Archives of Anesthesiology and Critical Care (In Press); x(x): xx-xx.

Available online at http://aacc.tums.ac.ir

Research Article

Evaluating the Decision-Making Proficiency Among Medical Residents at Tehran University of Medical Sciences in the Year 2022-2023: A Descriptive Cross-Sectional Study

Alireza Montaseri, Hamidreza Amiri, Babak Eslami, Maryam Parnian, Ridda*

Department of Anesthesiology and Critical Care, Imam Khomeini Hospital, Tehran University of Medical Sciences,Tehran, Iran.

ARTICLE INFO

Article history:
Received 01 September 2023
Revised 22 September 2023
Accepted 06 October 2023

Keywords:
Decision making proficiency;
Common biases;
Physicians;
Health care system

ABSTRACT

Background: To evaluate the decision-making proficiency among medical residents at Tehran University of Medical Sciences in the year 2022-2023.
Methods: A structured online web-survey via national approved services Author's designed questionnaire was used to collect the relative data based on variables of the study and was developed by the authors of the study by reviewing the previously conducted studies. The forms were sent to the medical residents at Tehran University of Medical Sciences as a link via electronic mail and social media; assistance was offered via direct or indirect contact upon request.
Results: In this study, 88 medical residents of Tehran University of Medical Sciences were evaluated. Out of 88 participants, the frequency of females was 52(59.09%) and frequency of males was found out to be 36(40.91%). The frequency of the first- year residents was 28(37.50), second year residents was 33(21.59), third year residents was 19(9.09) and the fourth- year residents was found out to be 8(31.82). The frequency of different specialties were: Pathology 1(1.14%), Infectious diseases 1(1.14%), Cardio vascular diseases 1(1.14%), Emergency medicine 1(1.14%), Orthopedics2(2.27%), Psychiatry 3(3.41%), ENT 12(13.64%), Internal Medicine 13(14.77%), Pediatrics13(14.77%), OB&GYN 19(21.59%), Anesthesiology19(21.59%), Dermatology 2(2.27%), General Surgery 1(1.14%).
Conclusion: There is a significant relationship based on linear regression between not having self - reported availability bias and surgical residency specialties. The surgical specialty is less prone to the availability bias. A difference of communication exists between the surgical and nonsurgical speciality and the nonsurgical specialties need to confirm their decision using other methods to prevent the patient harm.

Introduction

Decision-making can range from quick, intuitive, or heuristic decisions to well-reasoned, analytical, and evidence-based decisions that impact patient care. There are many ways to make decisions: On the one hand, we use our intuition and experience to make decisions, while in general there are many simple decisions to be made. At the other end of the spectrum, complex decisions can be made where the level of uncertainty is high and where an analytical and evidence-based approach is required, using rule-based heuristics or the experiences we have accumulated over time in "similar" situations [1] Decision-making is the process by which an individual, group or organization arrives at a conclusion about future action, given a set of goals and limitations of available resources [2]. Clinical decision-making is a blend of the science of evidence-based medicine and the art of collaborative healthcare decision-making [3].

The authors declare no conflicts of interest.
*Corresponding author.
E-mail address: montix3@gmail.com

Heuristics play a key role in discussions about decision making. We also use them in medicine. Heuristics are simply informal methods of problem solving, like trial and error, that lead to quick solutions. Experts are rarely aware of the heuristic cognitive pathways they use to make decisions. While heuristics are essential to our ability to make difficult decisions for many patients each day, our use should also be regularly reviewed and incorporated into convenient troubleshooting format to promote consistency and accuracy in our clinical assessments [4]. Physicians are confronted with many clinical decisions of varying complexity in their daily practice. Most of these decisions concern issues related to the diagnosis and treatment of patients. In making decisions, physicians typically use their "accumulated clinical knowledge," defined as the physician's personal knowledge base accumulated through years of formal education, medical training, research, and clinical experience, [5-6] to answer clinical questions. The accumulated clinical knowledge is traditionally used by physicians as it is the most practical source of information in healthcare. This is particularly important in critical situations, such as the emergency room, where diagnosis and treatment may be needed immediately. However, relying solely on this knowledge can lead to medical errors if these clinical questions remain unanswered or are not supported by the most recent medical literature [7]. Conducting this type of research is important for participating in health care and helps us understand the health conditions and treatment options needed to make the best health decisions for us. These studies are part of the research that provides the evidence needed to optimally design new therapies, implement protocols to improve quality of care, and increase the efficiency and capacity of the public health system [8]. They can also be used to assess patient responses to various factors such as: satisfaction with the physician's experience, bedside behavior and communication skills [9].

