

THE LANCET

Respiratory Medicine

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed.
We post it as supplied by the authors.

Supplement to: Habre W, Disma N, Virag K, et al. Incidence of severe critical events in paediatric anaesthesia (APRICOT): a prospective multicentre observational study in 261 hospitals in Europe. *Lancet Respir Med* 2017; published online March 28. [http://dx.doi.org/10.1016/S2213-2600\(17\)30116-9](http://dx.doi.org/10.1016/S2213-2600(17)30116-9).

**INCIDENCE OF SEVERE CRITICAL EVENTS IN PAEDIATRIC ANAESTHESIA:
A PROSPECTIVE MULTICENTRE OBSERVATIONAL STUDY IN 261 HOSPITALS IN EUROPE**
Results of APRICOT: (Anaesthesia PRACTICE In Children Observational Trial)

Web extra material

Table A. Details on the participating countries, institutions, and exemption of parents/patient consent. Institutions were classified as A for dedicated paediatric hospital, B for mixed adult-paediatric teaching hospital, C for Community hospital and D for private institution.

Countries	Number of centres	Number of included patients	Classification of participating centres	Exemption of parents/patient consent	Total number of paediatric cases performed in the 2 weeks and in 2012
Austria	7	602	5B, 1C, 1D	7No	679/18,932
Belgium	11	1,337	2A, 6B, 1C, 2D	4Yes/7No	1,518/31,068
Croatia	6	357	1A, 2B, 3C	5Yes/1No	365/9,420
Czech Republic	4	846	1A, 3B	2Yes/2No	1,033/23,232
Denmark	3	427	1A, 2B	Waived	445/7,900
Estonia	2	318	1A, 1B	Waived	344/8,069
Finland	3	266	3B	2Yes/1No	382/8,055
France	20	3,559	5A, 12B, 1C, 2D	Waived	3,825/78,359
Germany	29	2,229	3A, 20B, 5C, 1D	14Yes/15No	2,492/66,251
Gibraltar	1	15	1C	Waived	15/300
Greece	3	135	1A, 2B	1Yes/2No	263/7,998
Ireland	2	474	1A, 1B	Waived	520/14,000
Israel	2	512	1A, 1D	Waived	533/13,000
Italy	25	2,087	6A, 14B, 4C, 1D	2Yes/23No	2,481/76,230
Kosovo	1	119	1B	Waived	242/3,456
Latvia	1	253	1A	Waived	260/11,428
Lithuania	3	343	1A, 2B	3No	513/15,481
Malta	1	60	1B	Waived	60/700
Netherlands	13	1,455	2A, 7B, 4C	Waived	1,521/45,669
Norway	6	664	5B, 1C	Waived	675/16,148
Poland	6	896	4A, 1B, 1C	3Yes/3No	1083/21,714
Portugal	7	595	5B, 2C	3Yes/4No	685/17,849
Romania	15	1,467	6A, 3B, 4C, 2D	12Yes/3No	1,497/60,302
Russia	4	375	3A, 1B	3Yes/1No	670/27,969
Serbia	5	505	4A, 1B	5No	540/17,900
Slovakia	1	96	1A	No	127/3,000
Slovenia	1	167	1B	No	183/3,500
Spain	10	1,240	2A, 7B, 1C	2Yes/8No	1,516/35,165
Sweden	4	163	1A, 3C	3Yes/1No	399/9,155
Switzerland	8	952	4A, 2B, 1C, 1D	Waived	975/23,962
Turkey	10	682	8B, 1C, 1D	10 No	842/27,067
Ukraine	4	637	1A, 1B, 2C	Waived	724/20,411
United Kingdom	43	7,045	10A, 17B, 16C	Waived	7,520/200,330
Total number	261	30,878	63A/134B/52C/12D		34,927/924,020

Table B. Study population characteristics and medical history. Percentages express the incidence in the whole study population. N.A. for not asked/not relevant. * indicating 10 missing values for the medical history. ** allergy was not asked for 223 (0·7%) cases.

