

# Tolerance of Uncertainty and Fear of Making Mistakes Among Clinical Year Medical Students: A Cross Sectional Study

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## Abstract

Medical students go through self-doubt and uncertainties every single day. We have been in these positions personally, experiencing fear and second guessing. The study was aimed to understand how most medical students think in these situations and how much they were able to get through it, also what factors led these medical students to second guess themselves, such as gender, family background, clinical training and the awareness of medical negligence. A cross sectional study was conducted among the clinical phase medical students of Manipal University College Malaysia. An online questionnaire was distributed and a total of 126 participants responded. The data was statistically analyzed using Epi Info version 7.2.4.0. The independent and dependent variables were all calculated with frequency and percentage, and Chi Square Test was chosen to study the associations between them. Odds Ratio was also calculated to explore the associations between the independent variables and tolerance of uncertainty along with fear of making mistakes among clinical year medical students. Findings revealed that the number of students tolerating uncertainty quite well were about 70 (55.6%) compared to tolerating uncertainty poorly which was 51 (40.5%). 5 students were found tolerating uncertainty well (4.0%). Students who belong to a low socioeconomic status were found to be 5.38 times more likely to tolerate uncertainty poorly as compared to those from a high socioeconomic status family (95% CI for OR 1.70-17.06; P-value 0.003). It was also observed that students from a moderate socioeconomic status family were 2.93 times more likely to tolerate uncertainty poorly than those from a high socioeconomic status family (95% CI for OR 1.31 to 6.57; P-value: 0.008). All other variables were found to be insignificant. In summary it was seen that students coming from low or moderate socioeconomic backgrounds were more likely to tolerate uncertainty poorly compared to others. While we assume that most of these students have a fear of making mistakes when carrying out their doctor work, most of them were willing to acknowledge the mistakes made by providing an explanation to their patients, supervisor and their working community rather than trying to hide their mistakes. Our future medical care and efficiency is dependent on these medical students, further studies are needed to help medical students overcome their tolerance of uncertainty and fear of making mistakes.

## Keywords

Tolerance of Uncertainty, Fear of Making Mistakes, Clinical Year Medical Students, Cross-Sectional Study, Malaysia

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## 1. Introduction

Medical practise is renowned for being filled with uncertainty. Even the most experienced doctors face uncertainty, especially when it comes to complicated comorbid medical conditions that can make it difficult to apply established medical evidence. [1] Tolerance of uncertainty is defined as the set of negative and positive psychological responses—cognitive, emotional and behavioural—provoked by the conscious awareness of ignorance about particular aspects of the world. [2] Uncertainty in health care refers to a variety of unknowns, including whether or not a patient has or may acquire a specific illness; how that condition will evolve; the degree to which a particular medication is beneficial; and whether or not a patient is receiving the appropriate care, at the appropriate time and from the appropriate people. Uncertainty is a common issue due to the sheer number and variety of unknowns. Uncertainty can be aversive; vast bodies of studies from a variety of disciplines, both within and outside the health-care sphere, have shown that uncertainty causes apprehension, concern, and anxiety, as well as feelings of insecurity and decision-making avoidance. [3] Students had become more afraid of making errors during their first clinical years as they understand the possible effects of their mistakes.

Tolerance of uncertainty, as described, is linked with the decision of specialty. [5, 6, 7] Psychiatrists and physicians who graduated medical school later in life and were willing to prescribe novel predictive tests had a higher tolerance for uncertainty, according to Geller *et al.* Women, surgeons, general practitioners, and physicians who had been practising for a shorter time appeared to be more stressed by uncertainty, according to Gerrity *et al.* Similarly, surgeons were slightly less tolerant of uncertainty than physicians in a study using Budner's Intolerance of Ambiguity Scale. [1]

Characteristics like age, gender and different personalities can play a role in the specialty choice, hence are indirectly linked to tolerance of uncertainty. [6-9] A research study by Geller *et al.* proved that there was a distinct relationship between tolerance of uncertainty and gender, where female students had a higher tolerance of uncertainty. The study also stated that tolerance of uncertainty and age at entry of medical school had a significant relationship, where those who first joined medical school at an older age tend to have a higher tolerance of uncertainty. The study, however, showed that there was no association between tolerance of uncertainty and medical school years. [10] Students who were just commencing clinical training were fearful of making mistakes, and they fear to be seen as unprofessional in front of patients and senior doctors. [11] Physicians with lesser practice experience had

significantly greater malpractice fear than physicians with more than 10 years of experience. [12] Also, physicians who were aware of medical negligence were more concerned and more likely to order certain diagnostic tests, which was consistent with defensive medicine practice. [13] It's a good clinical practice as awareness of medical errors will lead to an attempt of preventing their occurrence. [14]

To ensure the quality of care given to patients, the ability to communicate is crucial. [20-24] Patients with communication issues were three times more prone than patients without such issues to encounter a preventable adverse incident, which were mostly due to medications or poor clinical management and these patients may need hospital readmission. Factors like foreign country of origin and unfamiliarity with the official language were linked to poor comprehension of diagnosis, prognosis and treatment in these patients. [15] Furthermore, the impact of language barrier on nurses caused problems with general communication, conveying information, and ensuring quality of care, which eventually caused stress. Physicians encountering language barriers had described similar difficulties, including the inability to communicate effectively, elicit good history taking, causing a fear of misdiagnosis and eventual stress. [16]

Among medical students who are about to begin their first clinical year, the fear of making mistakes was the most common cause of anxiety. [4] Ward is indeed the best place to learn but it only meets a small portion of the learner's needs. [17] In fact, the fear of making mistakes in medical clinical year students mainly occurred when they were in the wards. [18] Based on a qualitative study by Sharif *et al.*, a clinical student stated that on his/her first day, the worry of providing wrong information to the patient was the reason for feeling anxious. [18] The insufficient knowledge on clinical skills and procedure of examination resulted in lack of confidence in the student. Another one revealed the fear of failure and making mistakes arose from the inability to change a colostomy dressing in a desired timeframe. Along with the shaky hands while changing the dressing, he/she felt embarrassed in front of the patients and instructor. [18] Inevitably, this led to a loss of confidence. Furthermore, the ward doctors were not concerned about the students because they were busy with their duties. [18] This limited the opportunity of learning in students as the ward doctors were unable to teach and treat at the same time.

