

Variability in risk tolerance and adherence to guidelines in “go or no-go” decisions among anesthetists in Saudi Arabia

ABSTRACT

Background: Anesthetists deal with many situations where they decide whether proceeding with anesthesia is safe or not. These are termed “go or no-go” decisions. Although guidelines have been developed to ensure safe anesthesia, many factors affect anesthetists’ decision in practice. Therefore, we aimed to assess the variability in risk tolerance when making “go or no-go” decisions among anesthetists in Saudi Arabia.

Materials and Method: A questionnaire-based study that included anesthetists practicing in Saudi Arabia from 1--14th October 2017 was conducted. The questionnaire presented 11 clinical scenarios that involved deviation from guidelines, followed by four questions where the participants were asked to decide whether they would proceed with administering anesthesia, write a comment explaining their decision, to predict whether a colleague would make the same decision, and if they had a previous similar experience.

Results: A total of 124 anesthetists responded, of which 56.5% were consultants. There was no absolute consensus over the decision to proceed in any scenario. Most of the respondents who would proceed (67.35%) expected a colleague to make the same decision. Anesthetists who encountered a previous similar experience were more likely to proceed ($P = 0.000$). There was no significant difference among the respondents’ decisions according to years of experience ($P = 0.121$). Analysis of the comments showed that procedure urgency and presence of alternatives to deficient resources were the most frequent factors that dictated anesthetists’ decision.

Conclusion: There is a wide variation in risk tolerance among anesthetists. Further simulation-based studies are needed to identify and address factors that affect anesthetists’ decisions.

Key words: Anesthesia; clinical decision-making; patient safety

Introduction

In the field of health care, anesthesiology is acknowledged as the leading specialty invested in patient safety. Many solutions to safety issues have been developed, including incorporating technologies (i.e., in patient monitoring) and

identifying solutions for human and system factors that contribute to unsafe practices.^[1] Anesthesia and aviation are often compared with each other regarding the improvements in safety.^[2] In aviation, the pilot decides whether the aircraft

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can operate safely or not based on preflight checks. This decision is termed “go or no-go” decision. There are strict “go or no-go” safety standards applied to aid the pilot in making that decision.^[3]

Similarly, anesthetists deal with a wide spectrum of situations where they decide if it is safe or not to proceed with anesthesia. International standards and national guidelines have been developed to assist the anesthetist in making those decisions and minimize critical incidents.^[4,5] However, these guidelines were not strictly and uniformly followed as reported by Greig *et al.*, who found considerable variability in risk tolerance among anesthetists. Safe administration of anesthesia should be a priority to physicians and can be accomplished by strict application of evidence-based guidelines.^[1,6,7]

We hypothesize that there is significant inconsistency in risk tolerance and adherence to guidelines among anesthetists in decision making. Therefore, the aim of our study was to assess the level of variability in risk tolerance when making “go or no-go” decision among anesthetists in Saudi Arabia and identify factors that affect the anesthetist when making those decisions.

Materials and Method

This is a cross-sectional questionnaire-based study that was approved by the Ethical committee of our institution; (Ref. No. 511--17). The study included anesthetists practicing in Saudi Arabia during the study period, whom are estimated to be 800 physicians. The required sample size calculated with 95% confidence interval was 260. Data were collected via a self-administered electronic questionnaire that was distributed online for 2 weeks (October 1--14th, 2017).

The questionnaire used in our study was originally developed by Greig *et al.*^[6] The corresponding author was contacted and the original questionnaire used in their research was obtained with the author's consent to use it in our research. It consisted of 11 scenarios which were constructed after reviewing critical incident data related to anesthesiology [Table 1]. Each scenario presented a clinical situation implicating that guidelines were not fulfilled, followed by four questions where the participants were asked to decide whether they would proceed with the case and rate their answer to this question using a four-point Likert scale, write a comment explaining their decision, whether they had a previous similar experience to the presented case, and to predict whether a colleague with similar experience would make the same decision. The second part of the questionnaire covered