Methods

A structured online web-survey via national approved services Author's designed questionnaire was used to collect the relative data based on variables of the study and was developed by the authors of the study by reviewing the previously conducted studies. The forms were sent to the medical residents at Tehran University of Medical Sciences. The survey was sent as a link via electronic mail and social media; assistance was offered via direct or indirect contact upon request.

Inclusion Criteria: The study population of this survey included medical residents of all years.

Exclusion Criteria: None of the medical residents of Tehran University of Medical Science were excluded in this survey.

Statistical Analysis

Data analysis was done with SPSS Version 28 software. Categorical variables were compared using Fisher's exact or chi 2 tests, and continuous variables were compared using t test, ANOVA and chi square. Univariate analyses and multivariate analyses was performed. Data was presented as mean ± standard deviation(SD) for continuous variables and P value <0.05 was considered statistically significant.

Variables: Age, gender, type of specialty, residency year level, clinical experience, academic rank.

Sample

In this study, 88 medical residents of Tehran University of Medical Sciences were evaluated.

Results

(Table 1) shows the frequency of male and female medical residents of Tehran University of Medical Sciences who participated in the study. Out of 88 participants, the frequency of female was 52(59.09%) and frequency of males was found out to be 36(40.91%).

(Table 2) depicts the frequency of residency year level of the participating medical residents of Tehran University of Medical Sciences. Out of the 88 participants, the frequency of the first -year residents was28(37.50), second year residents was33(21.59), third year residents was19(9.09) and the fourth year residents was found out to be 8(31.82).

(Table 3) shows the frequency of different specialties among the medical residents of Tehran University of Medical Sciences who participated in the study. Out of 88 participants, the frequency of Pathology was 1(1.14%), Infectious diseases 1(1.14%), Cardiovascular diseases1(1.14%), Emergency medicine 1(1.14%), Orthopedics 2 (2.27%), Psychiatry 3(3.41%), ENT 12(13.64%), Internal Medicine 13(14.77%), Pediatrics 13(14.77%), OB&GYN19(21.59%), Anesthesiology 19(21.59%), Dermatology 2(2.27%), General Surgery 1(1.14%).

In this study, we categorized the specialty into two categories: Surgical and Non-Surgical. Emergency medicine and Anesthesiology were categorized as non-surgical and the rest as surgical.

The above table depicts that the mean age of the 88 participants of the study which was 33.01 with the standard deviation of 4.84. The minimum age of the participants was found to be 28 and the maximum was 57.

(Table 4) depicts that the mean age of the 88 participants of the study which was 33.01 with the standard deviation of 4.84. The minimum age of the participants was found to be 28 and the maximum was 57.

(Table 5) shows the mean of the clinical experience of the participants was 3.30 with the standard deviation of 4.79.

(Table 6) shows the mean score, standard deviation, maximum and minimum score for each question.

According to the (Table 7), the mean and the standard deviation of the different biases.

In the regression we performed in (Table 8), we demonstrated an insignificant relationship between the fourth-year residency level and the Availability bias (0.646*). Further, we found a negative relationship between surgical specialty and the availability bias meaning that they scored less for availability questions. This indicates that they are less prone to this bias.

As per the correlation (Table 9), we found that the surgical specialty had an invert relation with the availability bias. More the residency level goes up, there is more likely the confirmation and availability bias. We did not find any significant relationship between the female gender and the availability bias.

Also, we did not find any significant relationship between the ages of the medical residents and the decision -making biases. Further, no significant relationship was found between the medical residents and their clinical experiences.

Table 1- Gender

Variable	Category	Frequency	Percent
Gender	Female	52	50.09
	Male	36	49.91

Table 2- Residency Year Level

Variable	Category	Frequency	Percent
Level	First	28	37.50
	Second	33	21.59
	Third	19	9.09
	Fourth	8	31.82

Table 3- Specialty

Variable	Category	Frequency	Percent
Specialty	Pathology	1	1.14
	Infectious diseases	1	1.14
	Cardiovascular diseases	1	1.14
	Emergency Medicine	1	1.14
	Orthopedics	2	2.27
	Psychiatry	3	3.41
	ENT	12	13.64
	Internal Medicine	13	14.77
	Pediatrics	13	14.77
	OB & GYN	19	21.59
	Anesthesiology	19	21.59
	Dermatology	2	2.27
	General Surgery	1	1.14

