

Supplementary Table 1 Checklist data for calculation tables (CT)		
Numbers / Values	Unit	CT Workplace related performances
07:30 - 15:30	Times from - to	Duty hours (WP-opening hours)
10,00	Times from - to	Transit times
10,00	n = / year	Public holidays/days per year
8,40	Hours / day	Daily working hours full-time equivalent (FE) in hours
42,00	Hours / week	Core working hours full-time equivalent (FE) per week in hours
19,50	Percent values	Rest allowance in %
07:15 - 16:09	Times from - to	Core working time early shift
11:06 - 20:00	Times from - to	Core working time late shift
16:09 - 07:45	Times from - to	On-call duty Mo – Th
16:09 - 08:30	Times from - to	On-call duty Fr
08:00 - 08:30	Times from - to	On-call duty Sa
08:00 - 07:45	Times from - to	On-call duty Su
08:00 - 08:30	Times from - to	On-call duty public holidays
	Times from - to	Shift duty
	Hours / day	Shift core working time early shift
	Hours / day	Shift core working time early shift
	Hours / day	Shift duty Mo – Th
	Hours / day	Shift duty Fr
	Hours / day	Shift duty Sa
	Hours / day	Shift duty Su
	Hours / day	Shift duty public holidays
	Hours / day	Shift core working time
10,00	n = / day	Simultaneous running central early shift workplaces per day
2,00	n = / day	Simultaneous running central late shift workplaces per day after early shift until on-call duty
1,00	n =	Decentralized workplaces (number of week days, duration, location, program sequence)
2,00	n = / day	Simultaneous running decentralized early shift workplaces per day
2,00	n = / day	Simultaneous running cardiac surgery workplaces per day
Numbers / Values	Unit	CT Not-workplace related performances
17803	n = / year	Preinterventional anesthesiological evaluation ("premedication") in pre-assessment clinic
7689	n = / year	Preinterventional anesthesiological evaluation ("premedication") outside pre-assessment clinic
76	n = / year	Risk stratification (council)
100	n = / year	ECG
0	n = / year	Pulmonary function
400	n = / year	Central venous line
100	n = / year	Transoesophageal echocardiography (TEE)
0	n = / year	Autologous blood donation
0	n = / year	Autologous blood transfusion
20	n = / year	Autotransfusion
20	n = / year	Hemodilution
984	n = / year	Obstetric peridural catheter
42	n = / year	Emergency sectio / if outside operating theater
12	n = / year	Transportation support
50	n = / year	Anesthesia for emergency diagnostics/interventions
2	n = / year	Transportation support for sectional image diagnostics
450	n = / year	Emergency trauma room
13	n = / year	Reanimation / Emergency call
7328	n = / year	Acute pain duty daily medical rounds
399	n = / year	Acute pain duty installation of patient controlled analgesia (PCA) pump
517	n = / year	Acute pain duty removal of catheter
10994	n = / year	Patients in physician occupied postanesthesia care unit
14	n = / year	Patients in physician occupied holding area
400	n = / year	Neonatal and infant surgery (up to 12 months)
	n = / year	Sectio caesarea, if emergency care by anesthesiologist
20	n = / year	Transplantation of solid organs (liver, heart, lung, pancreas)
20	n = / year	Surgery/interventional care of aortic dissection/aneurysm, aortic arch reparation
20	n = / year	Patients with/for implantation of cardiac assist systems
20	n = / year	Medical care of polytraumatized patients
20	n = / year	Transport/interventions (incl. image diagnostics) of patients with multiple organ dysfunctions
20	n = / year	Craniotomy in seated position
0	n = / year	Neurophysiological monitoring by anesthesiologist
4362	n = / year	Overlapping initiation of anesthesia
2000	n = / year	Postoperative medical round
Number / Values	Unit	CT Total calculation
10,00	n = / year	First-time employee (FTE) per year
20,00	n = / year	Full-time equivalents residents
8,00	n = / year	Students in practical year
4,00	n = / year	Pregnancies
1000,00	Hours / year	Sum excess hours of physicians
1500,00	Hours / year	Sum overtime hours of physicians
250,00	Hours / year	Demand of use up overtime without pay contingents per year for excess hours
500,00	Hours / year	Demand of use up overtime without pay contingents per year for overtime
560,00	Hours / year	Additional holidays for alternating shift work
700,00	Hours / year	Additional holidays for shift work
600,00	Hours / year	Night employment
42,00	Hours / year	Time demand for continuing medical education and administrative provisions
10000,00	Hours / year	Annual salaried equivalent of employees for on-call duties
750,00	Hours / year	Annual salaried overtime hours of physicians
1500,00	Hours / year	Annual salaried excess hours of physicians



