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# **Description of practices and complications in the French centres that participated to APRICOT: A secondary analysis**

**Short Title: Results of the APRICOT trial in France**

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Dahmani S: study conception, data collection, data analysis, interpretation of results, drafting and correcting the manuscript and approved the final version of the manuscript.

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**Description of practices and complications in the French centres that  
participated to APRICOT: A secondary analysis**

**Short Title: Results of the APRICOT trial in France**

- a) What is already known: The practice of paediatric anaesthesia is highly variable in Europe. The participation of French centres to the APRICOT study allows comparison with other practices in Europe.
- b) What this article adds: The current study describes the epidemiologic and perianaesthetic data of the population of children anaesthetised in the French centres that participated to APRICOT and determine some key points for improving perioperative safety.
- c) Implications for translation: a wider spread of some key elements about safety during perioperative management in children has to be undertaken.

## Abstract

**Introduction:** Analysing national patients' profile and organisation of human resources are important for improving the perioperative quality of care. The aim of the current study was to achieve these goals using the French data from the APRICOT study.

**Material and Methods:** Data from the French centres that participated to the APRICOT study were extracted and analysed. The primary goal of the study was to describe patients' characteristics, procedures and perioperative anaesthetic management in France and compare them to the results of the European APRICOT trial. Secondary outcomes were the description of major perioperative complications and the determination of human resources organisation possibly associated with these perioperative complications.

**Results:** Overall 3535 procedures collected in 20 facilities (17 teaching hospitals, one community hospital and two private institutions) were analysed. Comparison between the French and European APRICOT cohorts found differences related to the more specialised French centres participating to the study. Overall complications (respiratory complications, haemodynamic instability, cardiac arrest, drug errors, and anaphylactic reactions) were observed in 6.4 % [95% CI: 5.6; 6.3] of cases. Multivariate analysis identified the anaesthesiologist's experience of < 15 years and the absence of an anaesthetic nurse as human factors independently associated with an increased risk for perioperative complications.

**Discussion:** The current study identified some important differences between the French and the whole APRICOT cohort in terms of preoperative evaluation, surgical specialties involved, and monitoring of neuromuscular blockade. It confirms that, in France, the presence of an anaesthetic nurse and of an experienced anaesthesiologist prevents anaesthetic complications.

**Keywords:** paediatric anaesthesia, safety, practice of anaesthesia, preoperative risks



## Introduction

Up to now, French data on paediatric anaesthesia were limited and/or monocentric (1, 2) or focused on one type of complication (3, 4). The participation of French centres to the APRICOT study allows comparison with other practices in Europe (5). This study not only gives epidemiologic data on paediatric anaesthesia in Europe but also explores perioperative management and complications. One of the finding of the APRICOT study was the great heterogeneity between countries regarding both practices and perioperative complications. Some part of this heterogeneity might come from the presence of national recommendations and the spread of updated medical information and/or particular organisation of human resources that might influence the overall quality of care and rate of complications. For example, there are in France some specific recommendations (that might not be available in other countries) (6, 7) published by some of our scientific societies. Moreover, the level of knowledge of recent developments in paediatric anaesthesia might be different from one country to another depending upon the availability of continuous medical education, the spread of recent knowledge and the educational methods used for both initial and continuous education (8). On the other hand, the constant need to limit healthcare expenses while preserving the quality of care, increases the pressure on the operative room teams asking them for more efficiency (9). Consequently, two practices for the intraoperative management of children are currently identified in France: the first consists in managing two operative rooms with specialised nurses (and/or trainee) in each room, while the other consists in managing one operative room at a time with or without the help of an anaesthetic nurse (3).

We therefore undertook a secondary analysis of the French data in APRICOT. The primary goal was to obtain a description of patients' characteristics, procedures and perioperative anaesthetic management in France. Secondary outcomes were the incidence and timing of

major perioperative complications (especially respiratory, the most frequent ones during paediatric anaesthesia) (5) and the determination of human resources organisation (experience of anaesthesiologist and the presence of an anaesthetic nurse) possibly associated with these perioperative complications.

## Material and Methods

### Study design

The study design has been widely described in the original publication (5). The study consisted in a prospective collection of perioperative data from children recruited during a consecutive 2-week period freely chosen by each centre, between April 1, 2014, and January 31, 2015 in each participating centre across 33 European countries. The study was nationally approved by an IRB (**CPP Sud Méditerranée I n° 2014-A00666-41**). Data were collected in an online electronic database (approved by the French regulatory office for the protection of privacy). The current study used all data collected in the French participating centres after approval by the primary investigators of the APRICOT study and the French national coordinators (AL and CD).

The detail of data acquisition is available in the original publication of the APRICOT study but basically, all children up to 15 years old undergoing an inpatient or outpatient diagnostic or surgeries, under regional anaesthesia alone, sedation or general anaesthesia (with or without regional anaesthesia), were eligible for inclusion in the APRICOT study.

### *Data extraction*

Concerning the description of practice of paediatric anaesthesia in France, the analysis of data was focused on the epidemiologic characteristics of the children who underwent anaesthesia, the surgical and non-surgical procedures performed and anaesthesia management during the perioperative management (patients were followed for up to 60 min after anaesthesia or sedation).