Medical clinical year students were thought to have fear and anxiety when they were in the medical ward or during clinical classes. Fear is a protective response towards any threat and as for anxiety it is similar to fear but with an increase in autonomic arousal. [17] Due to uncertainty towards taking a medical history, performing examination skills, coming into a diagnosis and planning the treatment, medical students tend to have fear and anxiety to approach a patient willingly. [25] Students

developed these emotions due to the stress when they were approached by the lecturers, such as when the instructions provided and the outcome did not match the expectations of the lecturers. In the previous study done, it showed that there was a lack of care and guidance by the lecturers thus these students found it difficult to discuss patients' illnesses with lecturers and they lacked the confidence to perform certain clinical examinations. [25] Students also felt pressured when they were being compared to their peers by their intellectual capabilities. Previous studies had also shown that a good number of students experienced competition between peers in clinical practice and therefore were not able to get along with the other peers in the group to carry out clinical discussions which was supposed to aid in better learning and understanding. [25] Last but not least, one's family's household income also played a big role in portraying the fear and anxiety in a medical student's life. Students coming from a lower-than-average household income tend to have the fear of failing, causing more financial burden to their family and might have to sacrifice much more than the others to have a decent life ahead. [19]

To our knowledge, research that assesses the tolerance of uncertainties and fear of making mistakes among the clinical year students in Malaysia are limited. By keeping that in mind the questionnaire has been set to get the most information out of our clinical year students. This group of research subjects belong to multiple ethnic groups and different genders of MUCM to make our research more accurate.

The objective of doing this research is to understand the fear and uncertainty that medical students face in their daily lives. We aim to understand how most students think once they are put into such a position. Most importantly how aware medical students are about the uncertainties they carry with themselves every day. In addition to that we wish to find out how aware medical students are about medical negligence if it can lead to uncertainties and fears. We aim to find out what factors lead these medical students to second guess themselves, such as gender, family background, clinical training and the awareness of medical negligence.

## 2. Methods

### 2.1. Study Design, Setting, Time and Population

A cross sectional study on the tolerance of uncertainty and fear of making mistakes was carried out by distribution of an electronic survey/questionnaire. This questionnaire was distributed among the clinical year students of Melaka University College Manipal in the Muar and Melaka campus and was being conducted from March to April 2021. The Muar campus comprised of two batches which were batch 41

and 42 while Melaka campus consisted of 3 batches which were batch 38, 39 and 40. This study included the MBBS students from Melaka campus, with each batch consisting a total of 150 students, while for batch 41 and 42 there were about 87 students. The total number of students that were doing the clinical years were about 647.

### 2.2. Sample Size

Based on a previous study, it was found that 22.0% of students had tolerance of uncertainty and fear of making mistakes in the clinical year. [4] The population of MBBS students of batch 38, 39, 40, 41 and 42 was taken as 647.

Using Epi Info version 7.2.4.0, the sample size determined is shown below:

StatCalc – Sample Size and Power

#### Population Survey or Descriptive Study

Population size	647
Expected frequency	22.0%
Acceptable margin of error	7.0%
Design effect	1.0
Clusters	1

Confidence level	Cluster size	Total sample
80%	53	53
90%	83	83
95%	111	111
97%	131	131
99%	171	171
99.9%	239	239
99.99%	291	291

Figure 1. Minimum sample size calculation with Epi Info.

With the acceptable margin of error being 7%, the minimum sample size that was obtained is 111. By allowing a non-response rate of 30%, the final sample size is calculated as below:

$$n(\text{final}) = \frac{n(\text{calculated})}{1 - (\text{non responding})} = \frac{111}{1 - 0.3} = 158.57$$

The final sample size that was taken is 159.

### 2.3. Sampling

Among the population of MBBS students from batch 38, 39, 40, 41 and 42, the questionnaire was distributed. The inclusion criteria were the medical students doing their clinical postings and those who voluntarily agreed to participate and fill the questionnaire with their consent. Exclusive criteria were pre-clinical medical students and students who did not fill the questionnaire or who did not wish to participate in the study. This method of sample collection is purposive sampling, a non-probability method.

### 2.4. Data Collection

A questionnaire was distributed via Google form to the

targeted clinical year MBBS students in Manipal University College Malaysia (MUCM). After informed consent was given, the data was then collected.

Independent variables of this study were age, gender, ethnicity, nationality, language proficiency, academic semester, scholarship award, first-degree relatives as medical doctors, first-degree relatives or relatives as general practitioners, socioeconomic status, clinical exposures (separated into online electives and physical clinical attachments) and awareness of medical negligence. Dependent variables of this study were uncertainty and fear of making mistakes. Association between the independent variables and dependent variables were to be analysed.

The questionnaire was obtained, reconstructed and finalized based on the previous research article. [4] It consisted of 3 parts: 1) Sociodemographic profile; 2) Uncertainty; General Practitioner's work in the view of students; and 3) Questions on fear of making mistakes.

Part 1 was designed to collect the students' age, gender, ethnicity, nationality, spoken languages, academic semester, scholarship status, family income, clinical attachment exposures, awareness of medical negligence and to know if they're related to any family members working as a medical doctor or general practitioner.

Part 2 of the questionnaire was set to inquire if the students tolerated uncertainty when a medical decision was to be made. Three choices were listed under the question: I tolerate uncertainty (1) very well, (2) well and (3) I have difficulties in tolerating uncertainty. Students were also asked about the attractive and unattractive features in a General Practitioner's work, where they were given the option to select as many features as they would like under the 2 questions. 8 attractive

features and 9 unattractive features were included as options, respectively.

