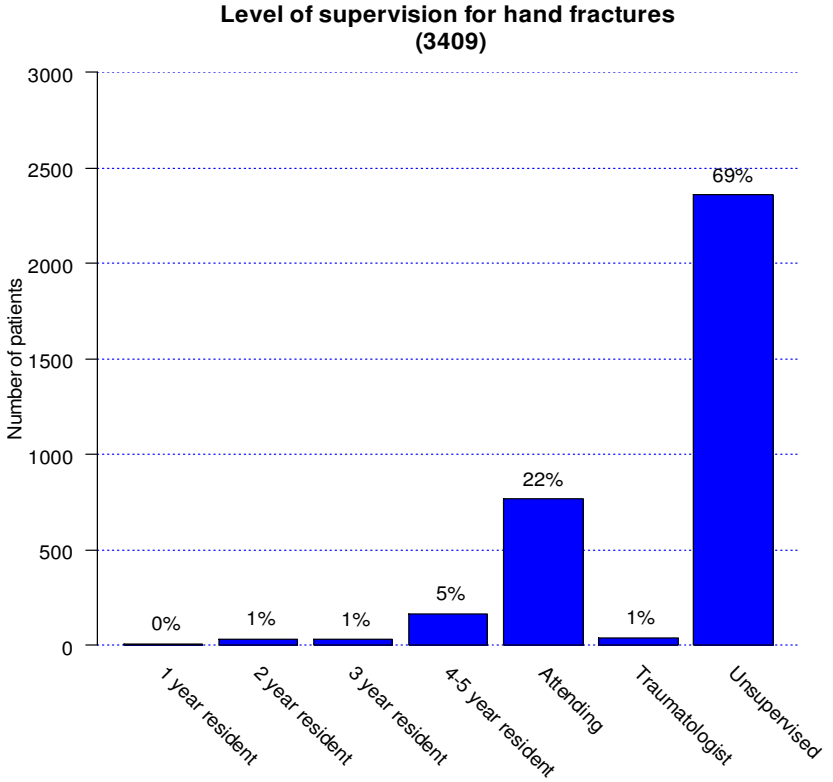

Fracture classification for distal radius fractures
(6698)
Number of patients
3500
3000
2500
2000
1500
1000
500
0
3
2
1
3
2
1
3
2
1
23A
23B
23C

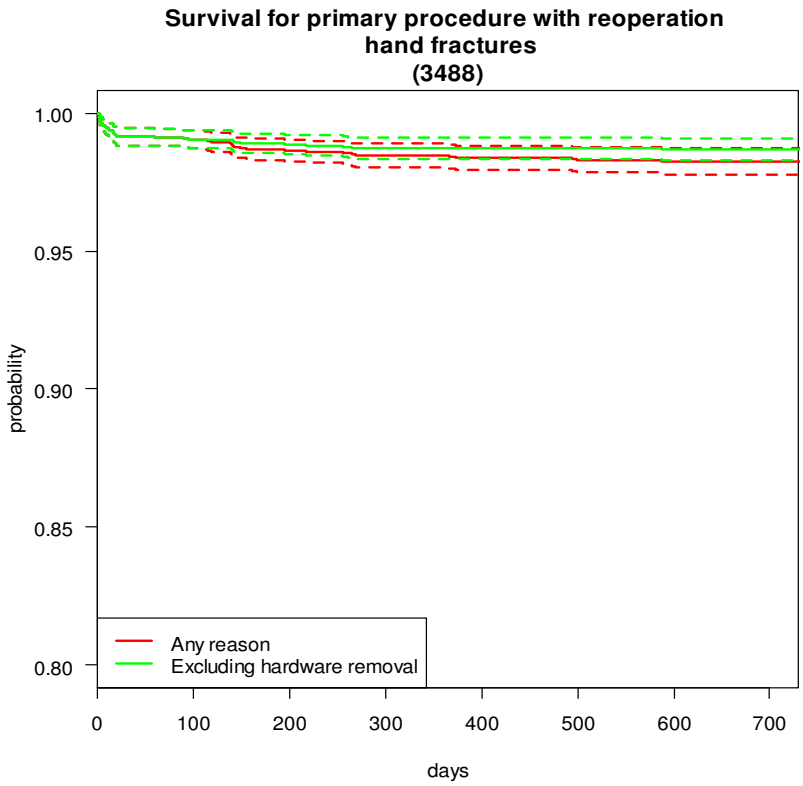
Hand

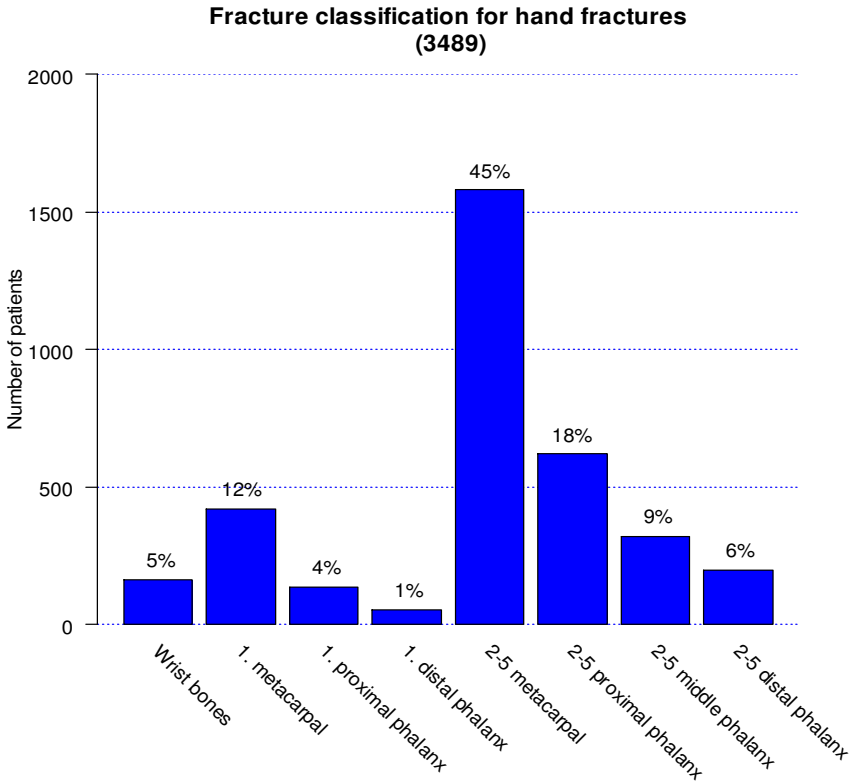

Method of osteosynthesis hand fractures
(3449)
Number of patients
3500
3000
2500
2000
1500
1000
500
0
81%
10%
9%
K-wire(s)
Screw(s)
Other


Indication for reoperations of hand fractures
(132)
Number of patients
50
40
30
20
10
0
14%
5%
1%
5%
17%
28%
11%
17%
2%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Bone necrosis

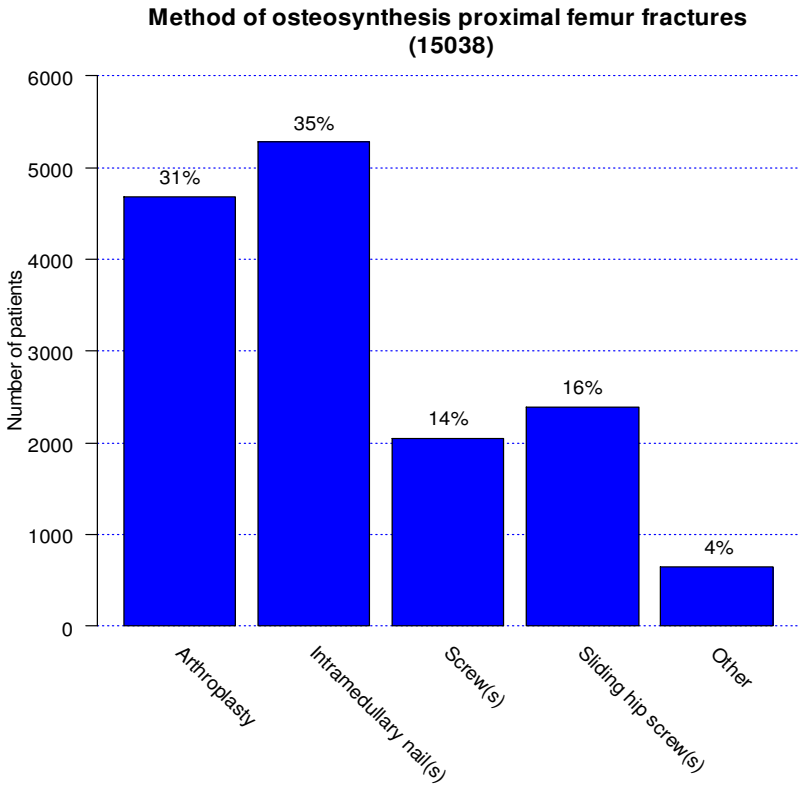

Surgeon level for hand fractures
(3489)
Number of patients
2000
1500
1000
500
0
0%
15%
12%
10%
12%
47%
3%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

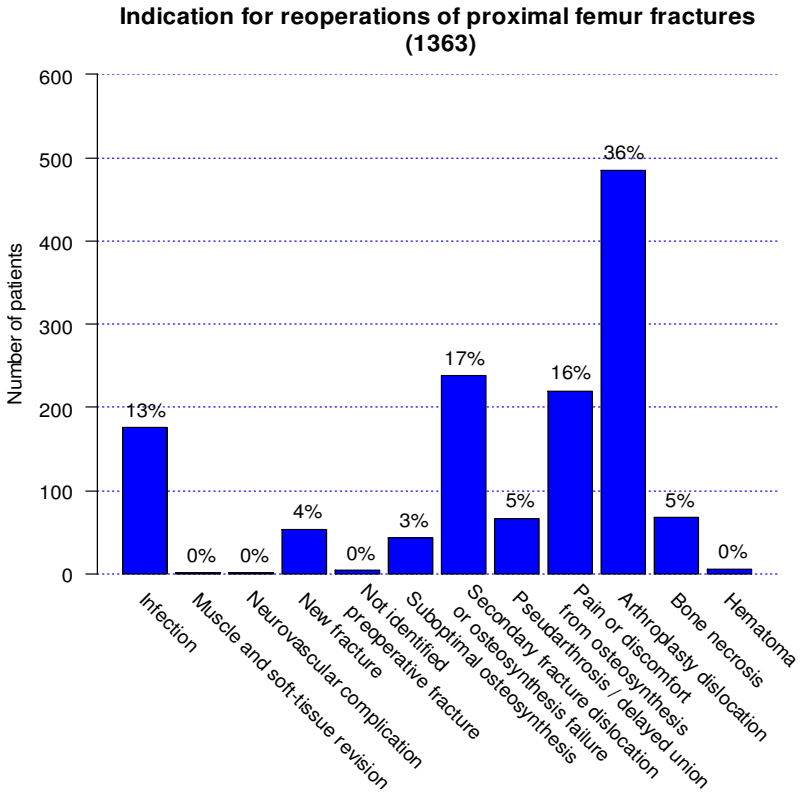

Level of supervision for hand fractures
(3409)
Number of patients
3000
2500
2000
1500
1000
500
0
0%
1%
1%
5%
22%
1%
69%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

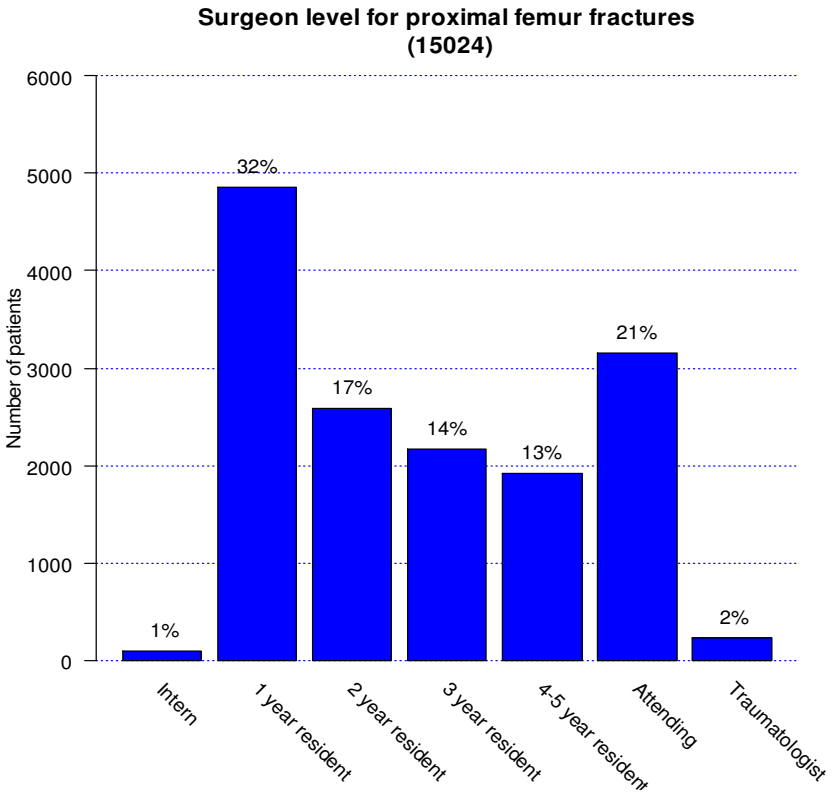

Survival for primary procedure with reoperation
hand fractures
(3488)
probability
1.00
0.95
0.90
0.85
0.80
0
100
200
300
400
500
600
700
days
Any reason
Excluding hardware removal

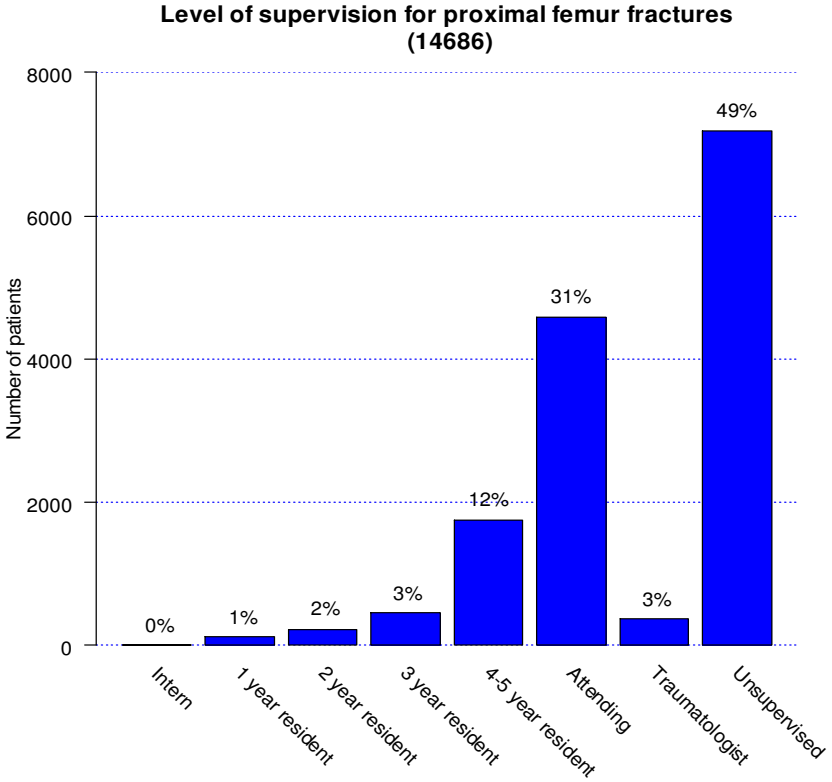

Fracture classification for hand fractures
(3489)
Number of patients
2000
1500
1000
500
0
5%
12%
4%
1%
45%
18%
9%
6%
Wrist bones
1. metacarpal
1. proximal phalanx
1. distal phalanx
2-5 metacarpal
2-5 proximal phalanx
2-5 middle phalanx
2-5 distal phalanx

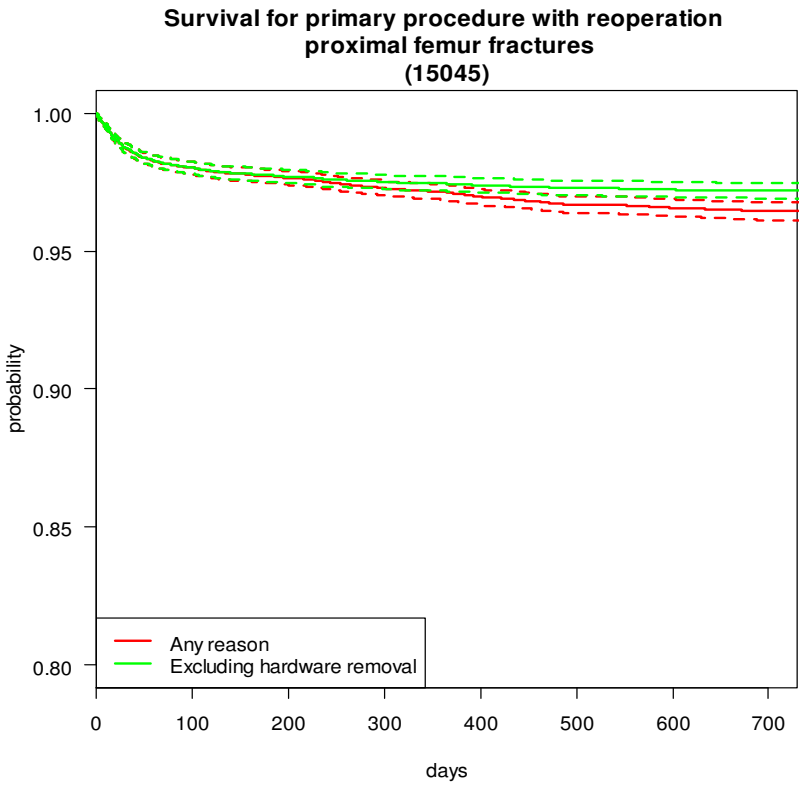
Proximal femur

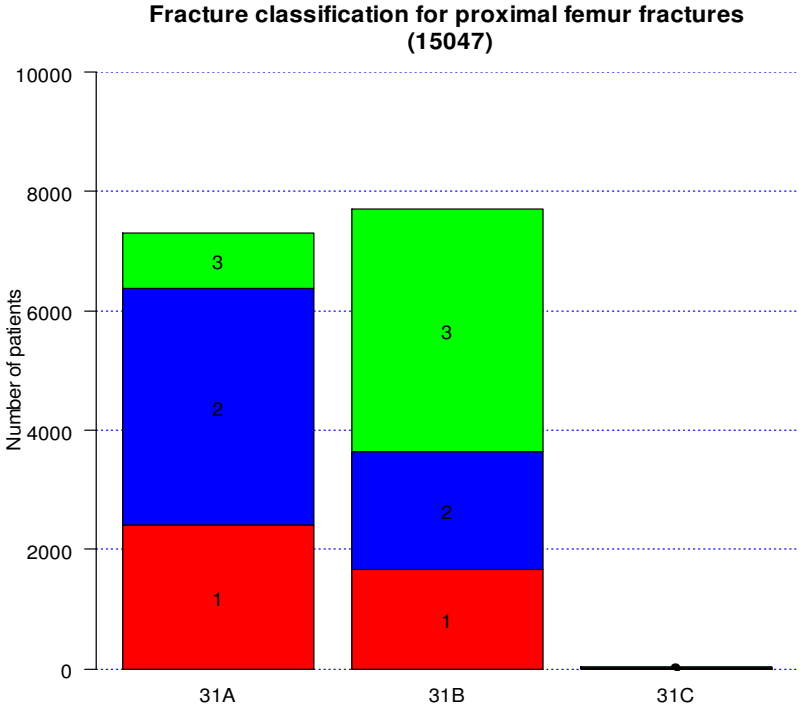




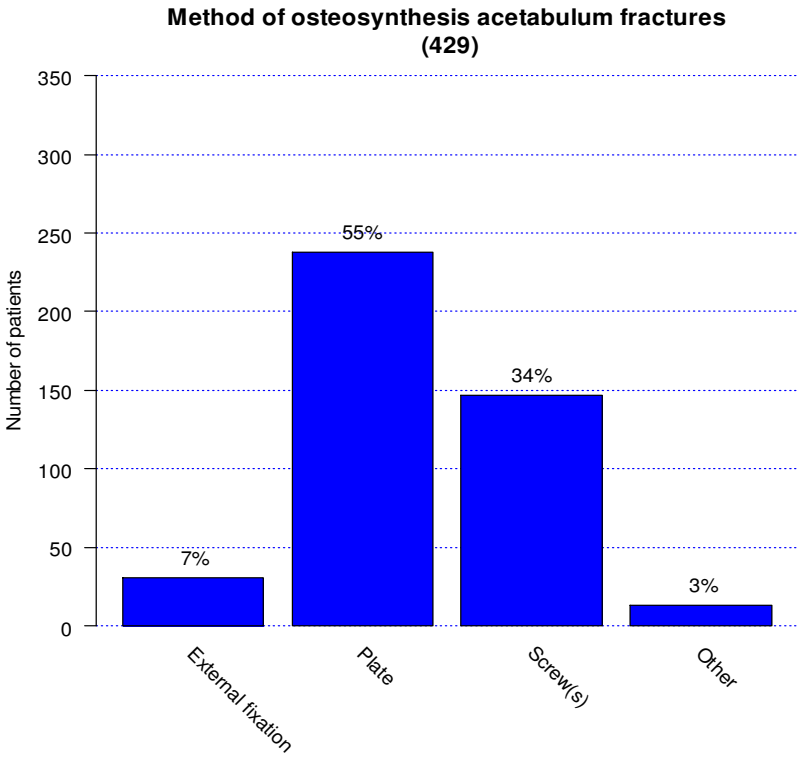

Surgeon level for proximal femur fractures
(15024)
Number of patients
6000
5000
4000
3000
2000
1000
0
1%
32%
17%
14%
13%
21%
2%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

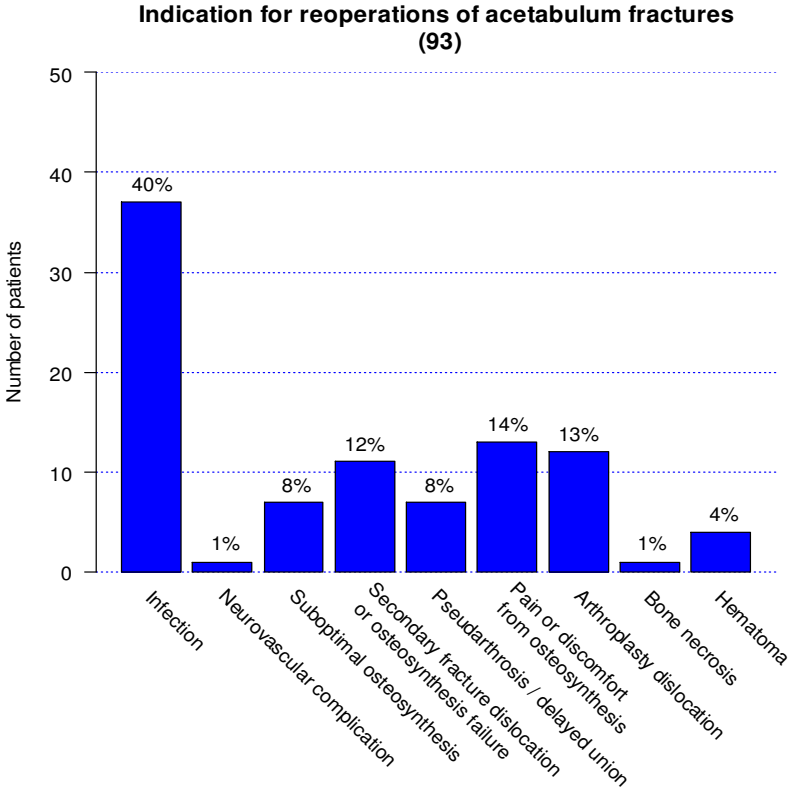

Level of supervision for proximal femur fractures
(14686)
Number of patients
8000
6000
4000
2000
0
0%
1%
2%
3%
12%
31%
3%
49%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

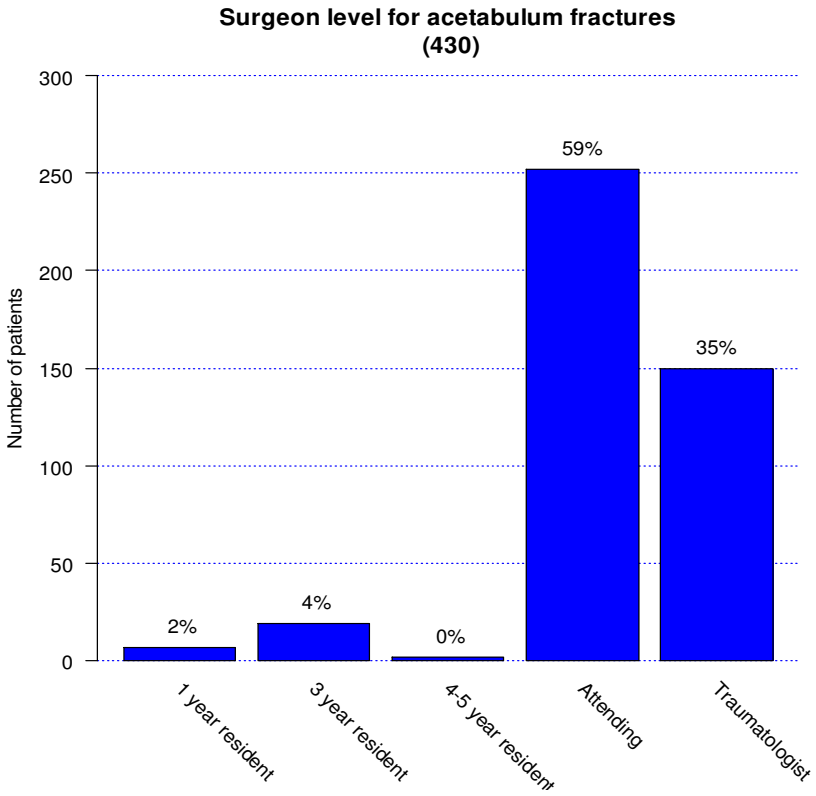

Survival for primary procedure with reoperation
proximal femur fractures
(15045)
1.00
0.95
0.90
0.85
0.80
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

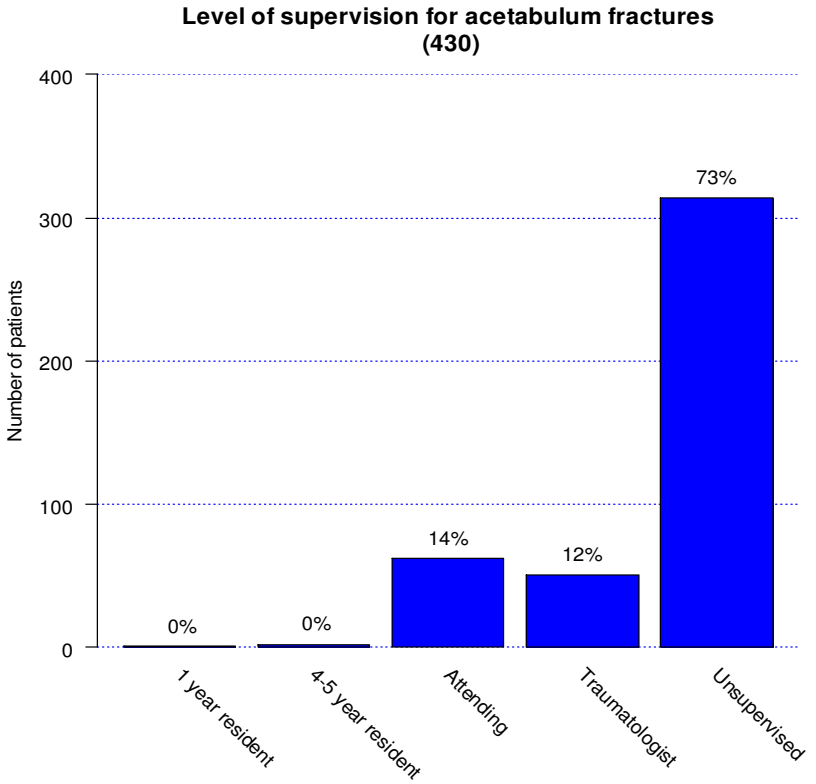

Fracture classification for proximal femur fractures
(15047)
10000
8000
6000
4000
2000
0
Number of patients
3
2
1
3
2
1
31A
31B
31C

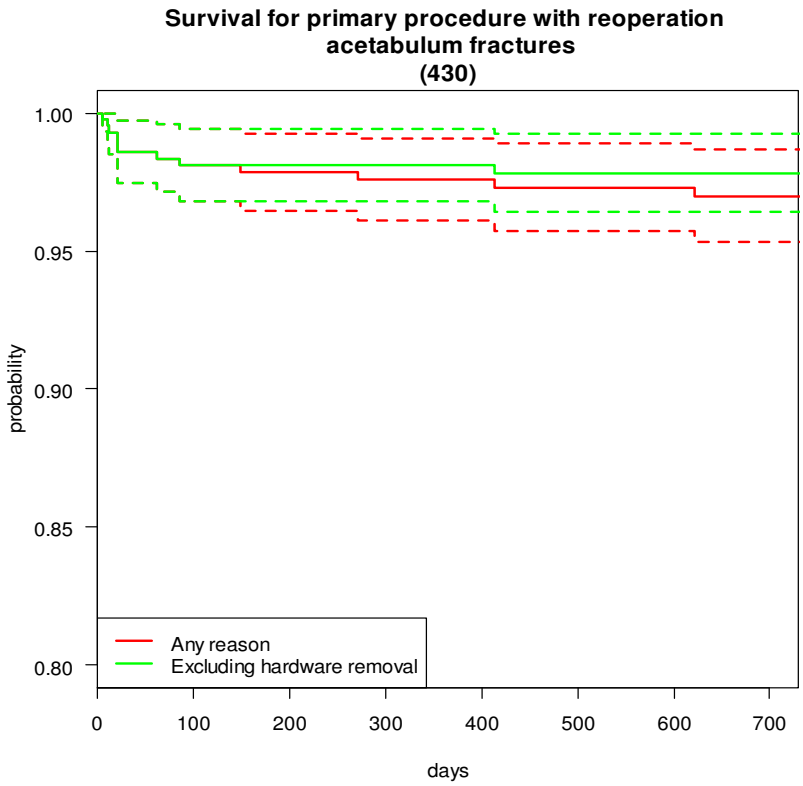
Acetabulum

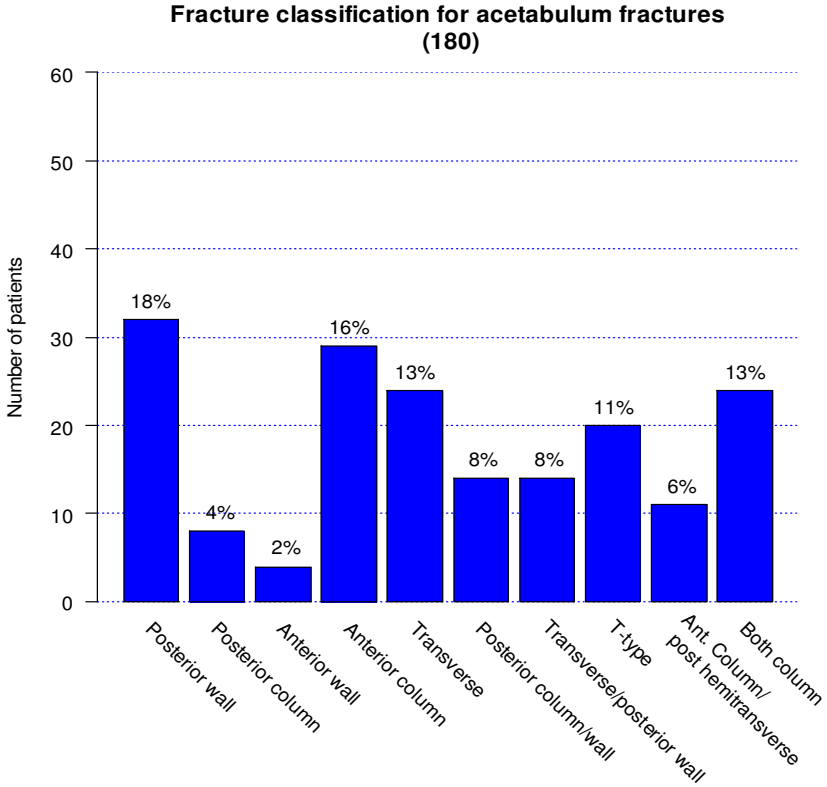

Method of osteosynthesis acetabulum fractures
(429)
Number of patients
350
300
250
200
150
100
50
0
7%
55%
34%
3%
External fixation
Plate
Screw(s)
Other


