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ORIGINAL ARTICLE

Rapid sequence induction

An international survey

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BACKGROUND Rapid sequence induction (RSI) is a standard procedure, which should be implemented in all patients with a risk of aspiration/regurgitation during anaesthesia induction.

OBJECTIVE The primary aim was to evaluate clinical practice in RSI, both in adult and paediatric populations.

DESIGN Online survey.

SETTINGS A total of 56 countries.

PARTICIPANTS Members of the European Society of Anaesthesiology.

MAIN OUTCOME MEASURES The aim was to identify and describe the actual clinical practice of RSI related to general anaesthesia.

RESULTS From the 1921 respondents, 76.5% (n=1469) were qualified anaesthesiologists. When anaesthetising adults, the majority (61.7%, n=1081) of the respondents preoxygenated patients with 100% O_2 for 3 min and 65.9% (n=1155) administered opioids during RSI. The Sellick manoeuvre was used by 38.5% (n=675) and was not used by 37.4% (n=656) of respondents. First-line medications for a haemodynamically stable adult patient were propofol (90.6%, n=1571) and suxamethonium (56.0%, n=932). Manual ventilation (inspiratory pressure $<$12 cmH_2O) was used in 35.5% (n=622) of respondents. In the majority of paediatric patients, 3 min of preoxygenation (56.6%, n=817) and opioids (54.9%, n=797) were administered. The Sellick manoeuvre and manual ventilation (inspiratory pressure $<$12 cmH_2O) in children were used by 23.5% (n=340) and 35.9% (n=517) of respondents, respectively. First-line induction drugs for a haemodynamically stable child were propofol (82.8%, n=1153) and rocuronium (54.7%, n=741).

CONCLUSION We found significant heterogeneity in the daily clinical practice of RSI. For patient safety, our findings emphasise the need for international RSI guidelines.

TRIAL REGISTRATION ClinicalTrials.gov identifier: NCT03694860

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Introduction

Rapid sequence induction (RSI) is a set of actions during induction of anaesthesia in unfasted patients or patients at risk of aspiration/regurgitation of gastric contents. The purpose of RSI is to secure the airway quickly and safely while actively reducing the risk of aspiration. RSI was first described in 1970.[1] Although its safety and efficiency were not (and still are not) based on high-quality evidence-based data, RSI has gradually been implemented into anaesthesiology clinical practice.[2] 'Classical RSI' consists of several steps, such as: monitoring of vital signs, intravenous line insertion, position of the patient before anaesthesia induction, functional and switched on suction with a wide bore suction catheter in place, preoxygenation, intravenous anaesthetic induction, an intravenous muscle relaxant drug with a rapid onset, the Sellick manoeuvre, intubation with the cuffed tracheal tube.

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Although there is an empiric recommendation for the use of RSI in high-risk patients, there are currently no clear recommendations as to whether RSI can be considered effective and well tolerated. 'Classical RSI' is associated with risks of hypoxaemia and cardiovascular complications,[3,4] raising concerns about the efficiency and safety of the current method of RSI.

Another problem is the heterogeneity of RSI techniques in the published data.[5–7] Such a variation in clinical practice can be dangerous for both patients (safety aspects) and physicians (legal consequences). The lack of internationally accepted RSI guidelines stimulated us to create an electronic survey with the aim of evaluating the actual RSI clinical practice internationally. The survey was designed to capture the clinical practice of RSI in both adult and paediatric patients.

