

Use of Succinylcholine by Anaesthetists in Turkey: A National Survey

Türkiye'de Anestezi Uzmanları Arasında Süksinilkolin Kullanımı: Ulusal Anket Araştırması

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Objective: Although succinylcholine (SCh) has side effects, it is among the most commonly used muscle relaxants for rapid induction because of the faster onset of its effects and short effect duration. However, there is no information regarding the frequency of use of SCh by anaesthetists in Turkey. This study aims to investigate the use of SCh by anaesthetists working in Turkey.

Methods: A web-based survey form was sent by e-mail to anaesthetists working in Turkey. The form comprised a total of 24 questions.

Results: E-mails were sent to a total of 1882 addresses at two separate times. E-mail replies were received from 433 (23%) an-aesthetists. Based on those who responded to the survey, 54.27% anaesthetists routinely used SCh for adult elective cases, 29.33% for paediatric elective cases and 74.13% for emergency cases. In adult elective cases, SCh was most frequently chosen for caesarean section (20.5%), and in paediatric elective and emergency cases, SCh was chosen most frequently because difficult intubation was expected (31.3 and 21.4%, respectively).

Conclusion: Our study reveals that SCh is still widely used by anaesthetists in Turkey. Majority of physicians who participated our survey were aware of the side effects; however, they reported using SCh in certain special situations. It is evident that creation of a standard care guide for departments is essential. The first stage of creating a standard care guide is to analyse and document the current application. With this aim, more wide-ranging advanced studies should be completed.

Keywords: Succinylcholine, neuromuscular blockers, survey

Amaç: Günümüzde süksinilkolin (SCh) yan etkilerine rağmen, etkisinin hızlı başlaması ve kısa etki süresi nedeniyle hala hızlı indüksiyon için en sık kullanılan kas gevşeticiler arasındadır. Bununla birlikte Türkiye'deki anestezi uzmanlarının SCh kullanım sıklığı ile ilgili veri bulunmamaktadır. Çalışmamızın amacı, Türkiye'de çalışmakta olan anestezi uzmanlarının anestezi uygulamalarında SCh kullanımını araştırmaktır.

Yöntemler: Türkiye'de çalışmakta olan anestezi uzmanlarına "web bazlı anket sayfası" şeklinde elektronik posta yoluyla ulaşıldı. Toplam 24 soru soruldu.

Bulgular: Toplam 1882 adrese iki faklı zamanda e-posta yoluyla ulaşıldı. 433 (%23) e-posta ile geriye dönüş alındı. Ankete katılanların yetişkinlerde elektif olgularda %54,27; pediyatrik elektif olgularda %29,33; acil olgularda %74,13 oranında SCh'i rutin olarak kullanmakta olduğu görüldü. Sırasıyla, yetişkin elektif olgularda sezaryen cerrahisi (%20,5); elektif pediyatrik ve acil olgularda zor entübasyon beklentisi (%31,3 ve %21,4) SCh kullanımının en çok tercih edildiği durumlardı.

Sonuç: Çalışmamız göstermiştir ki SCh Türkiye'de anestezistler tarafından halen yaygın olarak kullanılmaktadır. Anketimize katılan hekimlerin çoğunluğu olası yan etkilerin farkında olduklarını, ancak bazı özel durumlarda SCh kullanmakta olduklarını belirtmişlerdir. Bilim dalları ile ilgili "standart bakım klavuzlarının" oluşturulması esastır. Standart bakım kılavuzları oluşturulmasının ilk aşaması, mevcut uygulama durumunun analizi ve dökümünün gerçekleştirilmesidir. Bu amaçla Türkiye'de daha geniş kapsamlı ileri çalışmalar yapılmalıdır.