Indication for reoperations of acetabulum fractures
(93)
Number of patients
50
40
30
20
10
0
40%
1%
8%
12%
8%
14%
13%
1%
4%
Infection
Neurovascular complication
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Arthroplasty dislocation
Bone necrosis
Hematoma

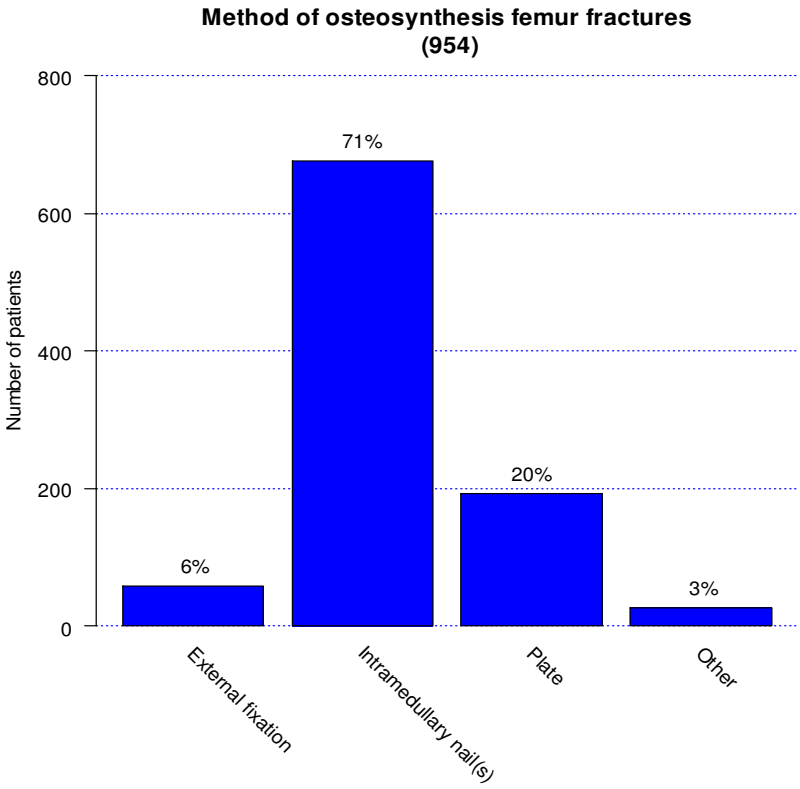

Surgeon level for acetabulum fractures
(430)
Number of patients
300
250
200
150
100
50
0
2%
4%
0%
59%
35%
1 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

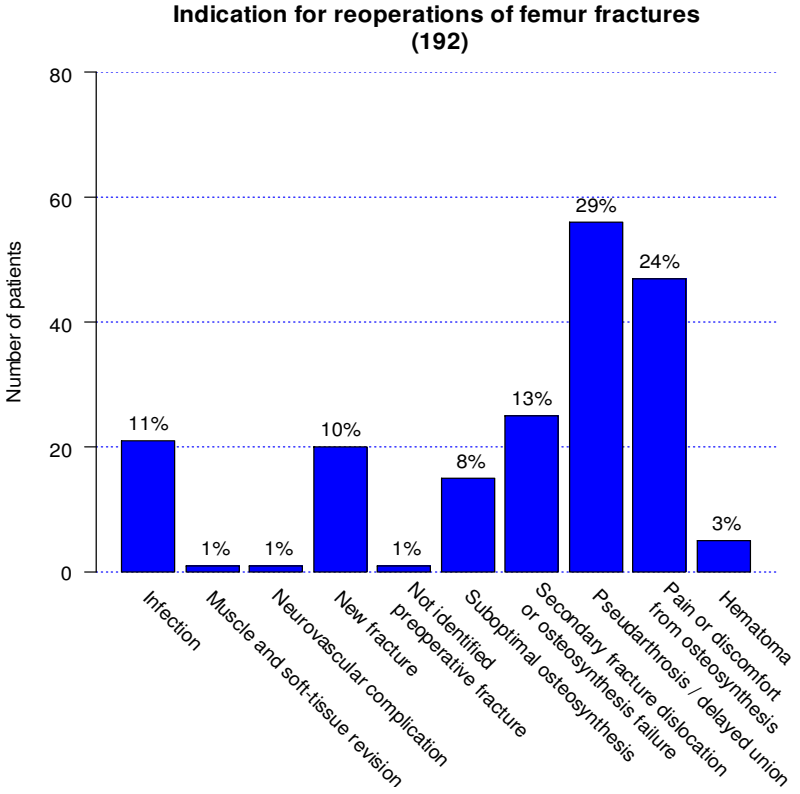

Level of supervision for acetabulum fractures
(430)
Number of patients
400
300
200
100
0
0%
0%
14%
12%
73%
1 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

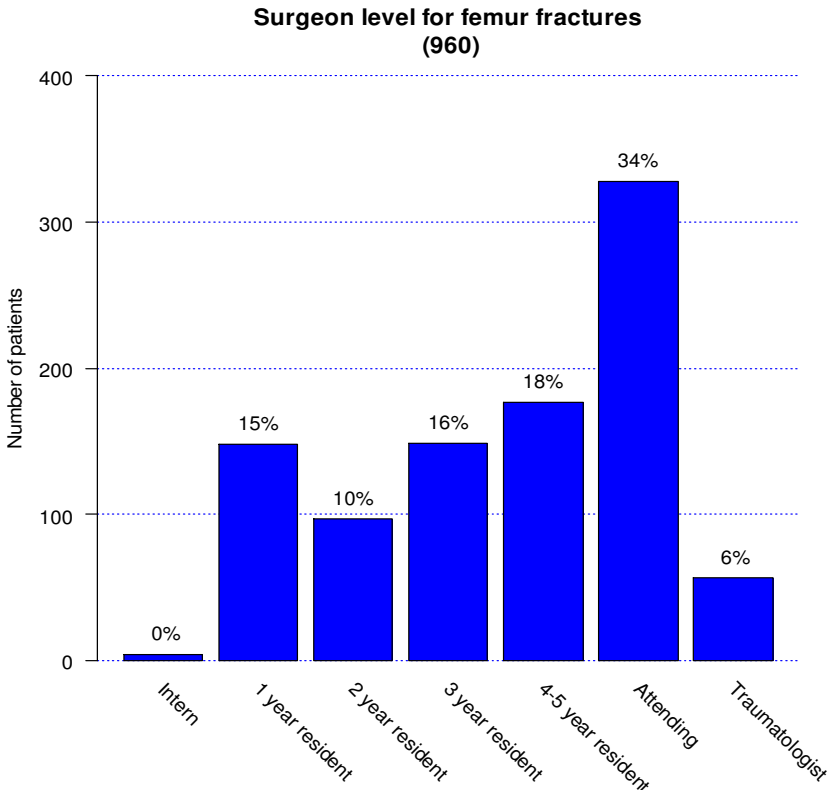

Survival for primary procedure with reoperation
acetabulum fractures
(430)
probability
1.00
0.95
0.90
0.85
0.80
0
100
200
300
400
500
600
700
days
Any reason
Excluding hardware removal

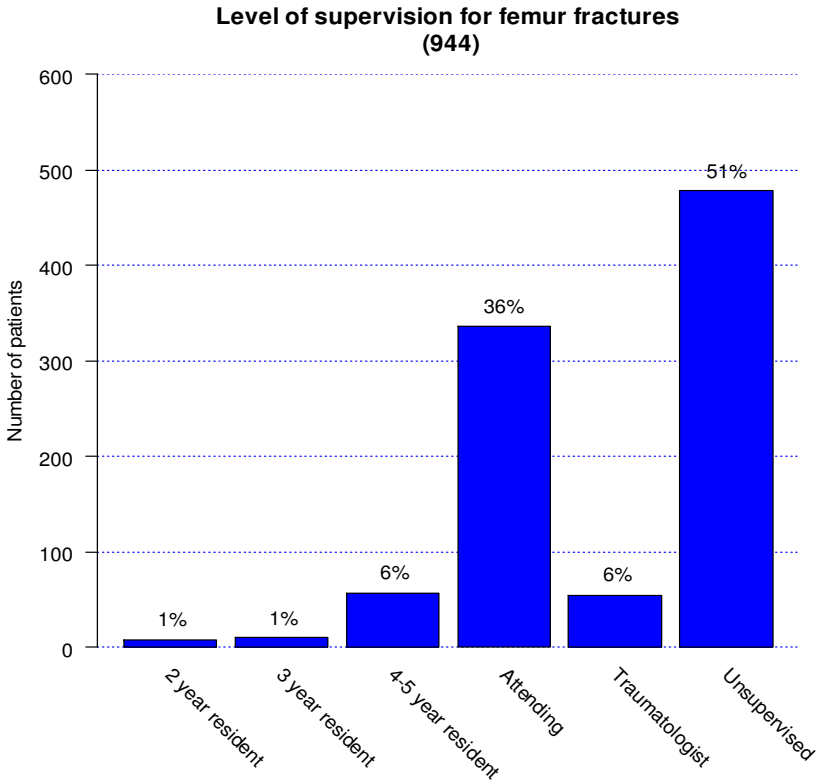

Fracture classification for acetabulum fractures
(180)
Number of patients
60
50
40
30
20
10
0
18%
4%
2%
16%
13%
8%
8%
11%
6%
13%
Posterior wall
Posterior column
Anterior wall
Anterior column
Transverse
Posterior column/wall
Transverse/posterior wall
T-type
Ant. Column/
post hemitransverse
Both column

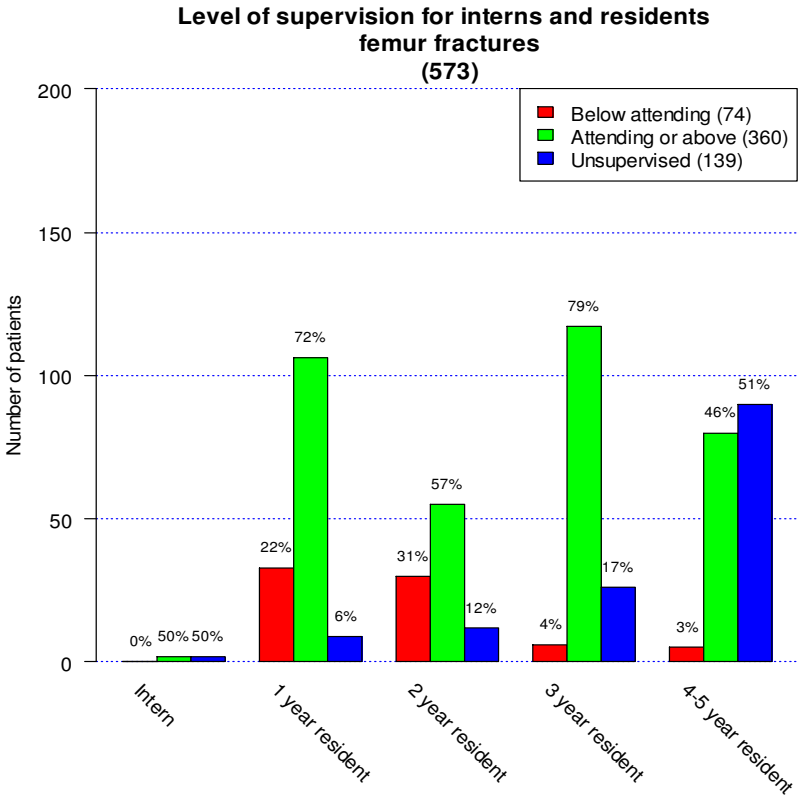
Femur

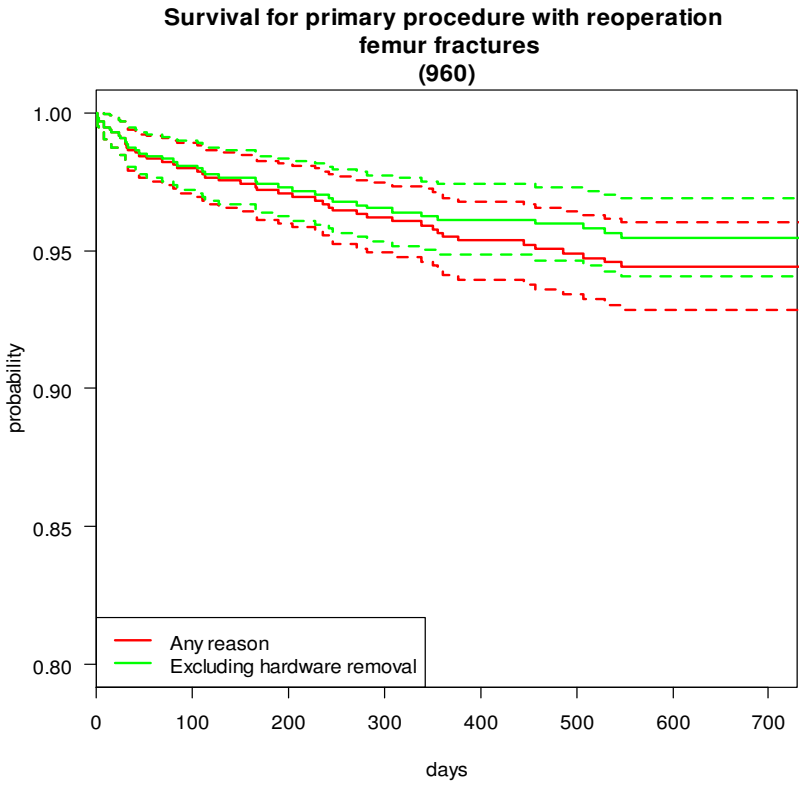

Method of osteosynthesis femur fractures
(954)
Number of patients
800
600
400
200
0
6%
71%
20%
3%
External fixation
Intramedullary nail(s)
Plate
Other

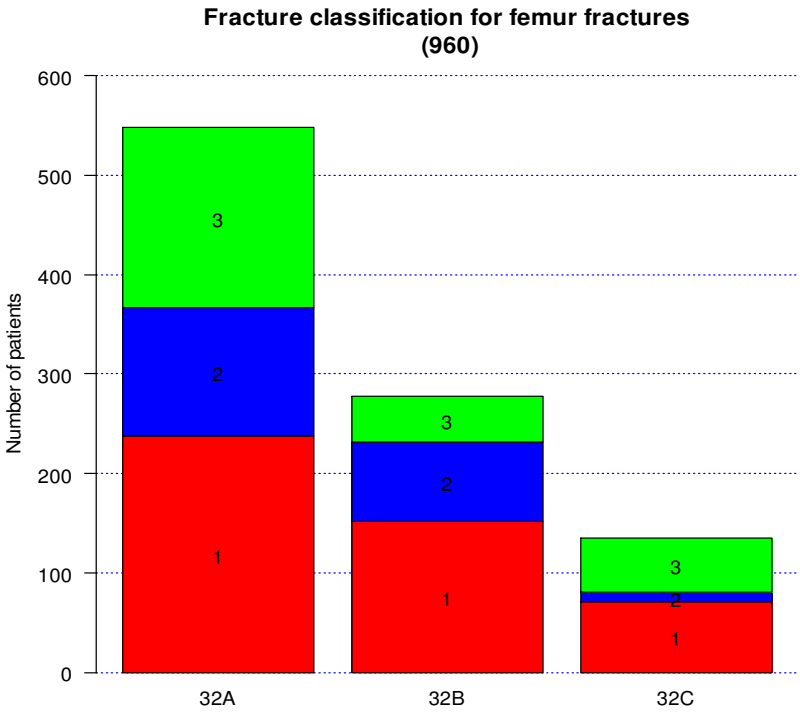

Indication for reoperations of femur fractures
(192)
Number of patients
80
60
40
20
0
11%
1%
1%
10%
1%
8%
13%
29%
24%
3%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Not identified preoperative fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Hematoma


Surgeon level for femur fractures
(960)
Number of patients
400
300
200
100
0
0%
15%
10%
16%
18%
34%
6%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

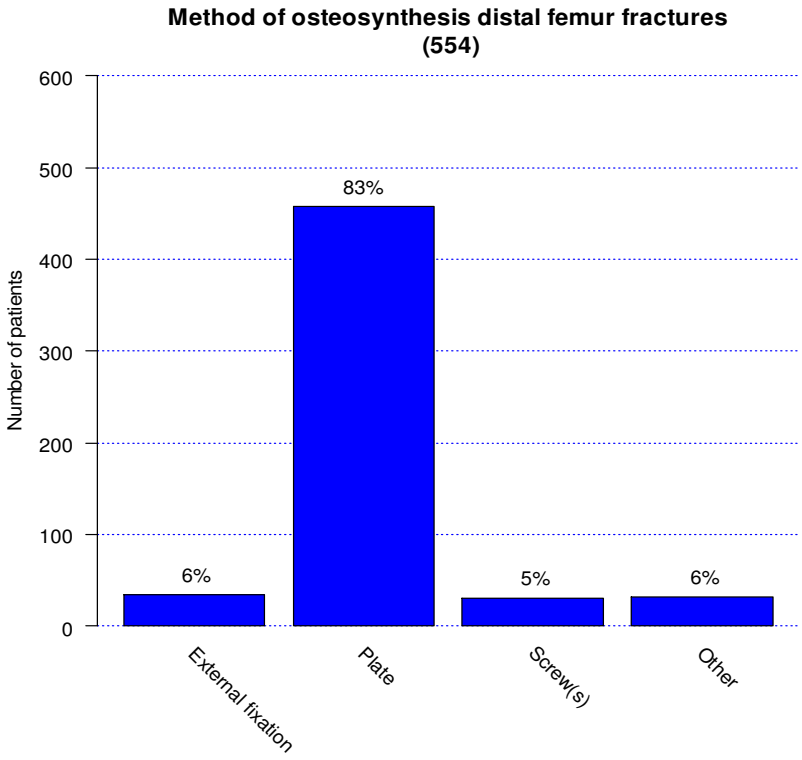

Level of supervision for femur fractures
(944)
Number of patients
600
500
400
300
200
100
0
1%
1%
6%
36%
6%
51%
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

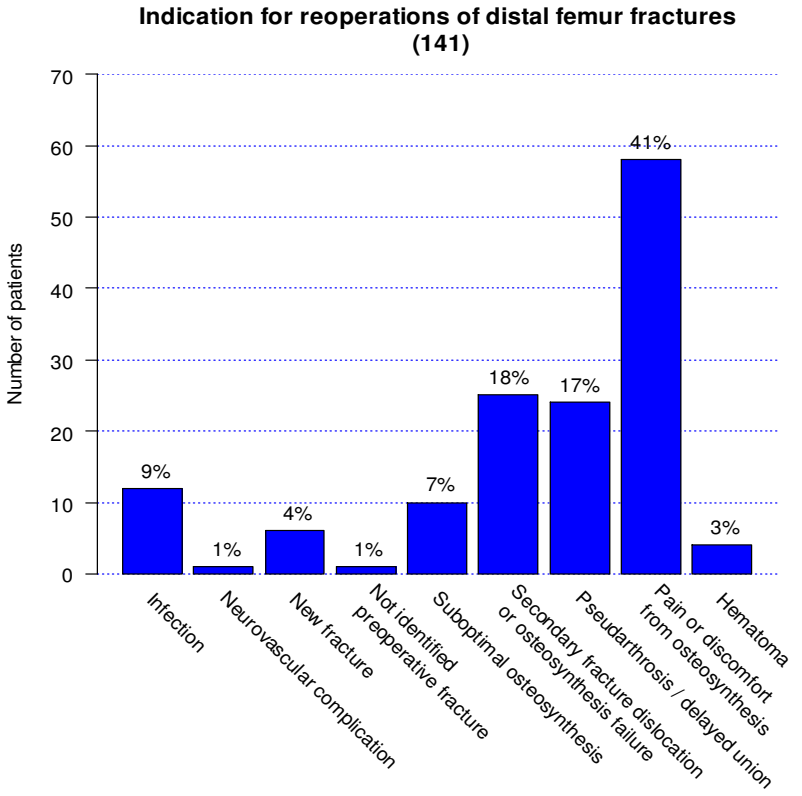

Level of supervision for interns and residents
femur fractures
(573)
Below attending (74)
Attending or above (360)
Unsupervised (139)
Number of patients
200
150
100
50
0
0%
50%
50%
22%
72%
6%
31%
57%
12%
4%
79%
17%
3%
46%
51%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident

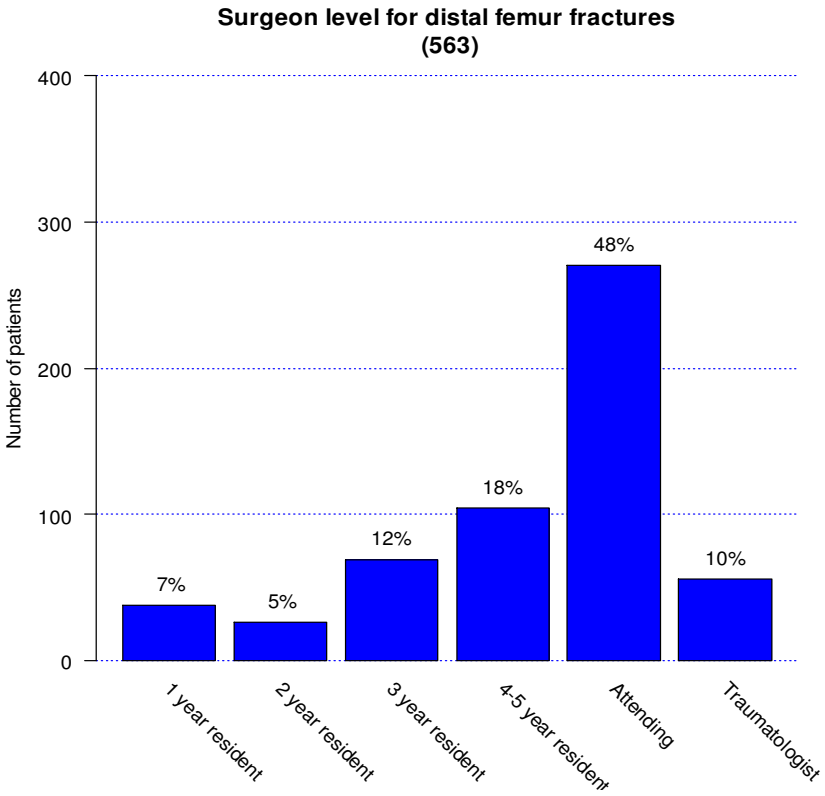

Survival for primary procedure with reoperation
femur fractures
(960)
probability
1.00
0.95
0.90
0.85
0.80
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

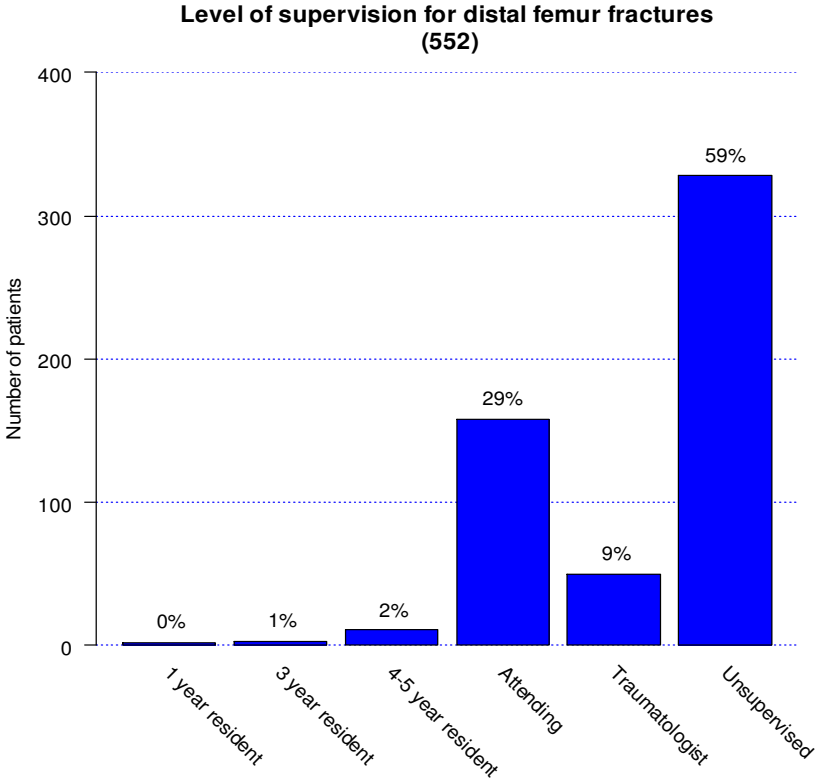

Fracture classification for femur fractures
(960)
Number of patients
600
500
400
300
200
100
0
3
2
1
3
2
1
3
2
1
32A
32B
32C

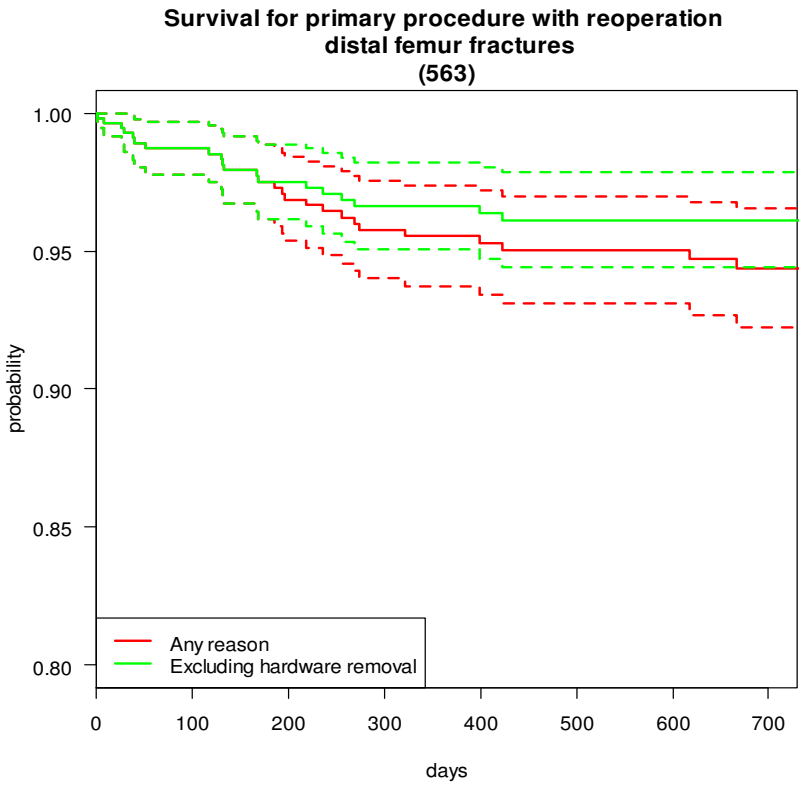
Distal femur

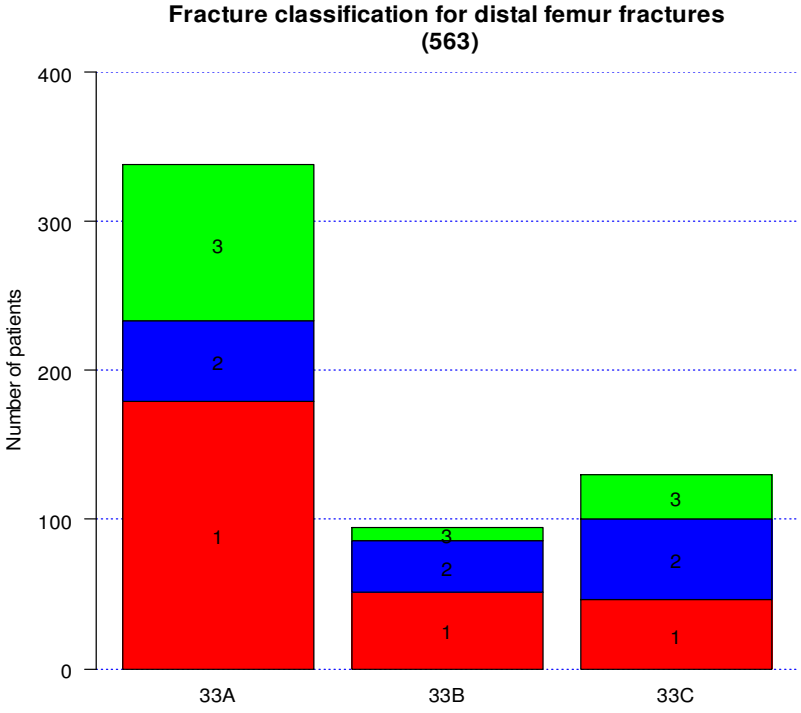




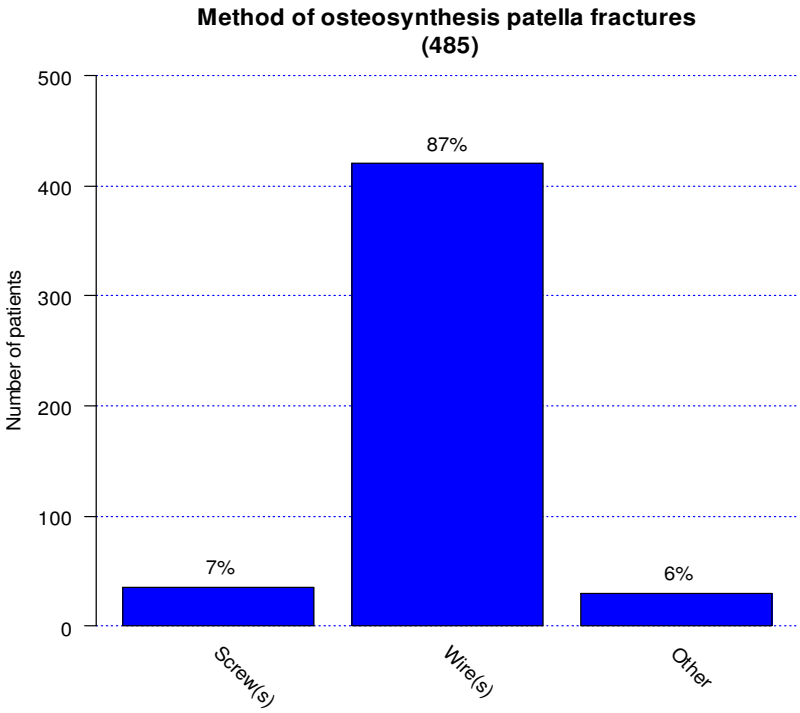

Surgeon level for distal femur fractures
(563)
Number of patients
400
300
200
100
0
7%
5%
12%
18%
48%
10%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