Part 3 was targeted towards the students' fear of making mistakes. It consisted of 5 "Yes" and "No" questions. A scenario with 5 attitudes were given and the students were expected to choose either yes or no for each attitude: (Attitude 1) I would try to hide it, (Attitude 2) I would inform my supervisor, (Attitude 3) I would tell the patient and offer an explanation, (Attitude 4) I would tell the patients and apologize, (Attitude 5) I would try to attribute the error to my work community.

## 2.5. Data Processing and Data Analysis

Responses were downloaded from Google Forms in the form of Microsoft Excel. The data were then analysed statistically using Epi Info Version 7.2.0.1. The independent and dependent variables of the study were all qualitative data. Thus, the independent variables (age, gender, ethnicity, nationality, spoken languages, academic year, scholarship status, first-degree relatives as medical doctors, first-degree relatives or relatives as general practitioners, socioeconomic status, clinical exposures (separated into online electives and physical clinical attachments) and awareness of medical negligence); and the dependent variables (tolerance of uncertainty and fear of making mistakes), were all calculated with frequency and percentage. Chi Square Test was chosen to study the associations between the independent variables and dependent variables. Odds Ratio was also calculated to explore the associations between the independent variables and tolerance of uncertainty along with fear of making mistakes among clinical year medical students in Manipal University College Malaysia (MUCM).

In the study, the following statistical test was used:

**Table 1.** Statistical tests applied to analyse the association between the independent and dependent variables.

Independent variable	Dependent variable	Statistical test
Age	Tolerance of Uncertainty	Chi Square test
Gender	Tolerance of Uncertainty	Chi Square test
Ethnicity	Tolerance of Uncertainty	Chi Square test
Nationality	Tolerance of Uncertainty	Chi Square test
Language	Tolerance of Uncertainty	Chi Square test
Academic year	Tolerance of Uncertainty	Chi Square test
Scholarship	Tolerance of Uncertainty	Chi Square test
First-degree relatives as medical doctors	Tolerance of Uncertainty	Chi Square test
First-degree relatives or relatives as general practitioners	Tolerance of Uncertainty	Chi Square test
Socioeconomic status	Tolerance of Uncertainty	Chi Square test
Electives	Tolerance of Uncertainty	Chi Square test
Awareness of medical negligence	Tolerance of Uncertainty	Chi Square test

Independent variable	Dependent variable	Statistical test
Gender	Fear of Making Mistakes	Chi Square test
First-degree relatives as medical doctors	Fear of Making Mistakes	Chi Square test
First-degree relatives and relatives as general practitioners	Fear of Making Mistakes	Chi Square test
Awareness of medical negligence	Fear of Making Mistakes	Chi Square test

## 2.6. Ethical Consideration

The study was approved by the Research Ethics Committee, Faculty of Medicine, Manipal University College Malaysia. Participants were asked to complete an informed consent letter in the first portion of the questionnaire to respond anonymously to the online survey. All participants were given information about the research purpose, information confidentiality, and the right to withdraw participation at any time without explanation in the consent form.

## 3. Results

**Table 2.** Sociodemographic details of clinical year medical students (n = 126).

Variable		Frequency (n)	Percentage (%)
Age	<23	43	34.1
	≥23	83	65.9
Gender	Female	87	69.1
	Male	39	31
	Chinese	31	24.6
Ethnicity	Indian	54	42.9
	Malay	19	15.1
	Others	22	17.5
Nationality	Malaysian	104	82.5
	Non-Malaysian	22	17.5
Language	≤2	67	53.2
	>2	59	46.8
Academic year	Year 4	96	76.2
	Year 5	30	23.8
Scholarship	Yes	101	80.2
	No	25	19.8
First degree relatives as medical doctors	Yes	29	23
	No	97	77
First degree relatives or relatives as general practitioners	Yes	63	50
	No	63	50
Socioeconomic status (family income)	Low	17	13.5
	Moderate	50	39.7
	High	59	46.8
Electives	Yes	35	27.8
	Online	11	27.5
Awareness of medical negligence	Physical	29	72.5
	No	91	72.2
	Yes	105	83.3
	No	21	16.7

A Google Form questionnaire consisting of 13 independent and 7 dependent questions were distributed to the MUCM medical students of batch 38, 39, 40, 41 and 42. The total participants who responded, were 126 and were in the age range of 20 - 27. The responses received from the age ≥23 were 83 (65.9%) compared to <23 that were 43 (34.1%). Besides that, female gender had more responses about 87 (69.1%) compared to male that was 39 (31%). In terms of ethnicity, Indian students had the highest response received that was about 54 (42.9%). The second highest ethnicity that had responded to our study was Chinese students with 31 (24.6%). Then the Malay and other students that responded were about 19 (15.1%) and 22 (17.5%),

respectively. Based on the Nationality, the responses received were more from Malaysians that was 104 (82.5%) compared to non-Malaysians that was 22 (17.5%). From the responses received, students from Manipal were able to speak many different languages, for example English, Malay, Chinese, Tamil and Sinhala. There were a majority of students of 67 (53.2%) that could only speak ≤ 2 languages and 59 (46.8%) students that were able to speak >2 different languages. A large number of responses received from fourth year academic students were about 96 (76.2%) and the rest were from the fifth-year medical students, 30 (23.8%). From the study, 101 (80.2%) students were scholarship recipients and 25 (19.8%) did not receive any scholarships. Looking at the responses received, students from Manipal that did not have first degree relatives as medical doctors were about 97 (77.0%) compared to students that had, 29 (23.0%). Students that had and did not have first degree relatives or relatives as general practitioners from this study were both 63 (50.0%). In terms of Socioeconomic status, those from high family income gave the highest response with 59 (46.8%). The second highest was those from a moderate family income with 50 (39.7%), followed by low family income that was 17 (13.5%). From the results received, there were more students that had not attended electives 91 (72.2%) compared to students that had attended electives 35 (27.8%). Out of those who underwent electives, the number of students that had done physical elective was 29 (72.5%) compared to online elective 11 (27.5%). From the number of responses received, students who had awareness of medical negligence was 105 (83.3%) compared to those not aware of medical negligence, 21 (16.7%).