Anahtar kelimeler: Süksinilkolin, nöromüsküler blokerler, anket

Introduction

After the neuromuscular effects of succinylcholine (SCh) were described by Bovet (1) in 1949, its use in clinical anaesthesia was initiated by Foldes et al. in USA in 1952 (2). The muscle relaxant effect is similar to acetylcholine (1-4). The simple molecular configuration of SCh formed by two acetylcholine molecules and low molecular weight allow it to quickly pass the endplate receptors from blood and is thought to contribute to its rapid onset effect. In normal plasma, the hydrolysis by cholinesterase of succinylmonocholine and choline in SCh is very fast (5).

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Currently, SCh is still the only depolarizing muscle relaxant in clinical use (1). The reasons SCh remains popular despite reported complications is that it forms a quicker deep block (within 60 s) than the common non-depolarizing neuromuscular blocking agents (ND-NMBA) in use today and allows recovery from the third minute to end block in 12-15 min together with non-toxic metabolites, and its lower cost (3-7). Because SCh stimulates the muscarinic and nicotinic receptors in a similar fashion to acetylcholine, it has unwanted and possibly life-threatening side effects such as bradycardia and asystole in the cardiovascular system; fasciculations and related muscle pain in the skeletal system; temporary increases in intragastric, intraocular and intracranial pressure; lengthened paralysis due to plasma pseudocholine esterase deficiency or depletion and malignant hyperthermia (1, 8). Due to SCh's shorter effect, it is a good choice as a muscle relaxant for situations with expected difficult intubation, such as morbid obesity and obstetric surgeries, to prevent life-threatening hypoxia in situations with a possible risk of aspiration of stomach contents such as the acute abdomen, ileus and emergency trauma surgeries and for aggressive airway management (9, 10).

Since introduction of the use of sugammadex, which is used to quickly eliminate the effects of steroid ND-NMBA, the concerns related to the indications for SCh have increased. Currently, there is a global trend to remove SCh from use, not only under elective conditions but also for paediatric and adult emergency surgeries. There is no data found on the use of SCh by anaesthesiologists in Turkey. The aim of our study was to investigate the use of SCh for emergency and elective anaesthetic applications in all age groups (children and adults) by anaesthesiologists working in Turkey. The hypothesis of this study was that SCh is frequently used in Turkey and that indications are widely varying and side effects are frequently encountered.

Methods

A "survey web page" was sent to the email addresses of anaesthesiologists working in Turkey twice between the dates of March 2012 and September 2012. This survey asked participants a total of 24 questions related to the use of SCh, a depolarizing muscle relaxant. The questions were divided into five groups labelled A–E. Section A included demographic data, section B included the use of SCh for adult elective surgeries, section C included the use of SCh for paediatric elective cases, section D included the use of SCh for emergency cases and section E included thoughts and experiences related to the drug (Appendix 1).

Ethics

This study was completed after receiving permission from Çanakkale Onsekiz Mart University, Anaesthesia and Reanimation Department, Çanakkale Onsekiz Mart University, Human Ethics Committee (Date 05/23/2012, Decision no: 2012/12-03).

Participants

Anaesthesiologists working in Turkey were included in the study. Participation was according to desire. Because filling the survey was according to the wish of the participants, consent was not obtained.

Reasons for exclusion from the study: (1) Those who did not respond between the dates were not included in the study and (2) after sending the email, addresses with problems reported during the sending procedure were removed from the study.

Statistical analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 15.0 for Windows.

Results

A total of 1882 email addresses of anaesthesiologists were contacted. Of the 1882 anaesthesiologists, 433 provided feedback. The response rate to the survey was 23% (433/1882). Of the anaesthesiologists who answered the survey, 152 (35.1%) worked in university hospitals, 177 (40.9%) worked in state hospitals and 103 (23.8%) worked in private hospitals (Table 1). Among those who participated in the survey, 54.27% reported the use of SCh for adult elective cases, 29.33% used it for elective paediatric cases and 74.13% used