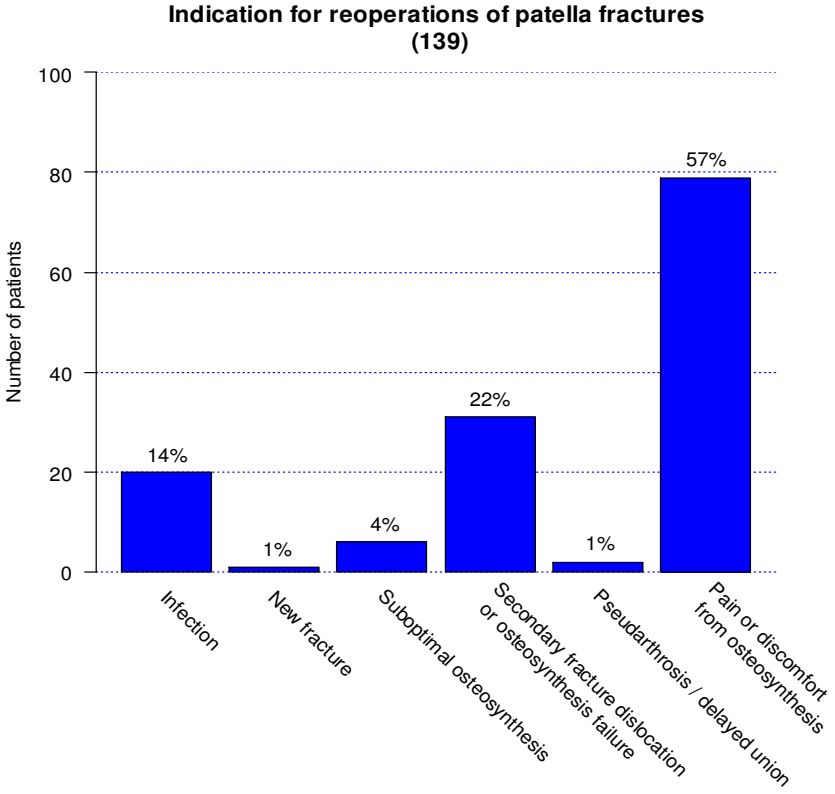

Level of supervision for distal femur fractures
(552)
Number of patients
400
300
200
100
0
0%
1%
2%
29%
9%
59%
1 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

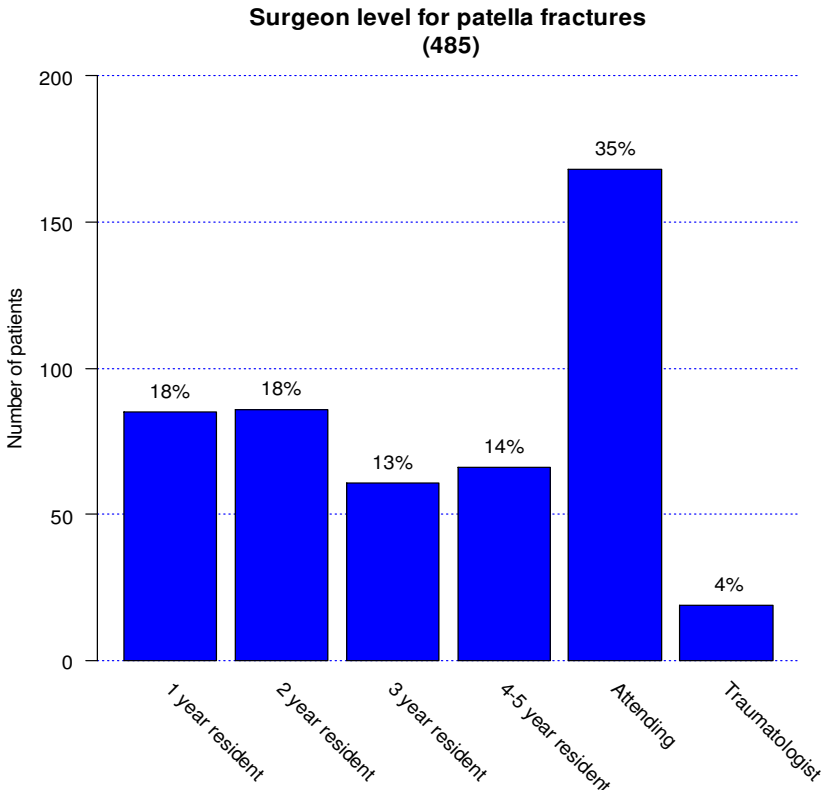

Survival for primary procedure with reoperation
distal femur fractures
(563)
1.00
0.95
0.90
0.85
0.80
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

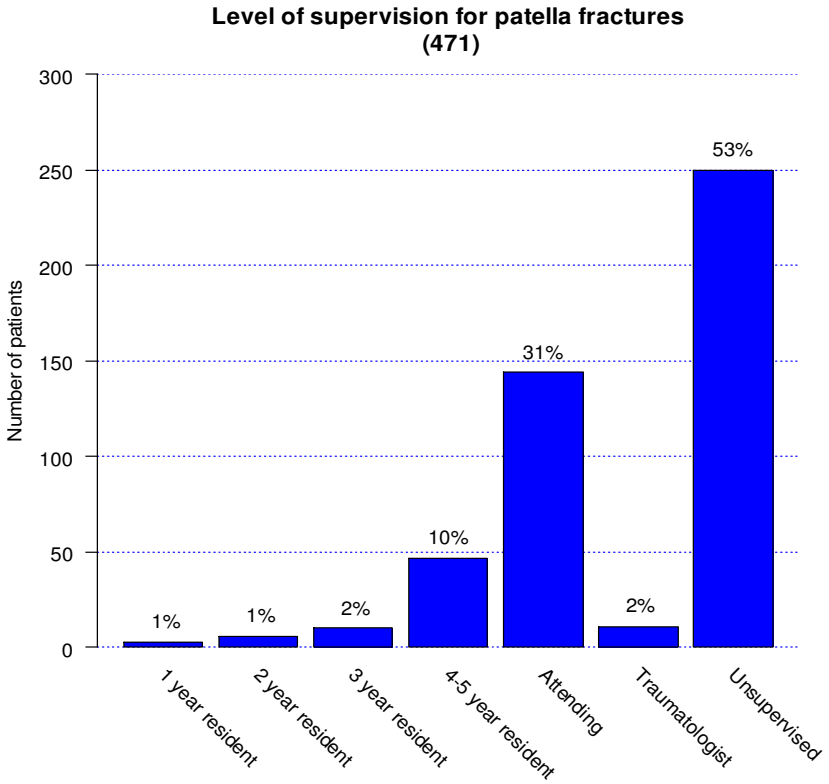

Fracture classification for distal femur fractures
(563)
400
300
200
100
0
Number of patients
3
2
1
3
2
1
3
2
1
33A
33B
33C

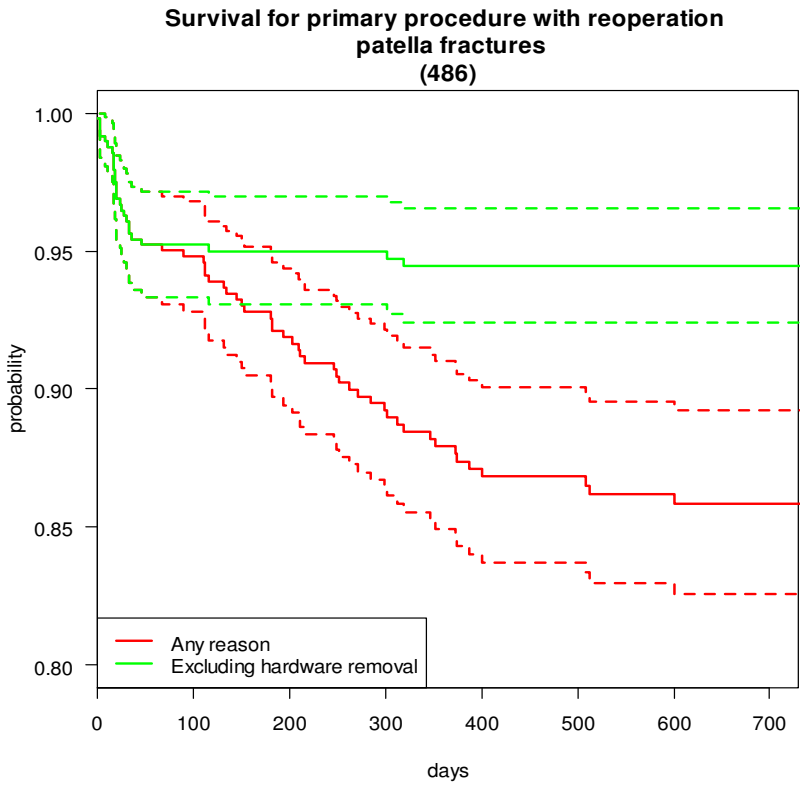
Patella

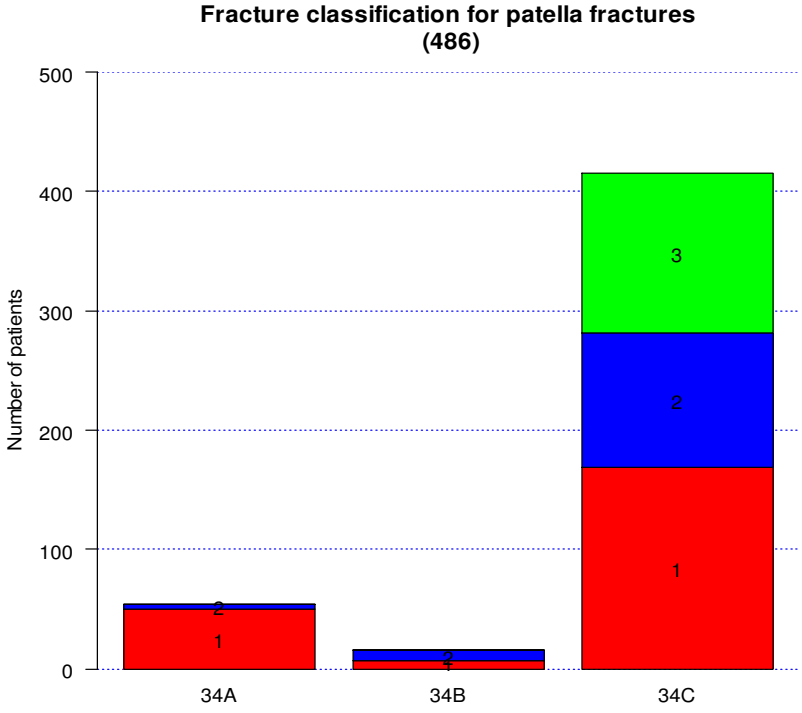

Method of osteosynthesis patella fractures
(485)
Number of patients
500
400
300
200
100
0
87%
7%
6%
Screw(s)
Wire(s)
Other


Indication for reoperations of patella fractures
(139)
Number of patients
100
80
60
40
20
0
14%
1%
4%
22%
1%
57%
Infection
New fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis

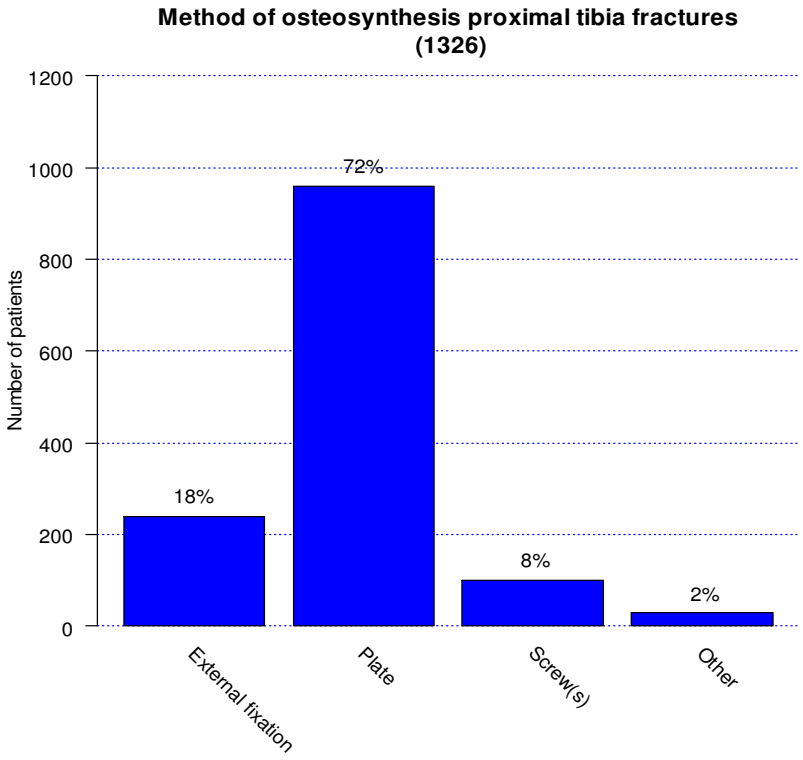

Surgeon level for patella fractures
(485)
Number of patients
200
150
100
50
0
18%
18%
13%
14%
35%
4%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

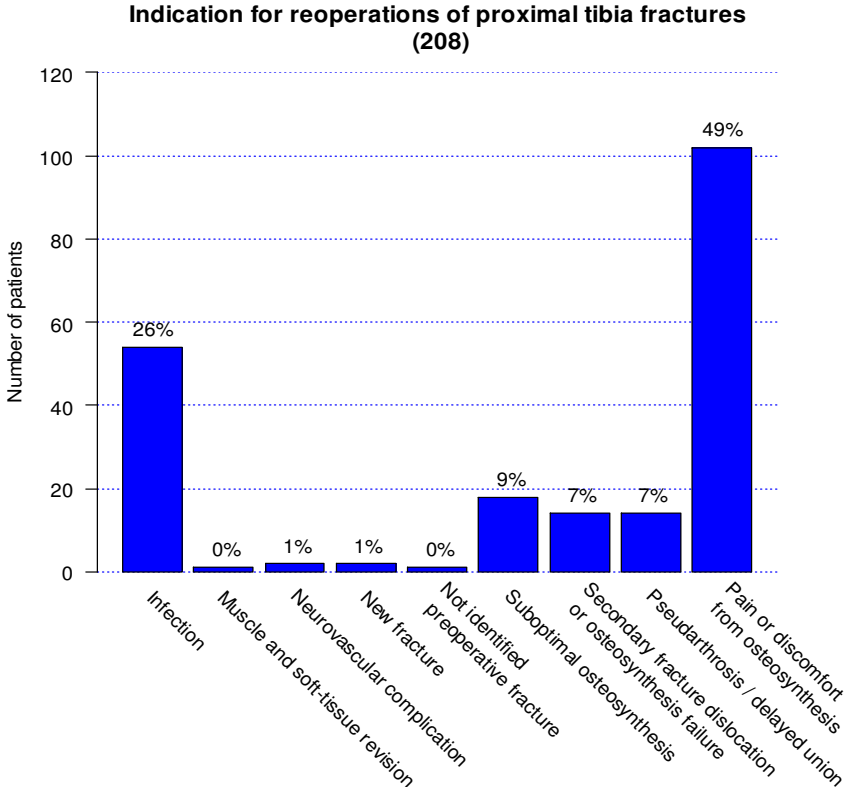

Level of supervision for patella fractures
(471)
Number of patients
300
250
200
150
100
50
0
1%
1%
2%
10%
31%
2%
53%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

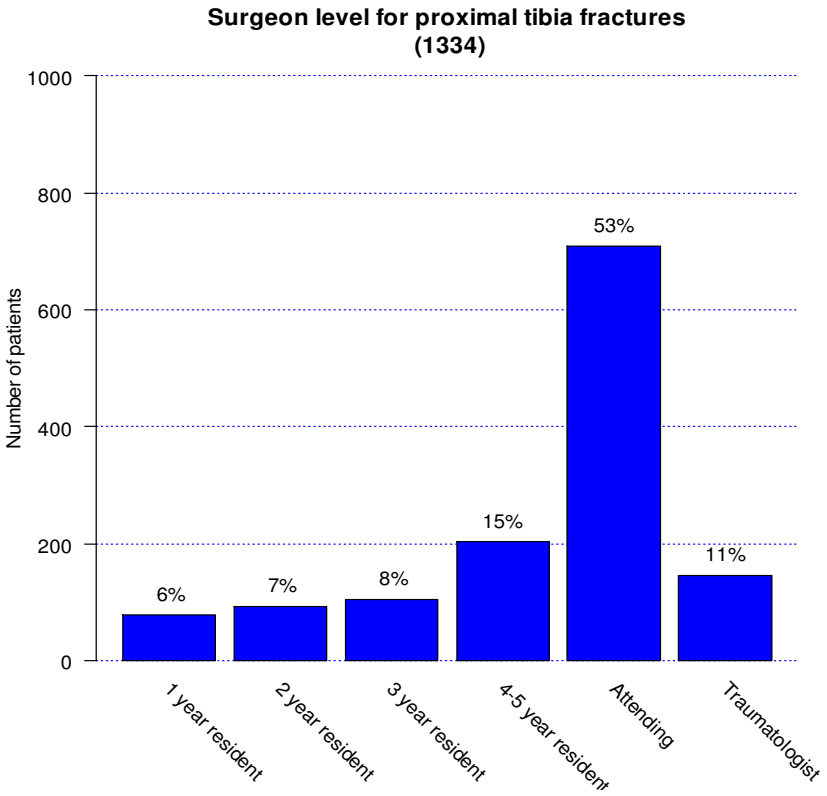

Survival for primary procedure with reoperation
patella fractures
(486)
probability
1.00
0.95
0.90
0.85
0.80
0
100
200
300
400
500
600
700
days
Any reason
Excluding hardware removal

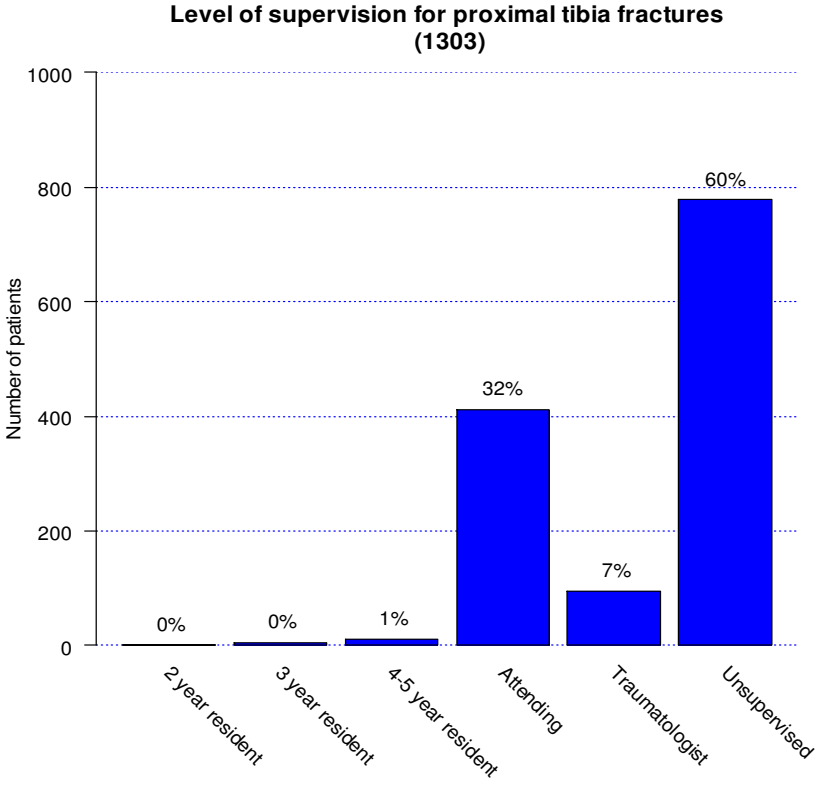

Fracture classification for patella fractures
(486)
Number of patients
500
400
300
200
100
0
34A
34B
34C
1
2
3
4

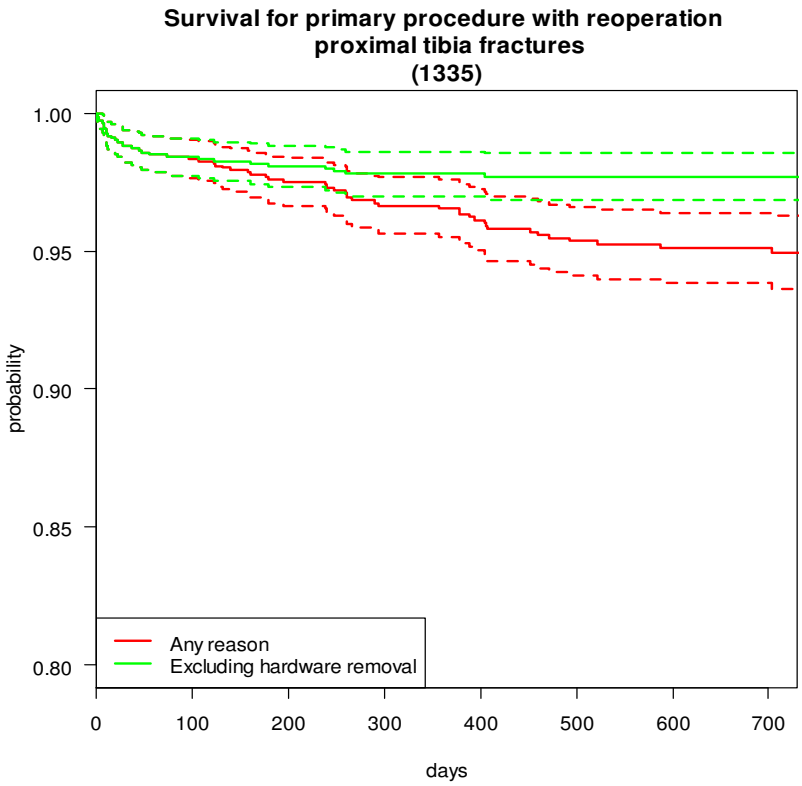
Proximal tibia

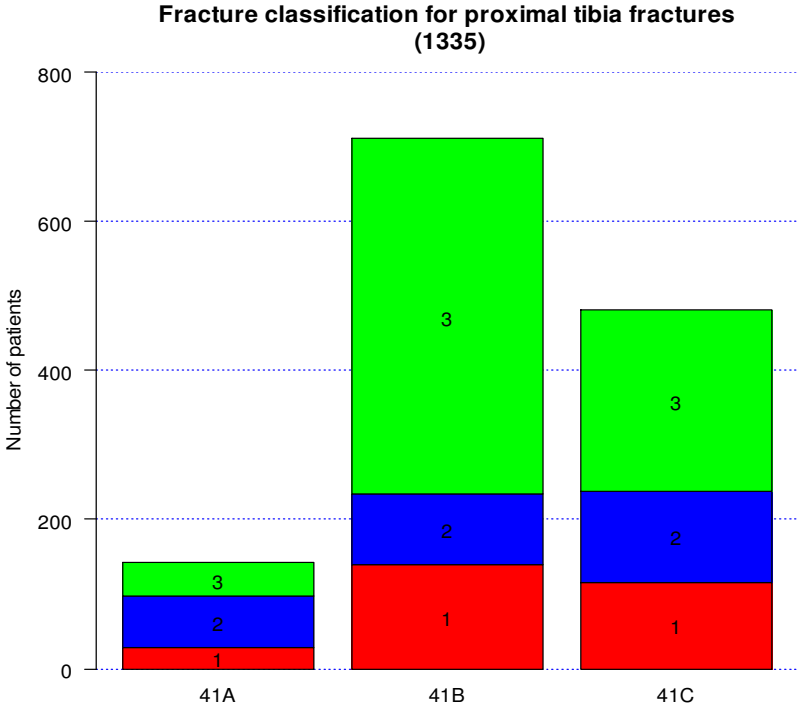




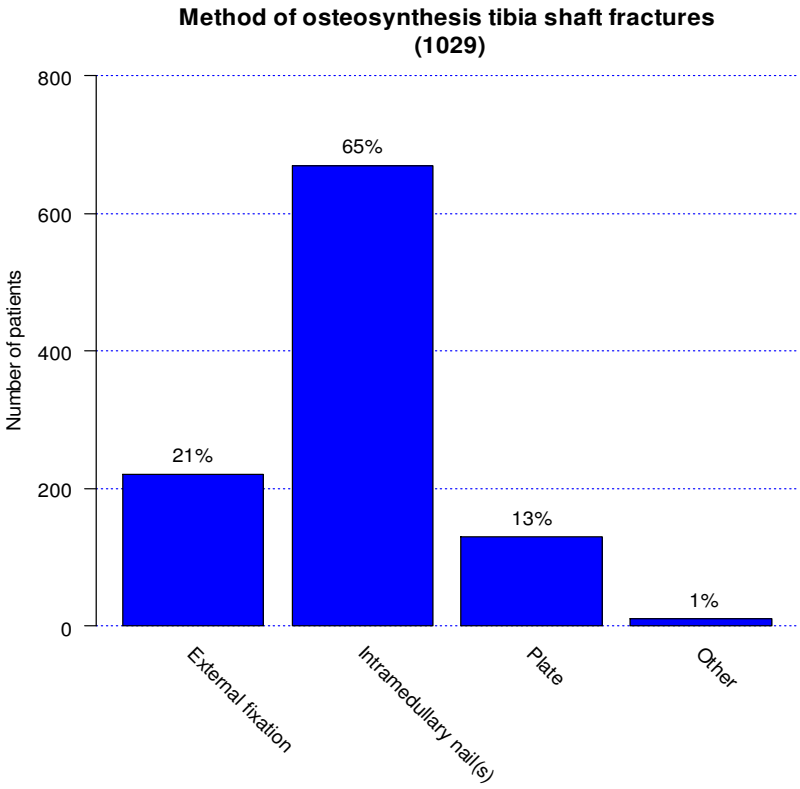

Surgeon level for proximal tibia fractures
(1334)
Number of patients
1000
800
600
400
200
0
6%
7%
8%
15%
53%
11%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

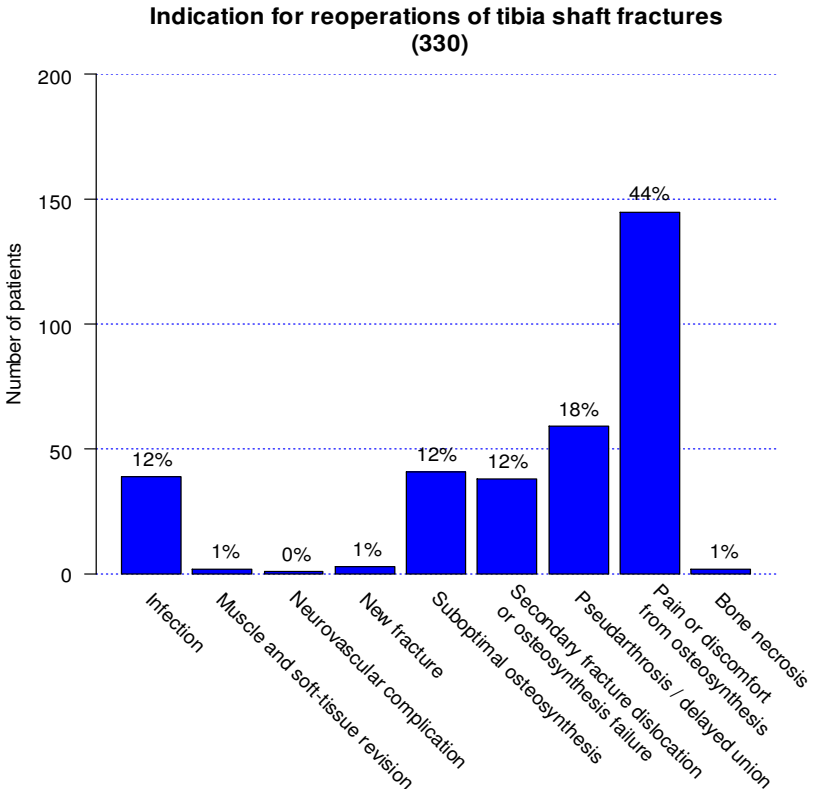

Level of supervision for proximal tibia fractures
(1303)
Number of patients
1000
800
600
400
200
0
0%
0%
1%
32%
7%
60%
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

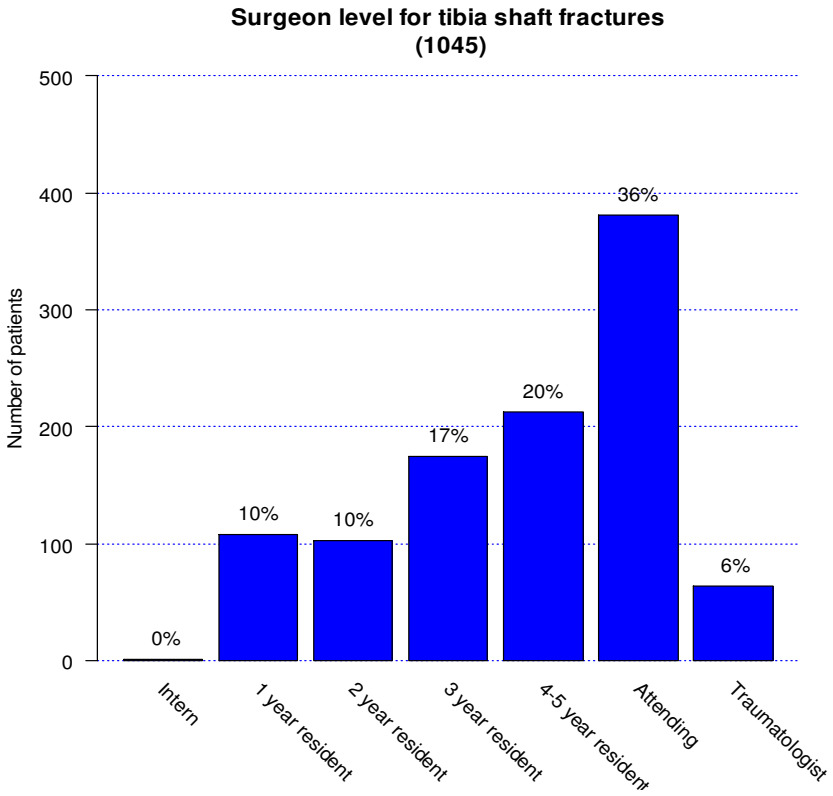

Survival for primary procedure with reoperation
proximal tibia fractures
(1335)
1.00
0.95
0.90
0.85
0.80
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

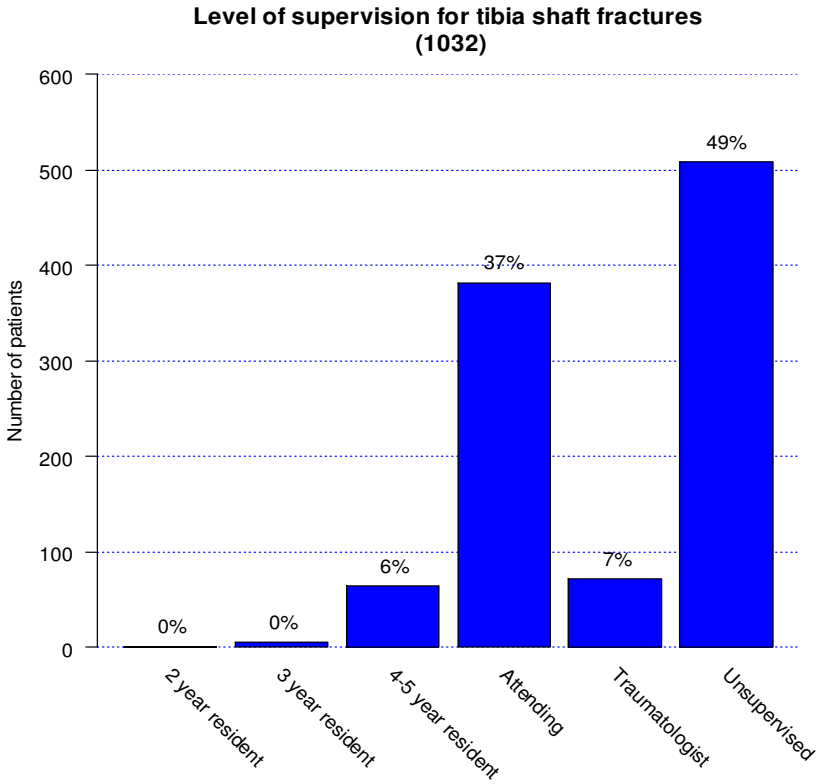

Fracture classification for proximal tibia fractures
(1335)
800
600
400
200
0
Number of patients
3
2
1
3
2
1
3
2
1
41A
41B
41C