Materials and methods

The survey was designed using the SurveyMonkey platform, registered on clinicaltrials.gov (NCT03694860) and conducted over 5 months (February 2019 to June 2019). The questionnaire consisted of 25 questions (two general pieces of information about the respondent, 11 questions about the RSI practice in adults and 12 questions about the RSI practice in paediatric patients) and could be completed within 5–7 min. The survey was supported by the European Society of Anaesthesiology (ESA, endorsed by Scientific Subcommittee 5 of ESA, 6 February 2019) and by the Czech Society of Anaesthesiology and Intensive Care (ČSARIM). Omitting answering questions was allowed. There were two multiple-choice questions (highlighted in brackets). An e-mail with the survey link (https://www.surveymonkey.com/r/CTGQWBB) was sent to all active ESA members by the ESA secretary. The survey electronic link was also accessible from ESA Facebook during the study period. The complete questionnaire is shown in Table 1. The data were assessed and prepared by a statistician to enable a comparison between adult and paediatric RSI practices. The statistical analysis was undertaken in cooperation with the Institute of Biostatistics and Analyses, Faculty of Medicine, Masaryk University, Czech Republic. The STATISTICA application was used for statistical analysis. Pearson's χ^2 tests and Fischer's exact test were used for the comparison of adult and paediatric sections of RSI. The statistical significance was set to $P = 0.05$.

Results

Overall, 1921 colleagues completed the survey, of whom 1469 were anaesthesiologists who had completed training (76.6%), and 424 (22.1%) were anaesthesiology trainees. The invitation to take part in the survey was sent to 9097 members of the ESA, and 4475 of ESA members opened the e-mail. Of those who opened the e-mail, the response rate was 42.9%, thus only 21% of the total membership responded. We received responses from more than 58 countries (Supplemental Digital Content 1, http://links.lww.com/EJA/A286). The majority of respondents were European (85%, *n*=1615), most of them being from Germany (9.0%, *n*=171), the Czech Republic (8.1%, *n*=154), Spain (5.0%, *n*=95) and the United Kingdom (4.8%, *n*=92).

In adult practice, the majority of respondents used RSI in high-risk patients: acute abdomen (88.6%, *n*=1546), a risk of regurgitation or aspiration (94.6%, *n*=1651), trauma (less than 6 h between last meal and trauma) (92.8%, *n*=1621). Head-up was the preferred patient position for anaesthesia induction in adults (60.1%, *n*=1052). The majority of respondents considered that a gastric tube for RSI in adults was unnecessary (38.3%, *n*=669). The Sellick manoeuvre was used by 38.5% (*n*=675) and never used by 37.4% (*n*=656) of respondents. The preferred type of preoxygenation during adult RSI was a tight-fitting face mask with 100% O_2 for 3 min (61.7%, *n*=1081). Opioids were used during anaesthesia induction by 65.9% (*n*=1155) of respondents. The preferred choice of RSI induction agents for haemodynamically stable patients were propofol (90.6%, *n*=1571) or thiopentone (11.2%, *n*=158), in combination with suxamethonium (56.0%, *n*=932). For haemodynamically unstable adult patients, ketamine (42.3%, *n*=664) or etomidate (37.9%, *n*=560) were the drugs of choice. Monitoring the onset of neuromuscular blockade

Table 1 The questionnaire

Question 1	'Your official working position'
Question 2	'Your anaesthesiology practice is located?'
Questions 3 and 14[a]	'In what situations do you indicate RSI?'
Questions 4 and 16[a]	'What kind of patient's position do you prefer for Rapid-sequence induction?'
Question 5	'What's your gastric tube management for RSI in adults?'
Questions 6 and 17[a]	'Do you use Sellick manoeuvre in RSI?'
Questions 7 and 18[a]	'How do you preoxygenate the patient before RSI?'
Questions 8 and 19[a]	'Do you use opioids for anaesthesia induction during RSI?'
Questions 9 and 21[a]	'What kind of induction agent do you use for haemodynamically unstable patient for RSI?'
Questions 10 and 20[a]	'What kind of induction agent do you use for haemodynamically stable patient for RSI?'
Questions 11 and 22[a]	'What kind of muscle relaxant do you prefer for anaesthesia induction during RSI?'
Questions 12 and 23[a]	'Do you ventilate the patient via face mask before anaesthesia induction?'
Questions 13 and 24[a]	'Do you monitor the onset of neuromuscular blockade before intubation attempt?'
Question 15	'Do you perform RSI in younger children with risk of regurgitation or aspiration?'
Question 25	'Do you intubate the paediatric patients indicated for RSI with a cuffed endotracheal tube?'