**Table 3.** Tolerance of uncertainty among clinical year medical students of MUCM.

	Frequency (n)	Percentage (%)
Tolerating uncertainty poorly	51	40.5
Tolerating uncertainty quite well	70	55.6
Tolerating uncertainty well	5	4.0

Based on table 3, the number of students tolerating uncertainty quite well were about 70 (55.6%) compared to tolerating uncertainty poorly which was about 51 (40.5%). 5 students were found tolerating uncertainty well (4.0%).

**Table 4.** Clinical year medical students' attitudes towards making mistakes.

Characteristics	Frequency (n)	Percentage (%)
"If I made a mistake in my doctor work"		
"I would try to hide it"		
Yes	5	4
No	121	96
"I would inform my supervisor"		
Yes	124	98.4
No	2	1.6
"I would tell the patient and offer an explanation"		
Yes	119	94.4
No	7	5.6
"I would tell the patient and apologize"		
Yes	124	98.4

Characteristics	Frequency (n)	Percentage (%)
No	2	1.6
“I would try to attribute the error to my working community”		
Yes	77	61.1
No	49	38.9

Table 4 was about questions given to medical students to see their response on what they will do if mistakes were made while working as a doctor. Based on the first question attitude received, 121 students (96.0%) chose “they will not hide their mistake” compared to 5 students (4.0%) which said that “they will hide their mistakes”. For the second question, there were about 124 (98.4%) students that opted “they will inform their

supervisor” compared to 2 (1.6%) students that opted for “they will not inform their supervisor”. The third question, 119 (94.4%) students chose that “they would tell and offer an explanation to their patients” while 7 (5.6%) chose that “they would not tell and offer any explanation”. Next, the fourth question, 124 (98.4%) students decided that “they would tell the patients and apologize” compared to 2 (1.6%) that decided that “they will not tell and apologize”. The last question, 77 (61.1%) “would try to attribute the error to their working community” while 49 (38.9%) chose that “they will not attribute the error to their working community”.

**Table 5.** Chi Square analysis between Sociodemographic profile and tolerance of uncertainty among the students.

Variable	Tolerating uncertainty poorly n(%)	Tolerating uncertainty quite well or well n(%)	Odds ratio (95% CI)	Chi-square	P-value
Age					
<23	15 (34.9)	28(65.1)			
≥23	36(43.4)	47(56.6)	1.43 (0.67-3.07)	0.85	0.357
Gender					
Female	40(46.0)	47(54.0)			
Male	11(28.2)	28(71.8)	2.17 (0.96-4.89)	3.53	0.060
Ethnicity					
Malay (reference)	4(21.1)	15(79.0)	2.37 (0.63-8.85)	1.69	0.194
Chinese	12(38.7)	19(61.2)	3.00(0.88-10.23)	3.25	0.071
Indian	24(44.4)	30(55.6)	3.75(0.94-14.96)	3.68	0.055
Others	11(50.0)	11(50.0)			
Nationality					
Malaysian	43(41.4)	61(58.7)			
Non- Malaysian	8(36.4)	14(63.6)	1.23(0.48-3.20)	0.19	0.665
Language					
≤2	28(41.8)	39(58.2)			
>2	23(39.0)	36(61.0)	1.12(0.55-2.29)	0.10	0.749
Academic year					
Year 4	38(39.6)	58(60.4)			
Year 5	13(43.3)	17(56.7)	0.76(0.33-1.79)	0.38	0.536
Scholarship					
Yes	11(44.0)	14(56.0)			
No	40(39.6)	61(60.4)	1.20(0.49-2.90)	0.16	0.688
First degree relatives as medical doctors					
Yes	13(44.8)	16(55.2)			
No	38(39.2)	59(60.8)	1.26(0.55-2.92)	0.30	0.586
First degree relatives or relatives as general practitioners					
Yes	21(33.3)	42(66.7)			
No	30(47.6)	33(52.4)	1.82(0.88-3.74)	2.67	0.102
Socioeconomic status (family income)					
High (reference)	15(25.4)	44(74.6)			
Low	11(64.7)	6(35.3)	5.38(1.70-17.06)	9.05	0.003
Moderate	25(50.0)	25(50.0)	2.93(1.31-6.57)	7.04	0.008
Electives					
Yes	16(45.7)	19(54.3)			
No	35(38.5)	56(61.5)	1.35(0.61-2.96)	0.55	0.458
If yes					
Online electives	5(45.5)	6(54.6)			
Physical electives	12(41.3)	17(58.6)	1.18 (0.29-4.78)	0.05	0.816
Awareness of medical negligence					
Yes	41(39.1)	64(61.0)			
No	10(47.6)	11(52.4)	1.42(0.55-3.64)	0.53	0.465

Table 5 shows the association between the social demographic profile of the students and their tolerance of uncertainty. Students who belong to a low socioeconomic status were found to be 5.38 times more likely to tolerate

uncertainty poorly as compared to those from a high socioeconomic status family (95% C1 for OR 1.70-17.06; P-value 0.003). It was also observed that students from a moderate socioeconomic status family were 2.93 times more

likely to tolerate uncertainty poorly than those from a high socioeconomic status family (95% CI for OR 1.31 to 6.57; P-value: 0.008).