Concerning the analysis of perioperative complications and data in relation with organisation and human resources associated with those complications, the following data

were extracted: years of experience of the anaesthesiologists and the presence of an anaesthetic nurse with the physician (either a physician or a resident). In order to account for confounding factors, all previously identified ones (or presumed to be) associated with respiratory and cardio-vascular complications (1, 3-5, 10-12) were also included in the analysis, namely: age, prematurity, gender, ASA physical status III to V, actual or previous URTI, fever, wheezing, asthma, parental smoking, allergy, snoring, previous anaesthesia complication, preoperative medication (indicating the presence of a preoperative illness) and preoperative handicap or congenital disease, the type of surgery or procedure, the preoperative premedication and the presence of parent at induction, the inpatient management, the emergency anaesthesia, the rapid sequence induction, the general anaesthesia and the use of regional analgesia, the intravenous induction, the device used for ventilation, the method of ventilation used and the use of muscle relaxation. Perioperative complications were defined in the APRICOT as following: respiratory complication (laryngospasm, bronchospasm, stridor and aspiration), haemodynamic complications (hypotension, arrhythmia, bleeding, vasodilatation and cardiac arrest), anaphylactic reactions and drug errors, death and neurological complications occurring at 30 days after the anaesthesia.

### *Statistical analysis*

Descriptive analysis used percentages and mean with their 95 % confidence interval. When comparison was performed it used a  $X^2$  test or a Student t test for discrete and continuous variables, respectively.

For determining of human factors associated with perioperative complications, univariate analyses were performed using ANOVA and the  $X^2$  or Fisher's exact test for categorical variables. Where a statistical association was found between a continuous variable and a study

outcome, the continuous variable was converted to a discrete variable by categorising it according to its J-point (the maximal value of the Youden index = sensitivity + specificity) following receiving operator characteristics (ROC) analysis. Although multivariate analysis can be performed using continuous variables, transforming continuous variables to discrete values allows the determination of a cut-off value and easier to interpret results (13, 14).

All categorical variables exhibiting a level of significance of 0.2 were collapsed as one variable for the following categories: demographic data and preoperative health status (including age, weight, preoperative respiratory risks... etc.), procedure characteristics (type of procedure and surgeries or non-surgical procedures), preoperative preparation (preoperative premedication and parental presence), perioperative anaesthesia management (general anaesthesia, tracheal intubation, postoperative management...etc.) and factors impacting the main studied outcomes (the experience of anaesthesiologists and the presence of an anaesthesiologist nurse).

Odds Ratios were determined for each significant factor (or collapsed category), as were goodness of fit (Hosmer & Lemeshow test with a  $p > 0.2$ ), c-statistics (ROC analysis of the model) (13). Finally, to avoid collinearity, correlations between predictive factors were analysed and one of the two correlated factors were removed if the correlation was  $\geq 0.7$ . Statistical analysis was performed using SPSS 22.0 software (IBM Company, Chicago, Illinois, USA). The alpha risk for error was set at 5 %.

## Results

Overall 20 centres (17 teaching hospitals, 1 community and 2 private institutions) in France included 3559 procedures, i.e. 11.5% of procedures included in APRICOT, and approximately 4 % of all paediatric anaesthetics performed in France during a two-weeks period of time in 2016 (according to the national electronic database on healthcare in France). After cleaning the database for incomplete records, analyses were carried on 3535 procedures.

### *Description of patients, procedures and perioperative management in the French APRICOT cohort in comparison to the European APRICOT data*

Characteristics of patients are displayed in table 1. Mean patients' age was 3.3 [95% CI: 2.4; 4.3] years (European cohort:  $6.35 \pm 4.5$  years). Their ASA status was predominantly I and II (92.2% versus 92% in the European cohort). Among included patients, 7.2% were former premature (7.6% in the European cohort), 14.4% were suffering from a handicap and/or a congenital disease (13% in the European cohort) and 26% were taking medications and among those patients 2.2% specifically cardiovascular and/or anticoagulant treatments. In addition, the preoperative respiratory risk factors found in the French patients were similar to those published in the whole APRICOT cohort apart for snoring (5.5% vs. 14.3% in the European cohort). Finally the incidence of allergies, preoperative medications, a history of previous anaesthetic complications and, the presence of a handicap and/or congenital disease were similar between the two cohorts.

The details of procedures performed and their characteristics are displayed in table 2. Most were surgical procedures (77.3%) with orthopaedics, urological and ear-nose and throat (ENT) surgeries being the most frequent. There were some differences in the proportion of some procedures between the French APRICOT cohort and the European one, especially for

most frequent surgeries (more orthopaedics and less ENT surgery). Concerning the non-surgical procedures, gastroenterological endoscopy, magnetic resonance imaging and central venous access were among the most frequent. Outpatient management was performed in 55.1% of cases (versus 37.6% in the European cohort). Timing of anaesthesia was predominantly during the working hours and 77.2% of procedures were elective. Finally, the duration of procedures averaged 45 minutes.

The detail of perioperative management in the French cohort is displayed in table 3. A preoperative examination prior to anaesthesia was performed in 83.7% of cases: this was higher than observed in the European cohort (59.4%). The mean number of years of experience of the anaesthesiologist caring for the child was 13.5 years, and most physicians performed paediatric anaesthesia during more than 80% of their working time. Standard monitoring consisting in ECG, SpO<sub>2</sub>, anaesthetic agent monitoring, capnography, non-invasive blood pressure, and temperature was used in 76.3% of cases but one of those elements was missing in 20.5% of cases. General anaesthesia (in comparison to sedation or regional anaesthesia without sedation or anaesthesia) was performed in 97.4% of cases (versus 93.4% in the European cohort). Sedation was mostly performed using ketamine. Induction of anaesthesia was predominantly performed using a volatile agent (sevoflurane in 70.4% of cases of general anaesthesia) and sufentanil was the most frequently used opioid during the intraoperative period (69.3% of cases of general anaesthesia). Airway was secured in more than 50% with endotracheal intubation, and controlled ventilation was the most frequent ventilation mode used. In case of rapid sequence induction, suxamethonium was used in 63.3% of cases and a non-depolarizing muscle relaxant in 23.7% of cases (table 3). Overall, tracheal intubation was performed in 23.9% of cases after the administration of a muscle relaxant. Monitoring and reversal of neuromuscular blockade were used in 59.9%, and 19.6% of the cases when a NDMR was used, respectively. This was much more frequent than

in the European cohort (16%) for the monitoring but less (33%) the European cohort for reversing NDMR. Finally, after anaesthesia, most patients were managed in the postoperative acute care unit.