Table 1. Succinylcholine use and demographic characteristics of survey participants				
	SCh users (%)	SCh non- users (%)	Total	р
Gender				0.239
Female	122 (51.9)	113 (48.1)	235 (54.3)	
Male	114 (57.6)	84 (42.4)	198 (45.7)	
Organization				0.039*
University Hospital	87 (56.9)	66 (43.1)	152 (35.3)	
State Hospital	104 (58.8)	73 (41.2)	177 (40.9)	
Private Hospital	45 (43.7)	58 (56.3)	103 (23.8)	
Age				0.182
<30 years	4 (66.7)	2 (33.3)	6 (1.4)	
31–40 years	119 (59.8)	80 (40.2)	199 (46)	
41–50 years	80 (47.3)	89 (52.7)	169 (39)	
51–60 years	24 (57.1)	18 (42.9)	24 (9.7)	
>60 years	9 (52.9)	8 (47.1)	17 (3.9)	
Experience working as anaesthetist 0.014*				
<5 years	74 (67.9)	35 (32.1)	108 (25.2)	
6–10 years	61 (50.4)	60 (49.6)	121 (2.9)	
11–20 years	68 (50.4)	67 (49.6)	135 (31.2)	
>20 years	33 (48.5)	35 (51.5)	68 (15.7)	
*statistically significant (p<0.05)				

it for emergency cases (Figure 1). There was no difference between those who used SCh and those who did not in terms of age (p=0.182). Although more male participants were found to use SCh, there was no difference between those who used it and those who did not in terms of gender (p=0.239). Based on expertise, the participants with an experience of less than 5 years were the group who used SCh the most, whereas those with an experience of more than 20 years were the group who used it the least (p=0.014). When examined in terms of organization, although those working in state hospitals used SCh the most, those working in private hospitals used SCh the least (p=0.039) (Table 1).

Use of SCh for Adult Elective Cases

In section B of the survey, it was reported that 54.27% (235/433) of participants used SCh for adult elective cases (Figure 1). Of the 235 anaesthesiologists who used SCh for adult elective cases, did it routinely (0.4%), often (5.2%), occasionally (35.2%) and rarely (59.2%). The top indications for use were as follows: caesarean section (20.5%), expectation of difficult intubation/ventilation (19.2%), uncertainty of patient's preoperative fasting (15.6%) and electroconvulsive therapy (ECT) (14.6%) (Table 2).

Of the participants 17.4% (41/235) routinely examined pseudocholinesterase levels preoperatively. While 26.80% (n:63) of the participants regularly performed precurarization before using SCh, 84.68% (n:199) reported never performing precurarization. Of the total number of participants, 19.14% (n:45) reported giving second doses of SCh. Of the total number of participants who did not use SCh (n:197) for adult elective cases, 92.89% (n:178) reported choosing other appropriate muscle relaxants, while the second reason for not choosing SCh was that it caused fasciculations.

Use of SCh Paediatric Surgery Cases

Of the total number of respondents of the survey, 29.33% (127/433) reported that they preferred to use SCh in paediatric surgery cases (Figure 1). Of the 29.33% of anaesthesiologists who used SCh for paediatric surgery cases, 0.7% did it routinely, 9.7% often, 33.6% occasionally and 56% rarely. The most frequent reason for use was expectation of difficult intubation/difficult airway (Table 2).



Use of SCh for Emergency Cases

Of the total number of respondents of the survey, 74.13% (321/433) reported that they preferred to use SCh in emergency cases (Figure 1). The anaesthesiologists who used SCh for emergency cases (29.33%) did it routinely (2.2%), often (14.3%), occasionally (51%), and rarely (32.5%). The most frequent reason for choosing SCh for emergency cases was expectation of difficult intubation/ airway (Table 2).