		Frequency	%
Sex	Boys	18,887	61·2
	Girls	11,987	38·8
Ethnicity	White/Europeans	25,412	82·3
	Arabic	1,789	5·8
	Hispanic/Latino	1,465	4·7
	Asian	1,091	3·5
	Black-Caribbean/African	932	3
	Mixed cultures	174	0·6
Medical History*			
Handicap/congenital disease	Yes	4,025	13
	N.A.	357	1·2
Recent URI < 2 weeks	Yes	4,153	13·5
	N.A.	860	2·8
Asthma	Yes	1,878	6·1
	N.A.	580	1·9
Wheezing in the last 12 months	Yes	1,954	6·3
	N.A.	1,723	5·6
Atopy	Yes	2,313	7·5
	N.A.	1,400	4·5
Snoring	Yes	4,399	14·3
	N.A.	4,830	15·6
Fever > 38°C	Yes	886	2·9
	N.A.	683	2·2
Passive smoking	Yes	3,362	10·9
	N.A.	9,536	30·9
Medication	Yes	7,115	23·1
	N.A.	256	0·8
History of anaesthesia/complications	Yes	578	1·9
	N.A.	1,054	3·4
Allergy**	Yes	3,789	12·3
	Food	1,208	3·9
	Nut	191	0·6
	Latex	77	0·2
	Antibiotics	1,074	3·5
	Pollen/Birch	472	1·5
	Dust mite	244	0·8
	NSAIDs	81	0·3
	Animal hair	158	0·5
	Myorelaxant	53	0·2
	Bees/insects	49	0·2
	Iode/contrast products	72	0·3
	Blood products	48	0·2
	Other	327	1·1

Table C. Anaesthesia plan characteristics.

Percentages express the incidence estimated from the total number of procedures. § for percentages estimated from number of patients. † for percentage of outpatients. G·A· for general anaesthesia, NIRS for Near infrared spectroscopy, RSI for rapid sequence induction. * defining a procedure that is required within less than 48 hours, ** for emergency procedure where the patient's life or organ-being jeopardised. # displaying the mean age and standard deviation of children who received premedication or had their parents present at induction. *** Standard for monitoring including electrocardiography, pulse oximetry, capnography, inhalation agent analyser, non-invasive blood pressure and temperature. Ψ for significance between mean age of children with cuffed vs uncuffed endotracheal tube ($p < 0.001$). NMB refers to patients who received neuromuscular blockade.

	Frequency	(%)
Type of anaesthesia		
General anaesthesia	29,064	93·4
Sedation	1,961	6·3
Regional		
Regional alone	76	0·2
Regional with GA	7,481	24
Regional with sedation	297	1
Stand-by	18	0·06
Degree of urgency		
Elective	25,072	81·2
Urgent*	4,974	16·1
Emergency**	826	2·7
Admission type		
Outpatient	11,703	37·6
Inpatient	19,424	62·4
Procedure scheduled time		
Weekdays Opening hours		
Monday	5,790	18·6
Tuesday	6,287	20·2
Wednesday	6,163	19·8
Thursday	6,038	19·4
Friday	5,323	17·1
After-hours	3,144	10·1
Saturday	872	2·8
Sunday	654	2·1
Preoperative consultation at least 24 hrs prior to elective procedures	18,344	§ 59·4
Preoperative assessment for elective out-patients	6,753	§ 21·9 † 57·7
Premedication	$6\cdot7 \pm 4\cdot3$ years #	§ 49·2
Parental presence	$6\cdot3 \pm 4\cdot3$ years #	§ 50·7
Type of premedication		
Midazolam orally	7,220	23·4
Midazolam rectally	989	3·2
Midazolam intravenously	720	2·3
Midazolam intranasal	172	0·6
Clonidine orally	247	0·8
Miscalleneous: 40 different combinations	3'250	10·53
NSAID's in combination	975	3·2
Atropine in combination	645	2·1
Monitoring		
Standard***	19,152	61·5
Standard with at least one equipment missing	10,966	35·2
Invasive	650	2·1
NIRS applied	354	1·1
Induction of anaesthesia		
Inhalation	Sevoflurane	15,994
	Halothane	13
Nitrous Oxide at induction		9,461
		30·4