Table 4- Age

Variable	N	Mean	Std. deviation	min	max
Age	88	33.01	4.84	28	57

Table 5- Experience

Variable	N	Mean	sd	min	max
Experience	88	3.30	4.79	0	30

Table 6- Mean Score,Standard Deviation,Maximum and Minimum Score for each question of the questionnaire

	N	mean	sd	min	max
Q1	88	2.71	1.16	0	5
Q2	88	2.77	1.08	1	5
Q3	88	2.54	1.12	0	5
Q4	88	2.35	1.10	0	5
Q5	88	2.58	1.11	0	5
Q6	88	2.89	1.20	0	5
Q7	88	1.89	1.07	0	5
Q8	88	2.08	1.10	0	4
Q9	88	2.67	1.05	0	5
Q10	88	2.19	1.02	0	4
Q11	88	1.36	1.35	0	5
Q12	88	1.75	1.17	0	4
Q13	88	1.44	1.29	0	4
Q14	88	2.23	1.08	0	4
Q15	88	1.90	1.11	0	5

Table 7- Mean Score, Standard Deviation, Maximum and Minimum Score of the decision making biases

Variables	N	mean	Std. deviation	min	max
Total Score	88	2.16	0.54	0.8	3.13
Availability	88	2.59	0.77	0.6	5
Representativeness	88	2.13	0.73	0.25	3.75
Confirmation	88	1.81	0.76	0.167	3.67

Table 8-Regression table

	Dependent Variables			
Variables	**Total Score**	**Availability**	**Representativeness**	**Confirmation**
Experience	-0.00961	-0.0193	0.0231	-0.0233
	(0.0133)	(0.0212)	(0.0182)	(0.0240)
Female	0.0744	0.254	0.00996	-0.0321
	(0.126)	(0.169)	(0.192)	(0.167)
2.Level	-0.0518	0.239	-0.00511	-0.325

	(0.144)	(0.181)	(0.191)	(0.209)
3.Level	-0.117	0.0444	-0.120	-0.249
	(0.183)	(0.231)	(0.259)	(0.241)
4.Level	0.191	0.646*	0.108	-0.132
	(0.149)	(0.356)	(0.299)	(0.235)
Surgical	-0.0678	-0.395**	0.112	0.0843
	(0.123)	(0.154)	(0.165)	(0.172)
Constant	2.199***	2.501***	2.023***	2.064
	(0.168)	(0.214)	(0.259)	(0.243)
Observations	88	88	88	88
R-squared	.043	0.171	0.032	0.054

Robust standard errors in parentheses, ***p<0.01, **p<0.05, *p<0.1

Table 9- Correlation

Variables	Age	Experience	Surgical	Female	Level
Total score	-0.114	-0.084	-0.048	0.110	0.029
Availability	-0.155	-0.122	-0.237*	0.162	0.184
Representativeness	0.119	0,138	0.042	-0.001	-0.040
Confirmation	-0.147	-0.134	0.089	0.059	-0.077
Q1	0.003	-0.011	-0.309*	-0.064	0.208
Q2	-0.169	-0.002	-0.180	0.211*	-0.061
Q3	-0.056	-0.099	-0.137	0.117	0.314*
Q4	-0.117	-0.114	-0.042	0.141	0.148
Q5	-0.202	-0.196	-0.142	0.164	0.010
Q6	0.216*	0.228*	-0.022	-0.098	-0.112
Q7	0.060	0.077	0.129	-0.002	-0.173
Q8	0.076	0.029	0.049	0.146	0.071
Q9	-0.058	0.015	-0.040	-0.041	0.119
Q10	-0.187	-0.168	-0.013	-0.047	-0.052
Q11	-0.038	-0.006	0.185	0.070	0.229*
Q12	-0.152	-0.157	0.030	-0.080	0.111
Q14	-0.157	-0.149	0.325*	0.107	0.253*
Q15	-0.062	-0.066	-0.146	0.025	0.083

Discussion

Clinical decision making is a multidimensional process that is influenced by several factors. Proper clinical decision making is important as it addresses the need for accurate diagnosis as well as the costs associated with inappropriate or overuse of diagnostic tests [10]. Conducting this type of research is important for participating in health care and helps us understand the health conditions and treatment options needed to make the best health decisions for us. These studies are part of the scientific research that provides the evidence needed to optimally design new therapies, implement protocols to improve quality of care, and increase the efficiency and capacity of the public health system [8]. They can also be used to assess the patient's responses to various factors, such as satisfaction with the physician's experience, bedside behavior and communication skills [9]. This study examined the key factors influencing clinical decision-making by medical residents.