Tibia shaft

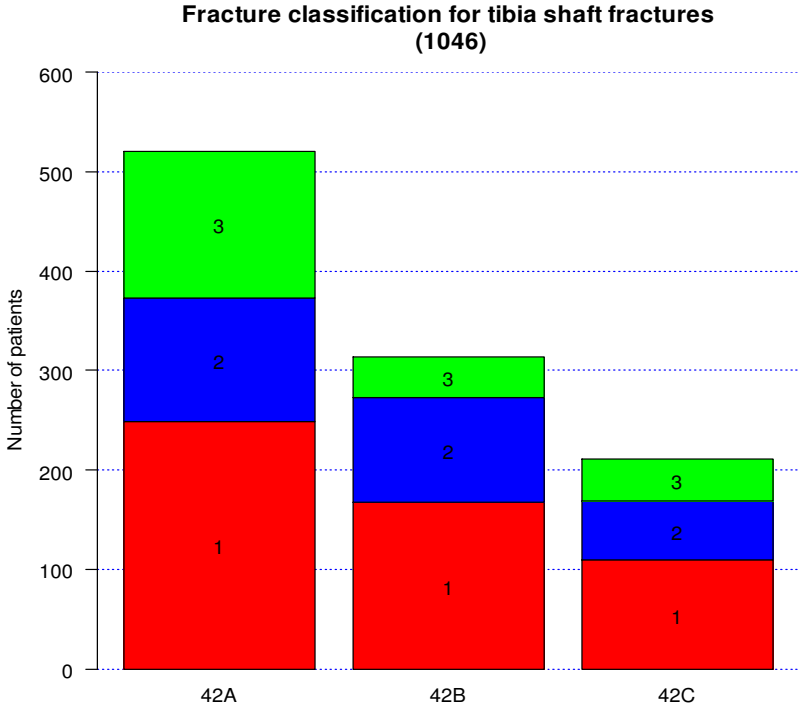

Method of osteosynthesis tibia shaft fractures
(1029)
Number of patients
800
600
400
200
0
65%
21%
13%
1%
External fixation
Intramedullary nail(s)
Plate
Other


Indication for reoperations of tibia shaft fractures
(330)
Number of patients
200
150
100
50
0
12%
1%
0%
1%
12%
12%
18%
44%
1%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Suboptimal osteosynthesis
Secondary fracture dislocation
or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort
from osteosynthesis
Bone necrosis

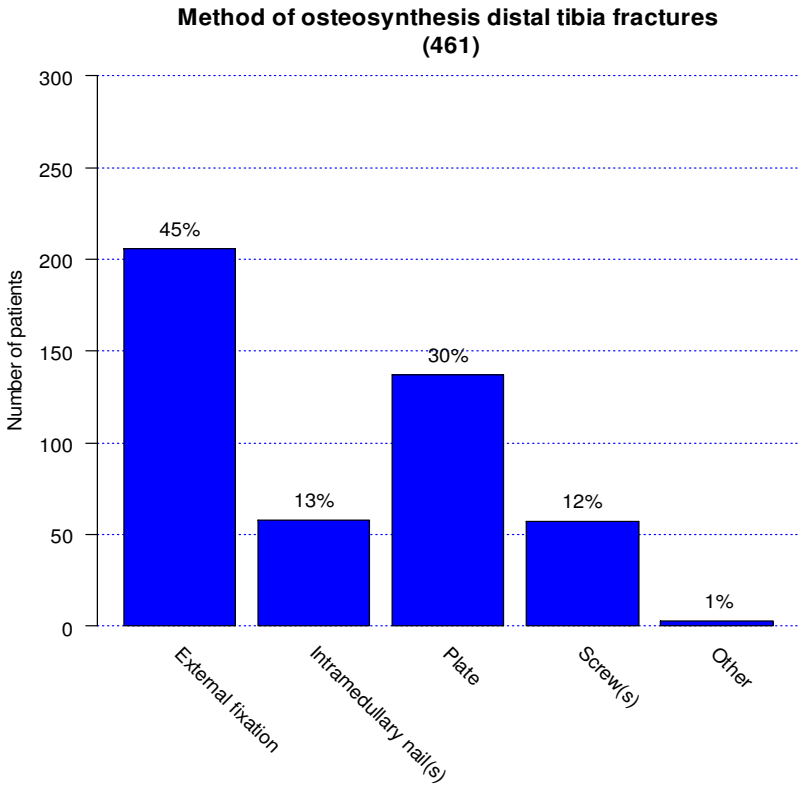

Surgeon level for tibia shaft fractures
(1045)
Number of patients
500
400
300
200
100
0
0%
10%
10%
17%
20%
36%
6%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

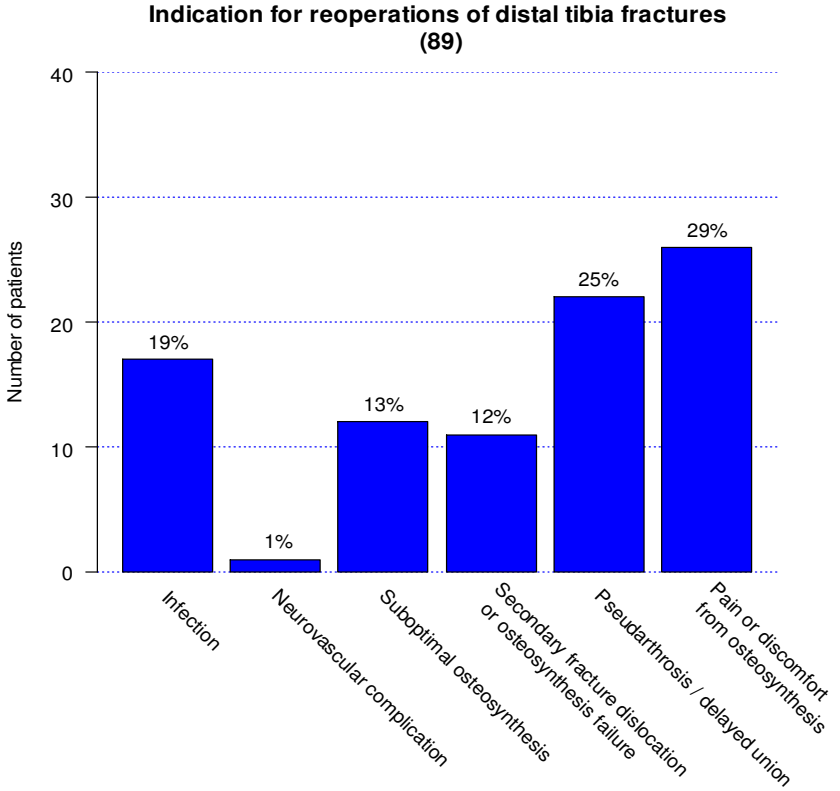

Level of supervision for tibia shaft fractures
(1032)
Number of patients
600
500
400
300
200
100
0
0%
0%
6%
37%
7%
49%
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

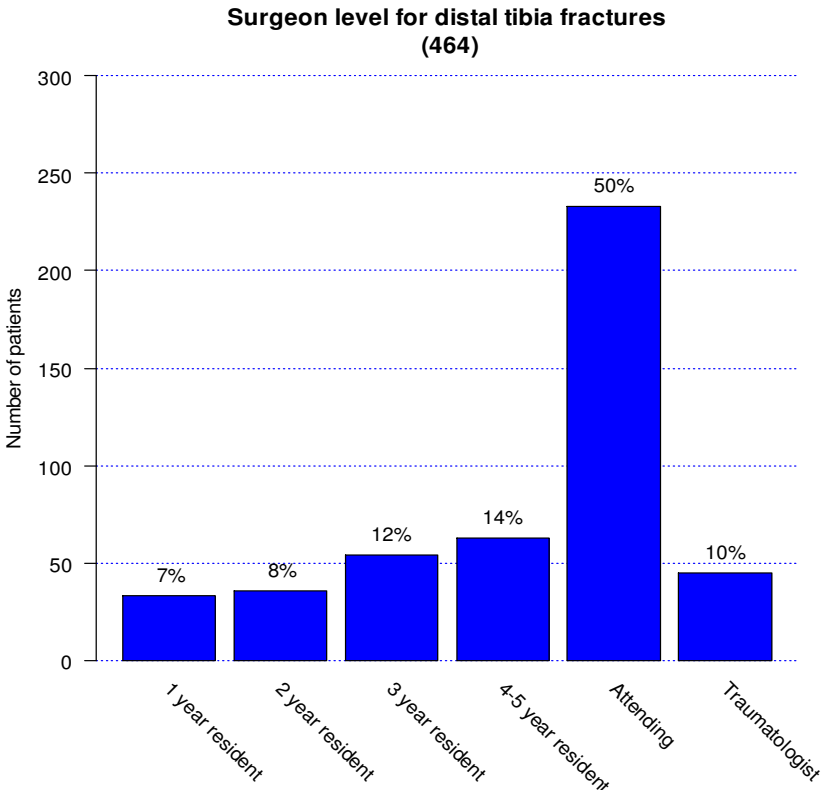

Survival for primary procedure with reoperation
tibia shaft fractures
(1046)
probability
1.00
0.95
0.90
0.85
0.80
0
100
200
300
400
500
600
700
days
Any reason
Excluding hardware removal

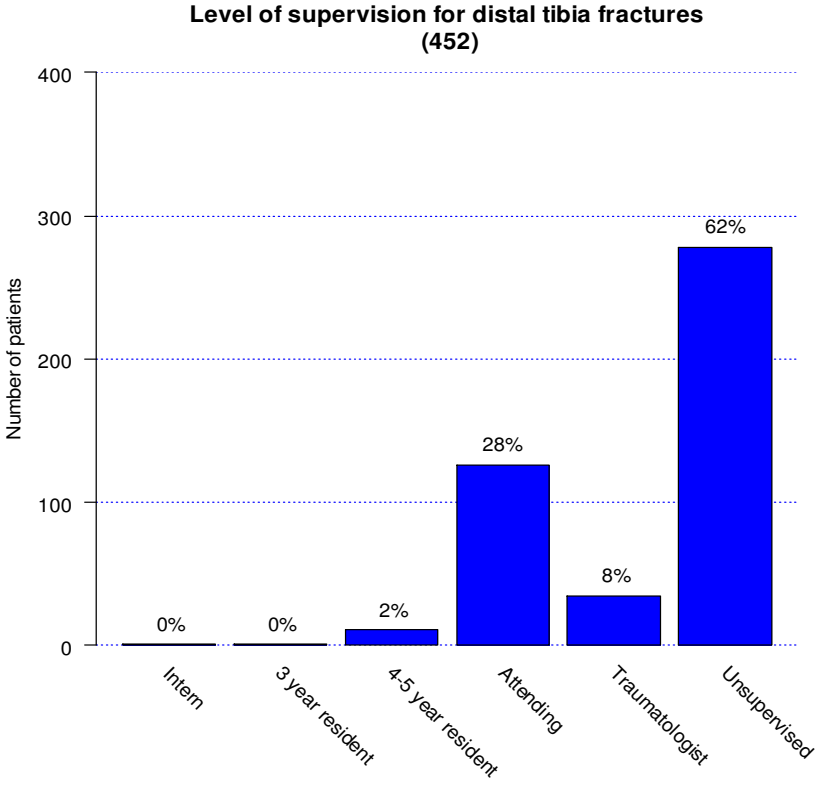

Fracture classification for tibia shaft fractures
(1046)
Number of patients
600
500
400
300
200
100
0
3
2
1
3
2
1
3
2
1
42A
42B
42C

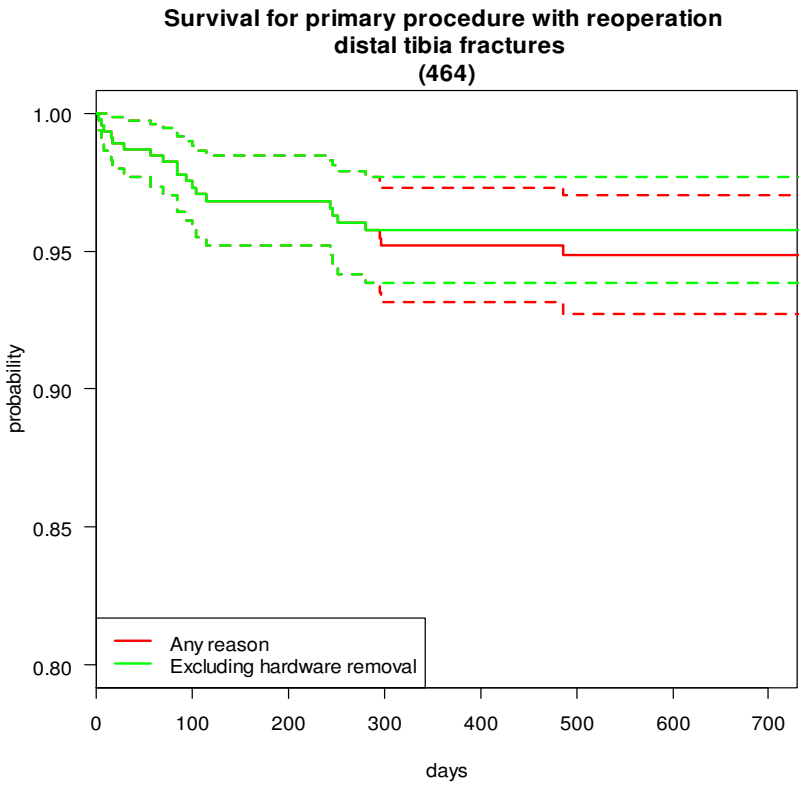
Distal tibia

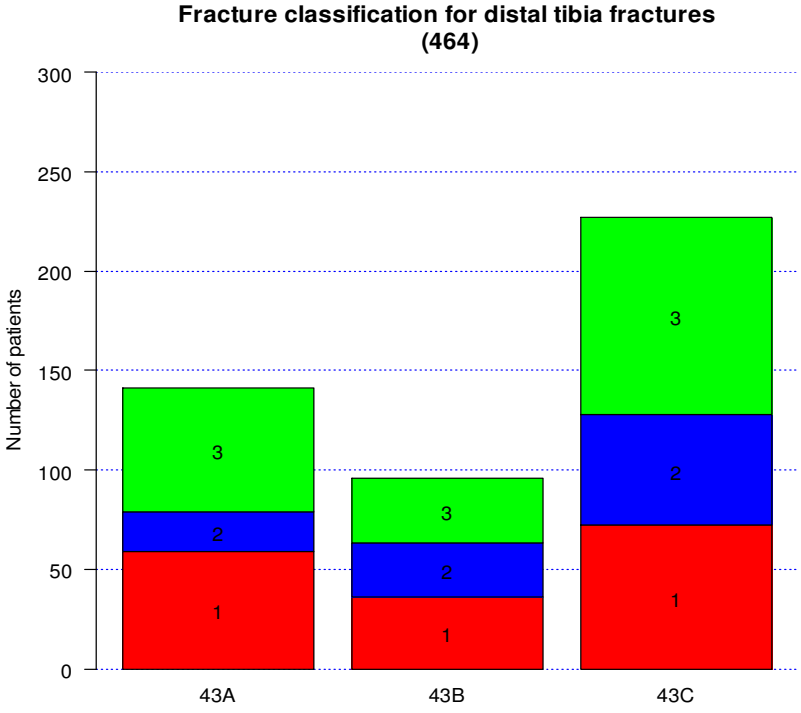




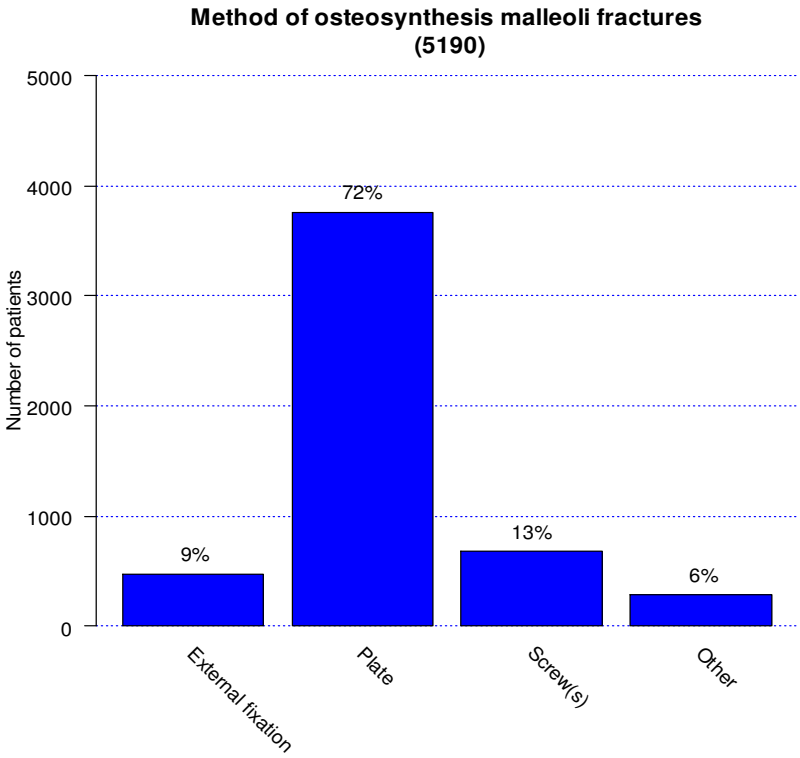

Surgeon level for distal tibia fractures
(464)
Number of patients
300
250
200
150
100
50
0
7%
8%
12%
14%
50%
10%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

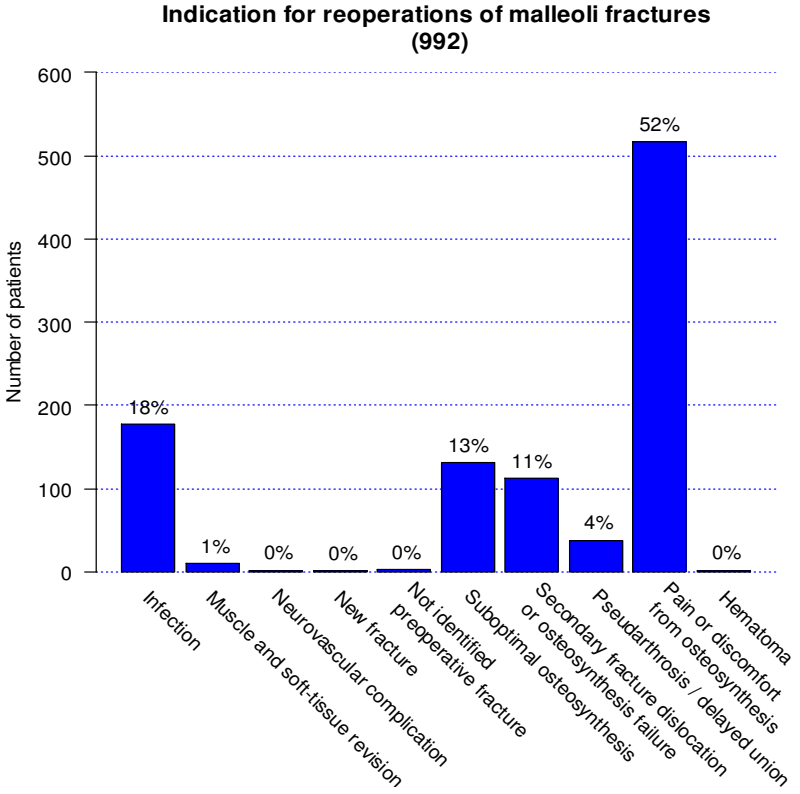

Level of supervision for distal tibia fractures
(452)
Number of patients
400
300
200
100
0
0%
0%
2%
28%
8%
62%
Intern
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

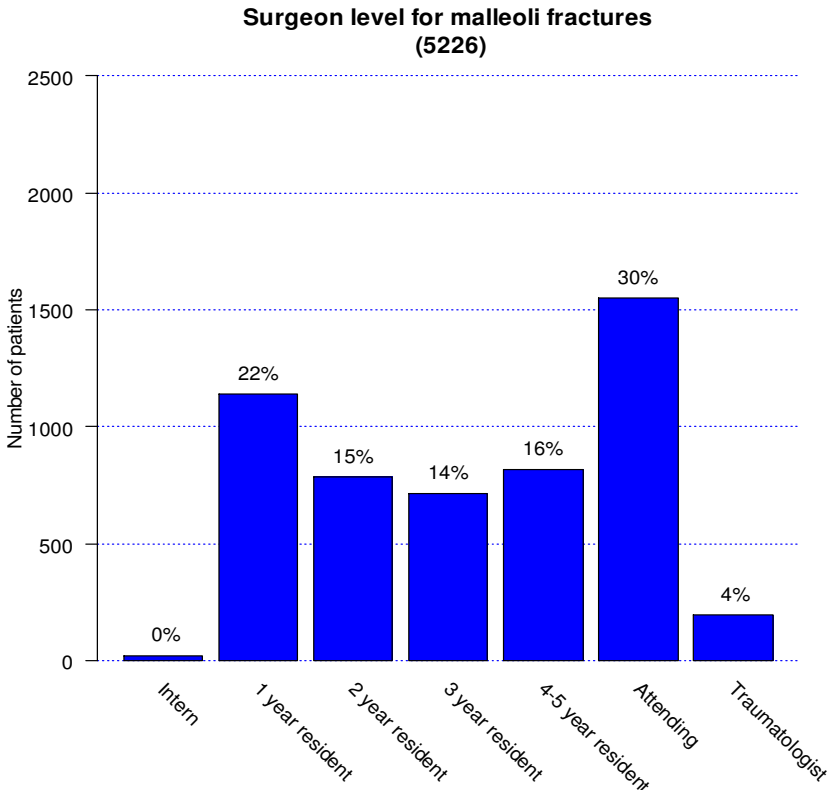

Survival for primary procedure with reoperation
distal tibia fractures
(464)
probability
1.00
0.95
0.90
0.85
0.80
0
100
200
300
400
500
600
700
days
Any reason
Excluding hardware removal

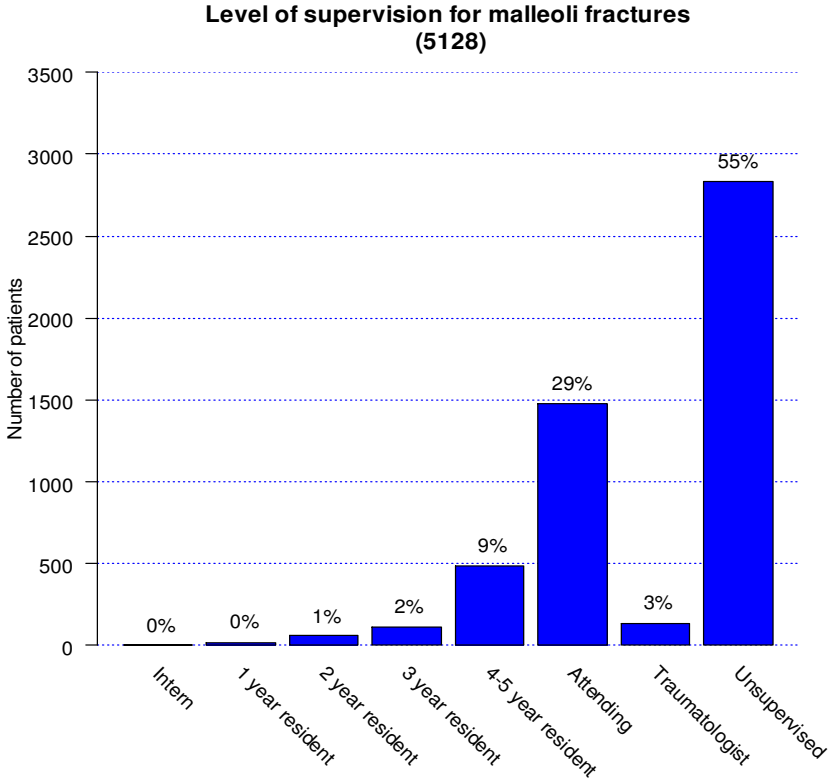

Fracture classification for distal tibia fractures
(464)
Number of patients
300
250
200
150
100
50
0
43A
43B
43C
1
2
3
1
2
3
1
2
3

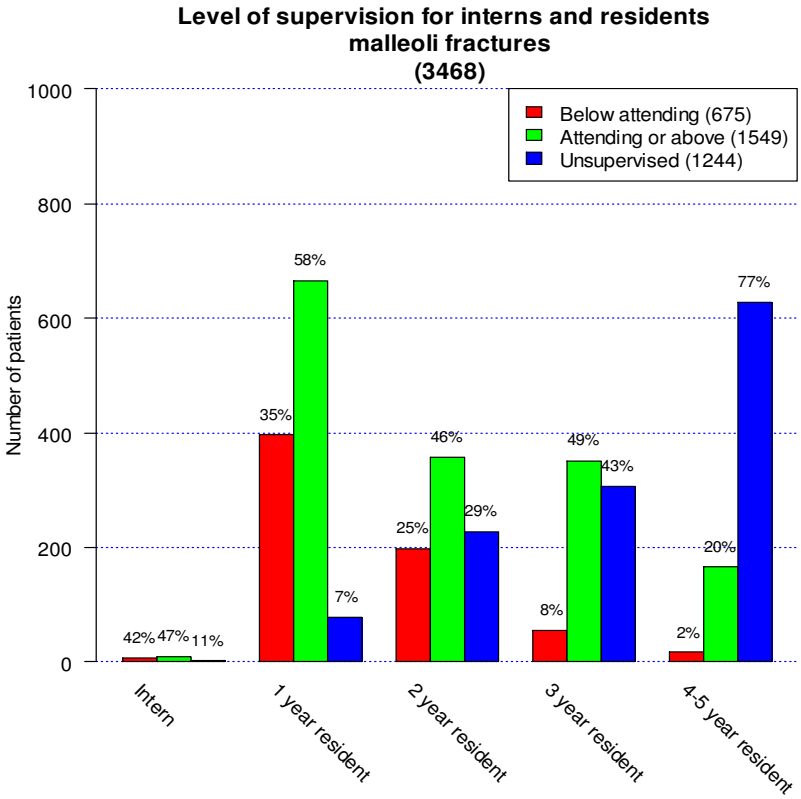
Malleoli

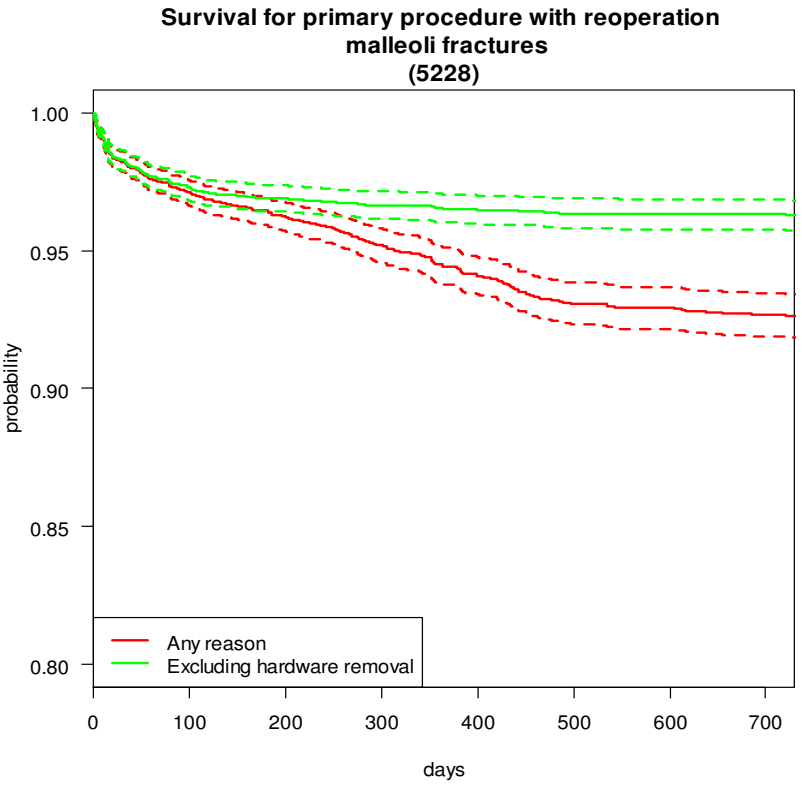

Method of osteosynthesis malleoli fractures
(5190)
Number of patients
5000
4000
3000
2000
1000
0
9%
72%
13%
6%
External fixation
Plate
Screw(s)
Other

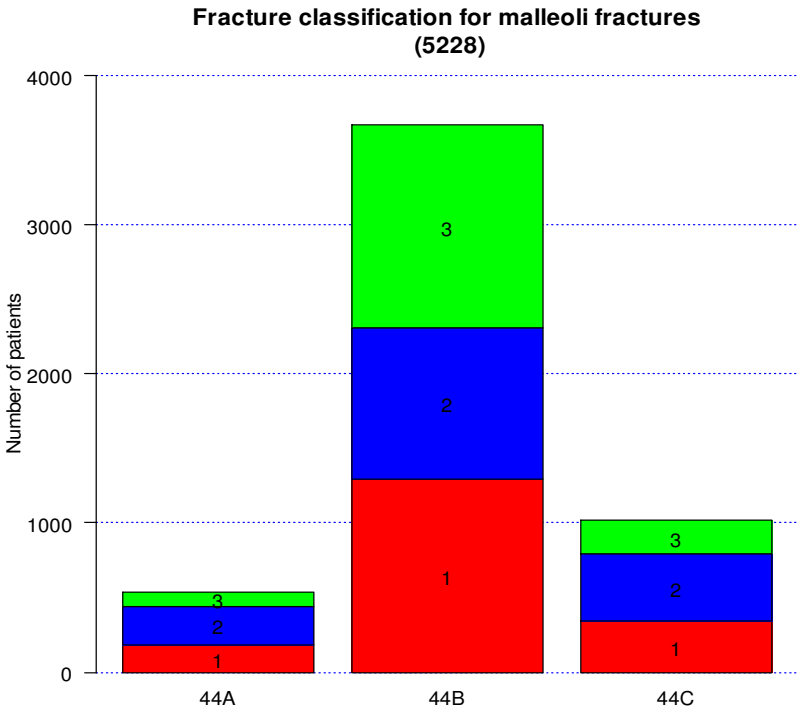

Indication for reoperations of malleoli fractures
(992)
Number of patients
600
500
400
300
200
100
0
18%
1%
0%
0%
0%
13%
11%
4%
52%
0%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Not identified preoperative fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Hematoma


Surgeon level for malleoli fractures
(5226)
Number of patients
2500
2000
1500
1000
500
0
0%
22%
15%
14%
16%
30%
4%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