Supplementary Table 3 Not workplace related performances (NWPRP)

	In-house time (min) physical duty	Standard time (min) physical duty		Number n = /year	Sum min/week	Sum h/week	Total sum h/week	FE net /week	Sum min/year	Sum h/year	Total sum h/year	FE net /year	FE net /year
1 Preinterventional anesthesiological evaluation ("premedication")													
Pre-assessment clinic	25	25	with completed questionnaire	17803	8559	142,65			445075	7417,9		4,4	
Outside pre-assessment clinic (+travel time 10 min)	35	35	with completed questionnaire	7689	5175	86,25			269115	4485,3		2,6	
2 Risk stratification (council)	30	30		76	44	0,73			2280	38,0		0,0	
3 ECG	15			100	29	0,48			1500	25,0		0,0	
4 Pulmonary function	20			0	0	0,00			0	0,0		0,0	
5 Central venous line	60	60	consent, installation, control	400	462	7,69			24000	400,0		0,2	
6 Transoesophageal echocardiography (TEE)	45	45	without cardiac surgery	100	87	1,44	239,25	5,70	4500	75,0	12441,2	7,3	
7 Autologous blood donation		30		0	0	0,00			0	0,0		0,0	
8 Autologous blood transfusion		120		0	0	0,00			0	0,0		0,0	
9 Autotransfusion	60	60		20	23	0,38	0,58	0,01	1200	20,0		0,0	
10 Hemofiltration	30	30		20	12	0,19			600	10,0	30,0	0,0	0,0
11 Specific department duties	30			20	12	0,19	0,19	0,00	600	10,0	10,0	0,0	0,0
12 Obstetric peridural catheter	90	90		984	1703	28,38			88560	1476,0		0,9	
Informed consent, installation, test dosage, bolus		60											
Observation time	30	30											
13 Emergency sector / if outside operating theater	75	75		42	61	1,01	29,39	0,70	3150	52,5	1528,5	0,0	0,9
14 Transportation support	30	30		12	7	0,12			360	6,0		0,0	
Anesthesia for emergency diagnostics/interventions	120	120		50	115	1,92			6000	100,0		0,1	
Transportation support for sectorial image diagnostics	60	60		2	2	0,04	2,08	0,05	120	2,0	108,0	0,0	0,1
15 Emergency trauma room	90	90		450	779	12,98			40500	675,0		0,4	
16 Resuscitation / Emergency call	60	60		13	15	0,25	13,23	0,32	780	13,0	688,0	0,0	0,4
17 Acute pain duty													
Daily medical rounds	15	15		7328	2114	35,23			109920	1832,0		1,1	
Installation of patient controlled analgesia (PCA) pump	15	15		396	115	1,92			5985	99,8		0,1	
Removal of catheter	15	15		517	149	2,49	39,63	0,94	7755	129,3	2061,0	0,1	1,2
18 Physician occupied postanesthesia care unit	12	12	per patient	10994	2537	42,28			131928	2198,8		1,3	
Physician occupied holding area	12	12	per patient	14	3	0,05	42,34	1,01	168	2,8	2201,6	0,0	1,3
19 Double staffing of special procedures													
Neonatal and infant surgery (up to 12 months)	120			400	923	15,38			48000	800,0		0,5	
Sectio caesarea, if emergency care by anesthesiologist					0	0,00			0	0,0		0,0	
Transplantation of solid organs (liver, heart, lung, pancreas)					0	0,00			0	0,0		0,0	
Surgery/interventional care of aortic dissection/aneurysm, aortic arch reparation	60			20	23	0,38			1200	20,0		0,0	
Patients with/for implantation of cardiac assist systems	60			20	23	0,38			1200	20,0		0,0	
Medical care of multi-trauma patients	60			20	23	0,38			1200	20,0		0,0	
Transport/interventions (incl. image diagnostics) of patients with multiple organ dysfunctions	60			20	23	0,38			1200	20,0		0,0	
Craniotomy in seated position	60			20	23	0,38			1200	20,0		0,0	
Neurophysiological monitoring by anesthesiologist				0	0	0,00	17,31	0,41	1200	20,0	900,0	0,0	0,5
20 Overlapping initiation of anesthesia	45	45		4362	3775	62,91	62,91	1,50	196290	3271,5	3271,5	1,9	1,9
21 Postoperative medical round	15	15		2000	577	9,62	9,62	0,23	30000	500,0	500,0	0,3	0,3
Total sum					27392	456,5	456,5	10,9	1424386	23739,8	23739,8		14,0