Table 1: Summary of the scenarios

Scenario	Description
1	Elective laparoscopic cholecystectomy; malfunctioning gas analyzer with no FiO ₂ * or agent analyzer
2	Laparoscopic inguinal hernia repair; leaking air hose, but O ₂ and N ₂ O functioning normally; a reserve air cylinder is available
3	Laparoscopic hemicolectomy; patient temperature measuring not available, but all warming devices present
4	Laparoscopic cholecystectomy; theatre temperature 16°C, but all patient warming devices present
5	Knee arthroscopy; theatre gas scavenging system off-line with no immediate prospect of repair
6	TURP; patient speaks little English and you do not speak his language; no hospital translator is available
7	Open colectomy; there are no intensive care unit beds available when the surgery is to begin, but there is a possibility of a bed becoming available later
8	Incision and drainage of an abscess; patient has a history of intravenous drug misuse and is likely to need central venous access; no ultrasound machine is available
9	Open colectomy; cardiologists recommended preoperative assessment visit with anesthetist, which never happened
10	You have had a busy weekend on-call and left the hospital at 05.45 this morning; you have an elective list scheduled to start at 08.30
11	You have a 3 day history of flu-like symptoms, and pyrexia of 37.9°C. You have an elective list to begin at 08.30 this morning

*FiO₂; Fractional inspired oxygen

demographic data and details about anesthesia training of the participants.

The original questionnaire was reviewed by the authors prior to distribution to determine its relevance and applicability based on current guidelines and standards of anesthesia practice followed in Saudi Arabia. Minor modifications were made in order to use familiar terminology. English language was used in constructing and responding to the questionnaire. A pilot study was conducted on a small group and no difficulties were encountered.

Statistical analysis

Continuous variables were presented as mean and standard deviation (SD). Categorical variables were presented as frequencies and percentages. Participants' comments were analyzed using thematic analysis. The association between the decisions to proceed with the procedure (definitely would not, probably would not, probably would, definitely would) and level of practice, total number of years of practice, main place of training, and encountering a previous similar situation were examined by χ^2 test. The analysis was performed in 95% confidence interval. *P* value of <0.05 was considered significant. The analysis was performed using Statistical Package for Social Science (SPSS), version 20 (IBM, Armonk, NY, USA).

Results

A total of 124 anesthetists practicing in Saudi Arabia answered the questionnaire with a response rate of 15.5% [Table 2]. The mean age of all respondents was 42.95 (8.7) years, with 108 (87.1%) male and 16 (12.9%) females. As per level of practice, 70 (56.5%) were consultants, 20 (16.1%) were senior specialist\ senior registrar, 26 (21.0%) were specialists, and eight (6.5%) were residents. Most of the respondents had their main training in anesthesia outside Saudi Arabia (90\123, 73.2%), but all of the respondents were currently practicing in Saudi Arabia.

The anesthetists' responses regarding the decision to proceed or not in each case scenario varied widely [Supplementary Table]. There was no absolute consensus

over the decision to proceed in any scenario. However, a majority of decision was observed in multiple scenarios. In scenarios one, 10, and 11, the majority decision was (not to proceed with the case) chosen by 91.1%, 72.6%, and 80.7% of respondents in each scenario, respectively. In contrast, 70.97% and 83.9% chose to proceed with the case in scenarios three and eight, respectively.

Most anesthetists predicted that colleagues would agree with their decision. Of those who chose "to proceed" in suboptimal conditions, 67.4% expected that a colleague with similar experience would make the same decision. On the other hand, 46.98% of those who chose "not to proceed" expected a colleague with similar training to cancel as well.

Anesthetists with different levels of practice (e.g., consultant, senior specialist, specialist, and resident) gave statistically similar answers regarding the decision to proceed or not (P value 0.18). Variability in decision making was also statistically nonsignificant across the different categories of number of years of practicing anesthesia (P value 0.1). However, when scenarios were analyzed individually, anesthetists with 10 or more years of experience were more likely to cancel the procedure in scenario 11 compared with anesthetists with less years of practice (1--9 years) (P value 0.02). Respondents who encountered a previous similar situation to the scenarios presented were more likely to proceed with the procedures (P value 0.000). There was no statistically significant difference in the decision to proceed when the respondents were compared by the place where they have received the anesthesia training (Saudi Arabia versus other countries) (P value 0.13) [Table 3].