RSI, rapid sequence induction. [a]Same question for paediatric and adult questionnaire.

was considered unnecessary by 33.2% (n=580) of respondents. In high-risk patients, ventilation with limited inspiratory pressure (<12 cmH_2O) was used by 35.5% (n=622) of respondents.

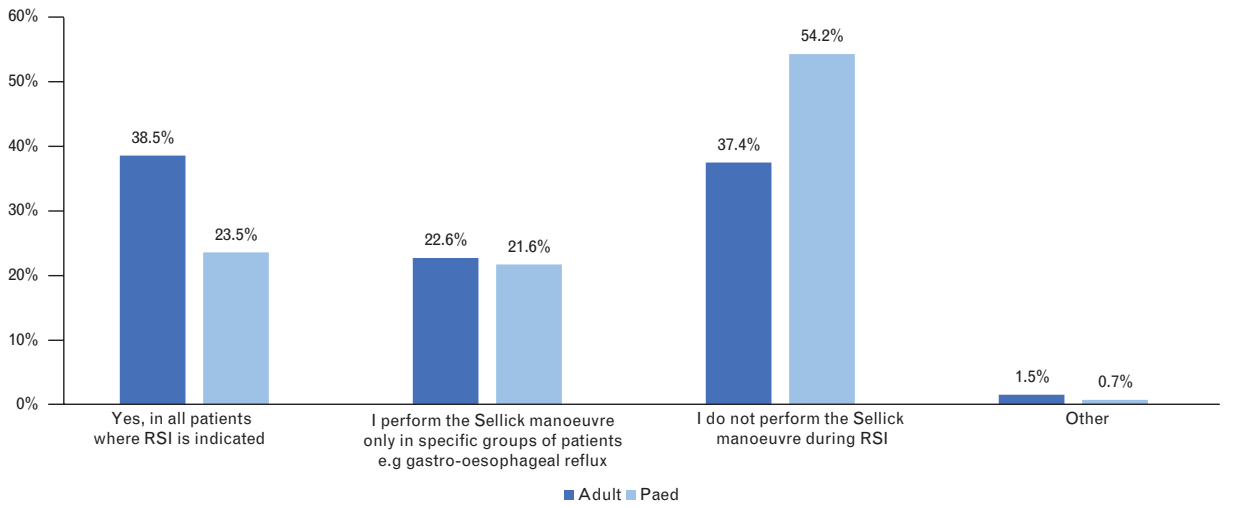
In paediatric practice, RSI was chosen for the majority of high-risk patients: acute abdomen 88.6% (n=1304), a risk of regurgitation or aspiration (91.0%, n=1339), trauma (less than 6 h between last meal and trauma) 88.7% (n=1305). The majority of respondents used RSI in older children only (44.1%, n=630), with 9.7% (n=138) never using RSI at all in children. The preferred position was supine (50.9%, n=736). A cuffed endotracheal tube was used for all children by 40.8% (n=585) of respondents, and by 30.6% (n=438) of respondents for all children except neonates. The majority of respondents used preoxygenation for 3 min (56.6%, n=817) and opioids (54.3%, n=797) without the Sellick manoeuvre (54.2%, n=784) during RSI in paediatric patients. The drugs of choice for RSI induction in haemodynamically stable paediatric patients were propofol (82.8%, n=1153) and rocuronium (54.7%, n=741). In the case of haemodynamic instability, the preferred drugs were ketamine (58.4%, n=748) and propofol (29.7%, n=348). Monitoring the onset of neuromuscular blockade was considered unnecessary by 37.2% (n=536) of respondents. Manual ventilation via face mask before anaesthesia induction was not performed by 41.4% of respondents in paediatric RSI, but in high-risk patients, manual ventilation with limited inspiratory pressure (<12 cmH_2O) was used by 35.9% (n=517) of respondents.

The differences between adult and paediatric RSI for the Sellick manoeuvre are presented in Fig. 1, the first-choice induction agent in haemodynamically stable patients for RSI in Fig. 2, and mask ventilation before the first intubation attempt in Fig. 3. Detailed comparisons between adult and paediatric practice are presented in Table 2. Detailed results are accessible in Supplemental Digital Content 1, http://links.lww.com/EJA/A286.