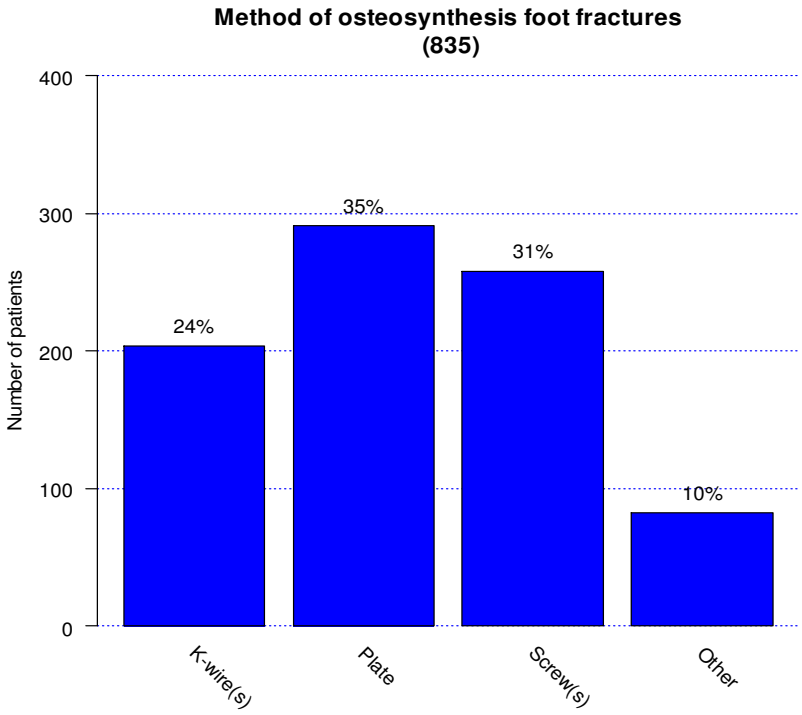

Level of supervision for malleoli fractures
(5128)
Number of patients
3500
3000
2500
2000
1500
1000
500
0
0%
0%
1%
2%
9%
29%
3%
55%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

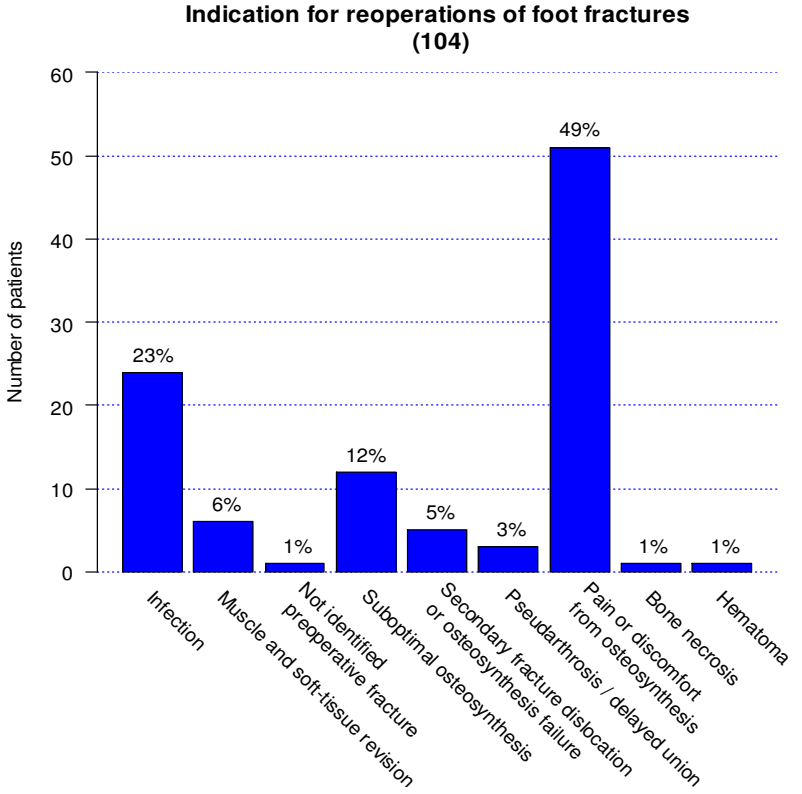

Level of supervision for interns and residents
malleoli fractures
(3468)
Below attending (675)
Attending or above (1549)
Unsupervised (1244)
Number of patients
1000
800
600
400
200
0
42%
47%
11%
35%
58%
7%
25%
46%
29%
8%
49%
43%
2%
20%
77%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident

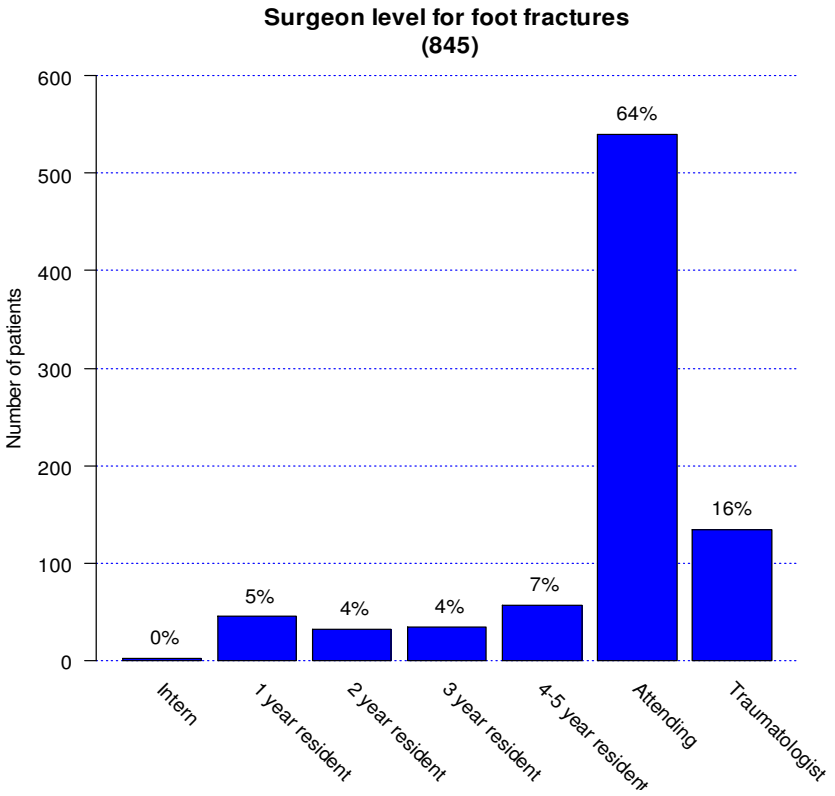

Survival for primary procedure with reoperation
malleoli fractures
(5228)
probability
1.00
0.95
0.90
0.85
0.80
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

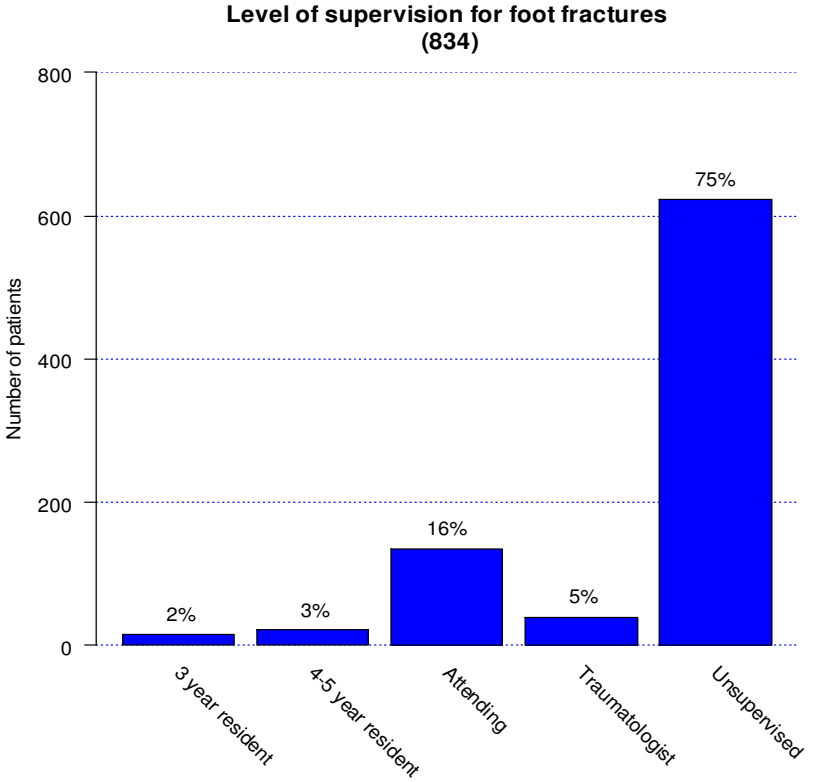

Fracture classification for malleoli fractures
(5228)
Number of patients
4000
3000
2000
1000
0
3
2
1
3
2
1
3
2
1
44A
44B
44C

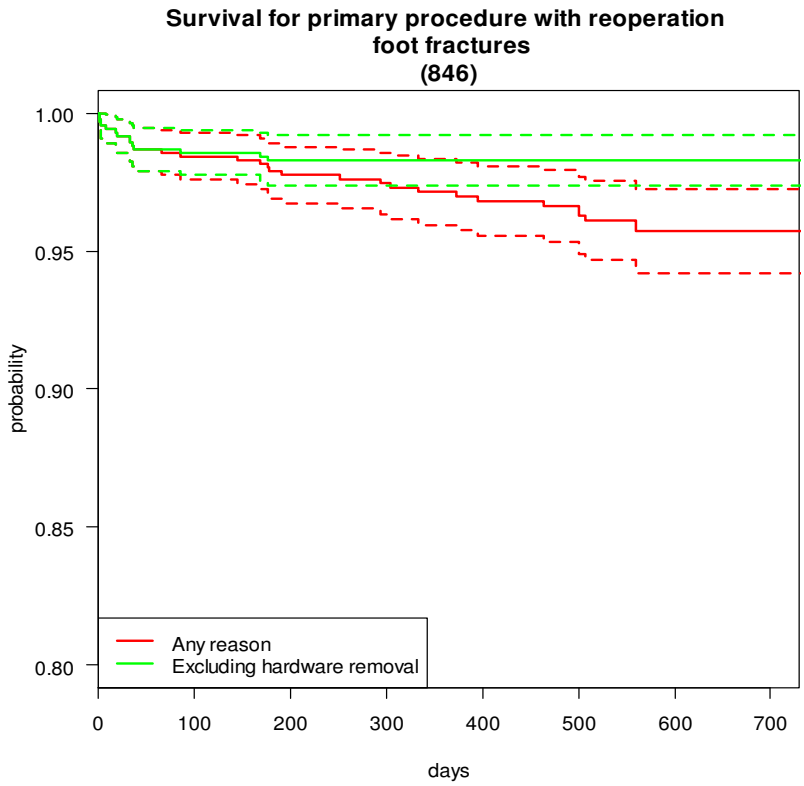
Foot

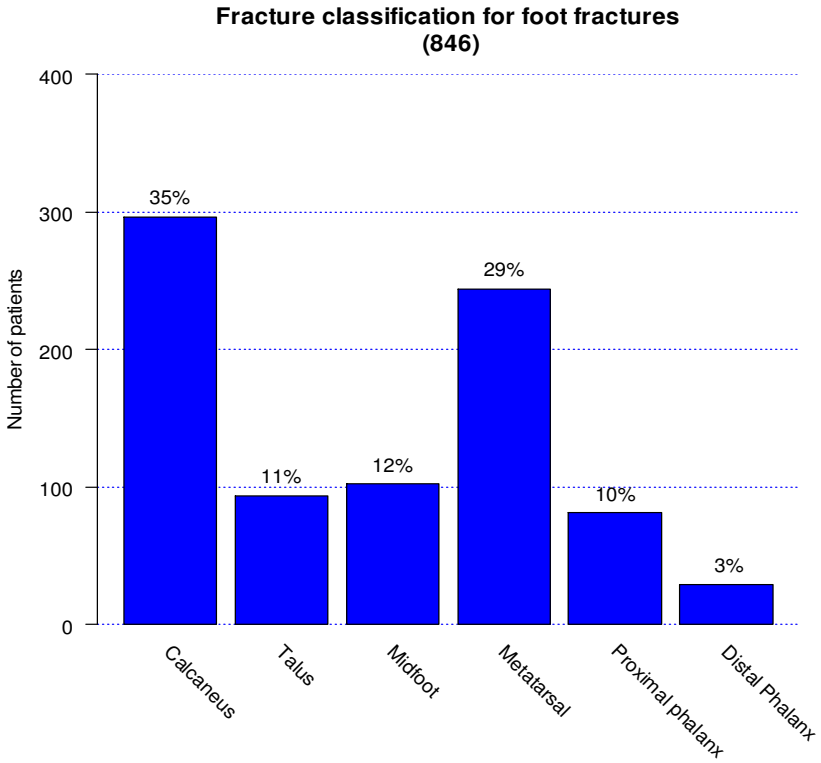

Method of osteosynthesis foot fractures
(835)
Number of patients
400
300
200
100
0
24%
35%
31%
10%
K-wire(s)
Plate
Screw(s)
Other


Indication for reoperations of foot fractures
(104)
Number of patients
60
50
40
30
20
10
0
23%
6%
1%
12%
5%
3%
49%
1%
1%
Infection
Muscle and soft-tissue revision
Not identified preoperative fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Bone necrosis
Hematoma

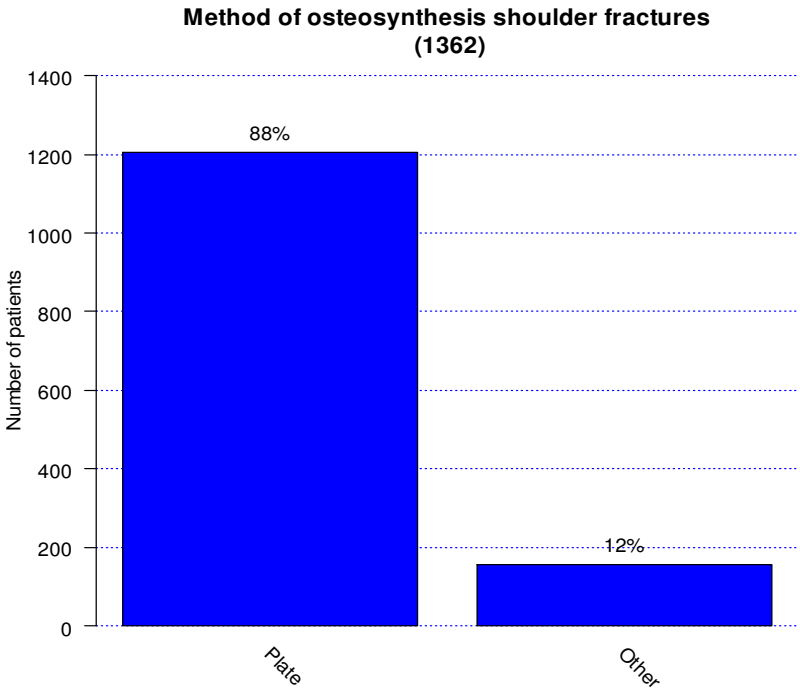

Surgeon level for foot fractures
(845)
Number of patients
600
500
400
300
200
100
0
0%
5%
4%
4%
7%
64%
16%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

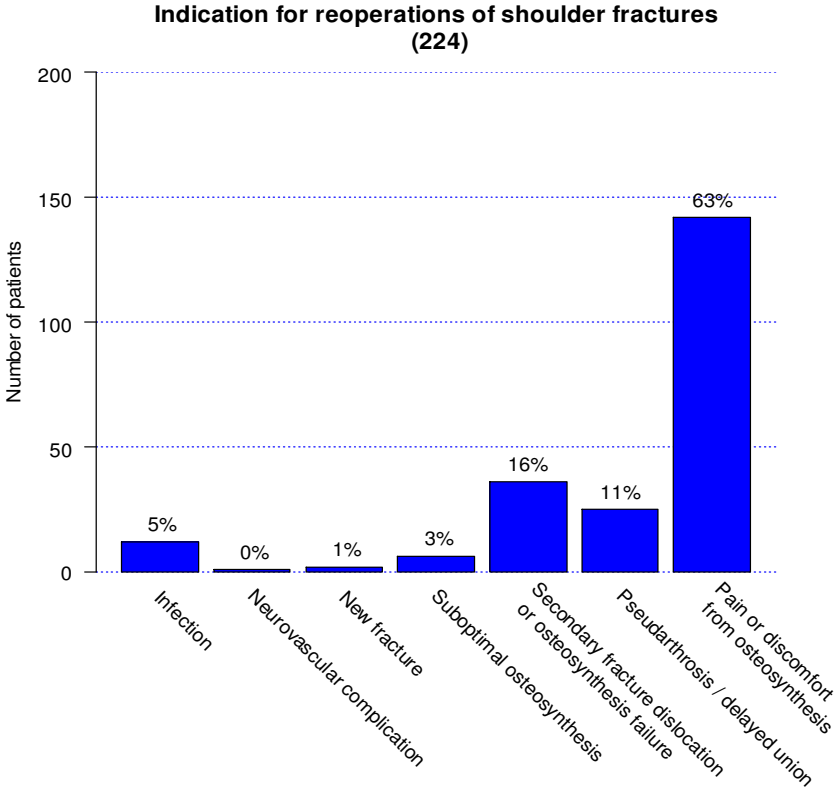

Level of supervision for foot fractures
(834)
Number of patients
800
600
400
200
0
2%
3%
16%
5%
75%
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

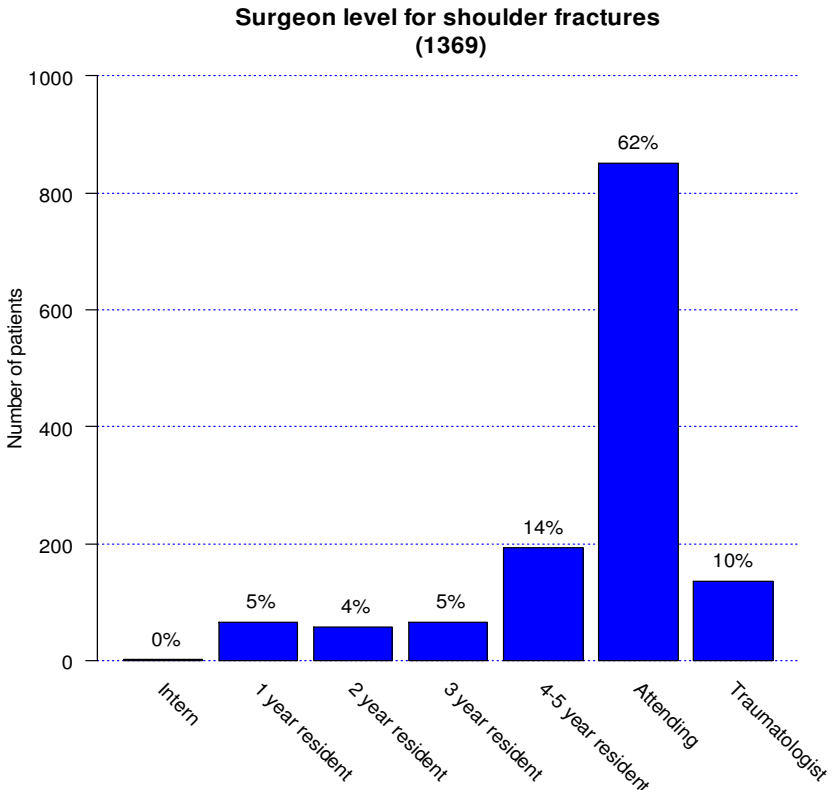

Survival for primary procedure with reoperation
foot fractures
(846)
1.00
0.95
0.90
0.85
0.80
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

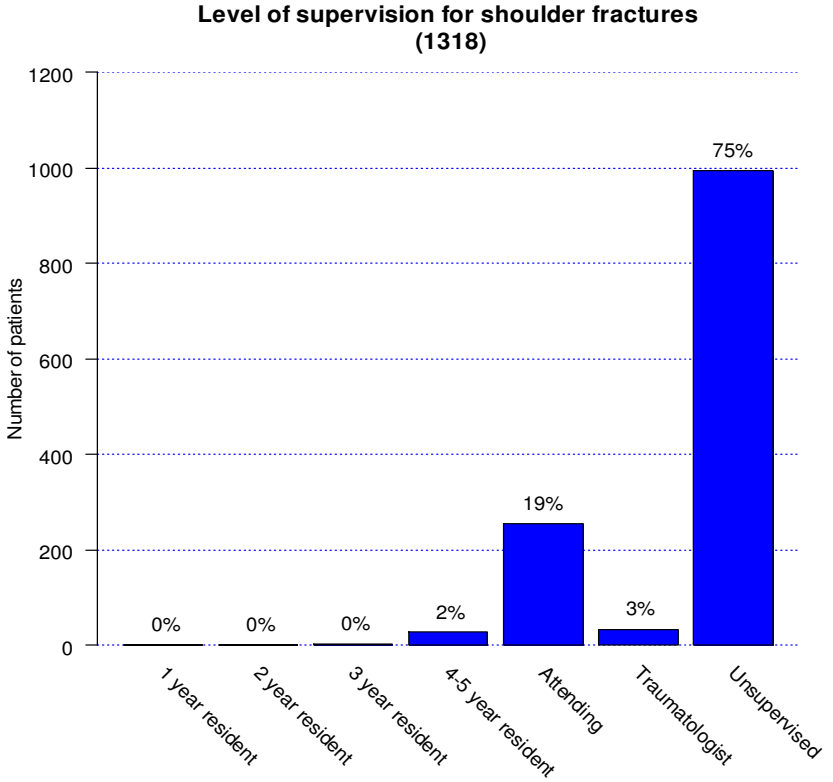

Fracture classification for foot fractures
(846)
400
300
200
100
0
Number of patients
35%
11%
12%
29%
10%
3%
Calcaneus
Talus
Midfoot
Metatarsal
Proximal phalanx
Distal Phalanx

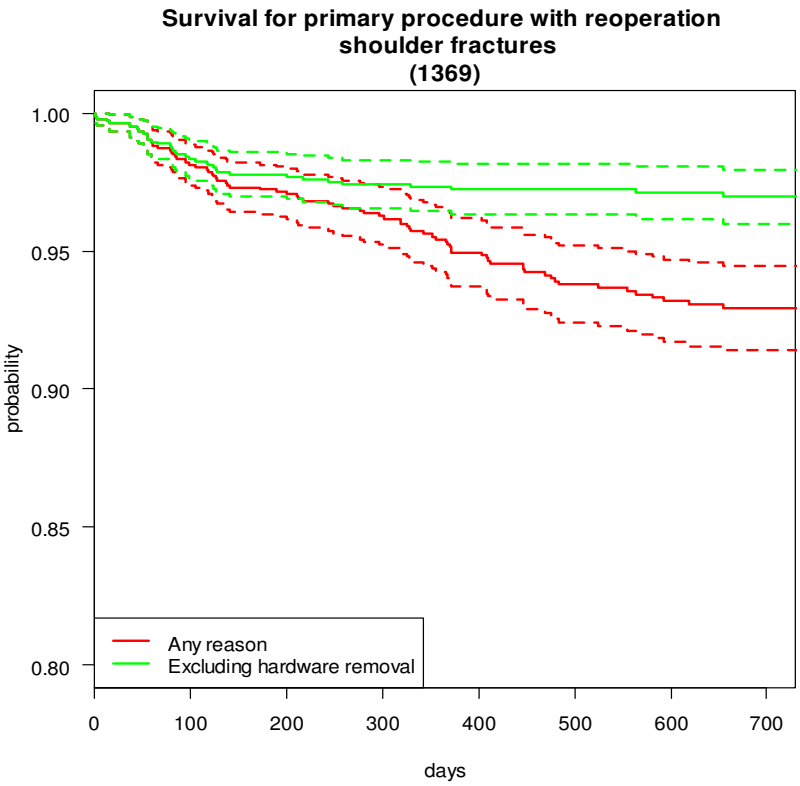
Shoulder

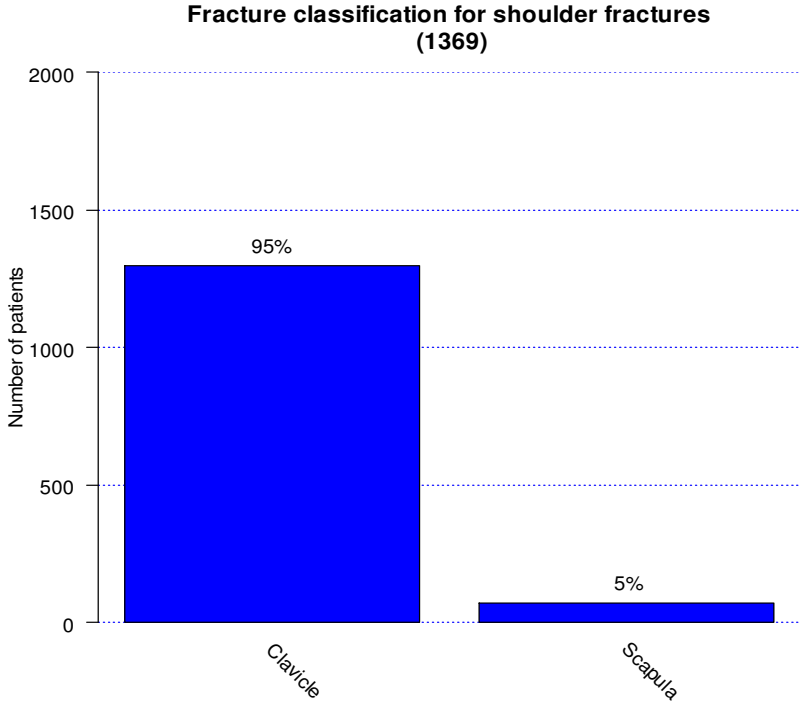

Method of osteosynthesis shoulder fractures
(1362)
Number of patients
1400
1200
1000
800
600
400
200
0
88%
12%
Plate
Other


Indication for reoperations of shoulder fractures
(224)
Number of patients
200
150
100
50
0
5%
0%
1%
3%
16%
11%
63%
Infection
Neurovascular complication
New fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis


Surgeon level for shoulder fractures
(1369)
Number of patients
1000
800
600
400
200
0
0%
5%
4%
5%
14%
62%
10%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

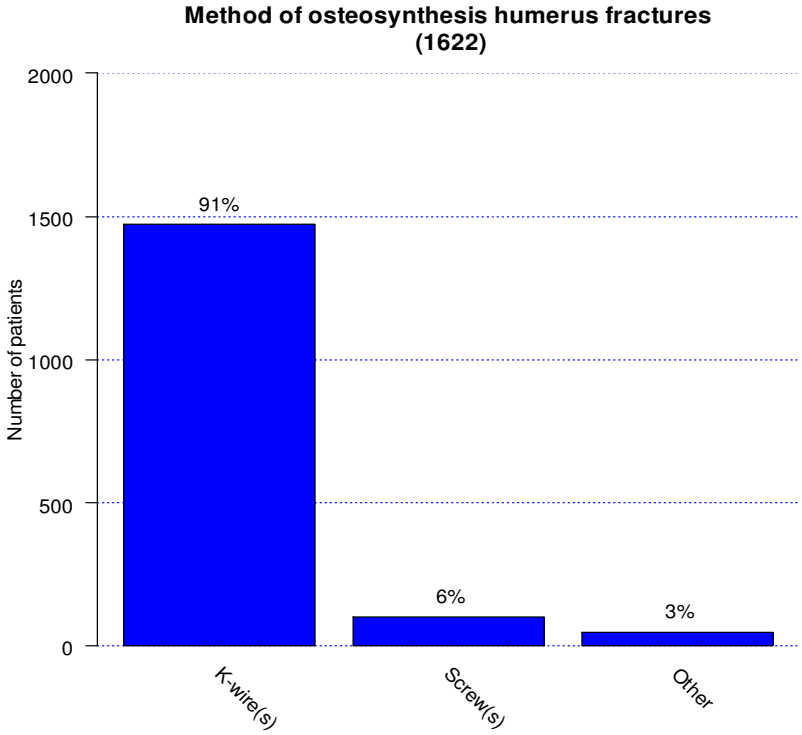

Level of supervision for shoulder fractures
(1318)
Number of patients
1200
1000
800
600
400
200
0
0%
0%
0%
2%
19%
3%
75%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

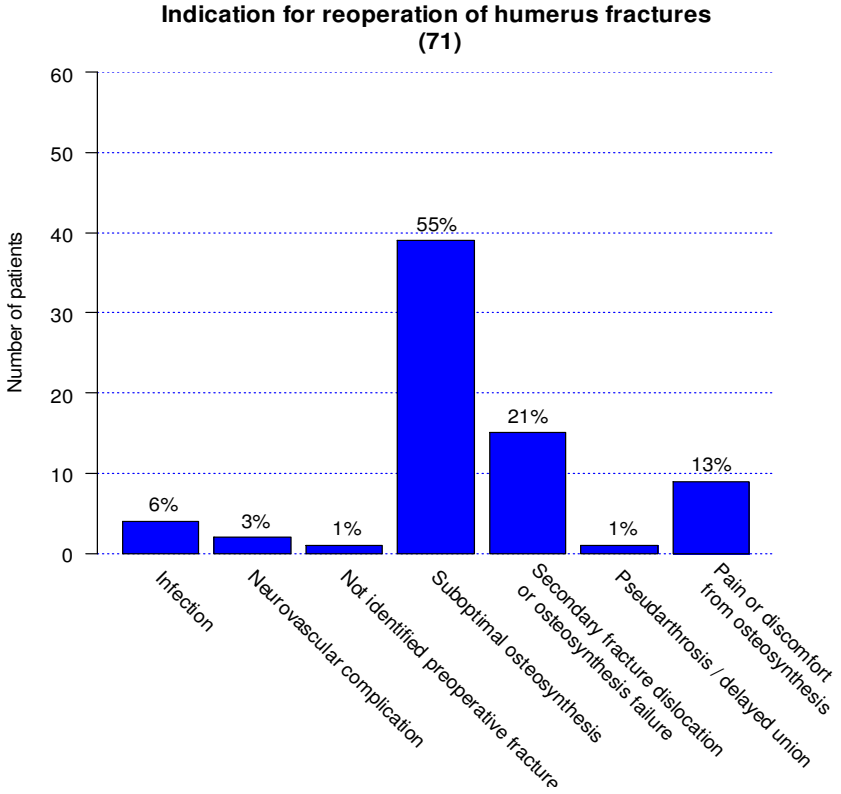

Survival for primary procedure with reoperation
shoulder fractures
(1369)
1.00
0.95
0.90
0.85
0.80
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