In the study, association of age with tolerance of uncertainty was not found to be significant (95% CI for OR 0.67 to 3.07; P-value 0.357). Association of gender with tolerance of uncertainty was not found to be significant (95% CI for OR 0.96 to 4.89; P-value 0.060). For ethnicity, having Malay students as our reference value, it was observed that the associations between Chinese, Indian, other ethnicities and Malay were not significant (Chinese: 95% CI for OR 0.63 to 8.85; P-value: 0.194) (Indian: 95% CI for OR 0.88 to 10.23; P-value: 0.071) (Others: 95% CI for OR 0.94 to 14.96; P-value: 0.055). Nationality was also not found to be significant in association with tolerance of uncertainty (95% CI for OR 0.48 to 3.20; P-value: 0.665). The ability of speaking more or less languages was also not found to be significant when associated with tolerating uncertainty (95% CI for OR 0.55 to 2.29; P-value: 0.749). The association

between academic year and tolerance of uncertainty was not found to be significant (95% CI for OR 0.33 to 1.79; P-value: 0.536). Next, the relationship between scholarship and tolerating uncertainty was not significant as well (95% CI for OR 0.49 to 2.90; P-value: 0.688). Not only that, having any first-degree relatives as medical doctors was not found to be significant too (95% CI for OR 0.55 to 2.92; P-value: 0.586), nor does having any family members as general practitioners (95% CI for OR 0.88 to 3.74; P-value: 0.102). The association between being exposed to electives and tolerance of uncertainty was insignificant (95% CI for OR 0.61 to 2.96; P-value: 0.458). Among those exposed to electives, the relationship between having online electives or physical electives and being tolerable to uncertainty was not significant either (95% CI for OR 0.29 to 4.78; P-value: 0.816). Those whom were aware of medical negligence, although being 1.42 times more likely to tolerate uncertainty poorly, the association was not found to be significant (95% CI for OR 0.55 to 3.64; P-value: 0.465).

**Table 6.** Chi Square analysis for the association between gender and attitude towards making mistakes.

Characteristics "If I made a mistake in my doctor work"	Male n(%)	Female n(%)	Odds ratio (95%CI)	Chi-square	P-value
"I would try to hide it"					
Yes	2(5.1)	3(3.5)			
No	37(94.9)	84(96.6)	1.51(0.24-9.44)	0.20	0.655
"I would inform my supervisor"					
Yes	38(97.4)	86(98.9)			
No	1(2.6)	1(1.2)	2.26(0.14-37.14)	0.35	0.557
"I would tell the patient and offer an explanation"					
Yes	37(94.9)	82(94.3)			
No	2(5.1)	5(5.8)	1.13(0.21-6.08)	0.02	0.888
"I would tell the patient and apologize"					
Yes	37(94.9)	87(100.0)	-	4.53	0.032
No	2(5.1)	0(0.0)			
"I would try to attribute the error to my working community"					
Yes	24(61.5)	53(60.9)			
No	15(38.4)	34(39.1)	1.03(0.47-2.23)	0.0043	0.947

**Table 7.** Chi Square analysis for the association between medical students with awareness of medical negligence and attitude towards making mistakes.

Characteristics "If I made a mistake in my doctor work"	Awareness of medical negligence (yes) n(%)	Awareness of medical negligence (no) n(%)	Odds ratio (95%CI)	Chi-square	P-value
"I would try to hide it"					
Yes	4(3.8)	1(4.8)			
No	101(96.12)	20(95.2)	0.79(0.08-7.46)	0.04	0.838
"I would inform my supervisor"					
Yes	103(98.1)	21(100.0)			
No	2(1.9)	0(0.0)		0.41	0.524
"I would tell the patient and offer an explanation"					
Yes	100(95.2)	19(90.5)			
No	5(4.8)	2(9.5)	2.11(0.38-11.66)	0.76	0.384
"I would tell the patient and apologize"					
Yes	104(99.1)	20(95.2)			
No	1(1.0)	1(4.8)	5.20(0.31-86.62)	1.63	0.202
"I would try to attribute the error to my working community"					
Yes	68(64.8)	9(42.9)			
No	37(35.2)	12(57.1)	2.45(0.95-6.35)	3.53	0.060

Table 6 shows the association between gender and their attitude towards making mistakes. Attitude 4 (“If I made a mistake, I would tell the patient and apologize”) showed a significant outcome pointing out that females were more likely to tell the patient and apologize when a mistake is made (P-value: 0.947). In Attitude 1 (“If I made a mistake in my doctor work, I would try to hide it”), Attitude 2 (“I would inform my supervisor”), Attitude 3 (“I would tell the patient the truth and offer an explanation”) and Attitude 5 (“I would try to attribute the error to my working community”) were found to have no significance statistically with gender in relation to attitude towards making mistakes.

In the study, males were 1.51 times more likely to hide their mistakes (95% CI for OR 0.24 to 9.44; P-value: 0.655), 1.13 times more likely to tell the patient and offer an explanation when a mistake was made (95% CI for OR 0.21 to 6.08; P-value: 0.888) and were 1.03 times more likely to attribute the error to their working community (95% CI for OR 0.47 to 2.23; P-value: 0.947). Whereas females were 2.26 times more likely to inform their supervisor when a mistake was made (95% CI for OR 0.14 to 37.14; P-value: 0.557).

Table 7 shows the association between awareness of medical negligence and attitude towards making mistakes. With the given scenario of making a mistake in the doctor’s work, Attitude 1 (I would try to hide it”), Attitude 2 (“I would inform my supervisor”), Attitude 3 (“I would tell the patient and offer an explanation”), Attitude 4 (“I would tell the patient and apologize”), and Attitude 5 (“I would try to attribute the error to my working community”) were seen to be insignificant in relation to awareness of medical negligence.

Those with awareness of medical negligence were 21% less likely to hide his/her mistake (95% CI for OR 0.08 to 7.46; P-value: 0.838), 2.11 times more likely to tell the patient and offer an explanation (95% CI for OR 0.38 to 11.66; P-value 0.384), 5.20 times more likely to inform patient and apologize (95% CI for OR 0.31 to 86.62; P-value 0.202), 2.45 times more likely to attribute the error to working community (95% CI for OR 0.95 to 6.35; P-value 0.060). In attitude 2 (I would inform my supervisor”). It was observed that all the medical students with no awareness of medical negligence answered “Yes” whereas 1.9% with awareness of medical negligence answered “No” (P-value 0.524).