#### *Description of perioperative complications and their timing in the French APRICOT cohort*

Overall a perioperative complication as defined in the method section occurred in 223 patients (6.4% [95% CI: 5.6; 6.3] versus 5.2% [95% CI 5.0; 5.5] in the European cohort). The incidence of respiratory complications was: 3.7% [95% CI: 3.1; 4.3] (versus 3.1% [95% CI 2.9; 3.3] in the European cohort) and incidence of cardio-vascular complications was 2.9% [95% CI: 2.3; 3.4] (versus 1.9% [95% CI: 1.7; 2.1] in the European cohort). Incidence and timing of the different type of complications are displayed in the supplemental table 1. Haemodynamic instability consisted in bleeding (25%), arrhythmia (9%), hypotension (90%) or other type (7%) of the complications (with some patients experiencing more than one complication). Other complications reported in the French cohort of the APRICOT study were drug errors in five patients (0.1 [95% CI 0; 0.3]: no details were available about those drug errors). No patient experienced neurological complications or anaphylactic reactions in the French cohort.

#### *Organisational of Human Resources associated with perioperative complication*

Univariate analysis identified the following factors as associated with the occurrence of respiratory or cardiovascular complications in the French cohort (table 4): preoperative health condition (age < 3 years, prematurity, ASA III to V status, actual or previous signs of



URTI, wheezing and asthma, preoperative medication, previous anaesthetic complications and preoperative handicap or genetic disorder), procedure characteristics (in hospital management, emergency surgery, procedure duration > 65 minutes, abdominal surgery, neurosurgery, cardiac surgery, traumatic (multiple), dental surgery, biopsy, tomodensitometric imaging, preoperative preparation (absence of premedication or parental presence), intraoperative management (general anaesthesia, muscle relaxation and intubation) and human resources organisation (the experience of anaesthesiologist < 15 years and the absence of an anaesthetic nurse). Collapsing those factors within each category (defining as the presence of one of the factors in relation with the corresponding category) also found the derived categories, except for preoperative preparation, to be significantly associated with perioperative complications (table 5). Although some factors such as mask ventilation, use of supraglottic devices and ventilation strategies were identified in the univariate analyses as predictive of perioperative complication, they were not entered in the collapsed variables in order to avoid collinearity. Including those categories with experience of the anaesthesiologist and the presence of an anaesthetic nurse in a multivariate found the following categories or factors independently associated with the occurrence of a respiratory or cardiovascular complication: preoperative health condition, procedure characteristics, intraoperative management, the experience of anaesthesiologist < 15 years and the absence of an anaesthetic nurse (table 5). The Hosmer & Lemeshow test exhibited a *p* value of 0.98, and the area under the curve of the ROC analysis of the model was 0.7 (95% CI 0.67; 0.74). There was no collinearity identified in the model.

## Discussion

The current study summarises the data from the French centres that participated to the APRICOT study and allows comparing them to the European data. In addition, it allowed identifying two human resources factors associated with perioperative complications, namely: the experience of the anaesthesiologist and the presence of an anaesthetic nurse.

### *Comparison between the French APRICOT and European APRICOT cohorts (5)*

The proportion of patients undergoing a preoperative evaluation was greater in the French cohort. This is expected because a pre-anaesthetic evaluation is mandatory by Law in France. However, it was not 100% despite this legal obligation of both the preoperative consultation and the immediate preoperative assessment (an additional ultimate check few hours before anaesthesia): this should be interpreted cautiously, bearing in mind the fact that 22.7% were either emergency or urgent cases, and that a pre-anaesthetic evaluation more than 24 h before the procedure was by definition not possible. In addition, given the French legal obligation of using ECG, SpO<sub>2</sub>, anaesthetic agent monitoring, capnography, non-invasive blood pressure monitoring, the lacking element was probably the temperature. However, knowing the importance of monitoring in patients' security, more efforts have to be undertaken to improve the situation, even if considering that the lacking basic monitor was probably the temperature.

Interestingly, the proportion of parental presence during the induction of anaesthesia was less frequent in France in comparison to the European cohort, despite the fact that most participating centres were specialised ones. One might hypothesise that this practice is far from the cultural management in France, given concerns regarding its effect on perioperative

quality of care (15).

The use of muscle relaxation for intubation was less frequent in the French cohort in comparison to the European one. However, this proportion will probably increase in regards to recent French recommendations for airway management in children (7) and recent studies indicating a potential benefice of using muscle relaxant during intubation in children (16, 17). The rates of monitoring and reversal of muscle relaxation were different between cohorts: specifically, the rate of reversal of NDMR blockade was lower in the French cohort. This data cannot be interpreted because we do not know in how many cases reversal was systematic or adapted to the result of neuromuscular monitoring in both cohorts. Although no controlled trial has investigated the usefulness of reversing muscle relaxation in children, a strong relation between residual neuromuscular block and postoperative respiratory complications has been described in adult patients (18). Further studies evaluating the effects of residual relaxation on postoperative respiratory outcomes are specifically needed in the paediatric population. Finally, rapid sequence induction (RSI) was performed more frequently in the French cohort. This is probably in relation with the higher proportion of emergency surgery. Interestingly, in 25% of cases, mask ventilation was performed, and in close to 39% of cases no cricoid pressure was performed. Although this is in accordance with major evolution in practice of RSI and the recent French recommendations, this was not yet recommended in France at the time of the APRICOT study (7, 19). In addition, muscle relaxation for RSI was achieved with a NMDR in 25% of cases, while recommendations still indicated the use of suxamethonium at that time (7).