Discussion

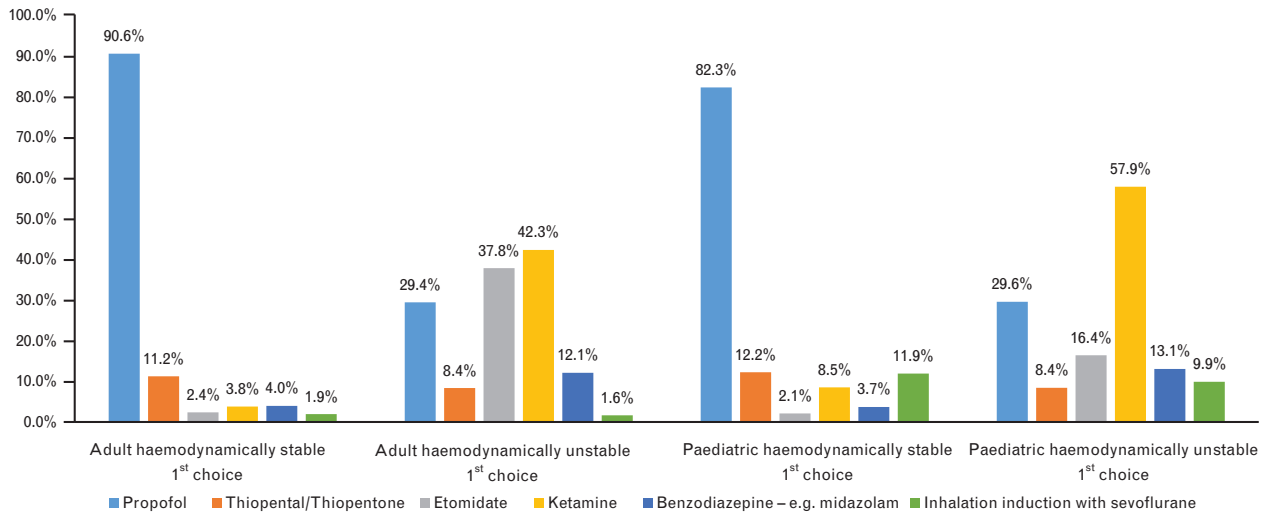
The primary aim of the survey was to evaluate the actual clinical practice of RSI in adult and paediatric patients. Our results confirmed the significant heterogeneity both in the components of RSI and in RSI practice between adults and paediatric patients. Although the majority of respondents used RSI in patients with a risk of aspiration, the number of respondents who did not do so in different situations varied from 5.4 to 11.4% in adult RSI and from 9.0 to 11.4% in paediatric RSI, respectively. This could be considered a dangerous practice as pulmonary aspiration remains the most common cause of death associated with anaesthesia.[7] In the majority of these reported cases, risk factors for pulmonary aspiration were not identified, and therefore, RSI was not performed.[8] Currently, RSI is indicated in patients who have any of the following conditions, nonfasted, active vomiting, subileus, ileus, limited protective laryngeal reflexes and gastrointestinal obstruction. In addition, RSI should be performed in pregnant women after the third trimester and during labour.[9] On the basis of previously published data, point-of-care gastric ultrasound for the residual gastric volume (the antral area) measurement could be promising for further identification of patients at risk.[10,11]The head-up position is associated with an increase of functional residual capacity, improved preoxygenation and a longer time to desaturation.[12–14] This adjustment can easily decrease morbidity and incidence of desaturation. In our survey, the head-up position was preferred by

Fig. 1



Do you use Sellick manoeuvre in rapid sequence induction?