Intravenous	Propofol	15,971	30·4
	Thiopentone	1,199	2·3
	Ketamine	653	1·2
	Etomidate	16	0·03
	Midazolam	1,217	2·3
Opioids		16,037	51·5
	Fentanyl	9,421	30·3
	Sufentanil	3,387	10·9
	Remifentanil	1,710	5·5
	Alfentanil	1,445	4·6
Rapid sequence induction		1,372	4·4
Modified with mask ventilation		641	2·1
No mask ventilation		731	2·3
Myorelaxant use (89% of cases)	Suxamethonium	592	-
	Rocuronium	379	-
	Atracurium	116	-
	Cisatracurium/Vecuronium	30/15	
Induction technique without myorelaxant	Deep level of sevoflurane	28	-
	Sevoflurane & opiates	22	-
	Sevoflurane & propofol	30	-
	Deep level of propofol	19	-
	Propofol & opiates	52	-
Airway management			
Endotracheal intubation		13,671	44
Cuffed #		9,828	31·6
	7·5 ± 4·7 years Ψ	48%	
Uncuffed #		3,843	12·3
	3·3 ± 2·9 years	21%	
	Packing inserted		
Myorelaxants for tracheal intubation		8,367	27
Vocal cords sprayed prior to intubation		1,134	3·6
Supraglottic airway		10,919	35
Myorelaxant for supraglottic airway		446	-
Face mask		4,970	16
Monitoring neuromuscular blockade		1,438	16% NMB
Reversal of neuromuscular blockade	Neostigmine	2,566	29% NMB
	Sugammadex	374	4% NMB
Removal of Endotracheal tube			
	Awake	9,370	-
	Deep	3,562	-
	Left intubated	732	-
Removal supraglottic airway			
	Awake	6,211	-
	Deep	4,600	-

Table D1. Surgical procedures: number (n) and percentage (%) of surgical procedures (total number, n=22,952), mean age in years (SD for standard deviation), outpatient/inpatient distribution, degree of urgency, mean duration in minutes (SD) of the anaesthesia and the procedure.

	n (%)	Age (mean (SD))	Outpatient/inpatient n (%)		Elective/urgent/emergency n (%)			Mean (SD) duration of anaesthesia (min)	Mean (SD) duration of procedure (min)
ENT	5,707 (25·3%)	6·0 (3·6)	2,342 (41·0%)	3,365 (59·0%)	5,317 (93·1%)	329 (5·8%)	61 (1·1%)	51·4 (46·2)	32·7 (38·1)
Gastro/abdominal	3,963 (17·5%)	5·8 (4·9)	947 (23·9%)	3,015 (76·1%)	2,487 (62·8%)	1,229 (31·0%)	246 (6·2%)	84·5 (69·7)	56·1 (56·8)
Urological/Kidney	3,641 (16%)	5·8 (4·4)	1,647 (45·2%)	1,994 (54·8%)	3,349 (92·0%)	233 (6·4%)	59 (1·6%)	73·2 (55·9)	48·6 (47·0)
Orthopaedics	3,455 (15·3%)	9·0 (4·5)	936 (27·1%)	2,519 (72·9%)	2,418 (70·0%)	893 (25·8%)	144 (4·2%)	93·9 (88·1)	62·2 (69·7)
Cutaneous/dermatology	1,143 (5·1%)	6·0 (4·6)	475 (41·6%)	667 (58·4%)	894 (78·3%)	217 (19·0%)	31 (2·7%)	52·6 (38·8)	31·0 (30·4)
Plastic (including cleft)	1,075 (4·8%)	5·6 (4·6)	344 (32·0%)	731 (68·0%)	787 (73·2%)	251 (23·3%)	37 (3·4%)	87·2 (66·2)	61·3 (55·1)
Ophthalmology	962 (4·3%)	5·5 (4·1)	559 (58·1%)	403 (41·9%)	909 (94·5%)	38 (3·9%)	15 (1·6%)	62·6 (38·1)	41·5 (31·5)
Trauma	835 (3·7%)	8·7 (4·0)	207 (24·8%)	628 (75·2%)	225 (26·9%)	515 (61·7%)	95 (11·4%)	63·2 (50·7)	40·3 (41·3)
Head and Neck	668 (3%)	7·6 (4·9)	250 (37·4%)	418 (62·6%)	532 (79·6%)	124 (18·6%)	12 (1·8%)	73·3 (76·8)	49·0 (61·0)
Neurosurgery	530 (2·3%)	6·0 (5·2)	6 (1·1%)	524 (98·9%)	336 (63·4%)	166 (31·3%)	28 (5·3%)	187·0 (138·0)	129·0 (115·0)
Cardiac surgery	256 (1·1%)	3·5 (4·7)	4 (1·6%)	252 (98·4%)	192 (75·0%)	52 (20·3%)	12 (4·7%)	254·6 (134·1)	179·1 (114·9)
Thoracic	156 (0·7%)	7·0 (6·1)	2 (1·3%)	154 (98·7%)	111 (71·1%)	40 (25·6%)	5 (3·2%)	157·2 (105·3)	102·6 (85·3)
Hepato-biliary/Pancreas	64 (0·3%)	8·2 (5·0)	2 (3·1%)	62 (96·9%)	55 (85·98%)	8 (12·0%)	1 (1·6%)	235·4 (185·7)	179·8 (154·9)
Others	137 (0·6%)	8·1 (5·1)	38 (27·7%)	99 (72·3%)	99 (72·3%)	31 (22·6%)	7 (5·1%)	96·6 (88·5)	68·6 (79·2)

