



Original article

Medical Error Disclosure: Medicolegal and Ethical Concerns among Cardiologists

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Abstract

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Background: Medical errors (MEs) represent deviations from established standards of care, potentially resulting in patient harm. ME disclosure is an ethical and legal obligation that preserves patient rights and dignity. However, cardiologists frequently encounter distinct challenges in this context. **Aim of the study:** The study aimed to improve the quality of care and establish a safer healthcare environment, ultimately resulting in improved patient health outcomes. **Participants and Methods:** This cross-sectional descriptive study involved 70 Egyptian cardiologists through a self-administered online questionnaire. This questionnaire assessed demographic and professional characteristics, self-reported experiences regarding MEs and their disclosure, as well as knowledge and attitudes related to the factors affecting the decision to disclose MEs. **Results:** The sample comprised 80% males, with a mean age of 34.9 years. Only 37.1% of participants received educational or training programs on MEs disclosure. Approximately 67% reported having committed MEs. Among them, 72.3% communicated the medical error to the patient, 51.1% reported it to the institution, and 53.2% faced malpractice claims. Approximately 67% of the participating cardiologists exhibited either no or poor overall knowledge. Approximately 91% of participants exhibited a neutral attitude regarding ME disclosure. A majority of participants (75.7%) indicated a willingness to disclose medical errors in contexts involving potential malpractice lawsuits. Over half of the participants (52.8%) indicated that the Egyptian Law regarding medicolegal liability would likely influence their decision to disclose MEs, either very likely or likely. **Conclusion and recommendation:** Although the participating cardiologists exhibited favorable practices regarding ME disclosure and reporting, the majority demonstrated limited knowledge and maintained a neutral attitude toward ME disclosure. This study highlighted concerns regarding legal consequences, inadequate training, and the absence of supportive forums or policies for reporting MEs to institutions. Improving educational initiatives and supportive reporting.

I. Background

A medical error (ME) is defined as a deviation from accepted professional standards by physicians, resulting in patient harm (Mansour et al. 2020). MEs can be categorized into several types, including diagnostic, preventative, surgical, medication errors (incorrect drugs or dosages), and follow-up (El Sayed, Mohammed, and Radwan 2021; Mansour et al. 2020).

The ME term encompasses errors committed by all healthcare providers, not solely physicians. Legal claims for damages predominantly target hospitals or physicians, leading to a primary focus on medical errors committed by physicians in legal discussions (Guillod, 2013). Ethical principles are relevant in the context of MEs. Patient autonomy and honesty are essential considerations (Wolf & Hughes, 2008). Informing patients about MEs is essential for acknowledging human dignity and respecting patients' rights, thus constituting an ethical and legal obligation for all healthcare professionals. Patients expect healthcare workers to participate in a patient-centered dialogue when an incident occurs (Renkema et al., 2014). Patients generally favor the acknowledgment of all errors, including minor ones. Furthermore, patients are more inclined to initiate legal proceedings when their physician does not disclose medical errors, underscoring the necessity for physicians to be knowledgeable about appropriate disclosure practices for medical errors. This encompasses understanding the appropriate timing and context for disclosing these MEs (Chamberlain et al., 2012).

The reasons for not reporting MEs can be divided into four main categories: personal and organizational factors, the type of error, educational hierarchy, and concerns about potential reactions and repercussions from reporting the errors (Ghaffari et al., 2024).

Challenges and obstacles to disclosing MEs include apprehensions regarding patient notification, potential adverse reactions from colleagues such as blame or reputational harm, difficulties in precise error reporting to the organization, and concerns about possible legal repercussions (Mendonca, Gallagher, and de Oliveira 2019; Asghari et al., 2010; Lipitz-Snyderman et al., 2017).

Reporting errors is crucial for enhancing care quality and fostering a safer healthcare environment, contributing to improved patient health outcomes. This tool is essential

for learning and education, promoting safer practices in the future (Alsulami et al., 2019). Underreporting is a significant issue due to barriers such as staff shortages, insufficient experience and training, inadequate language and communication skills, and concerns about medicolegal liability (Alsulami et al., 2019; Yassa & Peter, 2018).