Table 2. Indications of succinylcholine		
Indications	Number of people	(%)
Adult elective cases*		
Expectation of difficult intubation/ventilation	144	19.2
Caesarean section	154	20.5
Uncertainty of patient's preoperative fasting	117	15.6
Very short duration anaesthesia	91	12.1
Ear, nose and throat surgery	39	5.2
Obesity, hiatal hernia	26	3.5
Electroconvulsive therapy (ECT)) 110	14.6
Always use for induction of anaesthesia	1	-
Other	70	9.3
Paediatric elective cases*		
Expectation of difficult intubation/ventilation	96	31.3
Uncertainty of patient's preoperative fasting	67	21.8
Very short duration anaesthesia	77	25.8
Ear, nose and throat surgery	44	14.3
Obesity, hiatal hernia	6	2
Always use for induction of anaesthesia	2	0.7
Other	1	4.9
Emergency cases*		
Risk of aspiration of gastric contents	234	19.8
Ileus	102	8.6
Expectation of difficult intubation/ventilation	253	21.4
To provide fast and reliable muscle relaxation	98	8.3
Emergency caesarean section	198	16.8
To provide fast induction of anaesthesia	146	12.4
Laryngospasm	151	12.8
*More than one choice marked		

Thoughts of Anaesthesiologists on Use of SCh

In this section, where more than one choice could be marked, the top indication was the rapid onset of effect (82%). Other reasons for use were ability to use in emergency situations, short-term effect and quick recovery. The most frequently indicated disadvantage of SCh was bradycardia/ bradyarrhythmia. The percentage who had encountered negative side effects after use of SCh in clinical practice was identified as 73.21%. The most frequently reported side effect prolonged block as indicated by 206 people (Table 3).

Discussion

To our knowledge, this is the first study on collecting data pertaining to the habits and experience of SCh use in clinical practice among anaesthesiologists in Turkey. In June 2010, 1725 anaesthesiologists were employed in hospitals associated with Turkey's Ministry of Health, with 460 employed

Table 3. Thoughts of anaesthesiolog succinylcholine	gists on the	use of
	Number of people	(%)
Advantages of succinylcholine		
Fast onset of effect	358	35.30
Short duration and fast recovery	262	25.83
Effective and reliable relaxation	104	10.26
Use in emergency situations	268	26.42
No positive characteristics	22	2.17
Disadvantages of Succinylcholine*		
Myalgia/fasciculations	346	20.2
Bradycardia/bradyarrhythmia	354	20.6
Possibility of developing hyperkalaemia	a 291	17
May trigger malignant hyperthermia	296	17.3
Long duration of effect	306	17.8
Possibility of developing allergic reaction	on 110	6.4
There are no disadvantages	4	0.2
Other	8	0.47
Have observed side effects		
Yes	321	74.1
No	112	25.9
Observed negative side effects*		
Resistant bradycardia	141	21.1
Asystole	65	9.7
Trismus-masseter spasm	62	9.3
Severe muscle pain	148	22.1
Prolonged	206	30.8
Allergic reaction	40	6
Others	7	1
*More than one choice marked		

in university hospitals and 1023 employed in private hospitals, leading to a total of 3208 (11). Of the 433 participants who responded to our survey, SCh was used by 54.27% for elective adult cases, 29.33% for elective paediatric cases and 74.13% for emergency cases (Figure 1). On further investigation of this data, it was found that, particularly for emergency cases, SCh continues to be popular.

Use of SCh for Adult Elective Cases

In the B section of the survey, 54.27% (235/433) participants reported using SCh for adult elective cases. Compared to national surveys in other countries, this rate was only 8% in France (12), whereas the rate was 35% in hospitals in Germany (13), 23% in Italy (14) and approximately 70% in Croatia (15). Naguib et al. (16) in their research involving 2636 anaesthetists in the US and Europe reported rates of use of SCh as 85.8% and 92.8% to ease tracheal intubation in Europe and the US, respectively. Later Mirakhur (17) criticized the study by stating that there were more than 10,000 anaesthetists in the UK, and that the number of participants belonging to UK in the study by Naguib et al. (16) was unknown; therefore, a low number of participants indicated that the study could not be considered to represent practice in the UK. In 2011, a multinational study by Karanovic et al. (8) reported that rates varied between countries; however, the rate of use of SCh for adult elective cases was 69%. We believe that the rate of 54.27% in Turkey is close to the results of many other countries.