Table D2. Non-Surgical procedures: number (n) and percentage (%) of non-surgical procedures (total number, n=9172), mean age in years (SD for standard deviation), outpatient/inpatient distribution, degree of urgency, mean duration in minutes and standard deviation (SD) of anaesthesia and procedure duration.

	n (%)	Age (mean (SD))	Outpatient/inpatient n (%)		Elective/urgent/emergency n (%)		Mean (SD) duration of anaesthesia (min)	Mean (SD) duration of procedure (min)
MRI	2,055 (22·4)	4·3 (3·4)	1,267 (61·6)	788 (38·3)	1,925 (93·7)	114 (5·5)	16 (0·8)	55·1 (27·9)
Dental	1,650 (18·0)	7·1 (3·4)	1,449 (87·8)	201 (12·2)	1,602 (97·1)	44 (2·7)	4 (0·2)	46·1 (41·3)
Gastro-enterology	1,476 (16·1)	8·10(4·9)	704 (47·7)	772 (52·3)	1,266 (85·8)	191 (12·9)	19 (1·3)	40·1 (26·7)
Bone marrow & Lumbar puncture	915 (10·0)	6·9 (4·2)	434 (47·4)	481 (52·6)	784 (85·7)	127 (13·9)	4 (0·4)	28·2 (31·0)
Venous access	660 (7·2)	5·4 (4·6)	108 (16·4)	552 (83·6)	386 (58·)	262 (39·7)	12 (1·8)	64·9 (42·2)
Bronchoscopy	360 (3·9)	4·4 (4·2)	65 (18·1)	295 (81·9)	256 (71·1)	81 (22·5)	23 (6·4)	44·5 (25·3)
CT-scan	337 (3·7)	3·3 (3·2)	117 (34·7)	220 (65·3)	249 (73·9)	71 (21·1)	17 (5·1)	30·2 (31·7)
Cardiac cath/His/pace maker	243 (2·6)	6·0 (5·1)	23 (9·5)	220 (90·5)	234 (96·3)	8 (3·3)	1 (0·4)	117·1 (60·2)
Radiology (non interventional)	235 (2·6)	4·5 (4·0)	142 (60·4)	93 (39·6)	206 (87·6)	23 (9·8)	6 (2·5)	54·1 (46·9)
Burns dressing	206 (2·2)	2·9 (2·8)	76 (36·9)	130 (63·1)	170 (82·5)	33 (16·0)	3 (1·5)	37·2 (24·1)
Ophthalmology examination	204 (2·2)	3·3 (3·0)	157 (77·0)	47 (23·1)	199 (97·5)	5 (2·4)	0 (0·0)	38·7 (29·1)
Infiltration / puncture	185 (2·0)	7·1 (4·1)	123 (66·5)	62 (33·5)	176 (95·1)	8 (4·3)	1 (0·5)	35·6 (28·1)
Biopsy	173 (1·9)	6·8 (4·8)	49 (28·3)	124 (71·7)	142 (82·1)	31 (17·9)	0 (0·0)	52·6 (43·6)
Radiotherapy	130 (1·4)	4·6 (2·8)	88 (67·7)	42 (32·3)	124 (95·4)	6 (4·6)	0 (0·0)	30·0 (36·1)