Cardiologists are more likely to face malpractice claims than their non-cardiologist counterparts. Research indicates that diagnostic errors are the leading cause of litigation in cardiology-related malpractice claims (Patel et al., 2019). A significant number of malpractice claims directed at cardiologists pertain to non-cardiovascular conditions. The misdiagnosis of acute coronary syndrome represents a considerable liability risk within cardiovascular issues, alongside clinical scenarios related to resuscitation or surgery, medication errors, and aortic dissection (Mangalmurti et al., 2014).

MEs are likely to persist due to the fallibility of human clinicians. Despite significant efforts by healthcare organizations and physicians to mitigate and prevent these errors and adverse events, their occurrence continues to pose an inherent challenge. Nevertheless, this does not imply that these errors should be regarded as inevitable (Edwin, 2009). The American Heart Association (AHA) estimates that 14 to 27% of cardiac deaths attributable to MEs were potentially preventable (Freedman et al., 2002).

Only a few research studies have focused on ME disclosure in Egypt. Accordingly, the study objectives were to assess the knowledge, attitudes, and practices of a sample of Egyptian cardiologists regarding ME disclosure.

II. Participants and methods

II.1 Study sample:

A cross-sectional descriptive study was conducted on a convenience sample of Egyptian cardiologists representing a variety of settings. The sample size was calculated using Open Epi (Open-Source Epidemiologic Statistics for Public Health) version 3. The following criteria were set: 23.7% of physicians decide to disclose their MEs (El Sayed et al., 2021), a confidence level of 95%, and a limit of precision of 10%, with a design effect

of 1.0. The sample size was estimated to be 70 Egyptian cardiologists.

II.2 Study tool:

Recruited participants were asked to complete an online Google form questionnaire. The questionnaire, designed by researchers based on previous studies (Yassa & Peter, 2018; Mansour et al., 2020), was presented in English.

The questionnaire consists of six sections:

Section 1: Data on demographic and professional characteristics, including age, sex, degree, workplace, and years of experience as a cardiologist.

Section 2: Self-Experience regarding MEs and their disclosure: This includes receiving any training/education on ME disclosure, experiencing ME during practice and types of these MEs, disclosing MEs to patients, reporting MEs to the institution, and experiencing a malpractice claim during practice.

Section 3: Background Knowledge about MEs and their disclosure. This encompasses the definitions and classifications of MEs, differences between major and minor MEs, procedures for ME reporting, components of Egyptian Law regarding medicolegal liability, and the ME reporting framework in Egypt.

Section 4: Attitudes regarding the contributing factors affecting the decision of ME disclosure.

Section 5: Attitudes regarding ME disclosure, reporting MEs, and consequences.

Section 6: Relationship between the decision to disclose medical errors and medicolegal liability: This involves examining the impact of malpractice lawsuit risks and Egyptian Law on medicolegal liability in relation to disclosing MEs.

II.3 Questionnaire validation:

A panel of four experts in the relevant field evaluated the content validity of the questionnaire to determine the comprehensiveness, clarity, applicability, and suitability of the included items regarding the study's objectives. Necessary modifications were made.

II.4 Statistical analysis:

The data were entered and analyzed using version 23 of the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics were employed to summarize the data. Quantitative data were expressed as mean and standard deviation, whereas qualitative variables were presented as frequency and percentage.

Participants were asked to rate their knowledge regarding 6 items as either no knowledge, poor, average, or excellent. "No knowledge" responses were scored 1, and "excellent knowledge" responses were scored 4. The total score for knowledge ranged from 6 to 24. A score of 6 – 15 was considered no or poor knowledge, and 16 – 24 was considered average to excellent knowledge. Attitudes regarding MEs disclosure, reporting MEs, and consequences were assessed using a five-point Likert scale. For each of the 26 statements, respondents were asked to state their level of agreement, from "1-strongly disagree, 2-disagree, 3-not sure, 4-agree and 5-strongly agree". Strongly disagree was given a score of 1, and strongly agree scored 5 for positive attitude statements. For negative attitude statements, strongly agree was given a score of 1, and strongly disagree was given a score of 5. The total attitude score ranged from 26 to 130. A total score from 26 – <65 was considered a negative attitude, 65 – <104 was considered a neutral attitude, and 104 – 130 was considered a positive attitude. Binary logistic regression and chi-square tests were done to find the relation between disclosure of ME and the presence or absence of lawsuit risks. Statistical significance was defined as a P-value of (< 0.05).