A similar study by Karanovic et al. (8) reported that the first reason for choosing SCh was the expected difficulties in intubation/ventilation (74%), followed by caesarean section (54%). In our study it was reported that the most frequent reason for choosing SCh in this group was caesarean section, followed by the expected difficulties in intubation (Table 2). Similar national surveys showing that the rate of general anaesthesia use in planned caesarean sections and use of SCh are 1% GA/77% SCh in France (18), 5% GA/50% SCh in the Flanders region (19) and 19.2% GA/89.9% SCh in Germany (20). Staikou et al. (21) in a survey of anaesthetic administration related to obstetrics on the European Society of Anaesthesiology website (12/21/2011-12/21/2012) reported that generally the combination of thiopental/SCh (56.6%) was chosen. In our country, a retrospective screening study between 2009 and 2011 found that in 2534 caesarean surgeries general anaesthesia was administered in 26% with use of Sch for 23.2% and rocuronium for 2.8%. Gülhaş et al. (22) reported 30.8% were emergency patients and 69.2% were elective patients; however, detailed information about the general anaesthetic and muscle relaxants used for elective and emergency cases was not provided. In our study, we found that SCh was mainly used for caesarean surgeries in elective adult cases that were opted for by 65.53% patients.

Use of SCh for Paediatric Surgery Cases

In the caesarean section of the survey, the rate of use of SCh for paediatric elective cases was found to be 29.33%

(127/433) (Figure 1). The most frequent reason was the expectation of difficult intubation/airway (75.59%, 96/127) with the second most frequent reason for choosing SCh being very short duration anaesthesia (60.62%, 96/127) (Table 2). Nauheimer et al. (23) in a national survey study in 2009 found that in Germany, mivacurium was frequently chosen for paediatric elective cases while the use of SCh was very low with participants reporting that they never used SCh in 60% hospitals and 80% ambulatory anaesthesia centres. Furthermore, a national survey study in the same year in the UK, Alford et al. (24) found the rate of routine use of muscle relaxants for intubation in tonsillectomy surgery was 47% with the rate of use of SCh being very low at 9%.

In December 1993, a warning was issued by SCh producers to anaesthetists in the United States of America that "apart from emergency tracheal intubation and situations where the airway must be immediately secured, the use of SCh for children and teenagers are contraindicated" (6). This warning was issued on the basis of 36 cases between 1990 and 1993 where children with no diagnosis of myopathy were administered SCh during surgery and developed cardiac arrest or severe arrythmia (25). The problem was debated by the special Anaesthetic and Drug Support Advisory Committee and Federal Drug Administration, and it was decided that this directive had no scientific background. They recommended that a warning, informing that SCh may be related to hyperkalaemic cardiac arrest in children without diagnosis of myopathy, be included in the prospectus. At the meeting, the use of SCh was defended with the argument that the full removal of SCh from clinical administration would possibly cause more deaths and complications than the reported deaths related to muscle diseases (6, 26). In Turkey, the SCh prospectus includes warnings that "SCh should only be administered to paediatric cases in emergency situations" and "careful monitoring is required with its use because of more frequent incidence of increasing high fever and dangerous disorder of cardiac rhythms in children". The results of our study reveal that the most frequent reason for anaesthesiologists in our country choosing SCh in paediatric cases is the expectation of difficult intubation/ventilation.

Use of SCh for Emergency Surgeries

It was reported that of all groups in the survey, the highest rate of use of SCh was 74.13% for emergency surgeries (Figure 1). The first reason for use was expected to be difficult intubation/ventilation at 78.81% with the second reason being risk of aspiration of gastric contents at 72.89% (Table 2). It was possible to mark more than one indication in answer to this question on the survey.