Abbreviations: FE = full-time equivalent; h = hour; n = number; NWPRP = not workplace related performances.

**Supplementary Table 4 Total calculation**

				FE net
Workplace related performances (WPRP)	71044,1	h		41,9
Not workplace related performances (NWPRP)	23739,8	h		14,0
Sum excess hours of physicians per year (EHPY)	2000,0	h		1,2
Sum overtime hours of physicians per year (OPY)	1000,0	h		0,6
First-time employee (FTE) per year			10	
Demand of double staffing for first-time employees within first 3 months	4243,2	h		2,5
Full-time equivalents (FE) of residents per year			20	
Demand 1 medical specialist for 3 residents for compensation of professional deficits of residents (RD)	11315,1	h		6,7
Students in practical year (PY)				
Number practical students per year			8	
Demand of time of physicians for students in practical year in hours	1697,3	1 physician / 8 students in PY		1,0
Demand of use up overtime without pay contingents per year for:				
excess hours	250,0	h		0,1
overtime	500,0	h		0,3
additional holidays for alternate shifts	560,0	h		0,3
additional holidays for shift work	700,0	h		0,4
Number of night employment hours			600,0	
additional holidays for night employment hours in shift work	33,6	h		0,0
additional holidays for night employment hours in on-call duty	396,1	h		0,2
Number of pregnancies			4	
Compensation for pregnant employees (e. g. 14 weeks around delivery in Germany)	2352,0			1,4
Total time (WPRP+NWPRP + EHPY +OPY + FTE + RD + overtime)	119831,1	h		70,6
Number FE (WPRP+NWPRP + EHPY +OPY + FTE + RD + overtime)	<b>70,6</b>			
Tariff right demand of continuing medical education and administrative provisions (CMEAP) (hours/year/FE)			42	
Time demand for continuing medical education and administrative provisions (CMEAP) in hours	2965	h		1,7
Number FE (WPRP+NWPRP + EHPY +OPY + FTE + RD + overtime + PEAP)	<b>72,3</b>			
1 senior staff member per x employees (e.g. 50) for management tasks personnel / planning / budget	<b>1,4</b>			1,4
Number FE (WPRP+NWPRP + EHPY +OPY + FTE + RD + overtime + PEAP + management)	<b>73,8</b>	FE		73,8
if total demand is delivered by net annual working time per full-time equivalent (FE) (see table WPRP E5)	1697	h (core time hours)		
Total time (WPRP+NWPRP + EHPY +OPY + FTE + RD + overtime + CMEAP + management)	<b>125252,3</b>	h		
Subtraction full-time equivalents (FE) for payment for overtime beyond core working hours				
Annual salaried equivalent of employees for on-call duties in hours			10000	
Subtraction of full-time equivalents (FE) for on-call duties	<b>5,9</b>			5,9
Annual salaried overtime hours of physicians			750	0,4
Annual salaried excess hours of physicians			1500	0,9
Subtraction of full-time equivalents (FE) for salaried overtime and excess	<b>1,3</b>			
<b>Total number FE to be staffed minus salaried workload beyond core working hours</b>	<b>66,6</b>	FE		66,6
Total time demand in hours	113002,3	h		

**Abbreviations:** CMEAP = continuing medical education and administrative provisions; EHPY = excess hours of physicians per year; FE = full-time equivalent; FTE = first-time employee; h = hours; n = number; NWPRP = not workplace related performances; OPY = overtime hours of physicians per year; PY = practical year student; RD = residents; WPRP = workplace related performances.