II.5 Ethical considerations:

The study protocol complied with the Helsinki Declaration and was approved by the Research Ethics Committee (REC) of the Faculty of Medicine, Suez Canal University, Egypt (Reference number: #5317). Informed consent was obtained from all participants. The questionnaire contained an information sheet outlining the research's purpose, benefits, risks, and participant rights, ensuring voluntary participation and maintaining confidentiality by keeping the questionnaire anonymous.

III. Results

Seventy cardiologists were enrolled in the study with a mean age of 34.9 ± 5.2 years; males represent 80% of the sample. Approximately 35.7% of the participants were consultants, while 38.6% were specialists. The participants possess an average of 8.5 ± 4.9 years of experience as cardiologists. Over 55.7% of the participants are employed in university hospitals. Only 37.1% of participants engaged in educational or training programs regarding ME disclosure. Of the participants who responded affirmatively, 84.6% engaged in an

educational or training program alongside postgraduate education (Table 1). Forty-seven cardiologists (67%) reported having previously conducted MEs in their cardiology practice. Among the 47 cardiologists, 72.3% disclosed MEs to the patient, 51.1% reported it to the institution, and 53.2% experienced malpractice claims (Table 2). Of these 47 cardiologists who performed MEs during their practice, the least common error reported was “unethical conduct”; 83% have never performed it before (Table 3).

The results indicate that a majority of participants possessed average knowledge about the definition of ME (54.3%), types of MEs (55.7%), and the differences between major and minor errors (42.9%). Regarding ME reporting, most participants showed poor knowledge regarding the steps of ME reporting (41.4%) and the ME reporting system in Egypt (42.9%). Conversely, most participants (38.6%) were unaware of the elements of medicolegal liability under Egyptian law (Table 4). It was observed that 67.1% of the participating cardiologists exhibited either no or poor knowledge (Figure 1). Concerning the factors influencing the decision to disclose MEs, a majority of participants (71.4%) strongly agreed that workload is a significant factor. This was followed by a stressful environment (65.7%) and distractions at work due to fatigue (54.3%). Approximately 48.6% identified the absence of ongoing education or training as a contributing factor (Table 5).

Regarding MEs disclosure, most participants (88.6%) were willing to disclose as they wanted to be treated the same way. About 75.7% of respondents reported feeling a duty to disclose medical errors to patients and their families. Nevertheless, 77.1% indicated that disclosure is more straightforward when the error is not associated with malpractice. About 73% expressed disagreement with the assertion that “There is no need to disclose MEs because they are inevitable.” Over two-thirds of participants concurred that disclosing medical errors to patients aids physicians in maintaining professional integrity (91.4%) and enhances patient trust in physicians (68.6%). Furthermore, over two-thirds of participants concurred that revealing a medical error to colleagues could facilitate learning from mistakes (85.7%) and assess whether they had made similar clinical judgments and

decisions (77.8%). Approximately 91.4% indicated that insufficient training may contribute to the non-disclosure of MEs (Table 6). Over 80% of participants agreed on the importance of institutional reporting of MEs to prevent future incidents. However, 87.2% indicated that the lack of supportive forums or policies for reporting could impede reporting efforts. Significantly, 88.6% indicated a willingness to report MEs, provided they received follow-up feedback (Table 7). Most participants (72.9%) expected adverse reactions from patients and their families following the disclosure of MEs. Furthermore, 68.6% anticipated negative publicity from news or media, 64.3% predicted blame from colleagues, and 62.9% contemplated the potential for malpractice litigation (Table 8). The mean score for total attitude was 86.8 ± 10.9 , corresponding to a percentage of 66.8 ± 8.4 . About 91% of participants exhibited a neutral attitude regarding ME disclosure, ME reporting, and the implications of ME disclosure (Table 9).