A survey in Germany in 2003 by Hofmockel et al. (10) investigating the countrywide use of muscle relaxants for rapid sequence induction (RSI) found that while 86.8% of anaesthesia departments used SCh for RSI, an average of 56.5% used only SCh for RSI. Chabanne et al. (27) in a study in

the south east of France reported 98% use of SCh for RSI. Karanovic et al. (8) in a similar international study researching the use of SCh in 2011 reported 68% use of SCh for emergency cases. Another study in Croatia reported that SCh was not used for only 6% of emergency cases. In our survey, the use of SCh for emergency surgeries was found to be similar to these studies.

In our country, in the two-year period from January 2001 to December 2002, a study evaluating the anaesthetic methods for emergency obstetrics and gynaecology surgeries retrospectively reported that for 16% of 1225 patients administered general anaesthesia, SCh was used as a muscle relaxant (28). Similarly, in our study, SCh was chosen for emergency caesarean sections at a rate of 16.8% (Table 2).

According to the clinical practice guidelines on general anaesthesia for emergency situations published by the Clinical Practice Committee of the Scandinavian Society of Anaesthesiology and Intensive Care Medicine in 2010 and based on a literature between August 1961 and May 2009, for optimum intubation conditions in emergency situations, 1–1.5 mg kg⁻¹ succinylcholine is recommended and if succinylcholine is contraindicated 0.9–1.2 mg kg⁻¹ rocuronium is an alternative (9). The onset time of effect of rocuronium reduces in a dose-linked fashion. While the duration to onset in highdose rocuronium (60%, outpatient anaesthesia, 1.2 mg kg⁻¹) is similar to SCh, it has been criticized for the long effect duration (27, 29). Recently with the entry of sugammadex in to use the indication areas for rocuronium have increased, and the use of SCh has been questioned more.

Thoughts of Anaesthesiologists on the Use of SCh

In this section where more than one choice could be marked, it was observed that the first reason for choosing SCh was the rapid onset of effect. The next reasons were ability to be used for emergency situations due to the short duration of effect and quick recovery (Table 3). The most accepted disadvantage of SCh was that it caused bradycardia/bradyarrhythmia (Table 3). In the literature there are various numbers of reports of severe bradycardia and development of arrest after administration of SCh (30-33). Bradycardia and development of asystole after administration of SCh may develop with medications used during induction (30) and in patients with hyperkalaemia or patients at risk of possible hyperkalaemia stimulated by SCh administration (for example, skeletal muscle myopathies, muscle trauma and paraplegia) (33). During electroconvulsive therapy (ECT), post-stimulus and after seizure asystole and bradycardia have been reported (30, 31, 33, 34). Post-stimulus bradycardia is described as both an increase in vagal tone caused by stimulation of the hypothalamus and straining against a closed glottis during difficult expiration linked to the valsalva process (30). While the clinical importance of these events is debated, atropine is accepted as generally effective for acute treatment for asystole and as prophylaxis before treatment (35). In our country, a

retrospective study of anaesthesia administration outside the operating room between October 2010 and April 2012 by Türk et al. (36) reported that for 36 cases undergoing 234 sessions of ECT in 90 sessions etomidate+succinylcholine was used, while in 144 sessions propofol+succinylcholine was used. However, they did not mention the complications in these cases. In our study, participants using SCh for adult elective cases reported its use at a rate of 14.6% for ECT administrations (Table 2).