Cystoscopy/TEE	109 (1·2)	5·3 (4·1)	33 (30·3)	76 (69·7)	99 (90·8)	10 (9·2)	0 (0·0)	38·5 (23·4)
Angioembolisation/sclerotherapy	99 (1·1)	7·4 (4·9)	17 (17·2)	82 (82·8)	89 (89·9)	9 (9·1)	1 (1·0)	91·2 (76·0)
Cast	77 (0·8)	7·0 (4·9)	9 (11·7)	68 (88·3)	37 (48·0)	38 (49·3)	2 (2·6)	37·5 (29·4)
Laser Eye	43 (0·5)	5·1 (3·4)	35 (81·4)	8 (18·6)	41 (95·3)	2 (4·6)	0 (0·0)	24·2 (18·9)
Pleural/pericardial drainage	13 (0·1)	5·4 (4·6)	0 (0·00)	13 (100·0)	2 (15·4)	9 (69·2)	2 (15·4)	38·7 (28·4)
Challenging intubation	2 (0·0)	9·6 (6·5)	0 (0·00)	2 (100·0)	0 (0·0)	0 (0·0)	2 (100·0)	507·0 (695·8)
								15·0 (-)

Table E. Composition of the anaesthesia team in charge and mean years (SD) of experience of the different categories. The distribution is based on the most experienced health provider present in the room. SD for standard deviation. It is of note that a trainee was present for 8,740 procedures (28%), an anaesthetic nurse in 10,928 cases (35%) and an anaesthetic technician in 1,018 cases (3·3%).

Anaesthesia team showing percentage of practice as paediatric anaesthesia	Number of procedures performed solo	Team of 2 including 2 physicians	Team of 2 including physician and nurse/technician	Team of 3 or more with at least 3 physicians	Team of 3 or more with at least 2 physicians	Team of 3 or more with only one physician	Mean years of experience (SD) of the most experienced health provider	Total
Specialist >80%	9,505	1,267	4,560	41	2,985	9	16·3 (9·5)	18,367
Frequent practice 50-80%	2,899	268	664	16	508	4	13·9(8·0)	4,359
Occasional practice <50%	3,275	416	1,276	-	987	15	14·4 (9·0)	5,969
Trainee	1,584	-	798	-	-	8	5·7 (4·7)	2,390
Nurses/technician	30/1 (7 cases with both)	-	-	-	-	-	12·9 (9·9)	38
Total	17,294/17,301	1,951	7,298	57	4,480	36		31,116/31,123

Table F. Relative risk and 95% confidence interval (CI) for the risk factors associated with the occurrence of perioperative bronchial aspiration.