Figure 2 shows the impact of malpractice lawsuit risk on the decision-making process regarding the disclosure of medical errors. Most participants indicated a willingness to disclose medical errors involving potential malpractice lawsuits (75.7%) and in scenarios where the risk of lawsuits was not a concern (67.1%). A significant relationship was observed between the concealment/disclosure of MEs and the presence or absence of lawsuit risks ($p: 0.043$). Figure (3) depicts the relationship between the decision regarding ME disclosure and enacting the Egyptian Law on medicolegal liability. Over half of the participants (52.8%) indicated that the Egyptian Law regarding medicolegal liability would likely influence their decision to disclose medical errors. Conversely, 32.9% expressed uncertainty regarding the impact of law on their decision.

A binary logistic regression model was conducted to evaluate the factors linked to good knowledge. Years of experience as a cardiologist and prior training were included as covariates in the model, both showing significant associations with good knowledge ($P:0.014, 0.001$, respectively). Individuals with prior training on MEs demonstrated an average of eight times greater knowledge compared to those who did not receive previous training on MEs (Table 10).

Table 1: Demographic and professional data of participating cardiologists (n:70).

Demographic and professional data		%
Age	Mean \pm SD	34.9 \pm 5.2
Gender	Male	80%
	Female	20%
Current job title	Resident	25.7%
	Specialist	38.6%
Hospital category	Consultant	35.7%
	University hospital	55.7%
	Ministry of health hospital/Center	12.9%
	Private sector	5.7%
Experience years	Health insurance organization	25.7%
	Mean \pm SD	8.5 \pm 4.9
Educational or training programs on medical errors disclosure	Yes	37.1%
	No	62.9%
The received educational or training programs	Postgraduate	84.6%
	Undergraduate	15.4%

n:total number, %: percentage

Table 2: Frequency of medical errors performed by participating cardiologists and the subsequent actions taken (n:70).

Questions		Frequency	%
Had you previously performed MEs during practice as cardiologists?	No	23	33
	Yes	47	67
The last time you performed a medical error (n:47)			
Have you disclosed it to the patient?	No	13	27.7
	Yes	34	72.3
Did you report it to the institution?	No	23	48.9
	Yes	24	51.1
Have you experienced malpractice claim?	No	22	46.8
	Yes	25	53.2

N: total number; %: percentage

Table 3: Types and frequency of medical errors performed by participating cardiologists (n : 47).

Types and frequency of medical errors	Not done before Frequency (%)	Done 1 – 2 times Frequency (%)	Done 3-10 times Frequency (%)	Done > 10 times Frequency (%)
Unethical conduct	39 (83)	8 (17)	0	0
Delayed transfer	21 (44.7)	22 (46.8)	4 (8.5)	0
Diagnosis errors	21 (44.7)	16 (34)	10 (21.3)	0
Dose missing in prescription	18 (38.3)	21 (44.7)	8 (17)	0
Frequency missing in prescription	29 (61.7)	12 (25.5)	6 (12.8)	0
Wrong dose error	23 (48.9)	21 (44.7)	3 (6.4)	0
Wrong frequency error	23 (48.9)	24 (51.1)	0	0
Wrong drug	30 (63.8)	16 (34)	1 (2.1)	0
Drug interactions	13 (27.7)	20 (42.6)	14 (29.8)	0
Contraindication	27 (57.4)	14 (29.8)	6 (12.8)	0
Omission error	23 (48.9)	21 (44.7)	3 (6.4)	0
Lack of providing patient education	15 (31.9)	14 (29.8)	15 (31.9)	3 (6.4)
Inadequate follow up	16 (34)	10 (21.3)	18 (38.3)	3 (6.4)
Improper supervision of residents	18 (38.3)	20 (42.6)	6 (12.8)	3 (6.4)
Others (Interventions complications or power error)	45 (93.6)	3 (6.4)	0	0

n: total number; %: percentage

Table 4: Knowledge regarding medical errors and Egyptian law for medicolegal liability among participating cardiologists (n : 70).