The second disadvantage considered for SCh was myalgia/ fasciculations. A meta-analysis found the incidence of postoperative myalgia in the first 24 h was 51% (10%–83%) and reported the risk of myalgia was reduced at high doses of SCh (1.5 mg kg⁻¹) compared with low doses (1 mg kg⁻¹) (37). Though postoperative myalgia was described at the beginning of the 1950s the pathogenesis is still unclear (37). For prevention a variety of methods, such as low dose of ND-NMBA (37, 38), lidocaine (39), magnesium (40), dexmedetomidine (41) and gabapentin (42), have been suggested before administration of SCh. However, postoperative myalgia has still not been completely prevented. In our study, myalgia was in second place in the list of side effects of SCh with similar rates (n:140%–48%) (Table 3).

Precurarization was reported to be regularly performed before use of SCh by 22.38% (n:63) in our study. A national study in Germany in 2003 found precurarization was administered by 22% (43), while another national study in Germany in 2009 reported precurarization was not performed at rates of 90% and 75% for hospital and outpatient anaesthesia, respectively (23). In our study, there were similar rates of precurarization that were regularly performed by 22.58% (63/279) anaesthetists, sometimes by 6.09% (17/279) anaesthetists and not at all by 71.38% (199/279) anaesthetists.

The second most common side effect was severe muscle pain (n=148), whereas resistant bradyarrhythmias (n=141) was the third one. The opinions related to bradycardia were defined as "resistant bradycardia" in this question; therefore, we thought that "resistant bradycardia" may be not marked enough. In contrast, if the option "bradycardia" was added to options in this question, the choice indicated to this question would be different. However, claims of recovered bradycardia with atropine during anaesthesia induction is due to succinylcholine is not entirely true. Because it is more accurate to say that the atropine-resistant bradycardia is due to succinylcholine, the "resistant bradycardia" option is used in this question.

Study limitations

It is clear that a greater number of participants responding to the survey would increase the value of our study. While it is certain that future studies with more participants will increase the reliability of the obtained data, we believe similar results will be found.

Conclusion

Turkish anaesthesiologists mostly choose SCh for emergency cases, particularly for cases with expected difficult intubation/ ventilation. When possible side effects are considered together with provided advantages, SCh is still widely used in our country. This choice of Turkish anaesthesiologists is in harmony with the current trends in the world.

It is essential that a standard care guide related to departments is created. The first stage in creating a standard care guide is to analyse and document the current administration situation. We believe our study may be a step towards preparing this guide, and this study will be complimented by more comprehensive studies in Turkey with this aim in the future.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Çanakkale Onsekiz Mart University Clinical Research Human Ethics Committee (Date: 23/05/2013. Decision No. 2012/12-03).

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Appendix 1.	
Use of Succinylcholine By anaesthetists in Turkey: National res	earch survey
*Required	B3. If your answer is yes (to B1) mark the CLINICAL
A. Personal Information	a) Expectation of difficult intubation/ventilation
*A1. Age	b) Caesarean section
a) 30 years or younger	c) Uncertainty of patient's preoperative fasting
b) 31–35 years	d) Very short duration anaesthesia
c) 36–40 years	e) Ear, nose and throat (ENT) surgery
d) 41–45 years	f) Obesity, hiatal hernia
e) 46–50 years	g) Electroconvulsive therapy (ECT)
f) 51–55 years	h) Always use for induction of anaesthesia
g) 56–60 years	i) Other
h) 60 years or older	DA ILing maindabaling for showed ELECTRAE CASES A
A2 Gender*	B4. Using succinvictorine for plannea ELECTIVE CASES ao
a) Female	you regularly check preoperative pseudocholinesterase
b) Male	levels:
	a) les b . No
A3. Experience working as anaesthetist (years).*	a) Samatimas
a) 5 years or less	c) sometimes
b) 6-10 years	B5. Before use of succinylcholine do you complete
c) 11-15 years	precurarization (Precurarization: to reduce the muscle
d) 16-20 years	pain caused by succinylcholine 3 minutes before injection
e) 20 years or more	a non-depolarizing muscle relaxant is administered with a
A4. Affiliation*	small dose 1/10-1/5 of the induction dose)
a) University hospital	a) Yes
b) State hospital	b) No
c) Private hospital	c) Sometimes
PI De vou une aussimulabeline fou ADUIT ELECTIVE	d) Other
D1. D0 you use succenyuchoune for ADULI ELECTIVE	B6. Using succinvlcholine for planned ELECTIVE SURGERY
	CASES do vou give a second dose of succinvlcholine?
a) ies	a) Yes I give a second dose
D) INO	b) No I do not give a second dose
B2. If your answer is yes (to B1) how often do you use	c) I give succinvlcholine infusion
succinylcholine for ADULT ELECTIVE CASES?	
a) All the time	B7. If you do not use succinylcholine (if your answer to B1 is
b) Frequently	no) mark your POSSIBLE KEASONS (you may mark more
c) Sometimes	<i>than 1)</i>
d) Rarely	a) There are more appropriate muscle relaxants, no need to use it
	b) Possible development of arrhythmia
	c) Possible development of allergic reaction
	d) Fasciculation