*Perioperative complications and human resources associated with perioperative complications*

The rate of overall and respiratory complications was similar between the overall and the French cohorts. However, perioperative cardio-vascular complications appeared more frequent in the French cohort. One can hypothesise that the heterogeneity in patients' management, the lower age of patients included in the French cohort and the distinct procedures performed in comparison to the European cohort (table 5) might contribute to these apparent differences between French and European cohorts. They might be explained by the quasi-exclusive participation of specialised centres in France with specific high-risk patients.

The current study identified two major human and organisational factors associated with the occurrence of perioperative complications. In agreement with the literature (3, 5, 20, 21), the present study showed evidence of the role of the anaesthesiologist's experience in the occurrence of severe critical events. Our results are consistent with the RHUBARBE study on perioperative respiratory complications in patients with preoperative respiratory tract infection, which identified an experience of the anaesthesiologist < 15 years as a risk factor of perioperative desaturation (3). However, due to the limited number of patients and procedures included in the APRICOT French cohort, we could not evaluate the possible influence of the number of cases performed in each centre or by each anaesthesiologist during the study period. The second independent factor of interest consisted on the presence of an anaesthetic nurse. This is also consistent with a recent study in adults that found that the presence of a team consisting on a physician and nurse anaesthesiologists, in comparison with a solo anaesthesiologist, was associated with a 30 days decrease in mortality (22). The reasons advocated for explaining the results obtained in the latter were the optimisation of

intraoperative care with a resulting long-lasting improvement in the overall outcomes, and the same explanation can also apply to our finding. Alternatively, the presence of an anaesthetic nurse could indicate that a difficult case was anticipated. The current result seems to indicate that the presence of an anaesthetic nurse together with a physician, a resident or their combination would be part of the preventive strategies that should be considered in order to avoid complications, especially in patients with perioperative risk factors of complications.

The current study suffers from limitations, some of which have already been developed in the original APRICOT publication (5). This includes a selection of patients from structures who agreed to participate to the study, the limited time of inclusion within each centre (2 weeks) and the freedom to choose the inclusion period, although the latter probably mitigated some seasonal variations in complication rate. The major and specific limitation of the current study is its limited representativeness of the overall paediatric anaesthesia activity in France, given that the current French dataset represent only 4% of the overall yearly paediatric anaesthesia activity. In addition, one might question the fact that 17 of the 20 facilities that participated to the study were specialised ones. This is reflected by the difference in the rate of ambulatory surgery in France (23), which seems to be higher than that reported in Europe by APRICOT, independently of the ENT surgery that has been reported to be performed in private institutions in France (23, 24). In addition, the practice of paediatric anaesthesia was different from the whole APRICOT cohort (59% versus 85.3% of participants with more than 80% paediatric anaesthesia practice in the European and French cohorts, respectively) (10). We could thus analyse only the tip of the iceberg of the whole paediatric anaesthesia practice in France. Second, the French cohort was compared to the overall European one. This means that French data were included in this comparison. However, this is unlikely to have compromised the comparison, given that French data were representing only 11% of the included patients.

In conclusion, despite its limitations, the French APRICOT cohort gives important insights concerning paediatric anaesthesia practice in France. This study allows determining key factors for improving security and quality of healthcare during the perioperative period of paediatric anaesthesia. It might be considered as a starting point for further studies aiming to evaluate and improve the quality of paediatric anaesthesia practice in France.

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The current study was registered in ClinicalTrial.gov, number NCT01878760

Authors declare no conflict of interest.

## Legends of tables and figures

Table 1: description of patients' characteristics of the APRICOT French cohort. Data are expressed as percentages or mean with their 95% confidence interval. NR: not reported in the European APRICOT results

Table 2: surgery and procedures characteristics in the APRICOT French cohort. Data are expressed as percentages or mean with their 95% confidence interval. NR: not reported in the European APRICOT results

Table 3: Anaesthesia and perioperative management in the APRICOT French cohort. Data are expressed as percentages or mean with their 95% confidence interval. NR: not reported in the European APRICOT results. Percentages of surgical and non-surgical procedures are expressed as a proportion of overall included patients.

Table 4: Univariate analysis of factors associated with perioperative complications. Data are expressed as N (%). \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

Table 5: Univariate analysis after collapsing data to different categories and multivariate logistic regression analysis. Data are expressed as N (%); OR: odd Ratio. Hosmer & Lemeshow test = 0.97.

Supplemental Table 1: perioperative complications and their timing. Data are expressed as number and percentage with the 95 % confidence interval.