Knowledge item	No knowledge No. (%)	Poor knowledge No. (%)	Average knowledge No. (%)	Excellent knowledge No. (%)
Definition of medical error	4 (5.7%)	22 (31.4%)	38 (54.3%)	6 (8.6%)
Types of medical errors	5 (7.1%)	22 (31.4%)	39 (55.7%)	4 (5.7%)
Difference between major and minor errors	10 (14.3%)	25 (35.7%)	30 (42.9%)	5 (7.1%)
Steps of medical error reporting	20 (28.6%)	29 (41.4%)	18 (25.7%)	3 (4.3%)
Medical error reporting system in Egypt	28 (40%)	30 (42.9%)	12 (17.1%)	0 (0%)
Elements of Egyptian law for medicolegal liability	27 (38.6%)	26 (37.1%)	16 (22.9%)	1 (1.4%)

n: total number; %: percentage

Table 5: Attitudes regarding the contributing factors affecting the decision of medical error disclosure (n: 70).

Attitude item	Completely agree	Agree	Neutral	Disagree	Completely disagree
When thinking about medical error disclosure, I consider the following contributing factors					
Work overload	50 (71.4%)	12 (17.1%)	5 (7.1%)	3 (4.3%)	0 (0%)
Stressful environment	46 (65.7%)	20 (28.6%)	0 (0%)	4 (5.7%)	0 (0%)
Distraction in work due to tiredness	38 (54.3%)	24 (34.3%)	2 (2.9%)	5 (7.1%)	1 (1.4%)
Inappropriate instructions given to the patient	18 (25.7%)	30 (42.9%)	18(25.7%)	3 (4.3%)	1 (1.4%)
Patient illiteracy	35 (50%)	23 (32.9%)	1 (1.4%)	10(14.3%)	1 (1.4%)
Miscommunication between healthcare practitioners	29 (41.4%)	26 (37.1%)	10(14.3%)	4 (5.7%)	1 (1.4%)
Deficient scientific knowledge	25 (35.7%)	22 (31.4%)	11(15.7%)	8 (11.4%)	4 (5.7%)
Lack of continued education/ training	34 (48.6%)	16 (22.9%)	10(14.3%)	6 (8.6%)	4 (5.7%)

n:total number; %: percentage

Table 6: Attitudes regarding medical errors disclosure (n:70).

Attitude item	Completely agree	Agree	Neutral	Disagree	Completely disagree
There is no need to disclose medical error					
Because they are inevitable	9 (12.9%)	4 (5.7%)	6 (8.6%)	18(25.7%)	33 (47.1%)
If the adverse effects are minimal	7 (10%)	13 (18.6%)	12 (17.1%)	24(34.3%)	14 (20%)
Disclosing medical error to the patient					
Helps physicians keep professional integrity	39 (55.7%)	25 (35.7%)	1 (1.4%)	2 (2.9%)	3 (4.3%)
Helps alleviate physicians' feelings of guilt	13 (18.6%)	32 (45.7%)	12 (17.1%)	8 (11.4%)	5 (7.1%)
Reverses the adverse effect of the error	14 (20%)	24 (34.3%)	15 (21.4%)	9 (12.9%)	8 (11.4%)
Strengthens patient trust in physician	25 (35.7%)	23 (32.9%)	8 (11.4%)	8 (11.4%)	8 (8.6%)
I want to be treated in the same way so i will disclose	28 (40%)	34 (48.6%)	3 (4.3%)	2 (2.9%)	3 (4.3%)
I feel obligation to disclose medical error to the patient or his family	20 (28.6%)	33 (47.1%)	12 (17.1%)	5 (7.1%)	0 (0%)
If the error not related to malpractice, it is easier to disclose	11 (15.7%)	43 (61.4%)	8 (11.4%)	8 (11.4%)	0 (0%)
Late disclosure damage physician-patient relationship	21 (30%)	31 (44.3%)	9 (12.9%)	4 (5.7%)	5 (7.1%)
Proper pretreatment consent may be a cause of disclosure	21 (30%)	31 (44.3%)	11 (15.7%)	2 (2.9%)	5 (7.1%)
Lack of communication skills could be a cause of not disclosing medical errors	23 (32.9%)	33 (47.1%)	7 (10%)	6 (8.6%)	1 (1.4%)
Lack of training could be a cause of not disclosing medical errors	21 (30%)	43 (61.4%)	3 (4.3%)	2 (2.9%)	1 (1.4%)
Disclosing a medical error to colleague could be helpful					
To learn whether they have made the same clinical judgment and decision	18 (25.7%)	40 (52.1%)	9 (12.9%)	2 (2.9%)	1 (1.4%)
Allow them to learn from my error.	24 (34.3%)	36 (51.4%)	4 (5.7%)	5 (7.1%)	1 (1.4%)