Variable	Univariate										Multivariate ¹ (n=31,064)					
	yes			no			p	RR	95%CI		p	RR	95%CI			
	total	n	%	total	n	%			-	-			-	-		
Age (mean ± SD)	5·01	± 4·7		6·34	± 4·5		0·167	0·93	0·84	-	1·03	0·162	0·93	0·85	-	1·03
Sex (male/female)	1,9015	14	0·1	12,109	15	0·1	0·161	0·59	0·29	-	1·23	0·137	0·60	0·31	-	1·17
Prematurity	2,363	4	0·2	25,272	24	0·1	0·284	1·78	0·62	-	5·13					
Fever	904	0	0·0	29,522	28	0·1	-	-	-	-	-					
Handicap	4,083	2	0·1	26,672	26	0·1	0·348	0·50	0·12	-	2·12					
ASA Status II	8,739	10	0·1	18,883	13	0·1	0·227	1·66	0·73	-	3·79					
ASA Status III-IV-V	3,497	6	0·2	18,883	13	0·1	0·064	2·49	0·95	-	6·55					
Physical condition	8,095	9	0·1	23,030	20	0·1	0·538	1·28	0·58	-	2·81	0·955	1·02	0·51	-	2·03
General anaesthesia/Sedation	29,064	28	0·1	1,961	1	0·1	0·532	1·89	0·26	-	13·88					
Inpatient/outpatient	18,670	23	0·1	12,455	6	0·1	0·040	2·56	1·04	-	6·28					
Urgent-Emergency/elective	5,893	11	0·2	25,232	18	0·1	0·012	2·62	1·24	-	5·54					
After hours/opening hours	3,133	3	0·1	27,993	26	0·1	0·960	1·03	0·31	-	3·40					
Surgical/non-surgical	22,225	20	0·1	8,902	9	0·1	0·772	0·89	0·40	-	1·95					
Premedication	15,263	13	0·1	15,862	16	0·1	0·650	0·84	0·41	-	1·75					
Type of centers																
Mixed adult-paediatric/Paediatric	14,626	13	0·1	12,966	12	0·1	0·920	0·96	0·44	-	2·10					
Community private hospital/Paediatric	3,535	4	0·1	12,966	12	0·1	0·728	1·22	0·40	-	3·79					
Anaesthesia team																
Frequent/specialist	4,359	3	0·1	18,367	20	0·1	0·459	0·63	0·19	-	2·13					
Occasional/specialist	5,969	5	0·1	18,367	20	0·1	0·600	0·77	0·29	-	2·05					
Trainee/specialist	2,428	1	0·0	18,367	20	0·1	0·343	0·38	0·05	-	2·82					
Years of experience of senior person	13·31	± 8·2		14·78	± 9·4		0·351	0·98	0·95	-	1·02	0·376	0·98	0·93	-	1·03
Anesthesia Plan²	19,598	27	0·1	11,528	2	0·0	0·013	6·14	1·46	-	25·82	0·004	8·43	1·97	-	36·10
Induction type (intravenous/inhalation)	13,906	13	0·1	15,105	15	0·1	0·873	0·94	0·45	-	1·98					
Myorelaxant for intubation	8,382	12	0·1	5,284	7	0·1	0·870	1·08	0·43	-	2·74					
Rapid sequence	1,372	3	0·2	12,295	16	0·1	0·409	1·68	0·49	-	5·76					
Cricoid pressure	540	1	0·2	1,100	2	0·2	0·988	1·02	0·09	-	11·21					
Cuffed/uncuffed	3,843	11	0·3	9,828	8	0·1	0·007	3·52	1·41	-	8·73					
Deep/awake extubation	3,562	5	0·1	9,370	9	0·1	0·496	1·46	0·49	-	4·36					
Deep/awake removal SGA	4,600	3	0·1	6,211	4	0·1	0·987	1·01	0·23	-	4·52					
Anaesthesia management																

¹Variables in the multivariate model: Age, gender, physical condition, years of experience, anaesthesia plan

²Anaesthesia plan: Urgent-emergency or after hours or inpatient

Figure A. Incidence of severe critical events related to the number of procedures performed during the two-week period.

Each data point represents a centre with black dots for dedicated paediatric hospitals, red dots for mixed adult-paediatric, blue for community hospitals and pink for private institutions. Spearman correlation for respiratory critical events ($r=-0.242$, $p=0.001$) and for cardiovascular critical events ($r=-0.340$, $p=0.0001$)