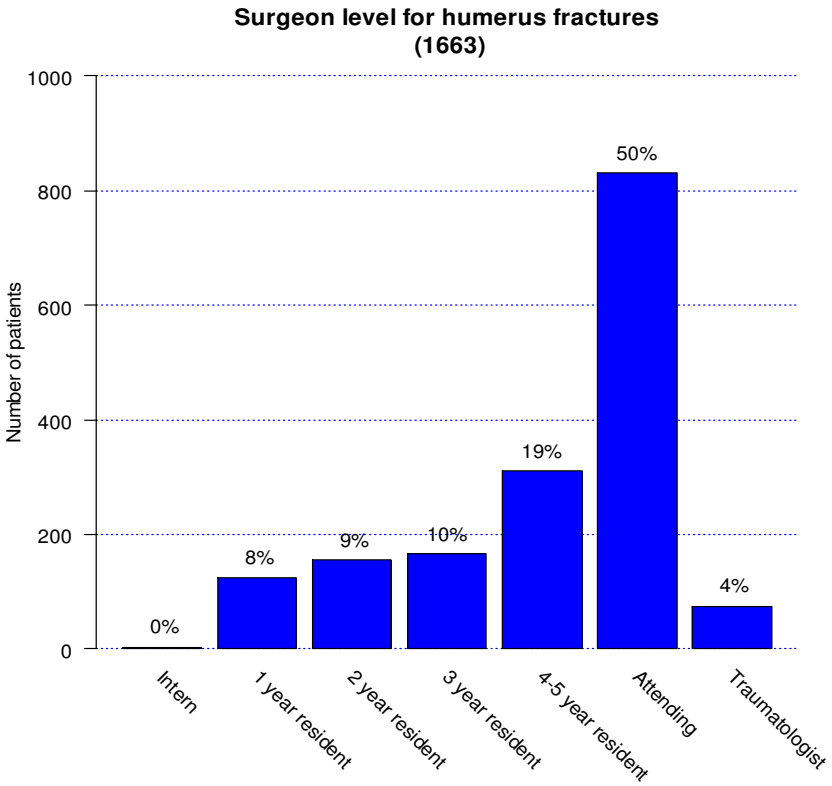

Fracture classification for shoulder fractures
(1369)
2000
1500
1000
500
0
Number of patients
95%
5%
Clavicle
Scapula

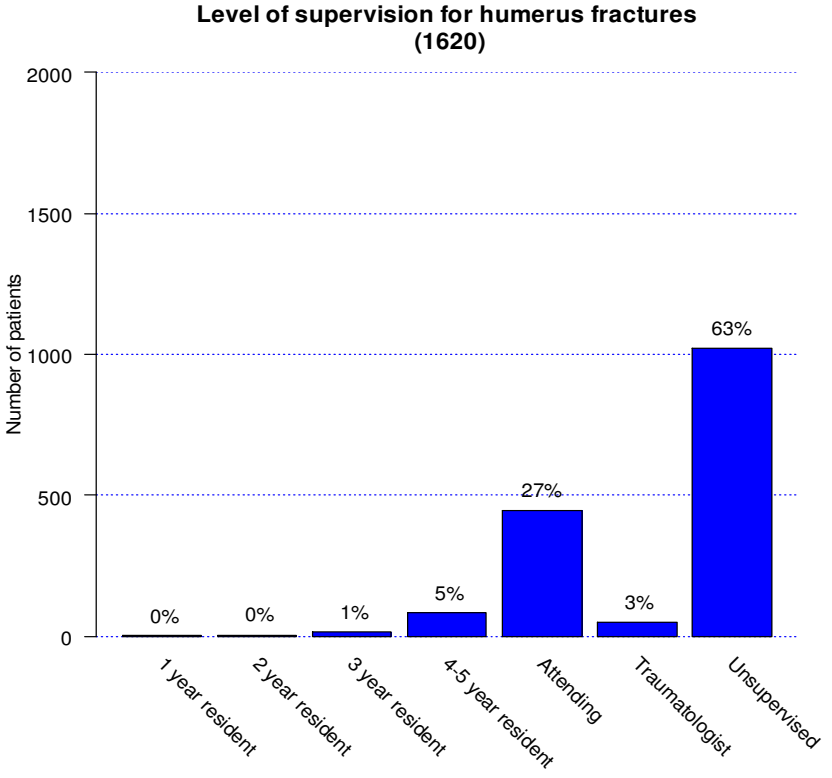
Pediatric

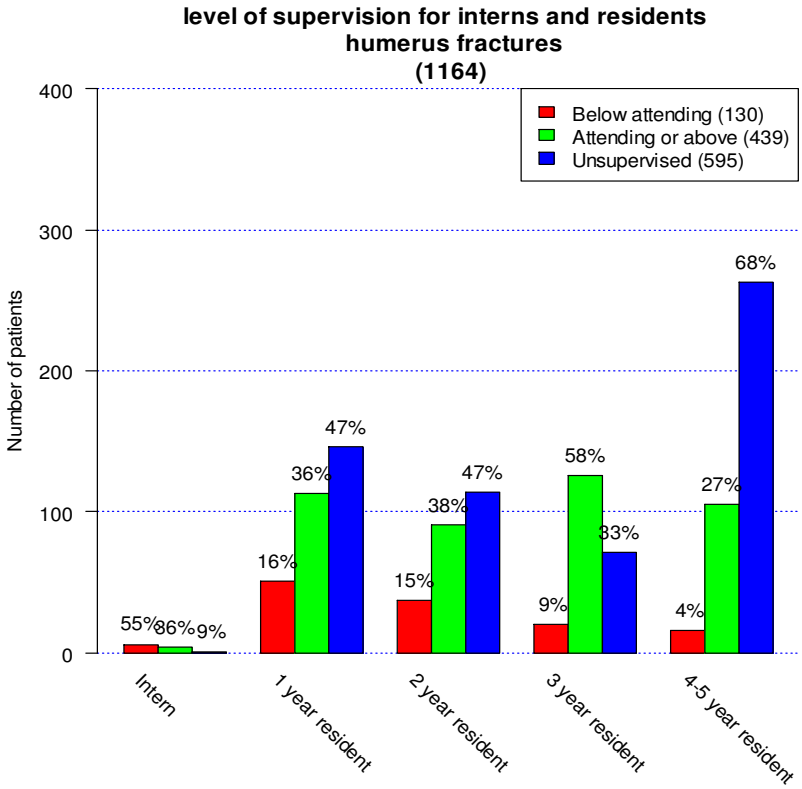
Humerus

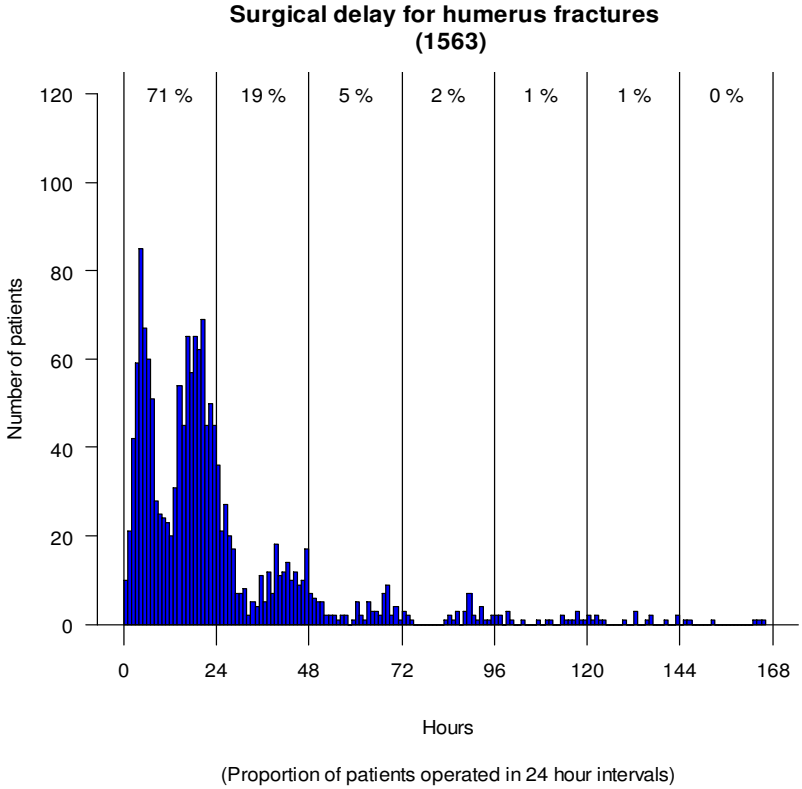


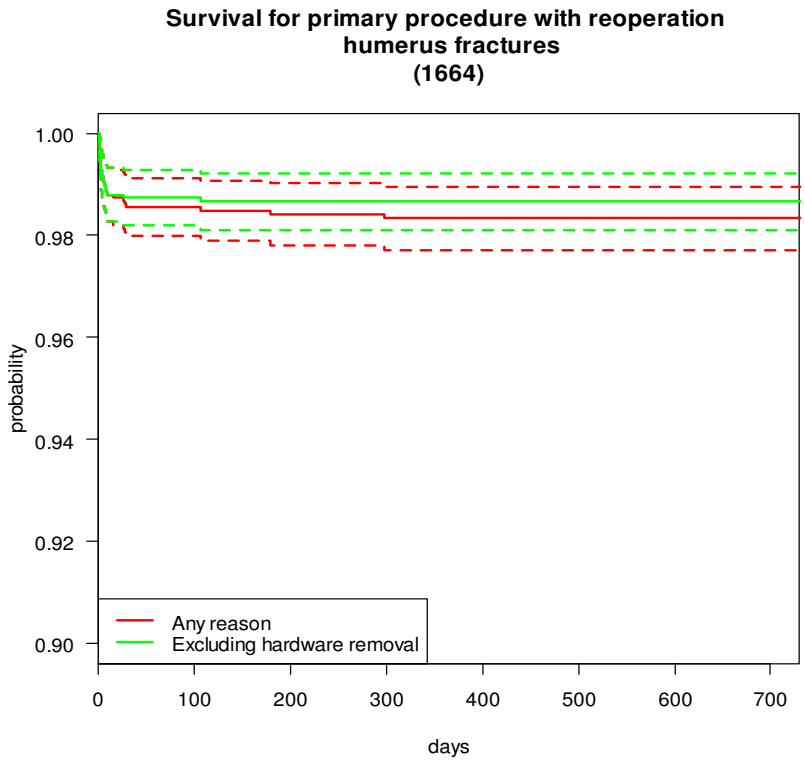


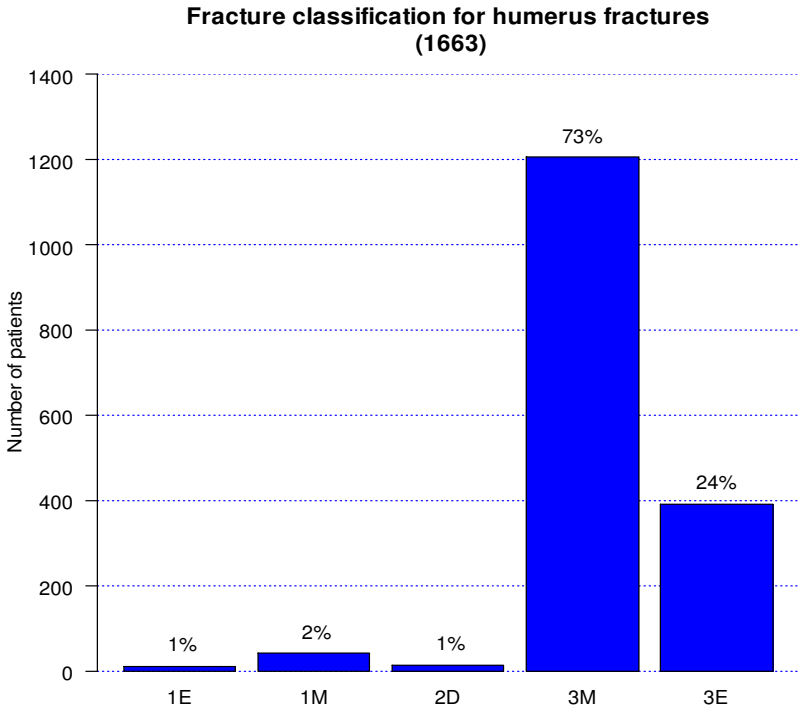

Surgeon level for humerus fractures
(1663)
Number of patients
1000
800
600
400
200
0
0%
8%
9%
10%
19%
50%
4%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist


Level of supervision for humerus fractures
(1620)
Number of patients
2000
1500
1000
500
0
0%
0%
1%
5%
27%
3%
63%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

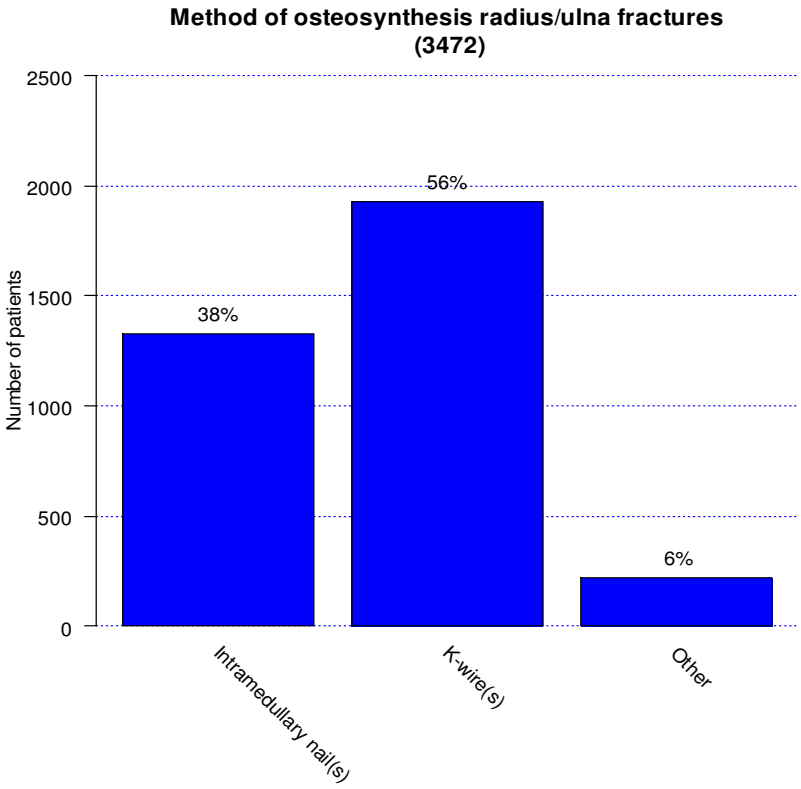

level of supervision for interns and residents
humerus fractures
(1164)
Below attending (130)
Attending or above (439)
Unsupervised (595)
Number of patients
400
300
200
100
0
55%
36%
9%
16%
36%
47%
15%
38%
47%
9%
58%
33%
4%
27%
68%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident

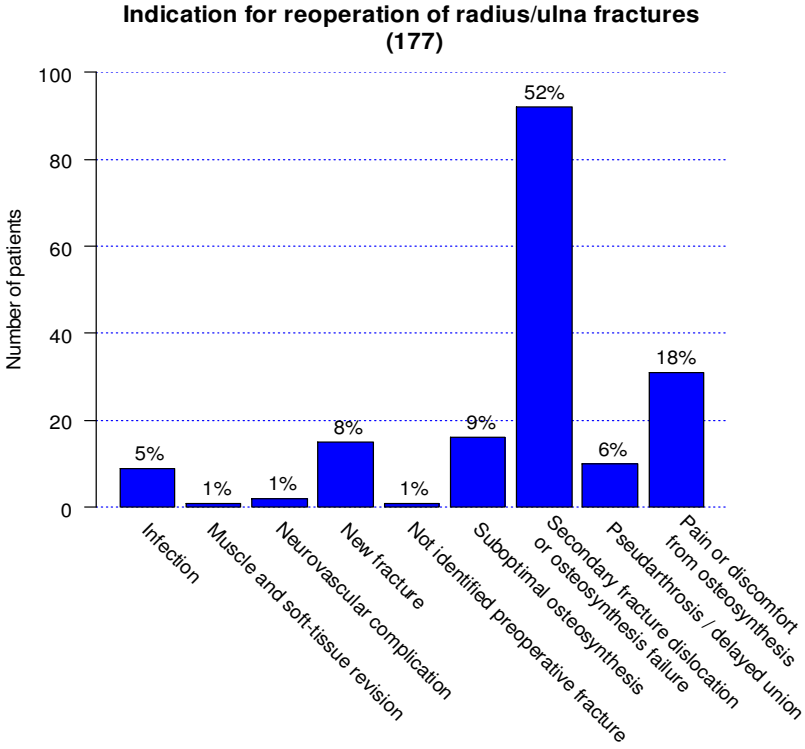

Surgical delay for humerus fractures
(1563)
71 %
19 %
5 %
2 %
1 %
1 %
0 %
Number of patients
120
100
80
60
40
20
0
0
24
48
72
96
120
144
168
Hours
(Proportion of patients operated in 24 hour intervals)

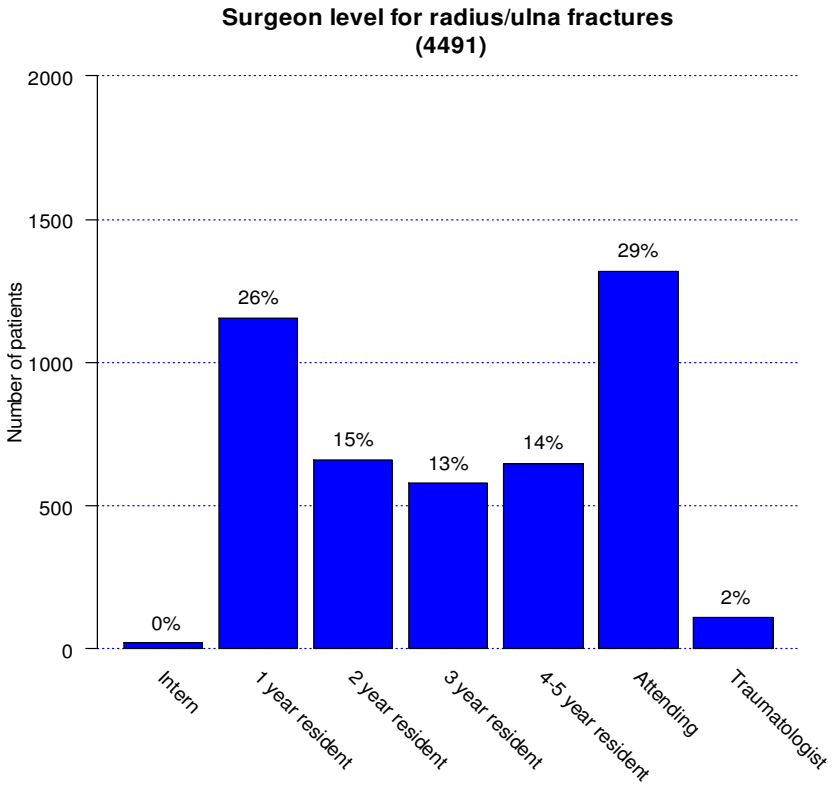

Survival for primary procedure with reoperation
humerus fractures
(1664)
1.00
0.98
0.96
0.94
0.92
0.90
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

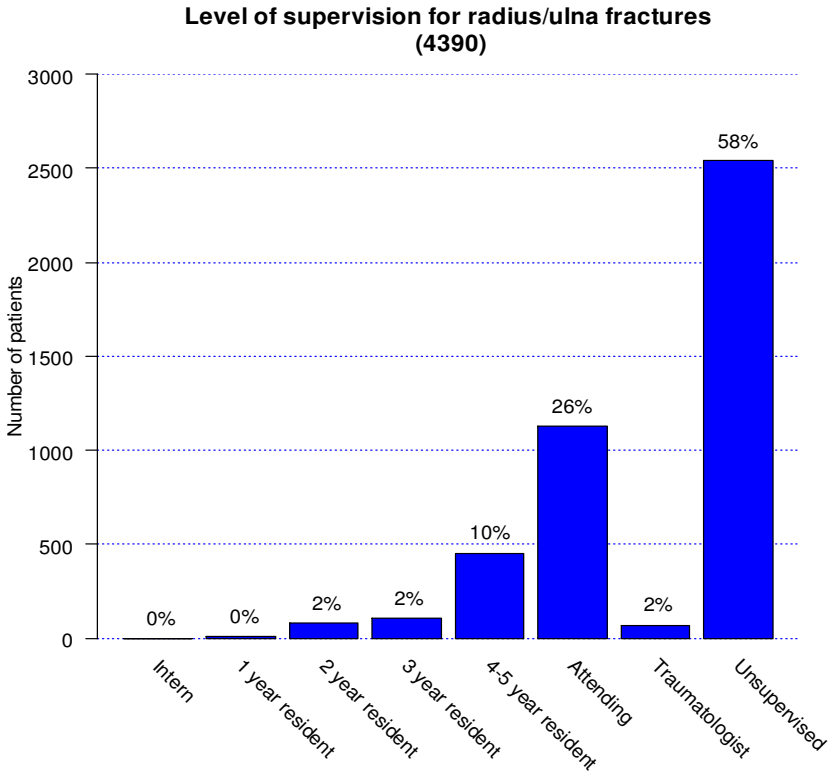

Fracture classification for humerus fractures
(1663)
1400
1200
1000
800
600
400
200
0
Number of patients
73%
24%
1%
2%
1%
1E
1M
2D
3M
3E

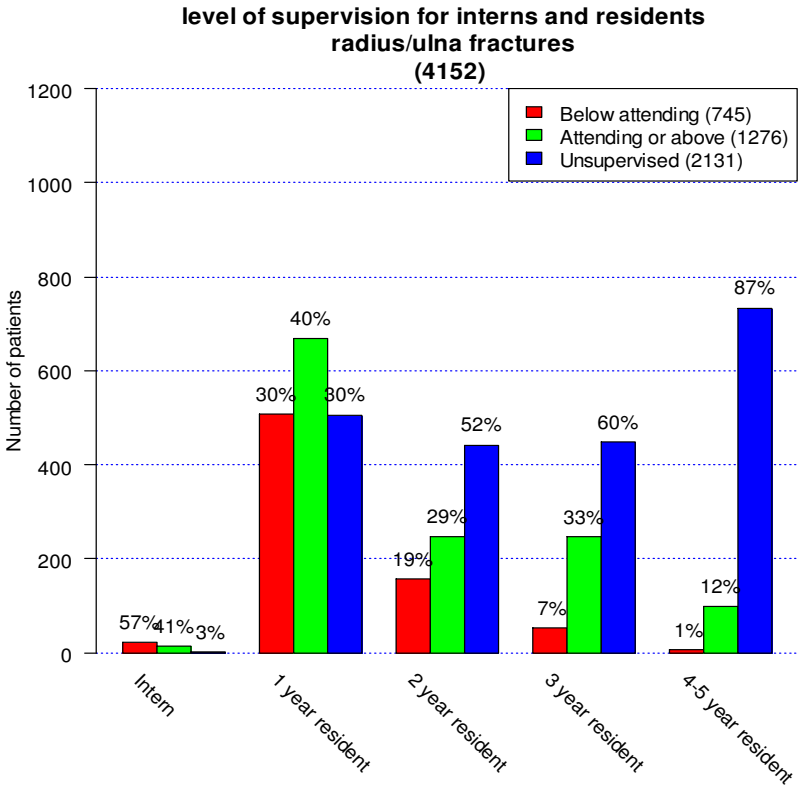
Radius/Ulna

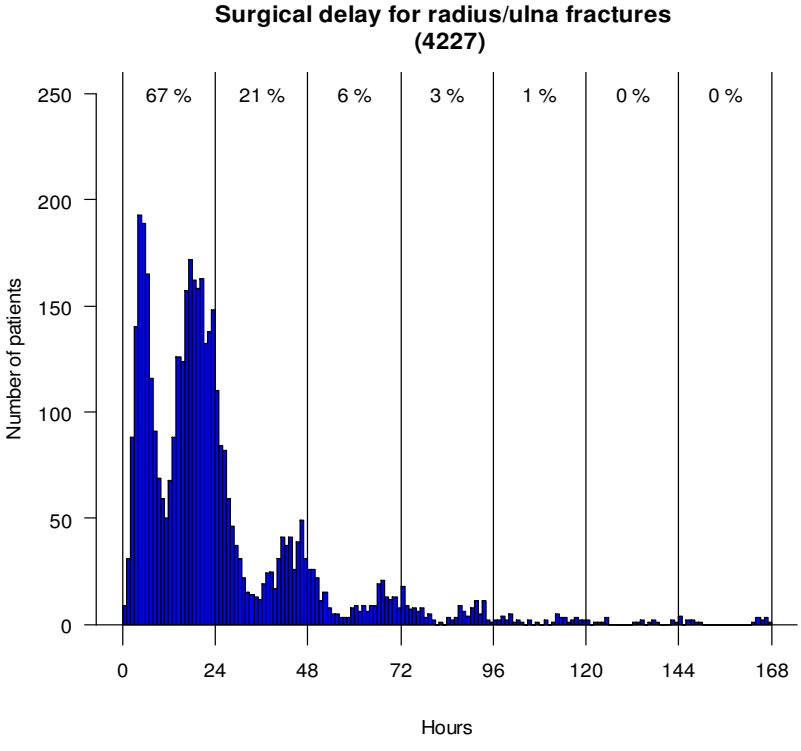

Method of osteosynthesis radius/ulna fractures
(3472)
Number of patients
2500
2000
1500
1000
500
0
38%
56%
6%
Intramedullary nail(s)
K-wire(s)
Other


Indication for reoperation of radius/ulna fractures
(177)
Number of patients
100
80
60
40
20
0
5%
1%
1%
8%
1%
9%
52%
6%
18%
Infection
Muscle and soft-tissue revision
Neurovascular complication
New fracture
Not identified preoperative fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis


Surgeon level for radius/ulna fractures
(4491)
Number of patients
2000
1500
1000
500
0
0%
26%
15%
13%
14%
29%
2%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

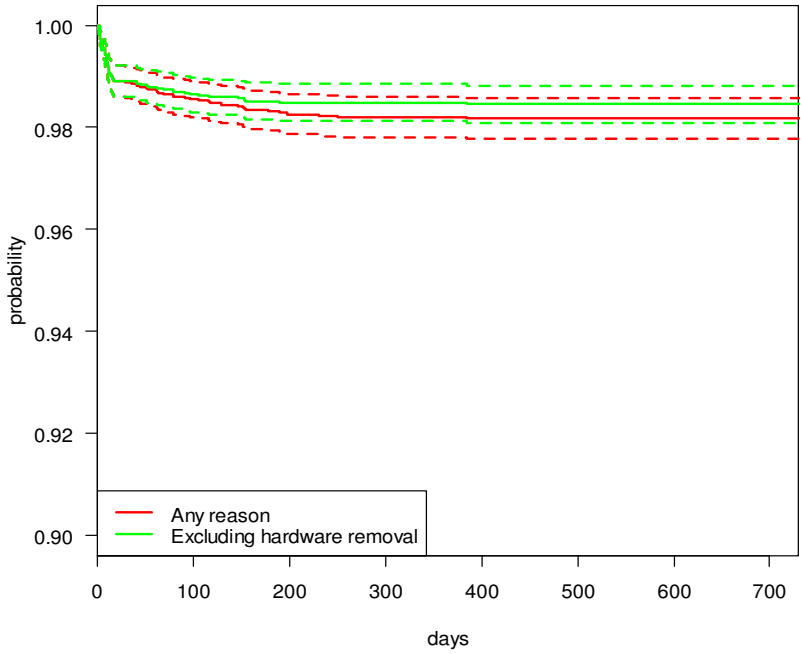

Level of supervision for radius/ulna fractures
(4390)
Number of patients
3000
2500
2000
1500
1000
500
0
0%
0%
2%
2%
10%
26%
2%
58%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised



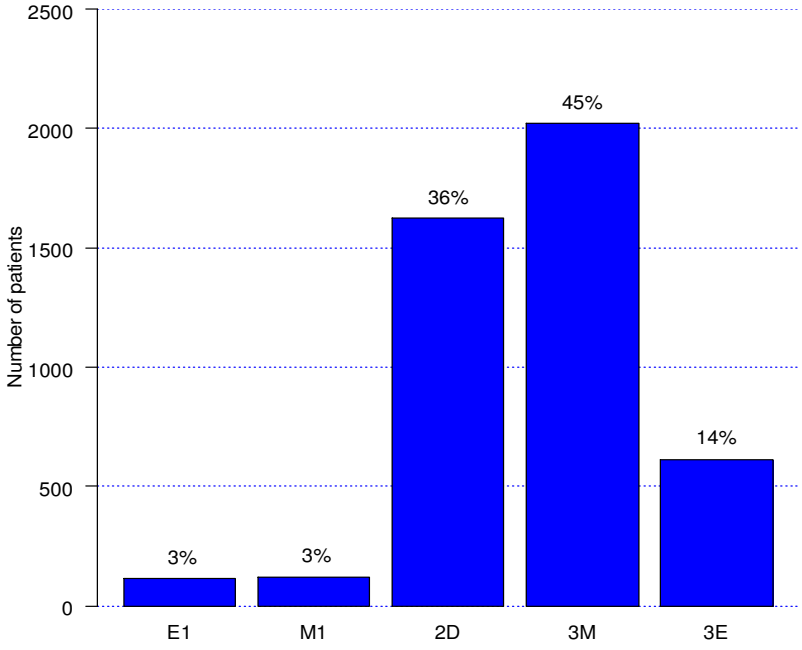


(Proportion of patients operated in 24 hour intervals)

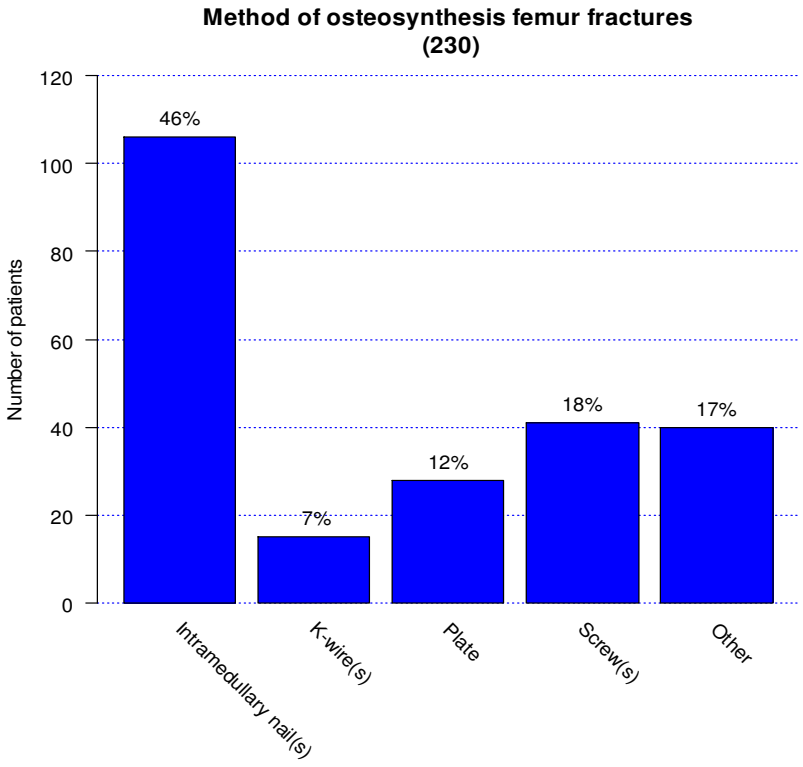
Survival for primary procedure with reoperation radius/ulna fractures (4493)