Supplementary Table 5 Checklist data for auxiliary tables (AT)		
Numbers / Values	Unit	AT Annual working time of employees
8,40	Daily working time h	Full-time equivalent (FE) 100%
8,40	Daily working time h	Part-time 75%
8,40	Daily working time h	Part-time 50%
8,40	Daily working time h	Part-time 25%
8,40	Daily working time h	Part-time 12,5%
8,40	Daily working time h	Part-time others
42,00	Weekly working time h	Full-time equivalent (FE) 100%
31,50	Weekly working time h	Part-time 75%
21,00	Weekly working time h	Part-time 50%
10,50	Weekly working time h	Part-time 25%
5,25	Weekly working time h	Part-time 12,5%
40,00	Weekly working time h	Part-time others
40,00	Number n =	Full-time equivalent (FE) 100%
10,00	Number n =	Part-time 75%
10,00	Number n =	Part-time 50%
10,00	Number n =	Part-time 25%
10,00	Number n =	Part-time 12,5%
10,00	Number n =	Part-time others
Numbers / Values	Unit	AT Not-patient oriented tasks
Working groups		
84,00	Hours / year	Airway management
84,00	Hours / year	Hemostaseology
84,00	Hours / year	Regional anesthesia
84,00	Hours / year	Others
Administrative tasks		
42,00	Hours / year	Waste disposal / Recycling
42,00	Hours / year	Department homepage
84,00	Hours / year	Controlling
218,00	Hours / year	Duty roster / duty pay off
42,00	Hours / year	In-service training
104,00	Hours / year	Executive board meetings
84,00	Hours / year	Annual report
84,00	Hours / year	Documentation of effort
84,00	Hours / year	Computers and interconnection
21,00	Hours / year	Rotation
21,00	Hours / year	Emergency room management
42,00	Hours / year	Rota plan
42,00	Hours / year	Holiday plan
42,00	Hours / year	Certificates
84,00	Hours / year	Others
Work in committees		
42,00	Hours / year	Antibiotics
42,00	Hours / year	Drugs
84,00	Hours / year	Urban planning
84,00	Hours / year	Equipment
42,00	Hours / year	Materials management and control
42,00	Hours / year	Transfusions
84,00	Hours / year	Others
Work in projects		
218,00	Hours / year	Project A
84,00	Hours / year	Project B
42,00	Hours / year	Project C
Teaching		
500,00	Hours / year	Nurses
600,00	Hours / year	Other matters
Regulatory decrees / representatives		
52,00	Hours / year	Worker protection
52,00	Hours / year	Data security
52,00	Hours / year	Diagnosis related groups
52,00	Hours / year	Hygiene
52,00	Hours / year	Devices
52,00	Hours / year	Hazardous material
52,00	Hours / year	Ordinance on medical devices
52,00	Hours / year	Quality management
52,00	Hours / year	Safety advices for x-rays
52,00	Hours / year	Transplantation
Numbers / Values	Unit	AT Reimbursement of full-equivalents
Compensation for		
100,00	Hours / year	prohibition of employment
100,00	Hours / year	employees with long-term illness (e.g., > 6 weeks)
192,00	Weeks / year	parental leave
Numbers / Values	Unit	Research and education
	Hours / year	Research
	Hours / year	Education

**Supplementary Table 6 Calculation of demand per year with work-fellows with different annual working times**

Carryover of table total calculation, total time (WPRP+NWPRP + EHPY +OPY + FTE + RD + overtime + CMEAP + management) in hours