n:total number; %: percentage

Table 7: Attitudes regarding medical errors reporting (n:70).

Attitude item	Completely agree	Agree	Neutral	Disagree	Completely disagree
Lack of supportive forums or policies of reporting prevents me from reporting.	23 (32.9%)	38(54.3%)	4 (5.7%)	5 (7.1%)	0 (0%)
Reporting to institution is important to prevent future incident.	25 (35.7%)	32(45.7%)	11(15.7%)	0 (0%)	2 (2.9%)
If I would receive feedback afterwards, I would be more likely to report medical errors.	20 (28.6%)	42 (60%)	8 (11.4%)	0 (0%)	0 (0%)
Benefits of reporting medical errors to an institution are outweighed the negative consequences for those who report them.	20 (28.6%)	32(45.7%)	15(21.4%)	3 (4.3%)	0 (0%)

n:total number; %: percentage

Table 8: Attitudes regarding consequences of medical errors disclosure (n:70).

Attitude item	Completely agree	Agree	Neutral	Disagree	Completely disagree
When thinking about medical errors disclosure, I'm concerned about the following consequences					
Blame from colleagues	16 (22.9%)	29 (41.4%)	17 (24.3%)	8 (11.4%)	0 (0%)
Blame from the patient for all health outcomes	15 (21.4%)	29 (41.4%)	17 (24.3%)	5 (7.1%)	4 (5.7%)
Disciplinary action from a professional body	11 (15.7%)	33 (47.1%)	18 (25.7%)	4 (5.7%)	4 (5.7%)
Loss of reputation among colleagues	13 (18.6%)	28 (40%)	21 (30%)	4 (5.7%)	4 (5.7%)
Malpractice litigation	17 (24.3%)	27 (38.6%)	23 (32.9%)	3 (4.3%)	0 (0%)
Negative patient or his family reaction	17 (24.3%)	34 (48.6%)	15 (21.4%)	4 (5.7%)	0 (0%)
Negative publicity from news or media	23 (32.9%)	25 (35.7%)	16 (22.9%)	6 (8.6%)	0 (0%)

n:total number; %: percentage

Table 9: Total attitudes mean score, percentage and interpretation among study participants (n:70).

Attitude	Mean ± SD
Total score (130)	86.8 ± 10.9
Percentage of total	66.8 ± 8.4
Interpretation	Frequency
Negative attitude (<50%)	3
Neutral attitude (50 – 80%)	64
Positive attitude (>80%)	3

n:total number, SD: standard deviation; %: percentage

Table 10: Binary logistic regression model to assess the factors associated with having average to good knowledge regarding medical errors.

Covariate	B	P-value	OR (95% CI)
Years of experience as cardiologist	0.165	0.014*	1.2 (1.03 – 1.35)
Previous training on medical errors	2.053	0.001*	7.8 (2.3 – 26.28)
Model		< 0.000*	0.046

*Statistically significant at $p < 0.05$.