**Table 8.** Chi Square analysis for the association between medical students having first degree relatives as medical doctors and attitude towards making mistakes.

Characteristics “If I made a mistake in my doctor work”	First degree relatives as medical doctors (yes) n(%)	First degree relatives as medical doctors (no) n(%)	Odds ratio (95%CI)	Chi-square	P-value
“I would try to hide it”					
Yes	0(0.0)	5(5.2)	-	1.56	0.212
No	29(100.0)	92(94.9)			
“I would inform my supervisor”					
Yes	28(96.6)	96(99.0)	0.29(0.02-4.81)	0.84	0.361
No	1(3.5)	1(1.0)			
“I would tell the patient and offer an explanation”					
Yes	28(96.6)	91(93.8)	1.85(0.21-15.99)	0.32	0.572
No	1(3.5)	6(6.2)			
“I would tell the patient and apologize”					
Yes	29(100.0)	95(97.9)	-	0.61	0.436
No	0(0.0)	2(2.1)			
“I would try to attribute the error to my working community”					
Yes	21(72.4)	56(57.7)	1.92(0.77-4.77)	2.02	0.155
No	8(27.6)	41(72.4)			

**Table 9.** Chi Square analysis for the association between medical students having family members as a general practitioner and attitude towards making mistakes.

Characteristic “If I made a mistake in my doctor work”	Family members as general practitioners (yes) n(%)	Family members as general practitioners (no) n(%)	Odds ratio (95%CI)	Chi-square	P-value
“I would try to hide it”					
Yes	0(0.0)	5(7.9)	-	5.21	0.023
No	63(100.0)	58(92.1)			
“I would inform my supervisor”					
Yes	62(98.4)	62(98.4)	1.00 (0.06-16.35)	0.00	0.999
No	1(1.6)	1(1.6)			
“I would tell the patient and offer an explanation”					
Yes	58(92.1)	61(96.8)	0.38(0.07-2.04)	1.36	0.243
No	5(7.9)	2(3.2)			
“I would tell the patient and apologize”					
Yes	61(96.8)	63(100.0)	-	2.03	0.154



Characteristic “If I made a mistake in my doctor work”	Family members as general practitioners (yes) n(%)	Family members as general practitioners (no) n(%)	Odds ratio (95%CI)	Chi-square	P-value
No “I would try to attribute the error to my working community”	2(3.2)	0(0.0)			
Yes	36(57.1)	41(65.1)	0.72(0.35-1.47)	0.83	0.361
No	27(42.9)	22(57.1)			

Table 8 shows the association between first degree relatives as medical doctors and making mistakes in his/her doctor work. For all Attitude 1 (“If I made a mistake in my doctor work, I would try to hide it”), Attitude 2 (“I would inform my supervisor”), Attitude 3 (“I would tell the patient the truth and offer an explanation”) Attitude 4 (“I would tell the patient and apologize”) and Attitude 5 (“I would try to attribute the error to my working community”) were found to have no significance with having first degree relatives as medical doctors.

With attitude 1, it was observed that all medical students that had first degree relatives as medical doctors answered “No” whereas 5.2% of medical students that did not have any first degree relatives answered “Yes” to hiding the mistake (P-value: 0.212) and in attitude 4, all the medical students with first degree relatives as medical doctors answered “Yes” whereas among medical students that did not have first degree relatives as medical doctors, 2.1% answered “No” to telling the patient about the mistake and apologize (P-value: 0.436). Those with first degree relatives as medical doctors were 71% less likely to inform his/her supervisor (95% CI for OR 0.02 to 4.81; P-value: 0.361). Also, they were 1.85 times more likely to offer an explanation if a mistake was made (95% CI for OR 0.21 to 15.99; P-value: 0.572), and 1.92 times more likely to attribute the error to his/her working community if a mistake was made (95% CI for OR 0.77 to 4.77; P-value 0.155).

Table 9 demonstrates the association between having family members as general practitioners and their attitudes towards

making mistakes. With Attitude 1 (“If I made a mistake in my doctor work, I would try to hide it”), it was observed that all medical students that had any family members as general practitioners (GP) answered “No”, whereas among medical student that did not have any family members as general practitioners, 7.94% of them answered “Yes” (P-value: 0.023). This shows that those that had any family members as GP have a good attitude when a mistake is made, as there were more than 1/3rd of the sample that tolerate uncertainty poorly as seen in Table 2.

Attitude 2 (“I would inform my supervisor”), Attitude 3 (“I would tell the patient and offer an explanation”), Attitude 4 (“I would tell the patient and apologize”) and Attitude 5 (“I would try to attribute the error to my working community”) were found to have no significance with having any family members as GP. No association was seen between having a GP as a family member and the medical student informing his/her supervisor with the given scenario (95% CI for OR 0.06 to 16.35; P-value: 0.999). Those with any family members as GP were 62% less likely to tell the patient with an explanation (95% CI for OR 0.07 to 2.04; P-value: 0.243) and were 28% less likely to attribute the error to his/her working community (95% CI for OR 0.35 to 1.47; P-value: 0.361). For attitude 4, although those without any family members as GP have all answered “Yes”, as compared to 3.2% of those with family members as GP that have answered “No”, the finding was not shown to be significant (P-value: 0.154).