e) Other

Appendix 1. Continued			
Use of Succinylcholine By anaesthetists in Turkey: National research survey			
 B8. If your answer to "B1" was "NO", for HOW LONG have you not used succinylcholine? a) Less than a year b) More than a year C1. Do you use succinylcholine for ELECTIVE PEDIATRIC CASES? a) Yes b) No C2. If your answer to "C1" is "YES", how often do you use succinylcholine for ELECTIVE PEDIATRIC CASES? a) All the time 	 D4. If you do not use succinylcholine what are the reasons? a) There are more appropriate muscle relaxants, no need to use it b) Possible development of arrhythmia c) Fasciculation d) Other E1. According to you, what are the MOST ACCEPTABLE CLINICAL CHARACTERISTICS of succinylcholine? *(you can mark more than 1) a) Fast onset of effect b) Short duration and fast recovery c) Effective and reliable relaxation 		
b) Frequentlyc) Sometimesd) Rarely	 d) Use in emergency situations e) No positive characteristics f) Other 		
 C3. If your answer to "C1" is "YES", mark the CLINICAL SITUATION (you may mark more than 1) a) Expectation of difficult intubation/ventilation b) Uncertainty of patient's preoperative fasting c) Very short duration anaesthesia d) ENT surgery e) Obesity, hiatal hernia f) Always use for induction of anaesthesia g) Other C4. If you do not use succinylcholine for ELECTIVE PEDIATRIC CASES what are the reasons? a) There are more appropriate muscle relaxants, no need to 	 E2. According to you, what are the disadvantages of succinylcholine *(may mark more than 1) a) Myalgia/fasciculations b) Bradycardia/bradyarrhythmia c) Possible hyperkalaemia in some situations d) Triggers malignant hyperthermia e) Long duration of effect (low levels of pseudocholinesterase) f) Possible allergic reaction g) No disadvantages h) Other E3. Have you observed NEGATIVE SIDE EFFECT(S) in		
use it b) Possible development of arrhythmia c) Fasciculation d) Other	 a) Yes b) No E4. If your answer is yes (to E3), please specify the NEGATIVE 		
 D1. Do you use succinylcholine for EMERGENCY CASES? * a) Yes b) No D2. If your answer to "D1" is "YES", how often do you use succinylcholine for EMERGENCY CASES? a) All the time b) Frequently c) Sometimes d) Rarely 	 SIDE EFFECT(S) (may mark more than 1) a) Resistant bradyarrhythmia b) Asystole c) Trismus-masseter spasm d) Severe muscle pain e) Long duration block f) Allergic reaction g) Other 		
 D3. If your answer to "D1" is "YES", mark the CLINICAL SITUATION (you may mark more than 1) a) Risk of aspiration of stomach contents b) Ileus c) Expectation of difficult intubation/ventilation d) To provide fast and reliable muscle relaxation e) Emergency caesarean section f) To provide fast induction of anaesthesia g) Laryngospasm h) Other 			

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