Thematic analysis of the comments showed that procedure urgency, the perceived consequences of the decision especially

Table 2: Characteristics of respondents

Variables	Number (percentage)
Male (%)	108 (87.1%)
Female (%)	16 (12.9%)
Mean age in years (SD)	
Consultants	46.90 (7.96)
Senior specialists	37.5 (5.37)
Specialists	40.27 (6.48)
Residents	29 (2.52)
Mean years of practice (SD)	
Consultants	19.03 (7.77)
Senior specialists	10.55 (3.59)
Specialists	12.23 (5.22)
Residents	3.38 (1.51)
Current city of practice (%)	
Riyadh	45 (36.29%)
Jeddah	33 (26.61%)
Makkah	12 (9.68%)
Eastern	29 (23.39%)
Province (Dammam- Khobar- Ahsa'a)	3 (2.42%)
Al-Medina Al-Monawara	2 (1.61%)
Other cities (Ar'ar-Taif)	

Table 3: Factors affecting "go/no-go" decisions

Factor/Decision	Definitely would not proceed	Probably would not proceed	Probably would proceed	Definitely would proceed	P
Level of training ($n=1364$)					
Consultant	269 (34.9%)	131 (17%)	238 (30.9%)	132 (17.1%)	0.180
Senior Specialist	74 (33.6%)	46 (20.9%)	56 (25.5%)	44 (20%)	
Specialist	99 (34.6%)	58 (20.3%)	91 (31.8%)	38 (13.3%)	
Resident	40 (45.5%)	13 (14.8%)	20 (22.7%)	15 (17%)	
Having a previous similar experience ($n=1358$)					
Yes	260 (31.6%)	131 (15.9%)	263 (32%)	168 (20.4%)	0.000*
No	220 (41%)	117 (21.8%)	139 (25.9%)	60 (11.2%)	
Years of practice ($n=1364$)					
1-9 years	129 (39.1%)	52 (15.8%)	90 (27.3%)	59 (17.9%)	0.121
10-19 years	222 (35.4%)	128 (20.4%)	176 (28.1%)	101 (16.1%)	
≥ 20 years	131 (32.2%)	68 (16.7%)	139 (34.2%)	69 (17%)	
Main Place of training ($n=1353$)					
In Saudi Arabia	122 (33.6%)	61 (16.8%)	105 (28.9%)	75 (20.7%)	0.126
Outside Saudi Arabia	357 (36.1%)	185 (18.7%)	297 (30%)	151 (15.3%)	

* $P < 0.05$ is considered significant

if the consequences were expected to be harmful to the patient, and the presence of alternatives to deficient resources were the most frequent factors that dictated anesthetists' decisions. Many respondents would proceed in the presence of alternatives, especially when the procedure is an emergency. Others mentioned they would cancel until optimal conditions are achieved. Additional factors mentioned in the comments include the presence or lack of resources, adherence to standards, and guidelines and presence of a hospital policy.

Discussion

The study found a wide variation in decision making among anesthetists in Saudi Arabia, which is consistent with previous reports. Even in scenarios where guidelines were clearly not met and a complete "no-go" decision was expected, there were still opposing decisions. For example, in scenario one, there was a majority agreement to cancel the procedure justified by many of the respondents that it would be unsafe to proceed with a nonfunctioning gas analyzer as it carries a risk of awareness and transmitting dangerously high levels of the anesthetic agent to the patient. However, there were still few respondents who chose to proceed, explaining that total intravenous anesthesia could be used safely. On the other hand, a majority decision to proceed was observed in scenarios three and eight. In the eighth scenario, which described that ultrasound was not available for venous catheter insertion, most anesthetists have decided to proceed, particularly those who encountered a previous similar situation. This decision was supported by many participants due to the urgency of the procedure mentioned in the case (abscess drainage) and their experience in central venous catheter (CVC) insertion without ultrasound guidance by relying on anatomical landmarks. Although the evidence supports the use of ultrasound to guide CVC insertion in adult patients as it has been found to reduce the number of complications and increase the safety and quality of CVC placement, most respondents were confident with the blind technique.^[8,9]

The practice of quality anesthesia care requires anesthesiologists to maintain their physical and mental health.^[10] This principle was violated in scenario eleven, which asked whether anesthetists would proceed with the list if they had a 3-day history of flu-like symptoms and pyrexia. Respondents with 10 or more years of experience were more willing to cancel the list, explaining that it will affect the anesthetist's concentration and efficiency, and there is a risk of transmitting the infection to the patients.