## References

1. Murat I, Constant I, Maud'huy H. Perioperative anaesthetic morbidity in children: a database of 24,165 anaesthetics over a 30-month period. *Paediatr Anaesth*. 2004 Feb;14(2):158-66.
2. Constant I, Louvet N, Guye ML, Sabourdin N. [General anaesthesia in children: a French survey of practices]. *Ann Fr Anesth Reanim*. 2012 Sep;31(9):709-23.
3. Michel F, Vacher T, Julien-Marsollier F, Dadure C, Aubineau JV, Lejus C, et al. Perioperative respiratory adverse events in children with upper respiratory tract infections allowed to proceed with anaesthesia: A French national cohort study. *Eur J Anaesthesiol*. 2018 Dec;35(12):919-28.
4. Nasr VG, DiNardo JA, Faraoni D. Development of a Pediatric Risk Assessment Score to Predict Perioperative Mortality in Children Undergoing Noncardiac Surgery. *Anesth Analg*. 2017 May;124(5):1514-9.
5. Habre W, Disma N, Virag K, Becke K, Hansen TG, Jöhr M, 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 2017/05//;5(5):412-25.
6. Vallet B, Blanloeil Y, Cholley B, Orliaguet G, Pierre S, Tavernier B. Guidelines for perioperative haemodynamic optimization. *Ann Fr Anesth Reanim*. 2013 Oct;32(10):e151-8.
7. Dadure C, Sabourdin N, Veyckemans F, Babre F, Bourdaud N, Dahmani S, et al. Management of the child's airway under anaesthesia: The French guidelines. *Anaesth Crit Care Pain Med*. 2019 Feb 23.
8. Everett TC, MacKinnon R, de Beer D, Taylor M, Bould MD. Ten years of simulation-based training in pediatric anesthesia: The inception, evolution, and dissemination of the Managing Emergencies in Pediatric Anesthesia (MEPA) course. *Paediatr Anaesth*. 2017 Oct;27(10):984-90.
9. Correia T, Dussault G, Pontes C. The impact of the financial crisis on human resources for health policies in three southern-Europe countries. *Health Policy*. 2015 Dec;119(12):1600-5.
10. Cote CJ, Posner KL, Domino KB. Death or neurologic injury after tonsillectomy in children with a focus on obstructive sleep apnea: houston, we have a problem! *Anesth Analg*. 2014 Jun;118(6):1276-83.
11. Bhananker SM, Ramamoorthy C, Geiduschek JM, Posner KL, Domino KB, Haberkern CM, et al. Anesthesia-related cardiac arrest in children: update from the Pediatric Perioperative Cardiac Arrest Registry. *Anesth Analg*. 2007 Aug;105(2):344-50.
12. Luce V, Harkouk H, Brasher C, Michelet D, Hilly J, Maesani M, et al. Supraglottic airway devices vs tracheal intubation in children: a quantitative meta-analysis of respiratory complications. *Paediatr Anaesth*. 2014 2014/10//;24(10):1088-98.
13. Meurer WJ, Tolles J. Logistic Regression Diagnostics: Understanding How Well a Model Predicts Outcomes. *JAMA*. 2017 2017//03/14;317(10):1068-9.
14. Tolles J, Meurer WJ. Logistic Regression: Relating Patient Characteristics to Outcomes. *JAMA*. 2016 2016/08/02//;316(5):533-4.
15. Erhaze EK, Dowling M, Devane D. Parental presence at anaesthesia induction: A systematic review. *Int J Nurs Pract*. 2016 Aug;22(4):397-407.
16. Julien-Marsollier F, Michelet D, Bellon M, Horlin AL, Devys JM, Dahmani S. Muscle relaxation for tracheal intubation during paediatric anaesthesia: A meta-analysis and trial sequential analysis. *Eur J Anaesthesiol*. 2017 Aug;34(8):550-61.
17. Devys JM, Mourissoux G, Donnette FX, Plat R, Schauvliege F, Le Bigot P, et al.

Intubating conditions and adverse events during sevoflurane induction in infants. *Br J Anaesth*. 2011 Feb;106(2):225-9.

18. Martinez-Ubieto J, Ortega-Lucea S, Pascual-Bellosta A, Arazo-Iglesias I, Gil-Bona J, Jimenez-Bernardo T, et al. Prospective study of residual neuromuscular block and postoperative respiratory complications in patients reversed with neostigmine versus sugammadex. *Minerva Anesthesiol*. 2016 Jul;82(7):735-42.

19. Algie CM, Mahar RK, Tan HB, Wilson G, Mahar PD, Wasiak J. Effectiveness and risks of cricoid pressure during rapid sequence induction for endotracheal intubation. *Cochrane Database Syst Rev*. 2015 Nov 18(11):CD011656.

20. Auroy Y, Ecoffey C, Messiah A, Rouvier B. Relationship between complications of pediatric anesthesia and volume of pediatric anesthetics. *Anesth Analg*. 1997 Jan;84(1):234-5.

21. von Ungern-Sternberg BS, Boda K, Chambers NA, Rebmann C, Johnson C, Sly PD, et al. Risk assessment for respiratory complications in paediatric anaesthesia: a prospective cohort study. *Lancet*. 2010 2010/09/04;376(9743):773-83.

22. Dony P, Seidel L, Pirson M, Forget P. Anaesthesia care team improves outcomes in surgical patients compared with solo anaesthesiologist: An observational study. *Eur J Anaesthesiol*. 2019 Jan;36(1):64-9.

23. Marie A, Dadure C, Seguret F, Capdevila X. One year of anaesthesia in France: A comprehensive survey based on the national medical information (PMSI) database. Part 2: Out-hospital patients. *Anaesth Crit Care Pain Med*. 2015 Aug;34(4):199-204.

24. Dadure C, Marie A, Seguret F, Capdevila X. One year of anaesthesia in France: A comprehensive survey based on the national medical information (PMSI) database. Part 1: In-hospital patients. *Anaesth Crit Care Pain Med*. 2015 Aug;34(4):191-7.