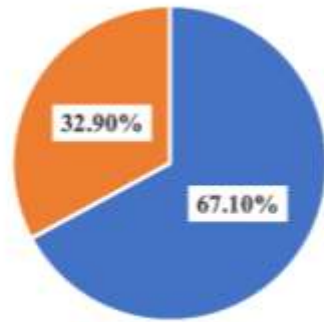


Figure 1: Overall knowledge regarding medical errors and Egyptian law for medicolegal liability among participants (n : 70)

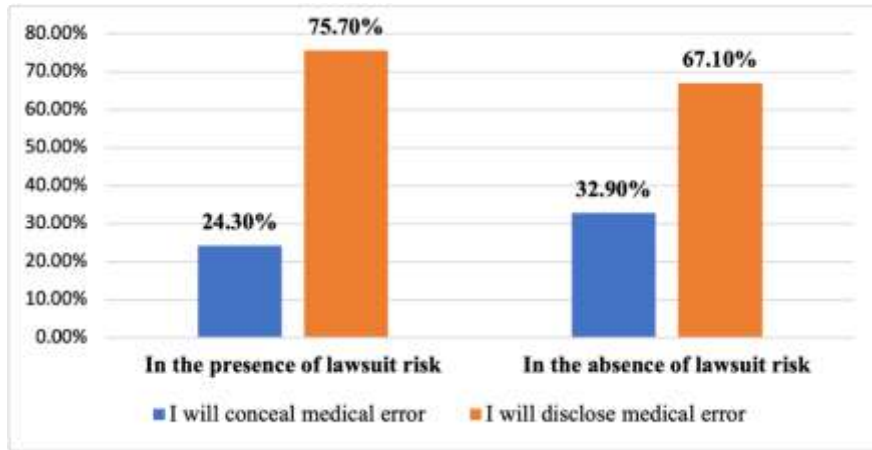


Figure 2: Relation between concealment/disclosure of medical error and the presence/ absence of lawsuit risks (P:0.043) (n:70)

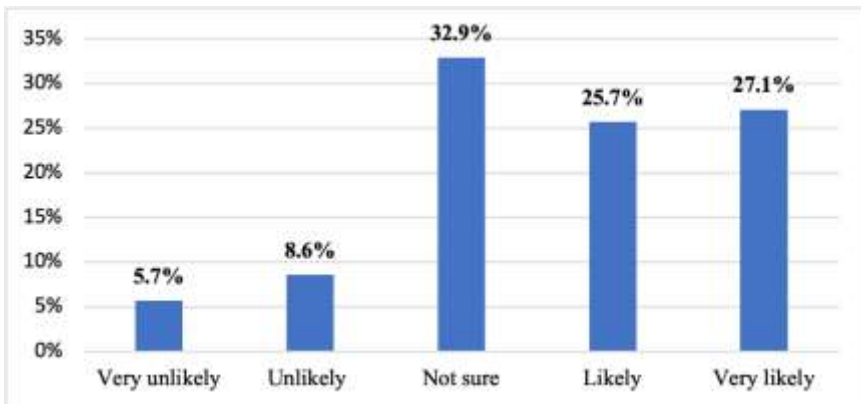


Figure 3: Likelihood of changing decision of medical error disclosure based on issuing Egyptian law for medico-legal liability (n:70)

III. Discussion

This study aimed to assess the knowledge, attitudes, and practices of a sample of Egyptian cardiologists regarding ME disclosure—seventy Egyptian cardiologists shared in this study. Only 37.1% participated in educational or training programs regarding ME disclosure. Sixty-seven percent of the cardiologists surveyed indicated they had previously conducted MEs in their cardiology practice. Nonetheless, 72.3% of participants reported their errors. The findings are inconsistent with those reported by [El Sayed et al. \(2021\)](#), which indicated that 76.3% of physicians in their study would choose to conceal their errors if they occurred.

Contrary to our findings, the study by [Yassa and Peter \(2018\)](#) revealed that 64.5% of the physicians they recruited indicated a willingness to conceal errors. The differences observed between our findings and those of prior studies may be attributed to the emphasis on transparency by cardiologists, who often manage high-risk procedures and critically ill patients.