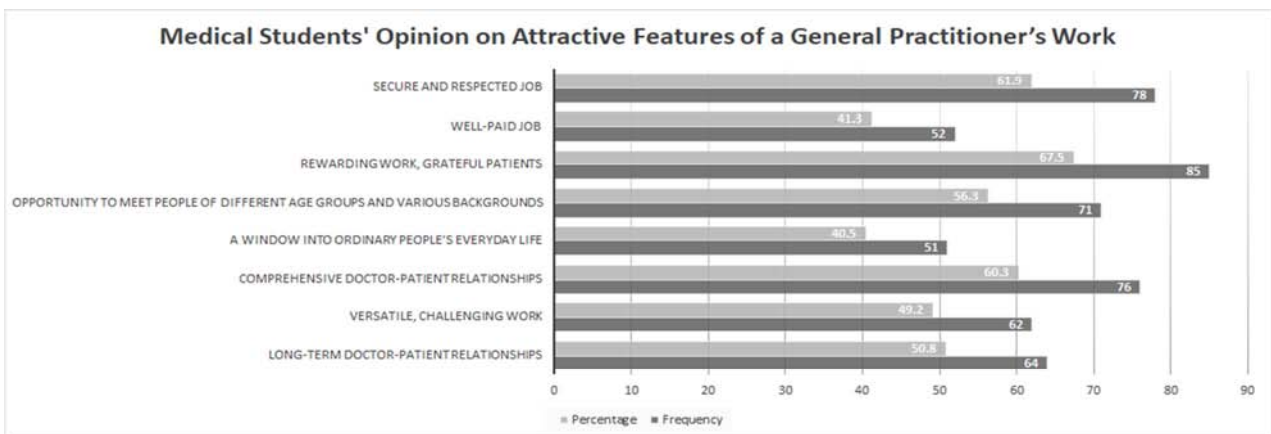
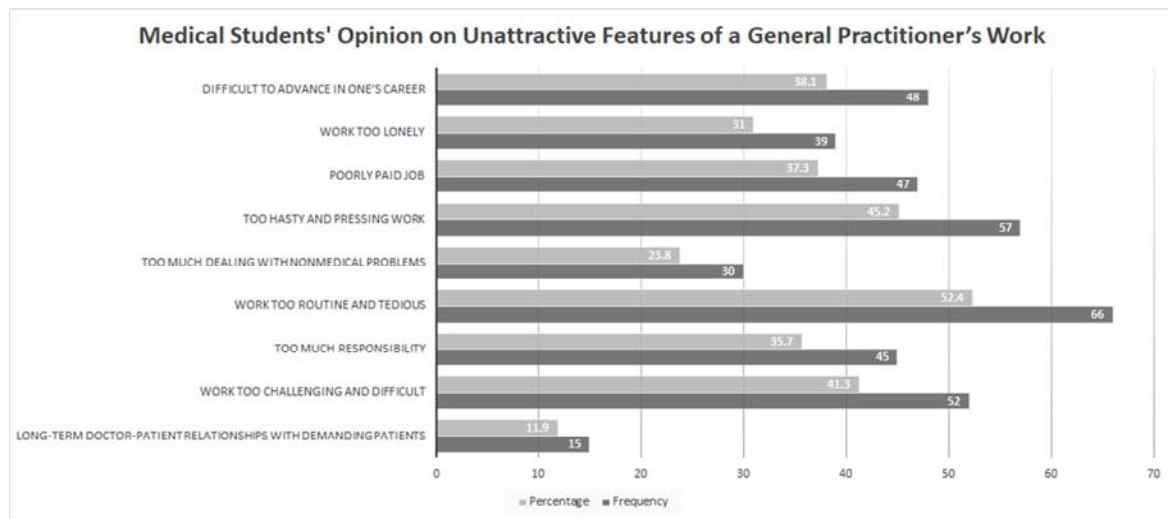


Figure 2. Horizontal Bar Chart on Medical Students' Opinion on Attractive Features of a General Practitioner's Work.

\* Multiple response answer

In the study, it was found that most of the students have chosen the option of “rewarding work, grateful patients” (85, 67.5%)

as the most attractive features of a GP's work. Followed by "secure and respected job" (78, 61.9%), "comprehensive doctor-patient relationships" (76, 60.3%), "opportunity to meet people of different age groups and various backgrounds" (71, 56.3%), "long-term doctor-patient relationships" (64, 50.8%), "versatile, challenging work" (62, 49.2%), "well-paid job" (52, 41.3%) and lastly, "a window into ordinary people's everyday life" (51, 40.5%).



**Figure 3.** Horizontal Bar Chart on Medical Students' Opinion on Unattractive Features of a General Practitioner's Work.

\* Multiple response answer

From the responses collected, it was observed that "work too routine and tedious" was chosen as the most unattractive feature of a GP's work by a majority of the medical students (66, 52.4%). This was followed by "too hasty and pressing work" (57, 45.2%), "work too challenging and difficult" (52, 41.3%), "difficult to advance in one's career" (48, 38.1%), "poorly paid job" (47, 37.3%), "too much responsibility" (45, 35.7%), "work too lonely" (39, 31%), "too much dealing with nonmedical problems" (30, 23.8%), and lastly "long-term doctor-patient relationships with demanding patients" was the least chosen option by the medical students (15, 11.9%).

## 4. Discussion

We conducted this study to understand the fear and uncertainty that medical students face in their daily lives. We aim to understand how most students think once they are put into such a position. Most importantly how aware medical students are about the uncertainties they carry with themselves every day. In addition to that we wish to find out how aware medical students are about medical negligence if it can lead to uncertainties and fears. We aim to find out what factors lead these medical students to second guess themselves, such as gender, family background, clinical training and the awareness of medical negligence. In our study, 40.5% of our medical students tolerate uncertainty poorly while a study conducted in Finland shows that 22% of their medical students tolerate uncertainty poorly when making medical mistakes.[4] Besides that, 55.6% and 4% of

our medical students responded with tolerating uncertainty quite well and well when making medical mistakes while medical students in Finland tolerating uncertainty well is 78%. Based on this finding we can conclude that medical students in Finland are better at tolerating uncertainty when making a medical mistake compared to our medical students. A study conducted in Tehran University of Medical Sciences states that when comparing results of studies done in Tehran, Iran and Maryland, USA there is a declining trend in medical students' tolerance for uncertainty. Increase in medical awareness, reliance on technology in the medical setting, a more formal educational environment and generational differences may all lead to differences in the tolerance of uncertainty among medical students. [28][29]