Table 1: Patients' characteristics

Factor	France APRICOT Cohort	Whole APRICOT data
Age (years)	3.3 [2.4; 4.3]	6.35
Weight (Kg)	13.8 [10.9; 16.6]	24.8
Prematurity (%)	7.5 [6.6; 8.4]	7.6
Female patient (%)	39 [37.4; 40.6]	38.8
Ethnical origin		
➤ Caucasian (%)	69.9 [68.4; 71.4]	82.3
➤ Spanish/Hispanic/Latino (%)	2.8 [2.3; 3.4]	4.7
➤ Asian (Indian, Pakistani, Bangladeshi, Chinese, Vietnam, etc.) (%)	2 [1.5; 2.5]	3.5
➤ Black (Caribbean, African) (%)	8 [7.1; 8.9]	3.0
➤ Arabic (North Africa, Middle East) (%)	16.5 [15.3; 17.8]	5.8
➤ Mixed (%)	0.6 [0.3; 0.8]	0.6
ASA status		
➤ I (%)	69.9 [68.4; 71.4]	60.7
➤ II (%)	22.3 [21; 23.7]	28.1
➤ III (%)	7.1 [6.3; 8]	9.6
➤ IV (%)	0.6 [0.3; 0.8]	1.6
Actual or previous (2 weeks) signs of URTI (%)	15.5 [14.3; 16.7]	13.5
Fever (> 38.5° Celsius) (%)	3.9 [3.3; 4.5]	2.9
Wheezing (%)	4.9 [4.2; 5.6]	6.3
Asthma (%)	7.6 [6.7; 8.4]	6.1
Atopy (%)	5.6 [4.8; 6.4]	7.5
Parental smoking (%)	7.1 [6.3; 7.9]	14.3
Allergy (%)	10.4 [9.4; 11.4]	12.3
Allergy type		
➤ Food or Nuts or antibiotics or others	9.4 [8.5; 10.4]	8.2
➤ Multiple (%)	0.8 [0.5; 1.2]	NR
➤ Others (pollen, other medications, dress, contrast ) (%)	3.8 [3.2; 4.5]	NR
Snoring (%)	5.5 [4.8; 6.3]	14.3
Previous anaesthesia complication (%)	1.6 [1.2; 2]	1.9
Preoperative medication (%)	26 [24.1; 27.4]	23.1
➤ Cardiovascular and/or anticoagulants (%)	2.2 [1.7; 2.7]	NR
➤ Analgesics (non-opioids, opioids, anti-neuropathic) (%)	6.3 [5.5; 7.1]	NR
Preoperative handicap or congenital disease (neurological or metabolic) (%)	14.4 [13.2; 15.5]	13

Table 2:

Factor	France APRICOT Cohort	Whole APRICOT dataset
Procedures		
➤ Surgery (%)	77.3 [75.9; 78.7]	71.4
➤ Non-Surgical (%)	22.7 [21.3; 24.1]	28.6
Surgical procedures (alone or associated with another)*		
➤ Orthopaedics (%)	28.7 [27.3; 30.3]	15.3
➤ Abdominal (%)	20.4 [19.1; 21.7]	17.5
➤ Urological (%)	15.8 [14.6; 17.1]	16
➤ Ear-Nose-Throat (%)	15.7 [14.6; 17]	25.3
➤ Skin surgery (%)	5.8 [5.1; 6.7]	5.1
➤ Ophthalmological (%)	3.2 [2.7; 3.8]	4.3
➤ Plastic and palate surgery (%)	3.1 [2.5; 3.5]	4.8
➤ Head and Neck (%)	2.8 [2.3; 3.4]	3.0
➤ Neurosurgery (%)	2.5 [2; 3.1]	2.3
➤ Traumatic (multiple) (%)	1.4 [1; 1.8]	3.7
➤ Thoracic (%)	0.6 [0.4; 1]	0.7
➤ Cardiac (%)	0.4 [0.2; 0.7]	1.1
➤ Other (%)	0.6 [0.4; 0.9]	0.6
➤ Hepatic-Biliary (%)	0.4 [0.2; 0.6]	0.3
Non-Surgical procedures (alone or associated with another)*		
➤ Magnetic resonance imaging (%)	20.5 [19.2; 21.9]	22.4
➤ Gastroenterology endoscopy (%)	18.2 [16.9; 19.5]	16.1
➤ Venous access (%)	14.5 [13.4; 15.7]	7.2
➤ Burns care (%)	13.9 [9.6; 15.1]	2.2
➤ Dental surgery (%)	10.6 [1.9; 11.6]	18.0
➤ Bronchial endoscopy (%)	5.7 [5; 6.5]	3.9
➤ Biopsy (%)	3 [2.4; 3.6]	1.9
➤ Ophthalmological examination (%)	3.1 [2.5; 3.7]	2.2
➤ Bone marrow aspiration and/or lumbar puncture (%)	2.2 [1.8; 2.7]	10.0
➤ Scannographic imaging (%)	1 [0.7; 1.3]	14.6
➤ Others (%)	7.3 [6.4; 8.2]	3.7
➤ Outpatient management (%)	43.9 [42.3; 45.5]	37.6
Emergency status		
➤ Elective (%)	77.2 [75.8; 78.6]	81.2
➤ Emergency (%)	21.6 [20.3; 23]	16.1
➤ Vital emergency (%)	1.1 [0.8; 1.5]	2.7
Timing of anaesthesia between 7am and 6 pm (%)	92.7 [91.9; 93.6]	92.1
Mean duration of the procedure (minutes)	44.7 [34.3; 55.21]	NR