125252

	Standard daily working hours (h)	Standard weekly working hours (h)	Public holidays	Gross AWT (h)	Rest allowance (%)	Net AWT (h)	Number of physicians	Net AWT real (h)
Employee typ 1	8,4	42,00	10	2192	19,5	1697	40	67890
Employee typ 2	8,4	31,50	10	1644	19,5	1256	10	12560
Employee typ 3	8,4	21,00	10	1096	19,5	815	10	8148
Employee typ 4	8,4	10,50	10	548	19,5	374	10	3736
Employee typ 5	8,4	16,60	10	867	19,5	630	10	6299
Employee typ 6	8,4	25,20	10	1315	19,5	991	10	9913
Employee typ 7	8,4	33,60	10	1754	19,5	1344	6	8066
Employee typ 8	4,2	21,00	10	1096	19,5	849	7	5940
Employee typ 9	8,4	42,00	10	2192	19,5	1697		0
Employee typ 10			10	0	19,5	0		0
Employee typ 11			10	0	19,5	0		0
Employee typ 12			10	0	19,5	0		0
Employee typ 13			10	0	19,5	0		0
Employee typ 14			10	0	19,5	0		0
Employee typ 15			10	0	19,5	0		0
Employee typ 16			10	0	19,5	0		0
Employee typ 17			10	0	19,5	0		0
Employee typ 18			10	0	19,5	0		0
Employee typ 19			10	0	19,5	0		0
Employee typ 20			10	0	19,5	0		0
Sum number of employees							103	
Sum annual working time real net (h)								122554
Hours net demand (negative values) (h)								-2699

Gross AWT = ((Standard weekly hours : 5 (days)) x (261 workdays - public holidays), underlying (365 running days - 102 Saturdays and Sundays = 261 workdays).  
Net AWT = gross AWT - (gross AWT x rest allowance) - (public holidays x standard daily working hours).

**Abbreviations:** AWT = annual working time; CMEAP = continuing medical education and administrative provisions; EHPY = excess hours of physicians per year; FTE = first-time employee;  
h = hours; NWPRPL = not workplace related performances; OPY = overtime hours of physicians per year; RD = residents; WPRP = workplace related performances.

### Supplementary Table 7

#### Personnel demand for not-patient oriented tasks

These FE are not added in the table total calculation  
under the item total FE to be staffed

	Time in h per year	FE net
<b>Leadership/managerial functions</b>		
Chief physician	850	0,50
Assistant medical director	400	0,24
<b>Working groups</b>		
Airway management	84	0,05
Hemostaseology	84	0,05
Regional anesthesia	84	0,05
Working group A	84	0,05
Working group B	84	0,05
Working group C	42	0,02
<b>Administrative tasks</b>		
Waste disposal / recycling	42	0,02
Department homepage	42	0,02
Controlling	84	0,05
Duty roster / duty pay off	218	0,13
In-service training	42	0,02
Executive board meetings	104	0,06
Annual report	84	0,05
Documentation of effort	84	0,05
Computers and interconnection	84	0,05
Rotation	21	0,01
Emergency room management	21	0,01
Rota plan	42	0,02
Holiday plan	42	0,02
Certificates	42	0,02
Administrative task A	84	0,05
Administrative task B		0,00
Administrative task C		0,00
<b>Work in committees</b>		
Antibiotics	42	0,02
Drugs	42	0,02
Urban planning	84	0,05
Equipment	84	0,05
Materials management and control	42	0,02
Transfusions	42	0,02
Committee A	84	0,05
Committee B		0,00
Committee C		0,00
<b>Work in projects</b>		
Project A	218	0,13
Project B	84	0,05
Project C	42	0,02
Project D		0,00
Project E		0,00
<b>Teaching</b>		
Nurses	500	0,29
Other matters	600	0,35
<b>Regulatory decrees / representatives</b>		
Worker protection	52	0,03
Data security	52	0,03
Diagnosis related groups	52	0,03
Hygiene	52	0,03
Devices	52	0,03
Hazardous material	52	0,03
Ordinance on medical devices	52	0,03
Quality management	52	0,03
Protection against x-rays	52	0,03
Transplantation	52	0,03
<b>Total hours net per year (h)</b>	<b>5132</b>	<b>3,02 FE net / year</b>

**Supplementary Table 8**

**Reimbursement of full-equivalents due to parental leave, prohibition of employment, long-term illness**

			FE net
Sum parental leave in weeks		192,0	
Compensation for parental leave	8064,0	h	4,8
Compensation for prohibition of employment (sum hours per year)	100,0	h	0,1
Compensation for employees with long-term illness (e.g., > 6 weeks) (sum hours per year)	100,0	h	0,1
<b>Total reimbursement full-equivalents (FE)</b>	<b>4,9</b>		<b>4,9</b>