In this study, medical students were given the scenario of making a mistake in doctor work. We learnt that 4.0% of medical students would hide the mistake, 98.4% would inform their supervisor, 94.4% would tell the patient and offer an explanation, 98.4% would tell the patient and apologize, and 61.1% would try to attribute the error to their working community. The study conducted in Finland showed that 73.0% of the medical students would tell the patient and apologize, whereas only 2.3% of medical students would try to hide the mistake and 6.9% of medical students would try to attribute the error to their working community. [4] Our findings were in line with their study, where majority of the medical students "would tell the patient and apologize" and minority of the medical students "would hide the mistake". Nevalainen et. al stated that this could uncover the students'

attitude to express their feelings more openly as well as their reflective abilities. [4] However, it was found that MUCM medical students were more likely to attribute to error to their working community as compared to the Finnish medical students. A study in Southern Finland showed that 72.9% of the young GPs had spoken about a mistake to either their supervisor or a colleague. [26] Crook et al. stated that the ability to disclose errors is highly dependent on the level of maturity of a physician, and many younger physicians need time to develop that particular skill. [27] The willingness to apologize in previous studies showed that 21-34% of young physicians apologized for the condition which resulted from the mistake made. A few studies have looked into the factors that predispose to medical errors. Many may have a greater fear of making mistakes for a number of reasons, the most significant of which is their lack of experience. [26]

We have found that there was no significant association between age, gender, ethnicity, nationality, language skills, academic year, scholarship, first degree relatives as medical doctors or general practitioners, the students' electives, awareness of medical negligence and tolerance of uncertainty among medical students. However, the students from low and moderate socio-economic status were significantly more likely to have poor tolerance to uncertainty than the students from high socio-economic status. A study done in China on entrepreneurial college graduates found that the level of family income affects the entrepreneurial intention of a child. [19] Although the variable of socioeconomic status was studied on graduates whose degree was unrelated to health sciences, we can say that a family's socioeconomic status does affect the child's ability to express and break through. Another study done among undergraduate study in China had findings suggesting that those from a lower family socioeconomic status does affect a person's self-esteem, hence increases the levels of fear of negative evaluation, which in turn elevates social anxiety. [32]

Through the study, we discovered that the association between gender and fear towards making mistakes were not significant. In spite of that, we learnt that females would be statistically more likely to tell the patient regarding the mistake and offer an explanation along with it as compared to males. Women's superior communication skills and emotional intelligence may help them form better relationships with patients, making them less likely to be the subject of complaints, claims, or discipline on a less extreme level. [33] A study conducted among Iranian English EFL (English as a Foreign Language) Learners showed that there is no significant difference between males and females in the levels of anxiety, with fear of negative evaluation being the main source of anxiety. [34]

We also found out that there was no significant relationship between awareness of medical negligence and fear of making

mistakes. Contradictorily, a study done in the United States among emergency physicians discovered that those in the upper tertile of fear for malpractice were significantly less likely to allow low-risk patients with possible acute cardiac ischemia to be discharged as compared to those in the lower tertile of malpractice fear. Thus, the emergency physicians who were more aware of medical negligence ordered more tests for the patients in fear of making mistakes. [30] Another study by Muller and Ornstein conducted among medical students and hospital resident physicians found that the clinical trainees were also afraid of medical litigation, losing trust from their patients and loss of reputation. [31]

In the study, we analysed that the association between medical students having any first-degree relatives as medical doctors was not found to be significant. Also, the relationship between medical students having any family members as a general practitioner and attitude towards making mistakes were discovered to be not significant. However, we found out that those who have any family members as a general practitioner were significantly less likely to hide a mistake if a mistake was made.

Unfortunately, as with any other studies, our study "Tolerance of Uncertainty and Fear of Making Mistakes Among Clinical Year Students" had a few limitations. Due to the busy academic calendar, we had received a noticeable limitation in our questionnaire responses, which had led us to have about 20.8% lack in responses among participants of MUCM students from Year 4 and Year 5, keeping in mind the non-response rate being 30%. In the study, 76.2% of respondents were from Year 4 and only 23.8% of respondents were from Year 5. This occurred as Year 5 students were preparing to sit for their examinations. We conducted the research using cross sectional study design, lasting for a 5-week span. Hence, we are unable to find out the reasons behind the tolerance of uncertainty and fear of making mistakes of the participants during the period of the study. Moreover, the study that was conducted by us was only done to clinical year MBBS MUCM students, thus we were not able to explore the tolerance of uncertainty and fear of making mistakes among students from other medical institutions and other health courses like nursing students and pharmacy students.

Teaching students how to deal with medical errors earlier in the curriculum could help them cope with their fears and uncertainty in the future. We would encourage medical schools to allow students to assist with patient care whenever it is reasonable and safe to do so, so that students can gain more clinical exposure and clinical experience, thus enabling them in making accurate diagnosis and decreasing the fear of making mistakes. To learn more about this topic, a qualitative study would be more beneficial as it allows us to explore more on the underlying reasons about the medical students' poor tolerance of

uncertainty and fear of making mistakes. Since our study included only clinical year medical students in a private college, we recommend future researchers to include more clinical year medical students from different colleges to understand their medical judgements and decision making in clinical practice.

## 5. Conclusion

In conclusion, it was seen that students coming from low or moderate socioeconomic backgrounds were more likely to tolerate uncertainty poorly compared to others. While we assume that most of these students have a fear of making mistakes when carrying out their doctor work, most of them were willing to acknowledge the mistakes made by providing an explanation to their patients, supervisor and their working community rather than trying to hide their mistakes. As tomorrow's medical care and efficiency is dependent on today's medical students, further studies are needed to help medical students overcome their tolerance of uncertainty and fear of making mistakes.

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