One of the objective of our study was to evaluate the decision making proficiency among medical residents at Tehran University of Medical Sciences according to gender. The sample size for our study was 88 residents, 59.09% women and 40.91% men. We found no significant association between female gender and availability bias. If the population studied were larger, we could probably make a connection between the two. In contradiction to our study, a study by Tiffany Champagne-Lgabeer and Andrew L. Hedges [11] found that physician gender as a source of bias suggests that there are differences between male and female physicians in clinical decision-making in some health areas and these biases can manifest themselves in behavioral outcomes and performance. In contradiction to our study, a study by R. Gotlieb [12] shows that male physicians used more heuristics and made decisions faster. Female doctors were more thorough and took longer to evaluate information. Another aim of our study was to assess the decision-making skills of resident physicians at Tehran University of Medical Sciences according to residency year level. Of the 88 participants, 28 were in their first year (37.50%), 33 in their second year (21.59%), and 19 in their third year (9.09%). An inverse relationship was found between the residency year level and the

availability and confirmation bias. More the residency level goes up, there is more likely the confirmation and availability bias. Similarly, a study by Silvia Mamade [13] found that second-year residents made errors consistent with an availability bias. Also, no significant association was found between fourth-year residents and availability bias. According to the aim of our study, which was the evaluation of the decision-making proficiency of medical residents at Tehran University of Medical Sciences according to type of specialty. In our study, most of the participants were specialized in obstetrics and gynecology (21% vs.59%) and anesthesiology (21.59%), followed by ENT (13.64%). In this study, we categorized the specialty into two categories: surgical and non-surgical. Emergency medicine and anesthesiology were classified as non-surgical and the rest as surgical. We found a significant association between surgical specialty and availability bias. We have a negative association between surgical specialty and availability bias, meaning they scored less on availability questions. This makes them less prone to this type of error. Similarly, a study by Waldrop RD [14] concluded that anchoring as one of the biggest biases in emergency medicine. Another study found that one of the three judgmental heuristics used to make decisions in uncertain situations with scarce information is anchor bias. Two other heuristics are representativeness and availability [15].

The mean age of the 88 participants of our study was 33.01 with the standard deviation of 4.84. We did not find any significant relationship between the ages of the medical residents and the decision making biases. According to a study conducted by EVA, KEVIN Wz [16], the greater the number of cases one has seen, the more prior examples one should have available to draw upon. Consistent with this framework, diagnostic accuracy in the context that would be expected to elicit decisions based primarily on nonanalytic processes has been shown to increase with age.

Also, no significant relationship was found between the medical residents and their clinical experiences. In a study conducted by FM Hajjaj, MS Salek and AY Finlay [17]. Physicians continue to use personal experience as part of their decision-making process and are subject to a wide range of influences, despite the recent emphasis on the use of Evidence based Medicine. In a study conducted by DargahiH [18], findings showed that increasing clinical experience increased diagnostic accuracy and changed cognitive medical errors. Similarly, the results of the study of Perona et al. [19], shows that clinical knowledge and skills and clinical experience are key factors in emergency care personnel's clinical decision-making. Lack of those capabilities poses a challenge when the personnel should make clinical decisions and adversely affects the quality and safety of the care. In a study conducted by Aghil Habibi Soola [20], mean scores of the Triage Decision Making and its subscales based on the self-reported levels of nursing proficiency, from novice to expert, were higher in expert nurses than in novice, advanced beginner, competent, and proficient nurses. In a study conducted by Silvia Mamade [13] more experienced residents would be more prone to the availability bias. According to the study by Tversky [21], certainly, representativeness seems to be a tool used by experienced physicians to match the salient features of a patient's presentation to a database of prior experiences.

Study Limitations

The main limitation of this study was that it was self reported. Due to less population studied, we recommend more studies should be done in this regard with wider population. Also the reliability and Validity of the questionnaire was not checked.

Conclusion

This study comes to a conclusion that there is a significant relationship based on linear regression between not having self - reported availability bias and surgical residency specialties. The surgical specialty is less prone to the availability bias. A difference of communication exists between the surgical and nonsurgical specialty and the nonsurgical specialties need to confirm their decision using other methods to prevent the patient harm.

Acknowledgements

The authors would like to thank the statistics consultants of the Research Development Center of Imam Khomeini Hospital for their technical Assistance.

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