Fig. 2



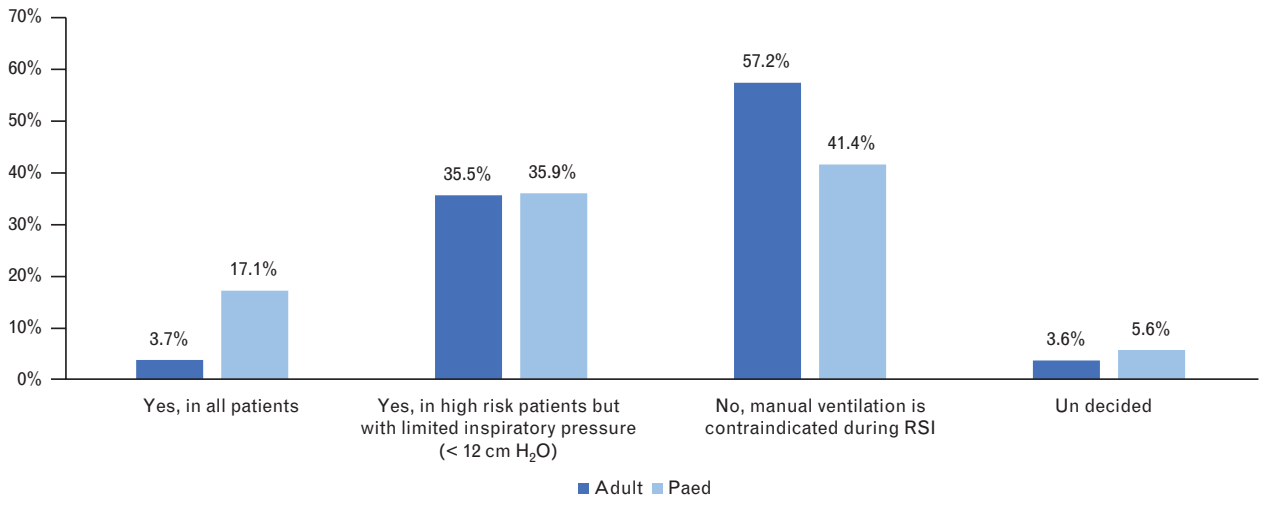
What kind of induction agent do you use for rapid sequence induction?

60.1% of respondents in adults and by 44.0% in paediatric patients. In previously published studies, the head-up position was preferred by 76 to 84% of respondents.[15–17] Although high-quality evidence-based data are still lacking, the head-up position for RSI should be recommended.[9]

Preoxygenation with 100% O_2 using a tight-fitting face mask for 3 to 5 min with or without continuous positive airway pressure can significantly increase the oxygen reserve. The risk of atelectasis formation is outweighed by the increase in patient safety. The majority of respondents preoxygenated patients with a tight-fitting mask with 100% O_2 for 3 min (adults 61.7%/paediatric 56.6%, or for 5 min 19.9%/19.1%). Preoxygenation with a tight-fitting face mask is considered a standard part of anaesthesia induction. In recent years, high-flow nasal oxygen cannulae (HFNC) have been tested as a potential upgrade of standard preoxygenation (to prolong the time to desaturation during apnoea), but the results are conflicting.[17–19]

There are only limited data about the requirement for a gastric tube before anaesthesia induction. Gastric tube insertion before induction can allow the evacuation of gastric contents, and therefore, lead to the reduction of

Fig. 3



Do you ventilate the patient via face mask before anaesthesia induction (before first intubation attempt)?