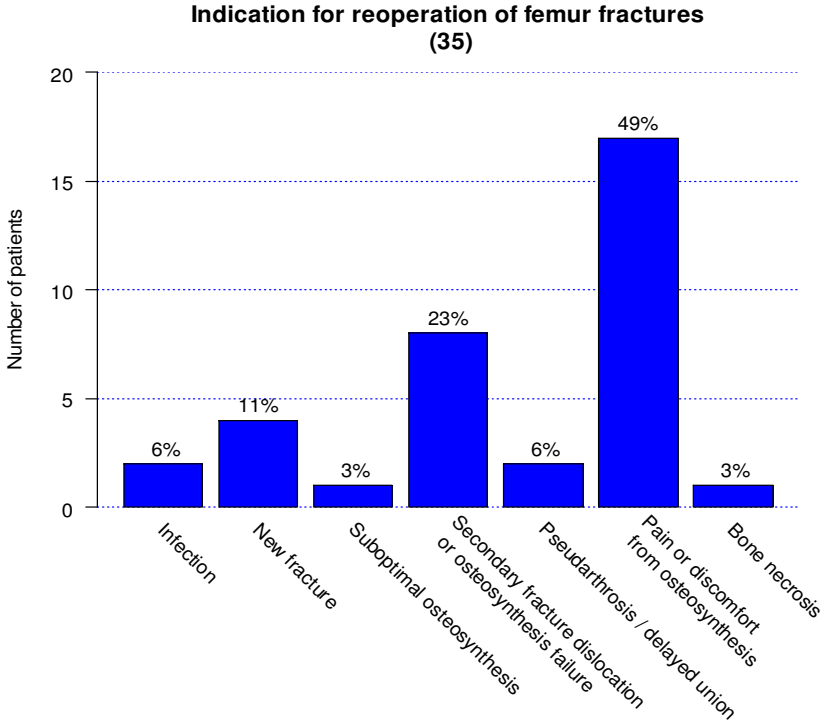


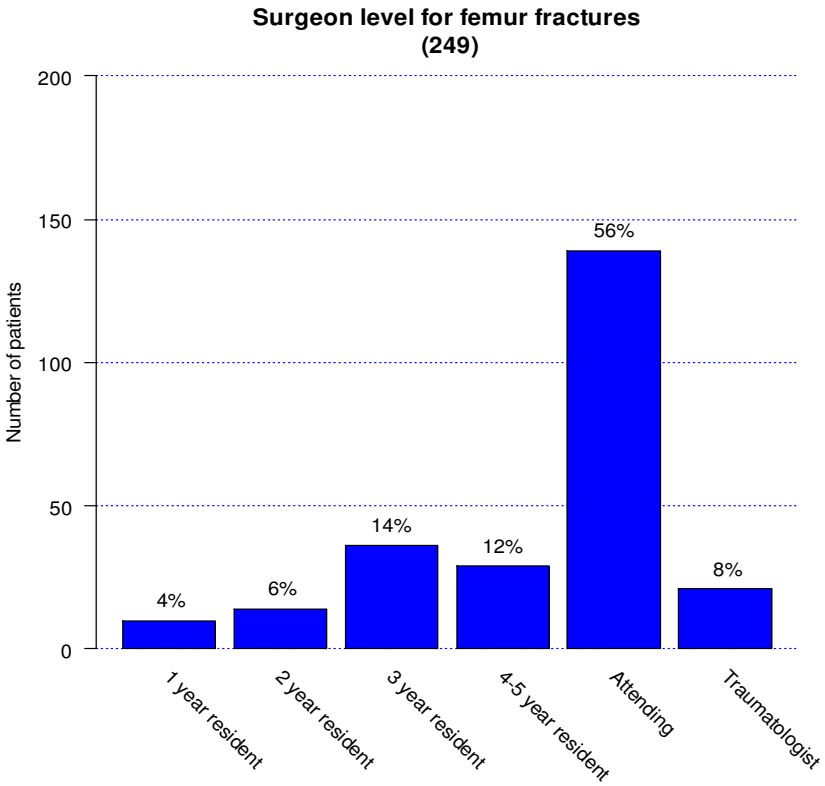
Fracture classification for radius/ulna fractures (4494)

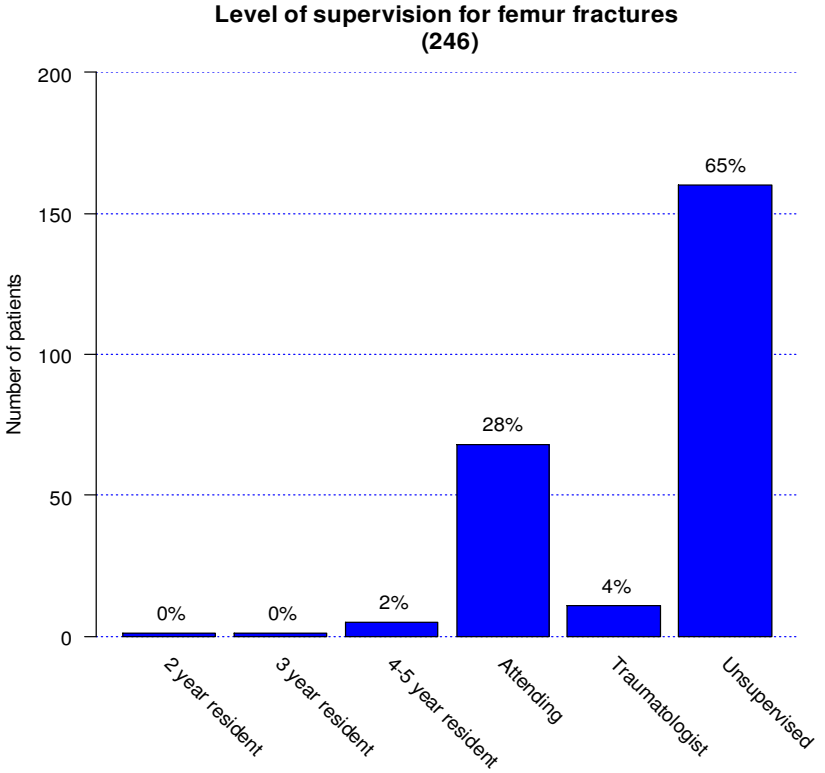


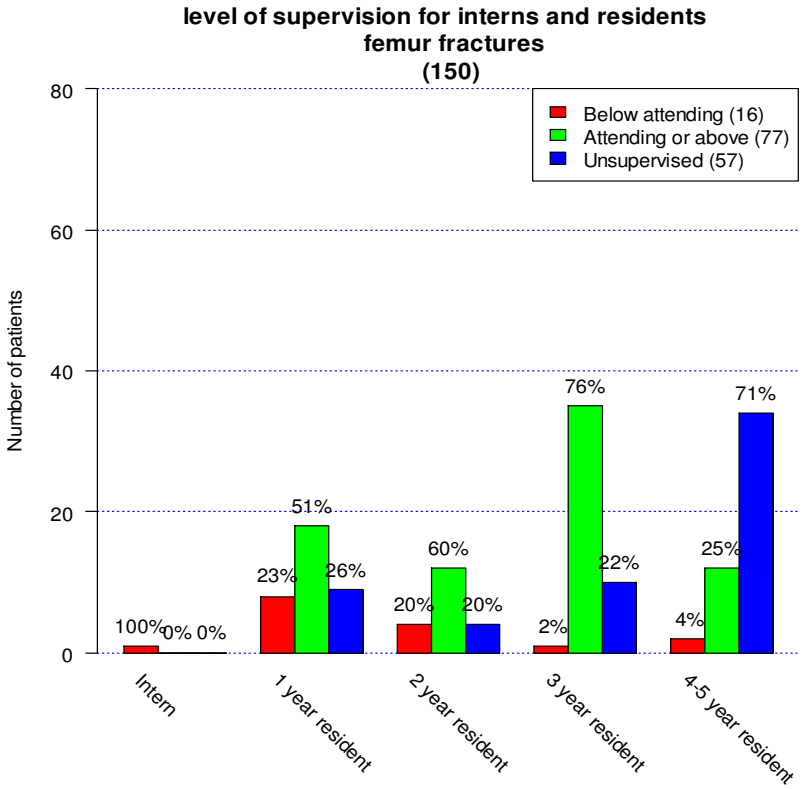
Femur

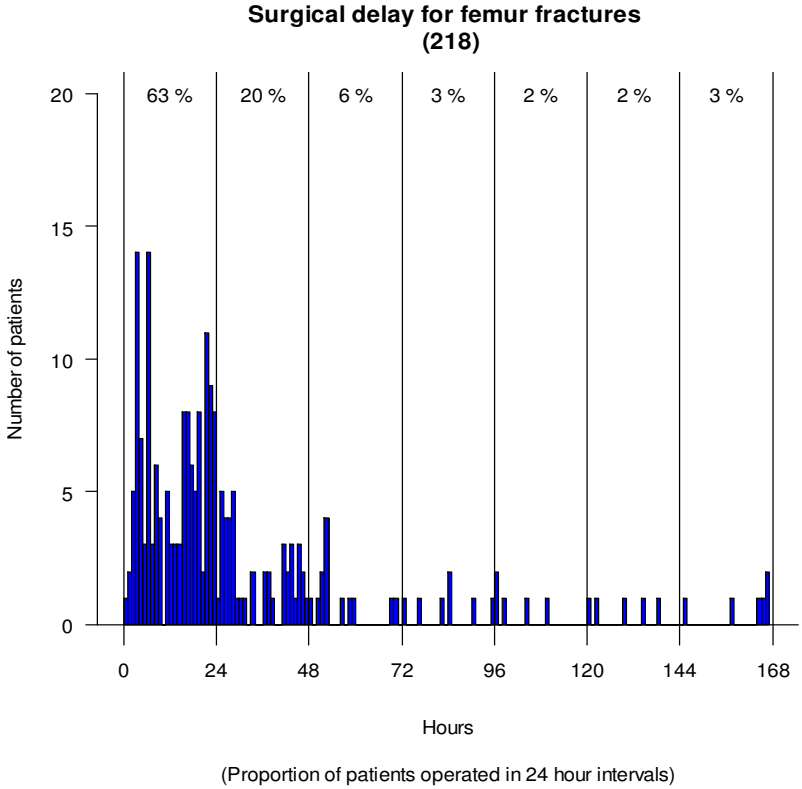

Method of osteosynthesis femur fractures
(230)
Number of patients
120
100
80
60
40
20
0
46%
7%
12%
18%
17%
Intramedullary nail(s)
K-wire(s)
Plate
Screw(s)
Other


Indication for reoperation of femur fractures
(35)
Number of patients
20
15
10
5
0
6%
11%
3%
23%
6%
49%
3%
Infection
New fracture
Suboptimal osteosynthesis
Secondary fracture dislocation
or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort
from osteosynthesis
Bone necrosis

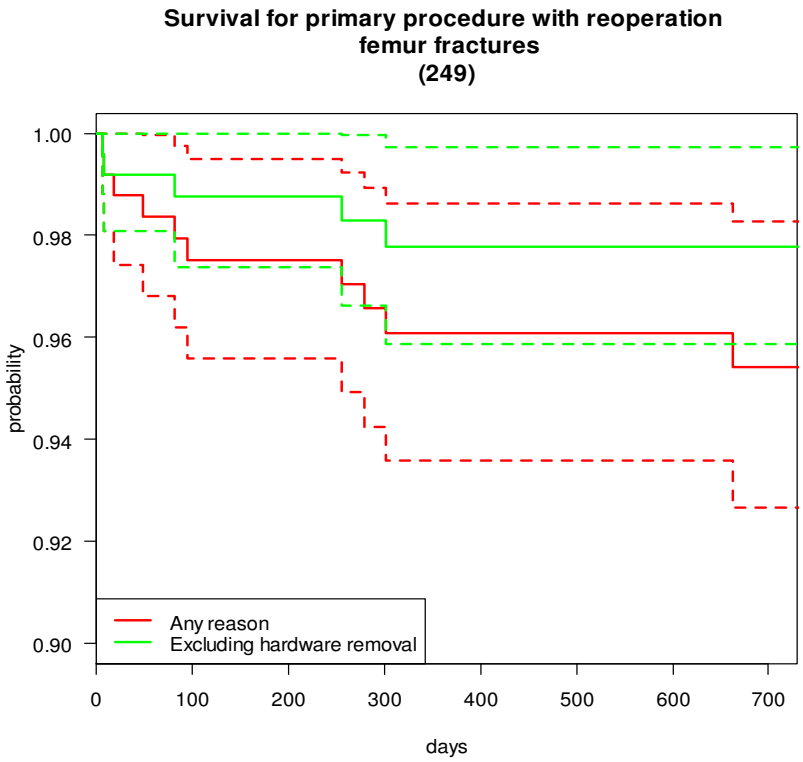

Surgeon level for femur fractures
(249)
Number of patients
200
150
100
50
0
4%
6%
14%
12%
56%
8%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

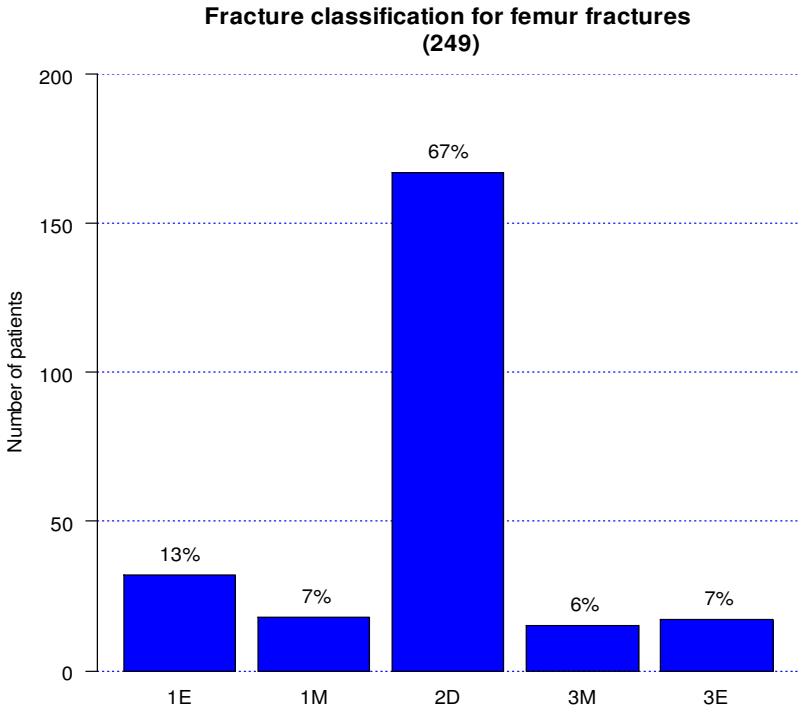

Level of supervision for femur fractures
(246)
Number of patients
200
150
100
50
0
0%
0%
2%
28%
4%
65%
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised



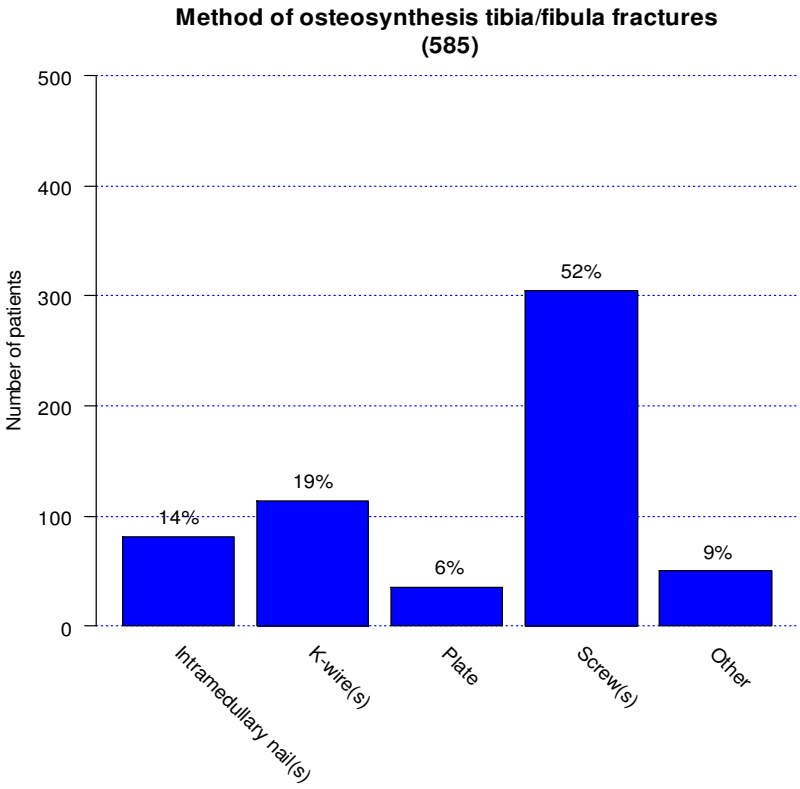


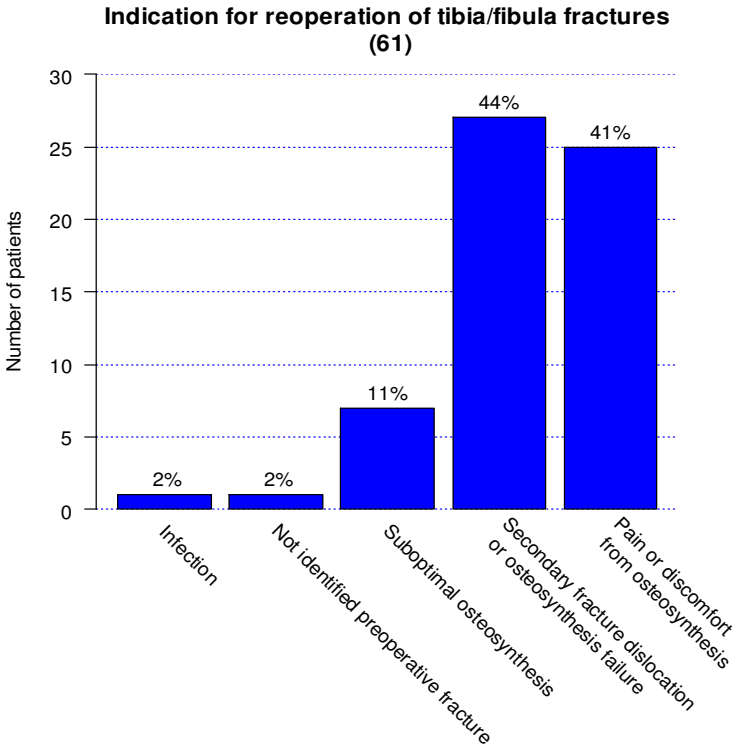
(Proportion of patients operated in 24 hour intervals)

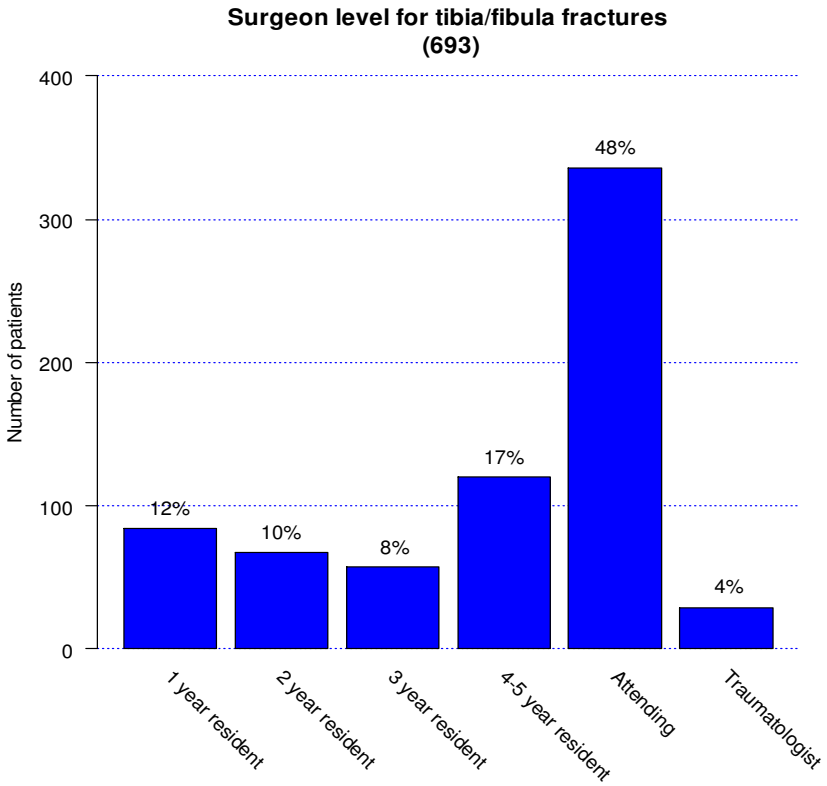

Survival for primary procedure with reoperation
femur fractures
(249)
1.00
0.98
0.96
0.94
0.92
0.90
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

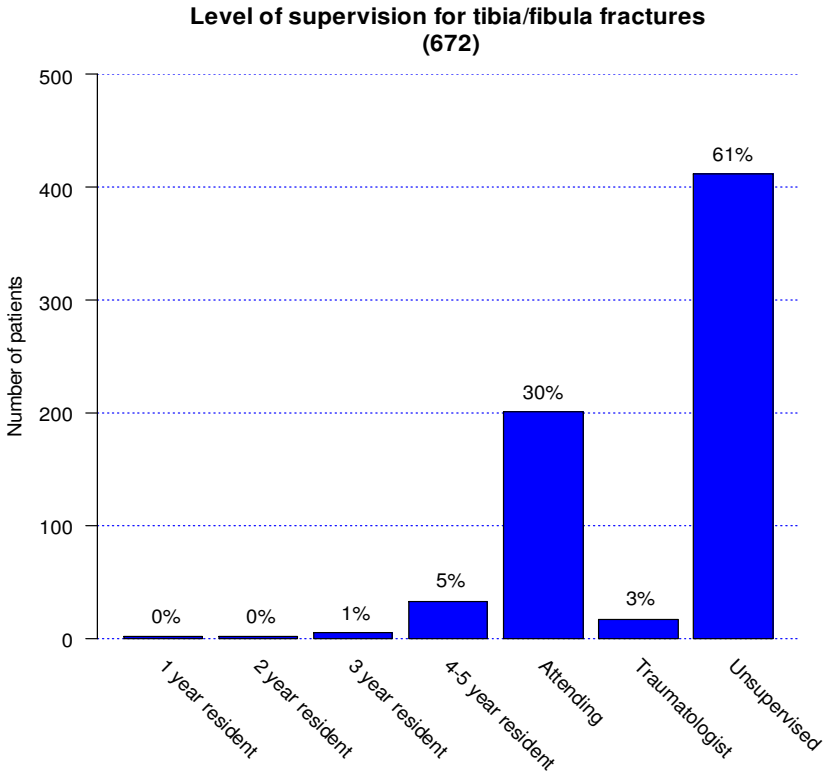

Fracture classification for femur fractures
(249)
200
150
100
50
0
Number of patients
13%
7%
67%
6%
7%
1E
1M
2D
3M
3E

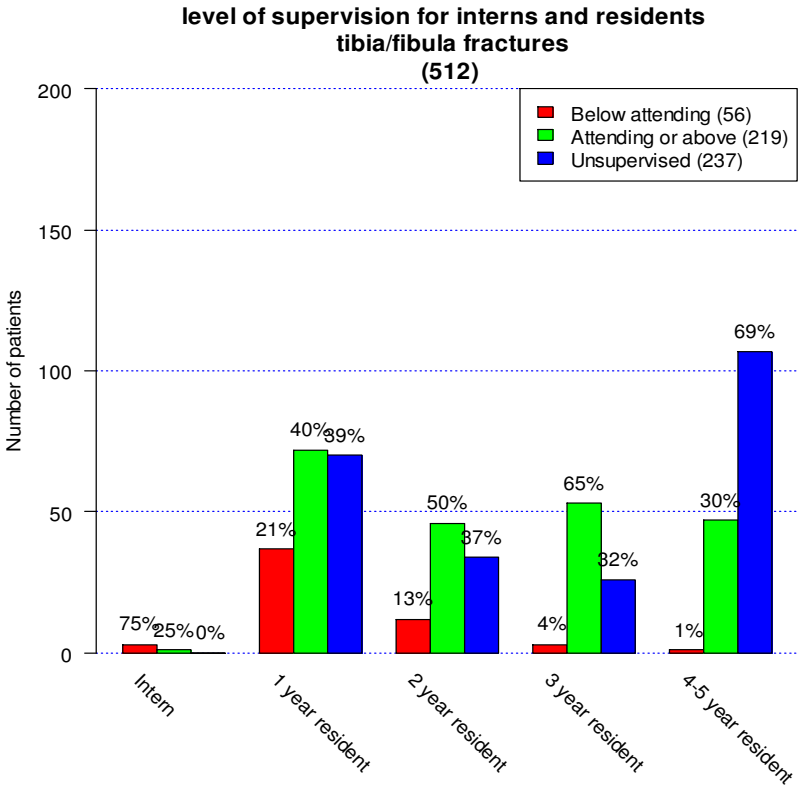
Tibia/fibula

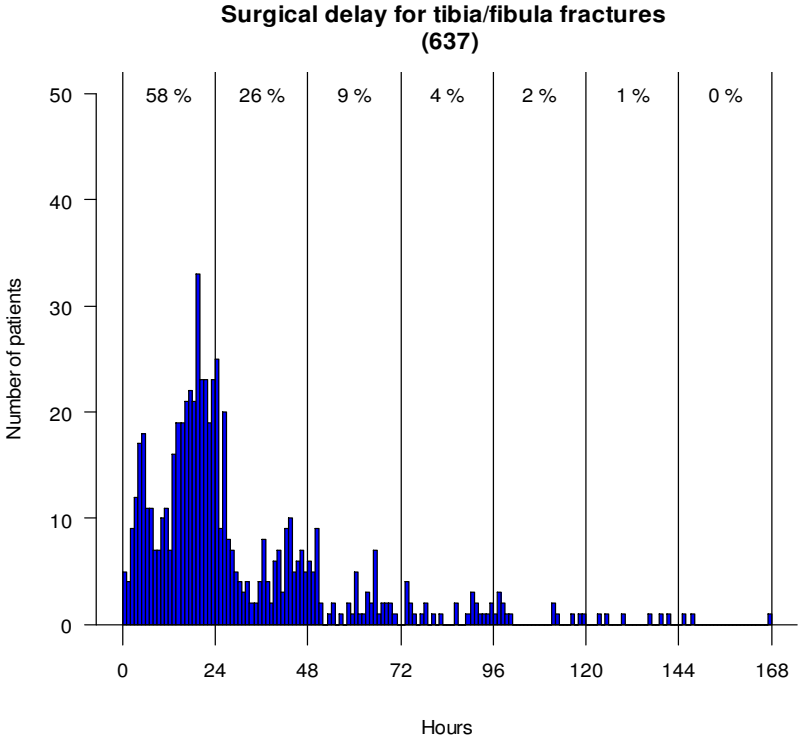




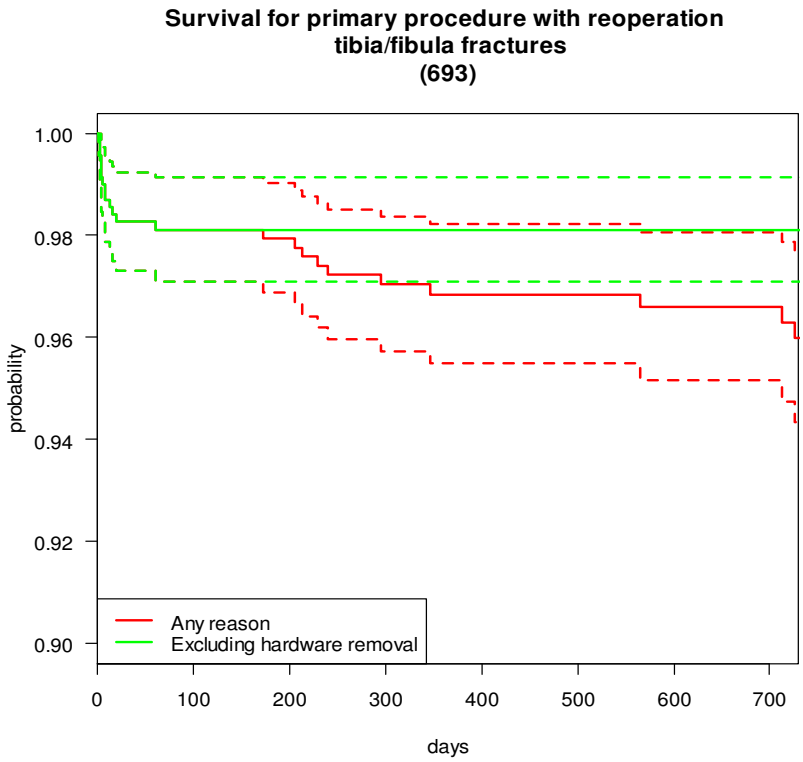

Surgeon level for tibia/fibula fractures
(693)
Number of patients
400
300
200
100
0
12%
10%
8%
17%
48%
4%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist

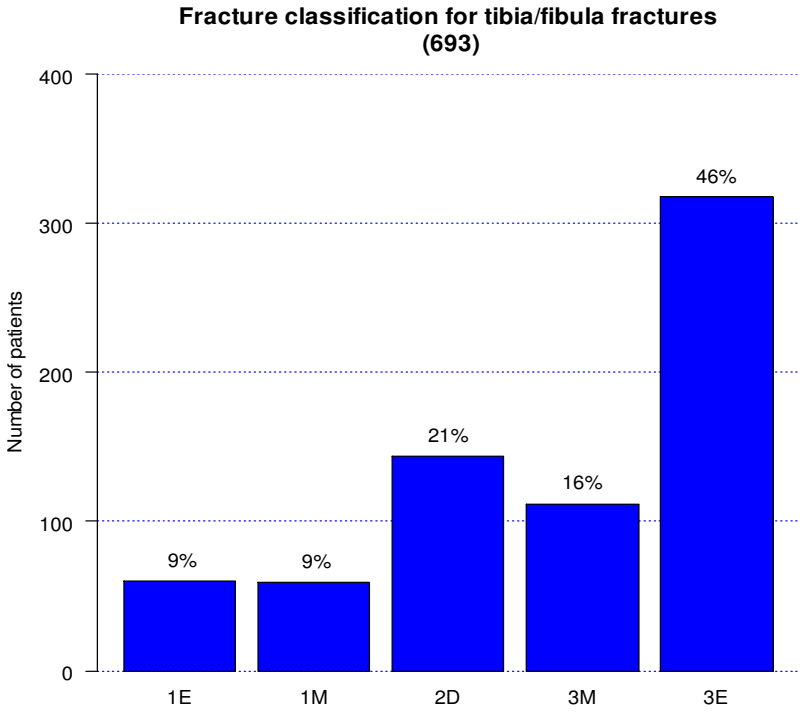

Level of supervision for tibia/fibula fractures
(672)
Number of patients
500
400
300
200
100
0
0%
0%
1%
5%
30%
3%
61%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised



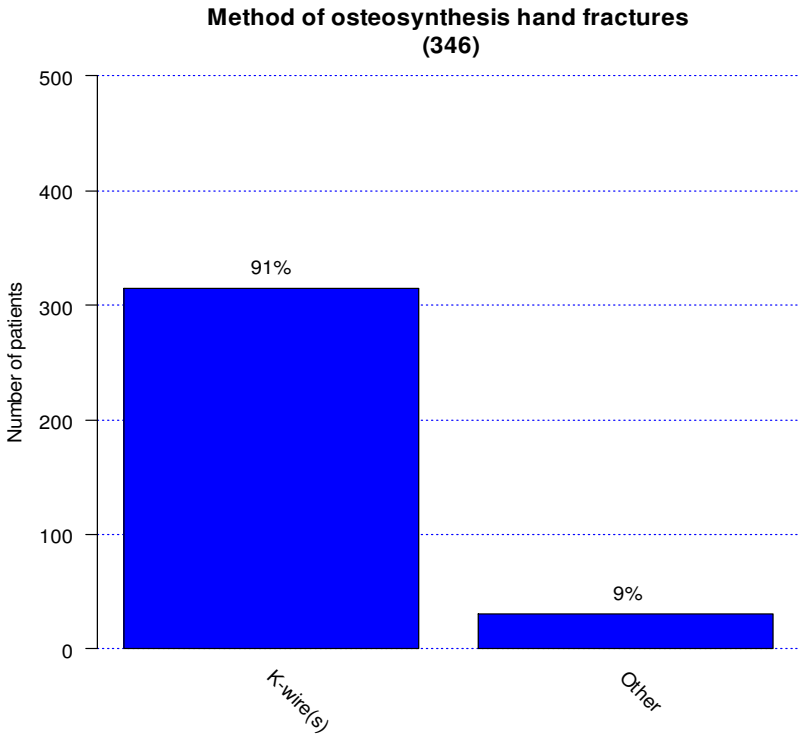


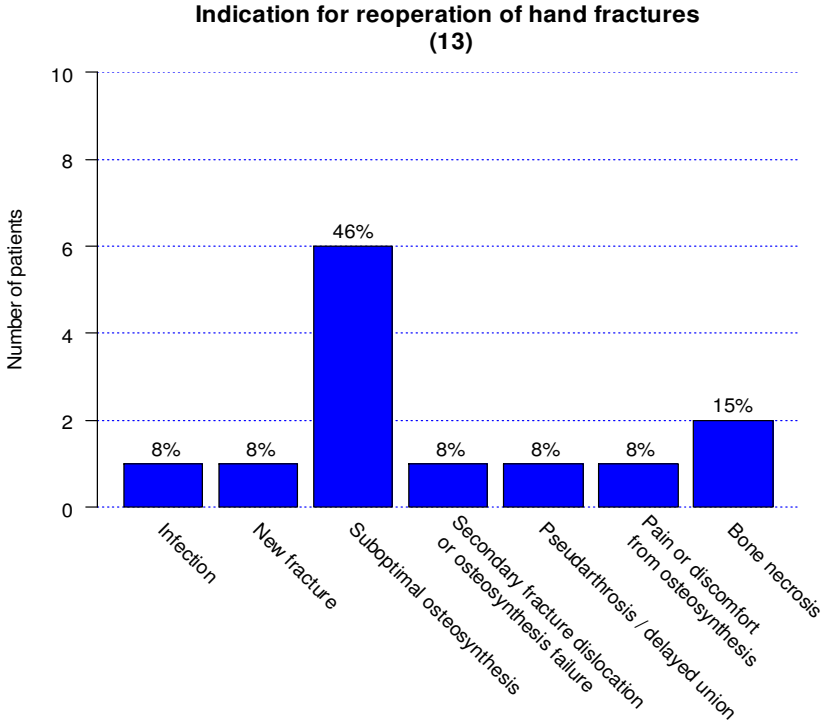
(Proportion of patients operated in 24 hour intervals)

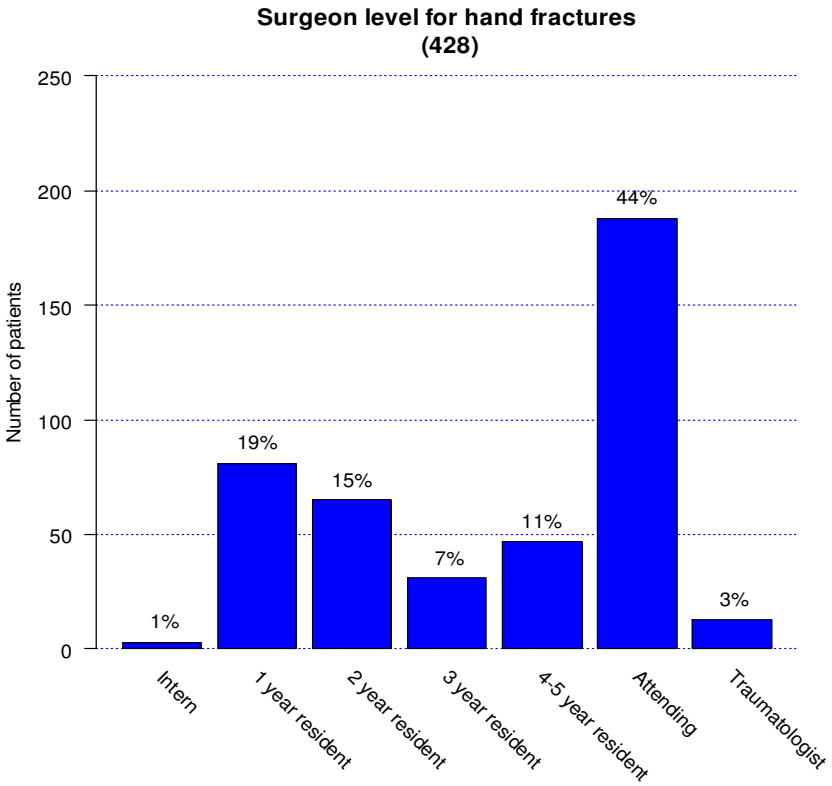

Survival for primary procedure with reoperation
tibia/fibula fractures
(693)
1.00
0.98
0.96
0.94
0.92
0.90
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

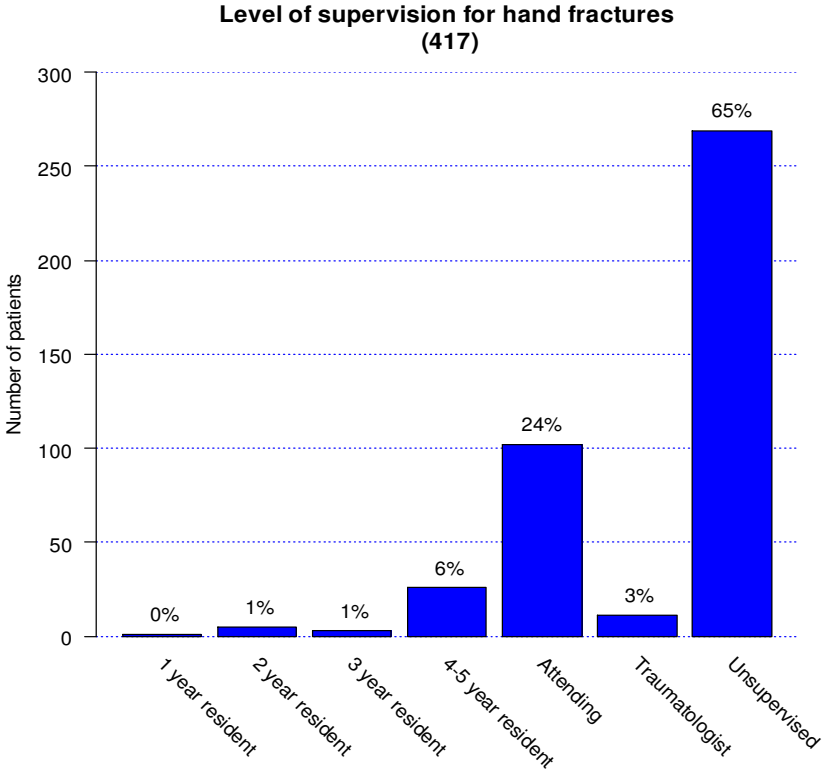

Fracture classification for tibia/fibula fractures
(693)
400
300
200
100
0
Number of patients
9%
9%
21%
16%
46%
1E
1M
2D
3M
3E

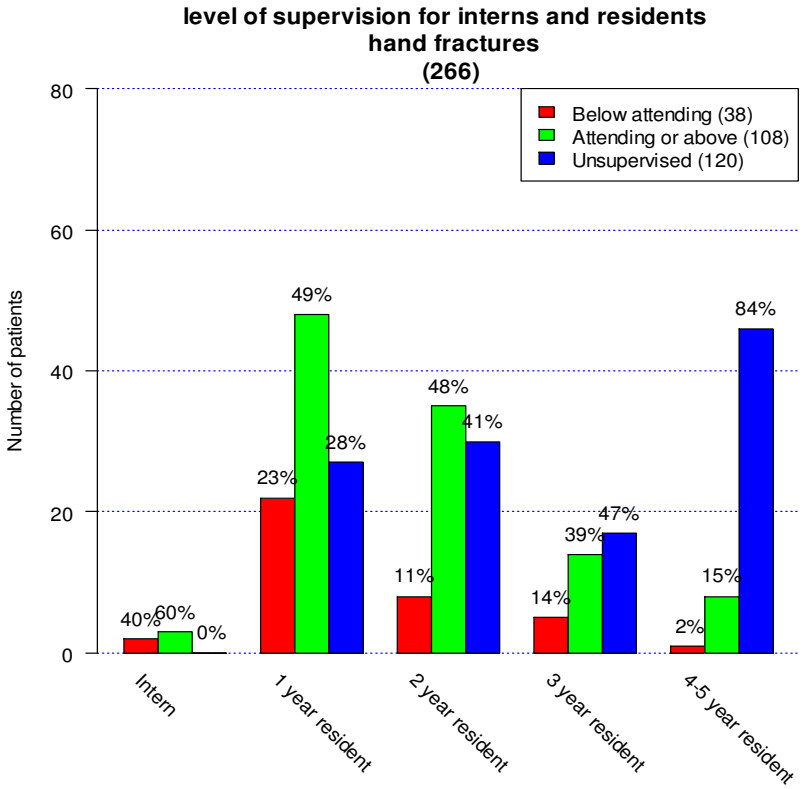
Hand

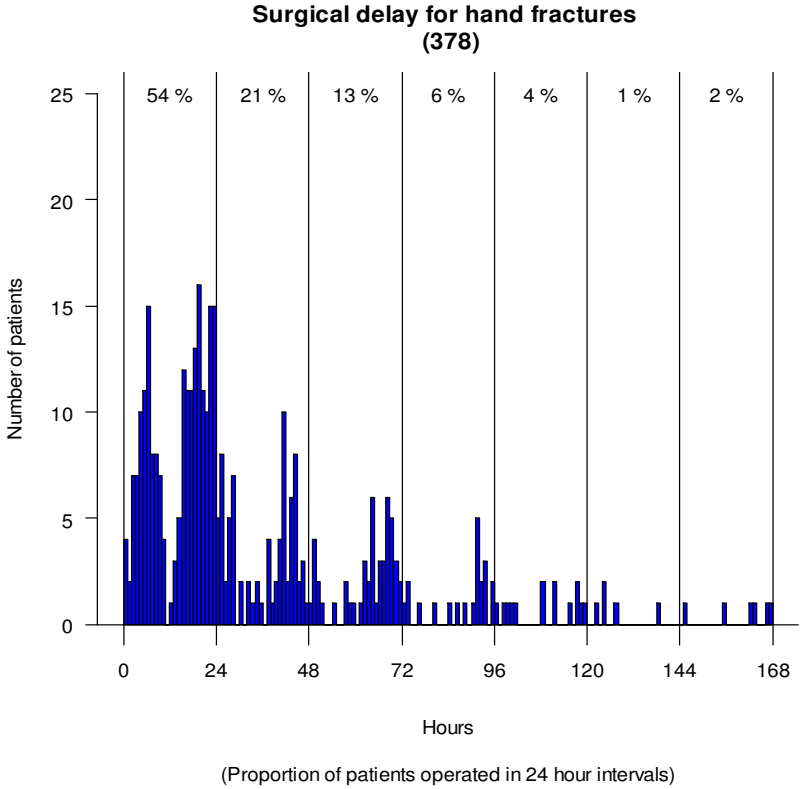

Method of osteosynthesis hand fractures
(346)
Number of patients
500
400
300
200
100
0
91%
9%
K-wire(s)
Other


Indication for reoperation of hand fractures
(13)
Number of patients
10
8
6
4
2
0
8%
8%
46%
8%
8%
8%
15%
Infection
New fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudarthrosis / delayed union
Pain or discomfort from osteosynthesis
Bone necrosis

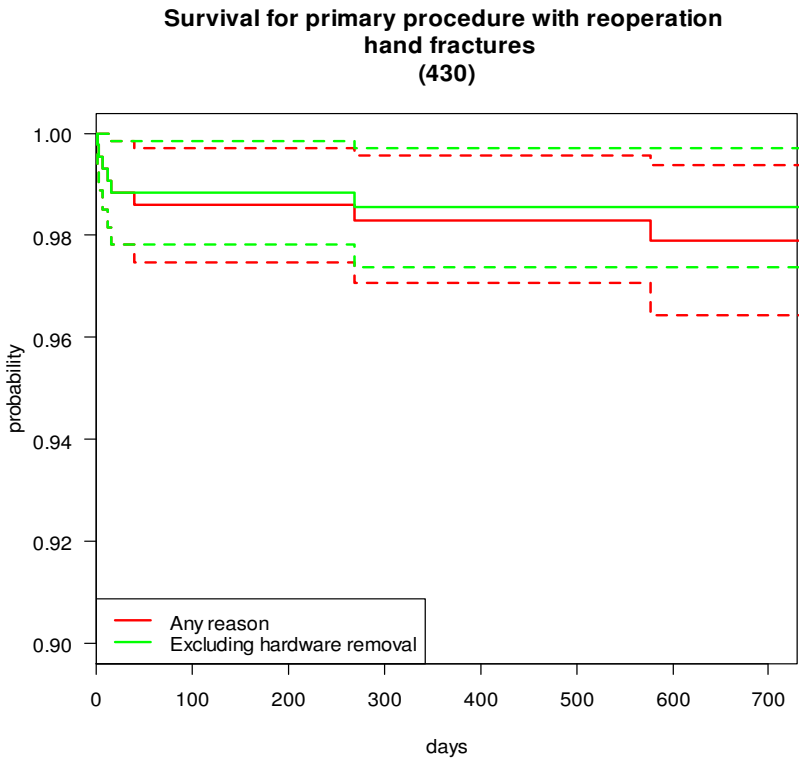

Surgeon level for hand fractures
(428)
Number of patients
250
200
150
100
50
0
1%
19%
15%
7%
11%
44%
3%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist


Level of supervision for hand fractures
(417)
Number of patients
300
250
200
150
100
50
0
0%
1%
1%
6%
24%
3%
65%
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist
Unsupervised

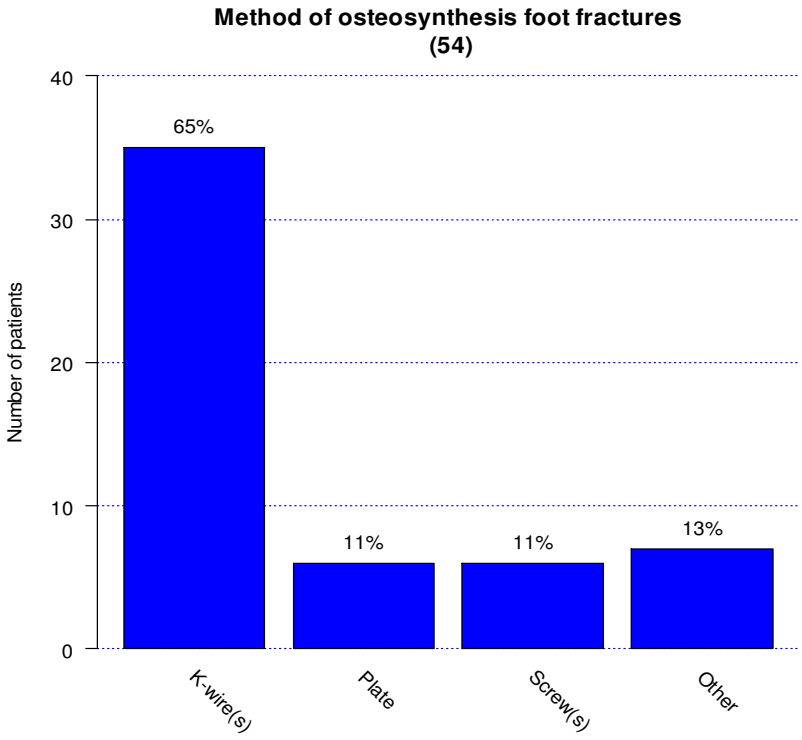


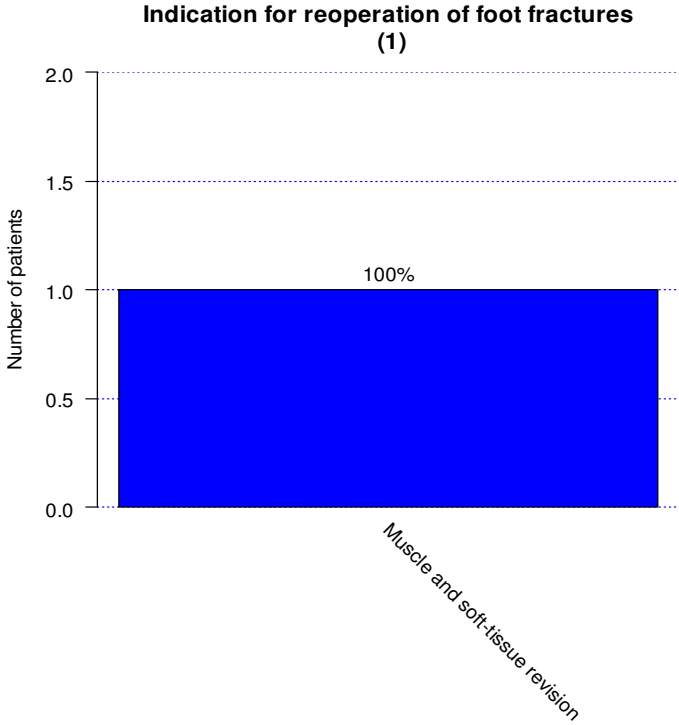


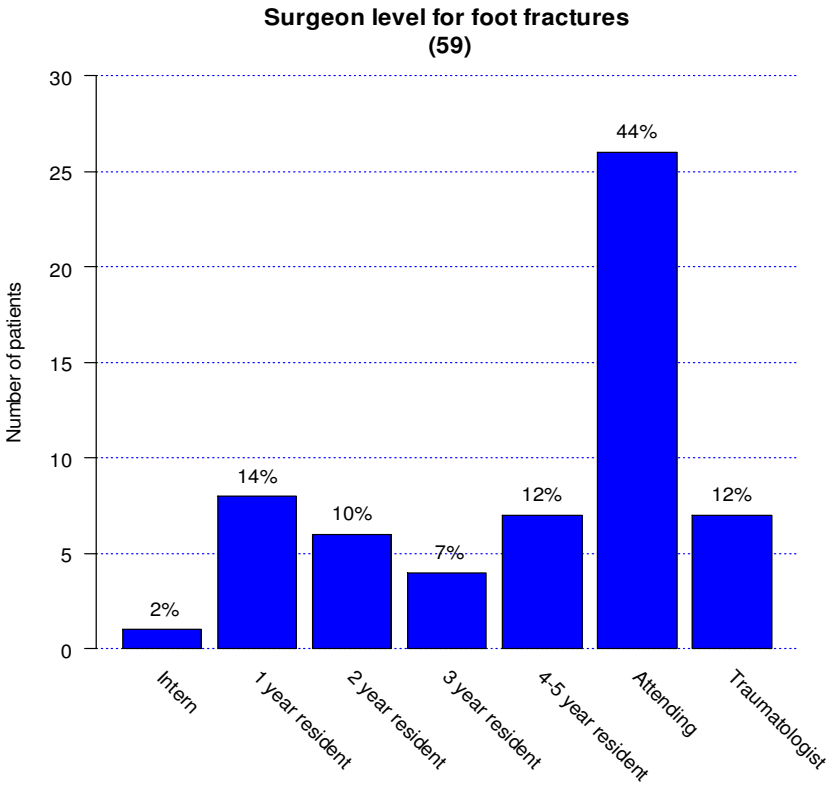
(Proportion of patients operated in 24 hour intervals)

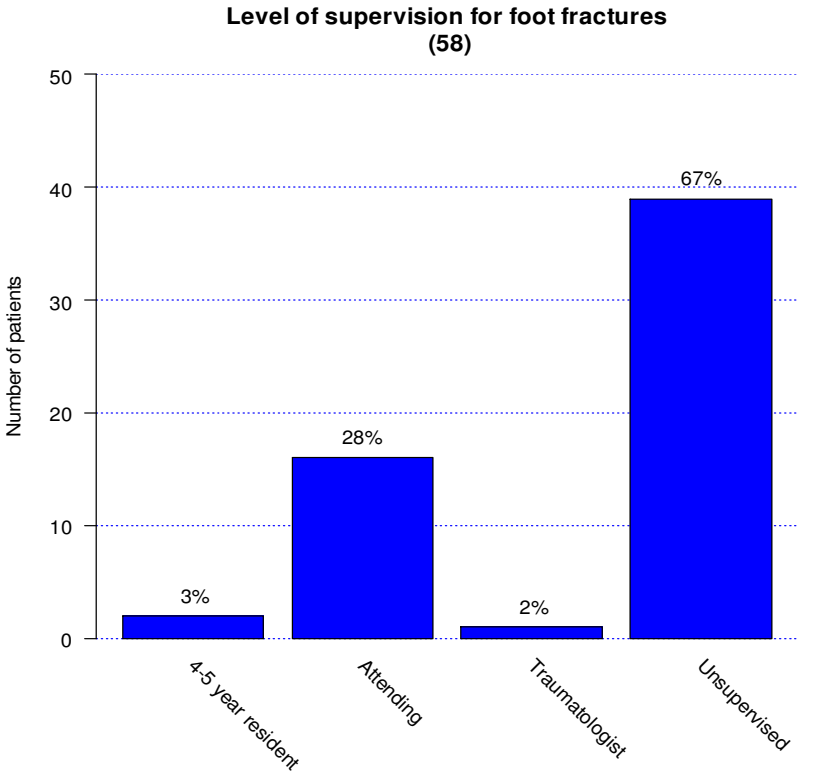

Survival for primary procedure with reoperation
hand fractures
(430)
1.00
0.98
0.96
0.94
0.92
0.90
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

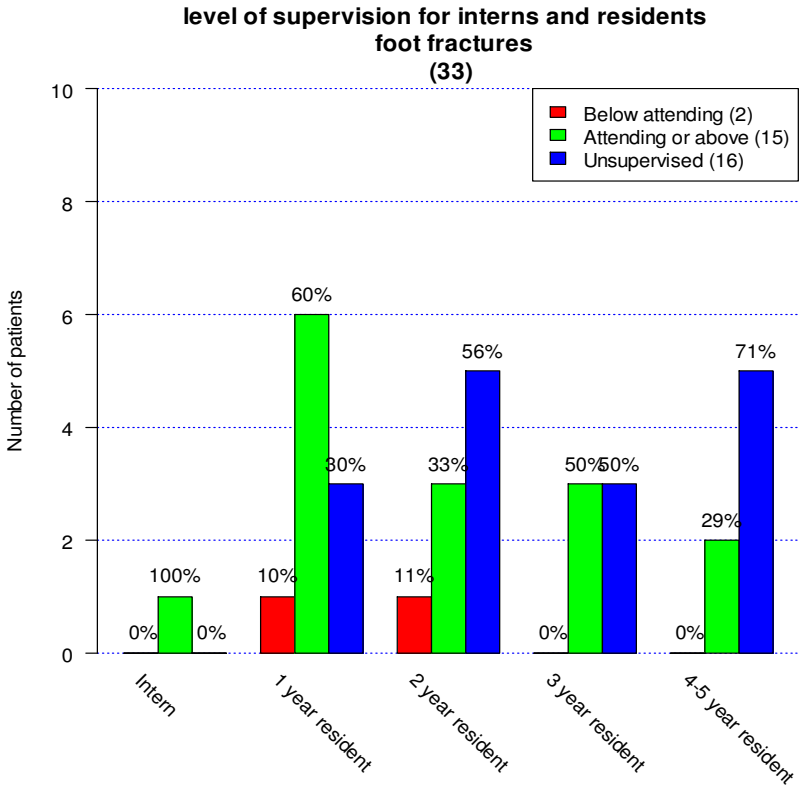
Foot

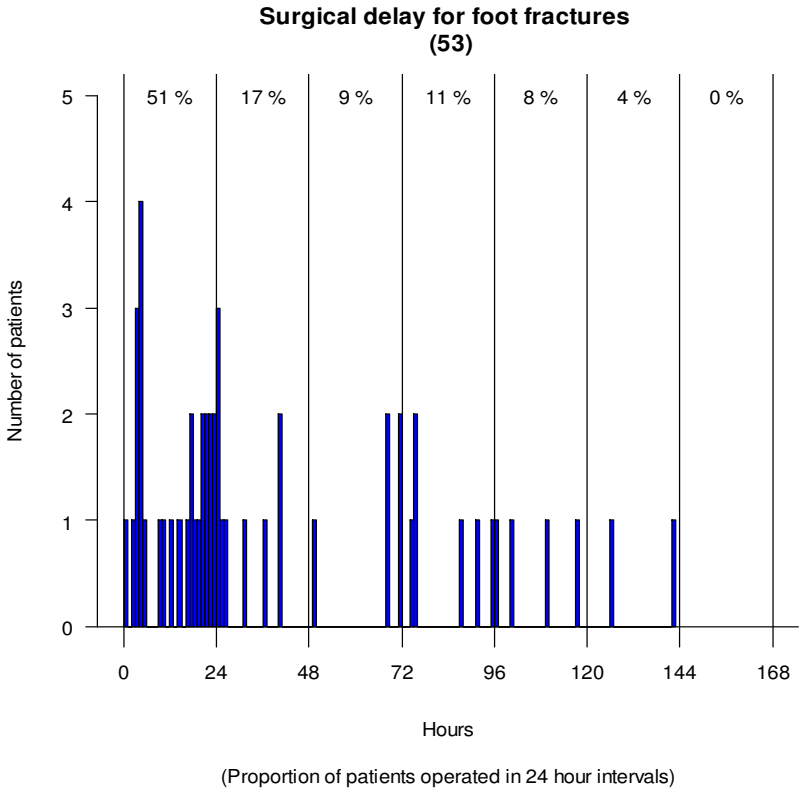

Method of osteosynthesis foot fractures
(54)
Number of patients
40
30
20
10
0
65%
11%
11%
13%
K-wire(s)
Plate
Screw(s)
Other


Indication for reoperation of foot fractures
(1)
Number of patients
2.0
1.5
1.0
0.5
0.0
100%
Muscle and soft-tissue revision

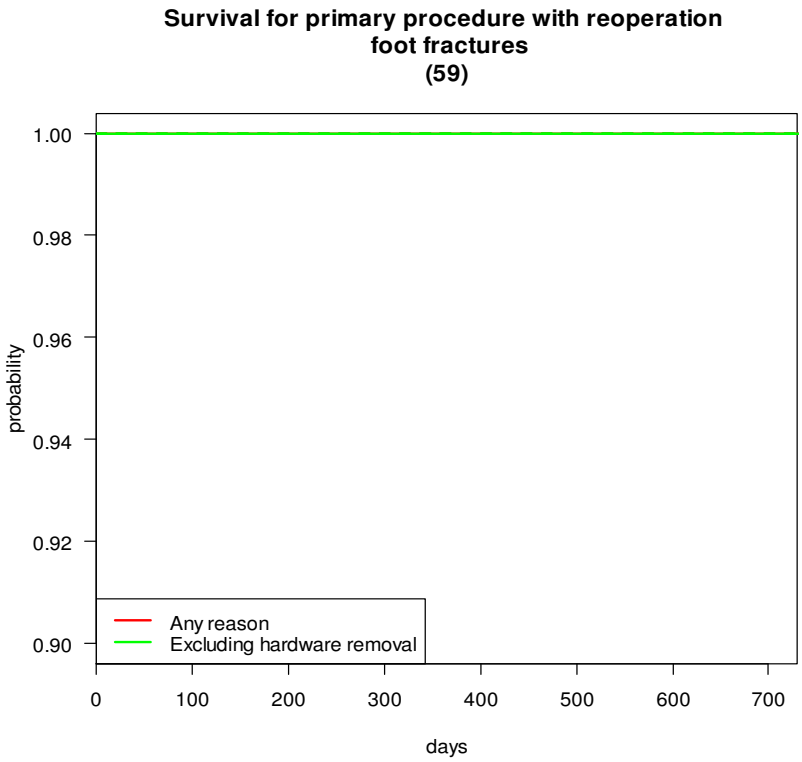

Surgeon level for foot fractures
(59)
Number of patients
30
25
20
15
10
5
0
2%
14%
10%
7%
12%
44%
12%
Intern
1 year resident
2 year resident
3 year resident
4-5 year resident
Attending
Traumatologist


Level of supervision for foot fractures
(58)
Number of patients
50
40
30
20
10
0
3%
28%
2%
67%
4-5 year resident
Attending
Traumatologist
Unsupervised





(Proportion of patients operated in 24 hour intervals)


Survival for primary procedure with reoperation
foot fractures
(59)
1.00
0.98
0.96
0.94
0.92
0.90
probability
Any reason
Excluding hardware removal
0
100
200
300
400
500
600
700
days

Appendix 1

Registered parameter		Values
Patient related parameters	CPR	Unique ID
	Gender	Male / Female
	Age	Years
	ASA score*	1/2/3/4
Trauma related parameters	Operated side	Left / Right
	Date and Time of the radiological exam**	Time of the day and date
	Major Trauma ***	Yes / No
	Gustillo Type	Closed / 1 / 2 / 3a / 3b / 3c
	Neurovascular status	Unimpaired/ dysthesia /parasthesia / lack of pulse
	Pathologic fracture****	Yes / No
Surgery related parameters	Date and Time of surgery	Time of the day and date
	Procedure Type	Primary / secondary / planned*****
	Fracture Type	Adult / pediatric / periprostetic
	Fracture Diagnosis	AO Müller / Rorabeck / Vancouver classification
	Method of osteosynthesis	Locking plate, non-locking plate, screw (one or more), K-wire, steel wire, cable, threaded wire, intramedullary nail, elastic nail, external fixation (bars), external fixation (ring), hemi arthroplasty , total arthroplasty, sliding hip screw, intramedullary nail with sliding screw (short), intramedullary nail with sliding screw (long), Hook plate, removal of hardware, fracture reduction w/o osteosynthesis, Hook pins, Polyfix, arthroplasty reduction, locking attachment plate, syndesmotic screw(s), ASLS screw for intramedullary, none of the above.
	Supplemental surgical procedures	Arthrodesis, bone resection, osteotomy, bone suture, Bone transplant (autograft), Bone transplant (allograft), Bone transplant (substitute), Amputation, fasciotomy , soft-tissue debridement, brissement, hematoma evacuation, tendon surgery, nerve or vascular surgery, ligament surgery, none of the above, reaming, nerve decompression , secondary suture, meniscal / labral suture, meniscal / labral resection, prosthesis exchange, VAC therapy, skin transplant, joint reduction, arthroscopic assistance.
	Antibiotic prophylaxis	Yes / No
	Use of tourniquet	Yes / No
	Educational level of the surgeon	Intern, 1st year resident, 2nd year resident, 3rd year resident, 4-5th year resident, attending, traumatologist******
	Educational level of the supervisor if present	Intern, 1st year resident, 2nd year resident, 3rd year resident, 4-5th year resident, attending, traumatologist******

*: American Society of Anaesthesiologist (ASA) score

**: Date and time of the radiological examination that provided indication for surgery

***: Major trauma was defined as when a trauma team was assembled upon arrival of the patient to the hospital

****: Pathologic fracture as suspected on radiological exam

*****: A primary surgical procedure is defined as the first surgical procedure due to a fracture. A planned secondary procedure is defined as a surgical procedure that is a part of the primary treatment plan following primary surgery. A reoperation is defined as a surgical procedure that is not a part of an initial treatment plan following primary surgery

******: Traumatologist: attending in orthopaedic surgery with at least 2 years of trauma subspecialization.

Indications for reoperation:
Infection
Muscle- and soft-tissue revision
Neurovascular complication
New fracture
Not identified intraoperative fracture
Suboptimal osteosynthesis
Secondary fracture dislocation or osteosynthesis failure
Pseudoarthrosis
Bone necrosis
Pain or discomfort from osteosynthesis

Indications for reoperation that are registered by the surgeon in DFDB when reoperation is registered.