Table 3: Perioperative anaesthesia characteristics

Factor	France APRICOT Cohort	Whole APRICOT dataset
Preoperative consultation (%)	83.7 [82.5; 84.9]	59.4
Experience of the anaesthesiologist (mean in years)	13.5 [11; 16]	NR
Mean duration of anaesthesia (minutes)	73.7 [60; 87.5]	NR
Anaesthesiologist experience		
➤ 80 % activity in paediatrics (%)	85.3 [84.1; 86.5]	59.2
➤ 50 % to 80 % activity in paediatrics (%)	2.9 [2.4; 3.5]	14.0
➤ < 50 %activity in paediatrics (%)	10.8 [9.8; 11.8]	19.2
➤ Resident (with a senior) (%)	27.2 [25.7; 28.5]	NR
➤ Nurse (with a senior) (%)	78.5 [77.1; 79.9]	NR
➤ Resident alone (%)	0.3 [0.1; 0.5]	7.8
➤ Nurse Anaesthesiologist Alone (%)	0.3 [0.1; 0.5]	NR
Premedication (%)	60.5 [58.8; 62.1]	49.2
Parental presence (%)	5.7 [4.9; 6.5]	50.7
Type of anaesthesia		
➤ Regional anaesthesia alone (%)	0.8 [0.5; 1.1]	0.2
➤ Sedation (%)	1.7 [1.3; 2.2]	6.3
➤ Anaesthesia (%)	97.4 [96.9; 97.9]	93.4
Hypnotic Drugs for sedation		
➤ Propofol alone (%)	0.1 [0; 0.3]	NR
➤ Ketamine alone (%)	1.2 [0.8; 1.5]	NR
Rapid sequence induction: RSI (%)	8.2 [7.3; 9.1]	4.4
➤ Modified with mask ventilation during RSI (%)	23 [18; 27]	48
➤ Cricoid pressure during RSI (%)	39.5 [30.1; 45.2]	46.7
➤ Non-depolarising muscle relaxant	63.3 [61.6; 64.8]	41.7
➤ Suxamethonium	23.7 [22.3; 25.1]	39.3
Regional anaesthesia (%)	32.5 [30.9; 34]	24.4
Type of induction		
➤ Volatile agent (%)	69.8 [68.3; 71.4]	50%
➤ Intravenous (%)	27.4 [25.9; 28.8]	36.2 %
Airway device		
➤ No device (%)	1.8 [1.4; 2.2]	4.3
➤ Face mask (%)	13.7 [12.6; 14.8]	16
➤ Supraglottic airway device (%)	30.3 [28.8; 31.8]	35
➤ Endotracheal intubation (ETT) (%)	52.7 [51; 54.3]	44
➤ Cuffed ETT (%)	50.5 [48.8; 52.1]	31
➤ Pressure monitoring (ETT) (%)	46.5 [44.9; 48.2]	48
Intraoperative Monitoring		
➤ Standard : ECG,SpO2 anaesthetic agent, capnography, NIBP, temp (%)	76.3 [74.9; 77.7]	61.5
➤ Standard+: Standard AND Arterial, central line (%)	1.4 [1; 1.7]	2.1

➤ Standard ++: Standard+ AND NIRS, EEG derivate data (%)	1.8 [1.3; 2.2]	1.1
➤ Standard minus one standard monitoring lacking (%)	20.5 [19.1; 21.8]	35.2
Use of muscle relaxation during tracheal intubation	23.9 [22; 25.9]	61.3
Monitoring of muscle relaxation in case of NDMR use (%)	59.9 [59; 60]	16
Muscle relaxant reversal in case of NDMR use(%)	19.6 [19.2; 30]	33
Postoperative location		
➤ Ward (%)	0.5 [0.3; 0.7]	13.1
➤ PACU (%)	95.5 [94.8; 96.2]	80.3
➤ Intermediate care (%)	0.1 [0; 0.3]	1.9
➤ Intensive care (%)	3.9 [3.2; 4.5]	4.7
Caregivers		
➤ Qualified nurse (%)	88.3 [87.2; 89.3]	NR
➤ Nurse in training (%)	1 [0.7; 1.4]	NR
➤ Other (%)	10.6 [9.5; 11.6]	NR
Postoperative O2 administration		
➤ Systematic (%)	42.7 [41.1; 44.4]	NR
➤ If Necessary (%)	13.6 [12.5; 14.7]	NR
➤ No administration (%)	43.1 [41.5; 44.8]	NR

Table 4:

Factor	No Complication (N = 3312)	Complication (N = 223)
Age < 3 years	1046 (31.6 %)	127 (57 %) <sup>***</sup>
Prematurity	231 (7 %)	34 (15.2 %) <sup>***</sup>
ASA physical status III to V	227 (6.9 %)	48 (21.5 %) <sup>***</sup>
Actual or previous (2 weeks) signs of URTI	490 (14.8 %)	57 (25.6 %) <sup>***</sup>
Fever (> 38.5° Celsius)	127 (3.8 %)	11 (4.9 %)
Wheezing	152 (4.6 %)	21 (9.4 %) <sup>**</sup>
Asthma	247 (7.4 %)	22 (9.9 %)
Atopy	185 (5.6 %)	13 (5.8 %)
Parental smoking	240 (7.2 %)	11 (4.9 %)
Allergy	350 (10.6 %)	18 (8.1 %)
Snoring	183 (5.5 %)	12 (5.4 %)
Previous anaesthesia complication	48 (1.4 %)	9 (4 %) <sup>**</sup>
Preoperative medication	835 (25.2 %)	83 (37.2 %) <sup>***</sup>
Preoperative handicap or congenital disease (neurological or metabolic)	465 (14 %)	43 (19.3 %) <sup>*</sup>
Surgical procedures		
➤ Orthopaedics	728 (22 %)	36 (16.1 %) <sup>*</sup>
➤ Abdominal	495 (14.9 %)	49 (22 %) <sup>**</sup>
➤ Hepatic-Biliary	11 (0.3 %)	1 (0.4 %)
➤ Urological	406 (12.3 %)	21 (9.4 %)
➤ Ear-Nose-Throat	410 (12.4 %)	22 (9.9 %)
➤ Ophthalmological	82 (2.5 %)	4 (1.8 %)
➤ Skin surgery	155 (4.7 %)	7 (3.1 %)
➤ Plastic and palate surgery	78 (2.4 %)	6 (2.7 %)
➤ Neurosurgery	56 (1.7 %)	15 (6.7 %) <sup>***</sup>
➤ Cardiac	5 (0.2 %)	7 (3.1 %) <sup>***</sup>
➤ Thoracic	18 (0.5 %)	2 (0.9 %)
➤ Traumatic (multiple)	36 (1.1 %)	0 (0 %)
➤ Head and Neck	76 (2.3 %)	4 (1.8 %)
➤ Other	17 (0.5 %)	0 (0 %)
Non-surgical procedures		
➤ Gastroenterology endoscopy	129 (3.9 %)	9 (4 %)
➤ Bronchial endoscopy	37 (1.1 %)	4 (1.8 %)
➤ Dental surgery	76 (2.3 %)	9 (4 %)
➤ Biopsy	20 (0.6 %)	4 (1.8 %)
➤ Medullar aspiration and/or lumbar puncture	18 (0.5 %)	0 (0 %)
➤ Ophthalmological examination	24 (0.7 %)	0 (0 %)
➤ Scannorgraphic imaging	5 (0.2 %)	3 (1.3 %)
➤ Magnetic resonance imaging	158 (4.8 %)	7 (3.1 %)
➤ Venous access	111 (3.4 %)	6 (2.7 %)
➤ Burns care	103 (3.1 %)	9 (4.0 %)
➤ Others	84 (2.5 %)	7 (3.1 %)
Inpatient management	1813 (54.7 %)	169 (75.8 %) <sup>***</sup>
Emergency	736 (22.2 %)	70 (31.4 %) <sup>**</sup>
Timing of anaesthesia: Out of Working hours and	342 (10.3 %)	20 (9 %)

during week-end		
Duration of the procedure (minutes)	48 ± 49	93 ± 97***
Duration of the procedure > 65 minutes	676 (20.5 %)	99 (45 %)**
Experience of the anaesthesiologist (years)	15 ± 10	12 ± 9***
Experience of the anaesthesiologist < 15 years	1705 (51.5 %)	141 (63.2 %)**
Absence of anaesthesiologist nurse	674 (20.4 %)	75 (33.6 %)**
Absence of premedication	1269 (39.1 %)	101 (45.5 %)
Absence of parental presence during anaesthesia induction	3117 (94.1 %)	215 (96.8 %)
General anaesthesia	3223 (97.3 %)	221 (99.1 %)
Rapid sequence induction	268 (8.1 %)	23 (10.3 %)
Regional anaesthesia	1078 (32.5 %)	71 (31.4 %)
Type of induction		
➤ Volatile agent	2313 (69.8 %)	158 (70 %)
➤ Intravenous	902 (27.2 %)	65 (29.1 %)
Muscle relaxation during induction	394 (11.9 %)	53 (23.8 %)**
Airway device		
➤ Face mask	475 (14.3 %)	9 (4 %)**
➤ Supraglottic airway device	1038 (31.3 %)	33 (14.8 %)**
➤ Endotracheal intubation (ETT)	1687 (50.9 %)	175 (78.5 %)**
Intraoperative ventilation		
➤ Spontaneous	525 (15.9 %)	11 (4.9 %)**
➤ Pressure support	349 (10.5 %)	7 (3.1 %)**
➤ Controlled ventilation	2435 (73.5 %)	203 (91 %)**



Table 5

Categories & Factors	OR	95 % Confidence Interval of the OR	p
Preoperative Health condition ➤ Age < 3 years ➤ Prematurity ➤ ASA status III to V ➤ Actual or previous (2 weeks) signs of URTI ➤ Wheezing ➤ Asthma ➤ Previous anaesthesia complication ➤ Preoperative medication ➤ Preoperative handicap or congenital disease (neurological or metabolic)	3.5	[2.4; 5.2]	< 0.001
Procedure characteristics ➤ Inhospital ➤ Emergency ➤ Procedure duration > 65 mn ➤ Abdominal surgery ➤ Neurological ➤ Neurosurgery ➤ Cardiac ➤ Traumatic (multiple) ➤ Dental surgery ➤ Biopsy ➤ Scannographic imaging	2	[1.4 ; 2.9]	< 0.001
Experience of the anaesthesiologist < 15 years	1.5	[1.02; 2.5]	0.001
Absence of anaesthesiologist nurse	1.8	[1.3; 2.4]	< 0.001
Preoperative preparation ➤ Absence of premedication ➤ Absence of parental presence during anaesthesia induction	Excluded by the analysis	Excluded by the analysis	0.26
Intraoperative management ➤ General anaesthesia ➤ Muscle relaxation during induction ➤ Endotracheal intubation (ETT) ➤ Controlled ventilation	4.2	[1.02; 17]	0.12