Table 2 Adult and paediatric rapid sequence induction questions

Question	Options	Adult RSI	Paediatric RSI	*P* value (Pearson χ^2 test)
In what situations do you indicate RSI?	Acute abdomen	88.6% (*n*=1546)	88.6% (*n*=1304)	0.97045
	Risk of regurgitation or aspiration (hiatus hernia, gastro-oesophageal reflux, nonfasted patient)	94.6% (*n*=1651)	91.00% (*n*=1339)	**0.00008**
	Trauma patient (with less than 6 h between last meal and injury)	92.8% (*n*=1621)	88.7% (*n*=1305)	**0.00004**
	Other (please specify)	26.6% (*n*=464)	6.3% (*n*=92)	**0.0000**
What kind of patient position do you prefer for rapid-sequence induction?	Trendelenburg position (head down by 15 to 30°)	4.9% (*n*=86)	5.1% (*n*=74)	**0.0000**
	Anti-Trendelenburg position (head up by 15 to 30°)	60.1% (*n*=1052)	44.0% (*n*=637)	**0.0000**
	Supine position	35.0% (*n*=613)	50.9% (*n*=736)	0.79370
Do you use the Sellick manoeuvre in RSI?	Yes, in all patients indicated for RSI	38.5% (*n*=675)	23.5% (*n*=340)	**0.0000**
	I perform the Sellick manoeuvre only in specific groups of patients (e.g. gastro-oesophageal reflux)	22.6% (*n*=397)	21.6% (*n*=313)	0.49663
	I don't perform the Sellick manoeuvre in RSI	37.4% (*n*=656)	54.2% (*n*=784)	**0.0000**
	Other	1.48% (*n*=26)	0.69% (*n*=10)	**0.03462**
How do you preoxygenate the patient before RSI?	100% O_2 with tight-fitting face mask for 3 min	61.7% (*n*=1081)	56.6% (*n*=817)	**0.00360**
	100% O_2 with tight-fitting face mask for 5 min	19.9% (*n*=348)	19.1% (*n*=275)	0.56739
	80% O_2 with tight-fitting face mask for 3 min	4.1% (*n*=72)	7.2% (*n*=104)	**0.00013**
	80% O_2 with tight-fitting face mask for 5 min	2.2% (*n*=38)	2.3% (*n*=33)	0.82191
	I don't routinely preoxygenate patients during RSI	1.5% (*n*=27)	4.2% (*n*=61)	**0.00000**
	Other	10.6% (*n*=186)	10.6% (*n*=153)	0.99014
Do you use opioids for anaesthesia induction during RSI?	Yes, in all patients	65.9% (*n*=1156)	54.9% (*n*=792)	**0.00000**
	In minority of patients, for example, with severe pain	19.6% (*n*=344)	25.7% (*n*=371)	**0.00004**
	No, never during RSI	9.3% (*n*=163)	17.3% (*n*=250)	**0.00000**
	Other	5.1% (*n*=90)	2.2% (*n*=31)	**0.00001**
Do you ventilate the adult patient via face mask before anaesthesia induction?	Yes, in all patients	3.7% (*n*=65)	17.1% (*n*=246)	**0.0000**
	Yes, in high-risk patients, with limited inspiratory pressure (<12 cmH_2O)	35.5% (*n*=622)	35.9% (*n*=517)	0.81623
	No, manual ventilation is contraindicated in RSI	57.2% (*n*=1003)	41.4% (*n*=597)	**0.0000**
	Not decided	3.6% (*n*=63)	5.6% (*n*=81)	**0.00600**
Do you monitor the onset of neuromuscular blockade before intubation attempt?	Yes, in all patients	14.0% (*n*=244)	11.2% (*n*=162)	**0.02157**
	Yes, sometimes	32.9% (*n*=575)	28.6% (*n*=413)	**0.00971**
	No, it is not needed	33.2% (*n*=580)	37.2% (*n*=536)	**0.01869**
	No, I don't have a monitor available	20.0% (*n*=349)	23.0% (*n*=331)	**0.04024**

RSI, rapid sequence induction. Bold - *P* value < 0.05.

regurgitation/aspiration risk. However, leaving the gastric tube in situ during the induction of anaesthesia compromises the lower oesophageal sphincter creating a risk of regurgitation. In another survey, 65% of respondents inserted a gastric tube before anaesthesia induction in patients with small bowel obstruction and left it in place during induction.[16] The majority of respondents in our survey inserted the gastric tube for RSI in adults (inserted and left in place, 27.7%; inserted with gastric content evacuation and removal before RSI in 20.8%). Evidence-based data does not specify the correct gastric tube management in RSI. Still, it should always be considered whether the gastric tube can reduce the associated risk. Overall, 38.3% of respondents indicated there was no need for a gastric tube for RSI, but this may be a risk in patients with bowel obstruction (e.g. ileus).