Senior anesthetists were found to proceed in suboptimal conditions more than trainees as reported by Greig *et al.* In

contrast, our study found similar decisions among anesthetists across different levels of practice, years of practice, and places of receiving anesthesia training (Saudi Arabia versus other countries). Encountering a previous similar experience was the only strong influencer on decision making in our study. Respondents who encountered a previous similar situation were more likely to proceed than those who did not.

In scenario 10, regarding working with fatigue and few hours of sleep, many mentioned that according to their hospital policy, a day off is given after on-calls and thus ensuring that this scenario is prevented. Similarly, many factors are encountered by anesthetists which may affect their decision including resource availability, external pressure, and procedure urgency. Stating a hospital policy to ensure optimal conditions before commencing with anesthesia is one of the solutions to avoid deviation from guidelines and adopt a safe work environment.

Although the anesthetists' decisions varied widely in all scenarios, most of them expected a high level of agreement with their decision from their peers. Unexpectedly, respondents who chose to proceed "go decision" expected that a colleague with similar experience would make the same decision (67.4%) more than those who chose to cancel the procedures "no-go decision" (46.98%). The expectation that peers would agree with the anesthetists' decision describes that the action of deviating from guidelines is perceived as acceptable or that the environment, resources, and necessity to maintain productivity dictates their decision. Regardless, when deviation from guidelines is believed to be acceptable and tolerated just to maintain productivity, errors occur which jeopardize the patient safety.^[11]

We are knowledgeable of some unavoidable limitations in our study. First, this research was conducted using a questionnaire that presented scenarios with critical incidents. This method of data collection provides less information on the actual behavior of the respondents in these situations. Observing the anesthetists in real-life critical incident or simulation-based studies would be more accurate and informative. However, details that were given in the free text response for each decision have confirmed the credibility of the responses and results.

Conclusion

Anesthetists are frequently compelled to work in conditions that are not ideal due to many individual and organizational factors. Hence, strict application of guidelines and standards of practice would decrease the variability in decision making

regardless of the factors confronted by anesthetists and ensure safe administration of anesthesia.

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Conflicts of interest

There are no conflicts of interest.

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Supplementary Table: Decisions to proceed and samples of participants' comments