Nowadays, one of the most controversial parts of RSI is the Sellick manoeuvre (cricoid pressure). The correct technique for the Sellick manoeuvre is the application of a 10 N pressure on the cricoid cartilage before anaesthesia induction and further increase of the pressure to 30 N after the induction.[12] The published data shows a wide variation of practice when using the Sellick manoeuvre. Sellick manoeuvre is used during RSI in 70 to 100% of patients.[15,16,20] Considering the paediatric population, Sellick manoeuvre is used less often (58.6% in infants compared with 95.3% in schoolchildren).[6] The

controversy of Sellick manoeuvre is also reflected in our results: 38.5%/23.5% always performed Sellick manoeuvre during RSI whereas 37.4%/54.2% never performed Sellick manoeuvre during RSI (adults/children). In addition, the Sellick manoeuvre is frequently used incorrectly, for example, in 71% it is only applied after anaesthesia induction.[20] On the other hand, Sellick manoeuvre can worsen the laryngoscopy view and make intubation difficult or impossible. The effectiveness and safety of Sellick manoeuvre has never been proven in a well designed, adequately powered, randomised controlled trial. The recently published IRIS trial[21] was the first-ever randomised, double-blind noninferiority trial to compare a sham Sellick manoeuvre with cricoid pressure. The results failed to prove the noninferiority between sham Sellick manoeuvre and cricoid pressure, but the study was underpowered. Pulmonary aspiration was comparable between the groups (0.6% in Sellick manoeuvre versus 0.5% in the sham group), but with higher incidence of Cormack Lehane grade 3 and 4 (10 versus 5%, $P < 0.001$) and a longer intubation time (intubation time >30 s, 47 versus 40%, $P < 0.001$) in the Sellick manoeuvre group.[21] The results of the IRIS trial raised further concerns about the safety and efficacy of Sellick manoeuvre in clinical practice. Although the debate about Sellick manoeuvre in the anaesthesiology community is ongoing, there are several national guidelines no longer recommending Sellick manoeuvre as a part of RSI in clinical practice.[22]

Opioids were not considered as a part of classical RSI. However, opioids during RSI reduce the cardiovascular response to laryngoscopy and can reduce the dose of the induction agent.[12] Currently, up to 92% of physicians use opioids during RSI.[23] This is in concordance with the results of our survey, where opioids were administered during RSI in 66.0%/54.9% of cases and sometimes administered in 19.6%/25.7% of cases (adult/paediatric). Overall use of opioids in RSI was 85.6% in adults and 80.5% in paediatric patients.

In classical RSI, the drug of choice for anaesthesia induction was thiopentone in combination with suxamethonium. This has changed over the past two decades. In 2001, thiopentone was still used in 88% of RSI[4] but now propofol is the drug of choice for induction of anaesthesia for RSI.[15] This change is also seen in our survey: propofol was the drug of choice for RSI in haemodynamically stable patients in 90.6%/82.8% of cases (adult/paediatric).

Currently, there are two drugs (ketamine, etomidate) that are considered safer during the induction of anaesthesia in haemodynamically unstable patients, or in patients with a high risk of hypotension. Etomidate is linked with the suppression of corticosteroid synthesis after administration and could be dangerous in patients with sepsis or septic shock. Unlike other intravenous anaesthetics, ketamine can even lead to the elevation of blood pressure and heart rate. The majority of respondents selected ketamine 42.3%/58.4% (adult/paediatric) and etomidate 37.9%/16.8% in haemodynamically unstable patients for RSI. Propofol or thiopentone were selected in 29.5%/29.7% and 8.4% /8.5% (adult/paediatric) of cases. However, as these drugs can lead to a further deterioration of the circulatory status, many consider them to be dangerous in haemodynamically unstable patients.

Suxamethonium is a part of the classical RSI technique but rocuronium ($1.2\,mg\,kg^{-1}$)[24] provides comparable intubation conditions. Worldwide, suxamethonium remains the first-choice drug for neuromuscular blockade induction during RSI. However, the availability of suggamadex, a selective antidote for rocuronium, has increased the use of rocuronium for RSI over the past few years. In our survey, suxamethonium remained the drug of choice for RSI in adults, with 56% of respondents favouring it compared with 49.3% using rocuronium. This situation was reversed in paediatric patients, where 54.7% of respondents used rocuronium and 48.3% used suxamethonium. This could be explained by the fear of malignant hyperthermia in children, or by the availability of sugammadex for rapid reversal of rocuronium and the additional possibility of minimising the incidence of residual neuromuscular blockade postoperatively. In 1992, the Food and Drug Administration (FDA) published a warning regarding serious adverse effects and fatal cases of malignant hyperthermia after suxamethonium administration.[25] Suxamethonium in children should be reserved for the treatment of laryngospasm and for RSI. Considering the serious side effects, the role of suxamethonium in paediatric RSI is debatable. Only a minority of respondents monitored the onset of neuromuscular blockade (adult/paediatric, sometimes 32.9%/28.6%, always 14.0%/11.2%). This could be a possible area for improvement. The majority of aspiration episodes during RSI have been linked to attempts to intubate the trachea during light anaesthesia before the onset of neuromuscular blockade.[26]

The basic principle of the classical RSI is the avoidance of manual ventilation, thus minimising the risk of air insufflation into the stomach and reducing the risk of aspiration/regurgitation. However, this practice is associated with a risk of hypoxaemia and cardiovascular complications.[3,4] Manual or mechanical controlled ventilation with a limited inspiratory pressure ($\leq$12–15 cmH_2O) can lead to effective ventilation and oxygenation without insufflating the stomach, and according to the published data, it can be considered well tolerated.[27–29] The inclusion of such pressure limited ventilation in the RSI algorithm is described as 'controlled RSI' or 'modified RSI'. Such 'controlled RSI' has been used by 67 to 85% of physicians (mainly in patients with respiratory insufficiency and in paediatric patients).[8,30]

The standard care for patients at risk of aspiration is to secure the airway for general anaesthesia with a cuffed tracheal tube. Historically, in children under 8 years of age, an uncuffed tube has been used because of the fear of post-extubation stridor.[31] However, the modern paediatric cuffed tracheal tubes (e.g. MicroCuff) are considered well tolerated and they can significantly reduce the need for tube exchange. In addition, the ideal seal reduces the risk of regurgitation/aspiration.[32,33] By improving the airway seal, cuffed tubes facilitate measurement of end-tidal CO_2 and enable positive pressure ventilation with higher inspiratory pressures. The new cuffed tracheal tubes can be used safely in all paediatric patients, including in the intensive care setting. The only safety prerequisite is the need to measure and limit the intracuff pressure to 20 cmH_2O or less; this will minimise the risk of mucosal damage and postextubation airway-related complications.[34] The majority of respondents (40.8%) in our survey used cuffed tracheal tubes for paediatric RSI, although 30.6% did not use cuffed tubes in neonates. This latter practice could be explained by a lack of supportive data and the low internal diameter of the cuffed tubes for neonates.

Several surveys in recent decades have evaluated the practice of RSI, revealing a wide variation in clinical practice.[6,8,15,16,20,23,30] However, only a minority of these surveys compared adult and paediatric RSI practice, and none of them was followed by the formation of any guidelines. The results of our survey confirmed the continuation of a wide variation in clinical practice when performing RSI, revealing several potentially dangerous aspects.

A possible limitation of the survey is the low response rate, with only 21% of the ESA members responding to the survey, thus the practice of the remaining 79% is unknown. Another possible limitation is the composition of respondents, with 26.9% of respondents from five European countries). On the other hand, we consider the data obtained from 56 countries around the world as a strong point of the survey.

In conclusion, the results of the survey confirmed wide variations of RSI in clinical practice. After 50 years of RSI with no evidence-based proven benefit (or harm, there is an urgent need for international RSI guideline formation to improve the safety of our patients).

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Conflicts of interest: none.

Presentation: preliminary results of the survey were presented on the National Congress of Czech Society of Anaesthesiology and Intensive Care in Brno, 2019 in the form of an oral presentation.

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