Scenario	Level of training	Would you proceed with this procedure?				Sample quotations {level of practice; number of years of experience}	
		Definitely would not proceed	Probably would not proceed	Probably would proceed	Definitely would proceed	"Go" decision	"No-go" decision
Scenario 1	Consultant	58	4	6	2	I would conduct maintenance of anesthesia with TIVA* and BIS†. {consultant; 9 years}	Awareness or dangerously high levels of anesthetic agents or hypoxic mixture could be delivered without functioning gas analyser. It would be very unsafe. {consultant; 18 years}
	Senior specialist	17	2	1	0		
	Specialist	23	2	1	0		
	Residents	7	0	0	1		
Scenario 2	Consultant	24	13	26	7	Confirm that O ₂ and N ₂ O has no issues, use air cylinder and proceed after confirming with surgeon the duration to complete surgery. {Consultant; 17 years}	There is a risk of jeopardizing the patient's safety and all the health workers in the operating room, in case the leak worsened during the case. {Specialist; 10 years}
	Senior specialist	8	0	7	5		
	Specialist	6	7	10	3		
	Residents	2	2	4	0		
Scenario 3	Consultant	10	11	29	20	If warming devices are working properly, then I will warm the patient and give warm fluids. I will check the temperature by other means. {senior specialist; 12 years}	It is a major abdominal case with high risk of hypothermia. I can measure the patient's temperature at least every half an hour even if manually, by using tympanic thermometer from recovery room. Also, I would utilize all warming measures available. Otherwise, I won't proceed with a major elective case without standard monitor. {consultant; 12 years}
	Senior specialist	1	2	10	7		
	Specialist	2	4	14	6		
	Residents	4	2	0	2		
Scenario 4	Consultant	18	17	16	19	Keep the patient warm with air forced warmer, warm intravenous fluids and airway humidification. {Specialist; 13 years}	With very cold ambient temperature patient warming may be inefficient. Also it may be uncomfortable for the staff to work in. {consultant; 18 years}
	Senior specialist	9	4	3	4		
	Specialist	8	5	8	5		
	Residents	2	0	3	3		
Scenario 5	Consultant	17	11	29	13	Change anesthetic technique to TIVA or TCI‡ {Consultant; 13 years}	It is unsafe for the staff to work without scavenging, especially with N ₂ O and inhalational agents. {Consultant; 17 years}
	Senior specialist	2	6	5	7		
	Specialist	6	4	11	5		
	Residents	4	0	2	2		
Scenario 6	Consultant	23	9	29	9	If an official translator is not available, then any staff member can translate my words regarding informed consent. {senior specialist; 20 years}	I can't take full medical history or explain the procedure and adverse events well, if I cannot understand the patient. {senior specialist; 12 years}
	Senior specialist	7	3	4	6		
	Specialist	7	6	9	4		
	Residents	3	1	4	0		
Scenario 7	Consultant	12	15	31	12	I will speak with the surgical and ICU§ colleagues. If a bed is likely to be ready by the time the surgery is expected to finish then I will proceed with the case. This is a semi urgent case and all efforts should be made not to cancel the surgery. {Consultant; 25 years}	I will not proceed, unless I can confirm that an ICU bed will be available by the end of the case for a major complex surgery. {Consultant; 12 years}
	Senior specialist	6	5	8	1		
	Specialist	11	4	8	3		
	Residents	5	0	2	1		
Scenario 8	Consultant	7	2	22	39	Although, US guided is the standard of care, this is an emergency procedure and we have good skills in the blind internal jugular technique. {Consultant; 10 years}	Anatomy may be distorted. {Specialist; 10 years}
	Senior specialist	2	1	8	9		
	Specialist	2	2	15	7		
	Residents	3	1	1	3		

Contd...

Supplementary Table: Contd...

Scenario	Level of training	Would you proceed with this procedure?				Sample quotations {level of practice; number of years of experience}	
		Definitely would not proceed	Probably would not proceed	Probably would proceed	Definitely would proceed	"Go" decision	"No-go" decision
Scenario 9	Consultant	24	15	28	3	It is preferred to see the patient prior to surgery and examine him thoroughly for associated comorbidities as well as explain the associated risks with anesthesia and surgery. However, this is a cancer operation which needs to be done as soon as possible as. He already saw the cardiologist then his medications should have been optimized. {Consultant; 25 years}	The patient should be optimized and risk stratification should be done and explained to him. This patient needs cardiac evaluation and Echo must be done in order to help me design my anesthetic plan and consent him as a high risk patient. {senior specialist; 12 years}
	Senior specialist	6	9	2	3		
	Specialist	13	7	6	0		
	Residents	3	2	3	0		
Scenario 10	Consultant	39	11	14	6	It depends on how I feel. If I felt fit to provide safe anesthesia then I would proceed, otherwise I will ask for help. {Consultant; 23 years}	Sleep deprivation is a major cause of fatigue in the operating room & it can expose the patient to major risks. It is just as unsafe as an anesthesiologist who is drunk on alcohol before giving anesthesia. {senior specialist; 11 years}
	Senior specialist	8	9	3	0		
	Specialist	10	7	7	2		
	Residents	4	2	0	2		
Scenario 11	Consultant	37	23	8	2	I would take extra precautions not to transmit my infection to others. {senior specialist; 11 years}	This will negatively affect my concentration and performance. {Consultant; 28 years}
	Senior specialist	8	5	5	2		
	Specialist	11	10	2	3		
	Residents	3	3	1	1		

*TIVA: Total intravenous anesthesia; ¹BIS: Bispectral Index; [†]TCI: target controlled infusion; [§]ICU: Intensive care unit; ^{||}PACU: Post anesthesia care unit