Regarding MEs reporting, 51.1% of the participants of this study who had previously performed MEs had reported their errors to the institution. In contrast to our results, the study by [Alsafi et al. \(2015\)](#) revealed that 61% of physicians

had not filed any ME reports. Several factors contribute to physicians underreporting MEs. A significant factor contributing to the reluctance to report violations is the prevalent and well-documented resistance among physicians to comply with clinical protocols. Numerous professionals in the medical field view these protocols as a challenge to their professional autonomy (Alsaifi et al., 2015).

The relationship between ME disclosure and malpractice claims, particularly among cardiologists, is complex and multifactorial. Fifty-three percent of participants in this study who had previously conducted medical evaluations reported experiencing malpractice claims during their practice as cardiologists. The results align with previous studies; Elrewieny et al. (2022) indicated that over half of the physicians (58.56%) dealt with malpractice cases, Garg et al. (2020) reported that most respondents faced malpractice suits. Mangalmurti et al. (2014) conducted a study on medical malpractice claims among U.S. cardiologists, revealing that 8.6% of cardiologists faced a claim, in contrast to 6.6% of general internists and 18.9% of cardiothoracic surgeons. Using malpractice claims as a measure of adverse events may be misleading, as the majority of medical errors do not result in such claims. Malpractice claims involve a complex interaction of factors related to patients, physicians, and society (Wallace et al., 2013).

The participating physicians in this study identified various types of medication errors, including wrong frequency errors, inadequate follow-up, lack of patient education, and improper supervision of residents. These results are consistent with the findings of Thomas et al. (2019) in their systemic review of medication errors in the Middle East, as they found that prescription errors were the most common errors. Poor knowledge or training is typically the root cause of incorrect prescription and other flaws (Velo & Minuz, 2009).

Ghaffari et al. (2024) found that one of the key factors influencing the non-reporting of MEs is the educational hierarchy, "the lack of attention from professors toward junior residents" (Alduais et al., 2014). In the present study, approximately 67% of the participating cardiologists had no or poor knowledge about MEs. These results are inconsistent with previous studies; Alsulami et al. (2019) identified prescription errors as the most prevalent type of error in their systematic review of medication errors in the Middle East. Inadequate knowledge or training often

leads to incorrect prescriptions and other errors (Velo & Minuz, 2009).

More than half of the participants in this study identified workload, a stressful environment, and work-related distractions due to fatigue as factors influencing their decision to disclose MEs. The findings align with the research conducted by El Sayed et al. (2021), which identified stress and work overload as primary contributors to medication errors among consultants and specialists. Furthermore, the study by Yassa and Peter (2018) in Assiut Governorate indicated that 31% of physicians identified inadequate team design as the primary cause of medical errors, followed by work pressure. The relationship between physician stress and a decrease in empathy creates a cyclical pattern that increases the likelihood of future medical errors. In March 2017, the World Health Organization (WHO) initiated the Safety Challenge to mitigate patient harm caused by medication errors (MEs). The objective was to achieve global commitment and action aimed at reducing severe and avoidable medicine-related harm by fifty percent over the next five years, emphasizing the identification of harm resulting from medication errors or hazardous practices stemming from deficiencies in the healthcare system (Donaldson et al., 2017).

Regarding attitudes toward ME disclosure, 91% of participants have neutral attitudes. Most of the participants were willing to disclose as they wanted to be treated the same way. This agrees with the study by Mansour et al. (2020). However, 77.1% declared that if the error is not related to malpractice, it is easier to disclose. Despite that declaration, most participants indicated that they would reveal MEs in situations involving potential malpractice lawsuits (75.7%). The apprehension of potential legal repercussions can affect physicians' decisions to disclose medical errors. Physicians exhibited ambivalence regarding the reporting of errors, displaying both positive and negative attitudes. Opting not to share information results in losing significant learning and development opportunities for physicians. On the other hand, if they do share, they risk being traumatized by public blame for their mistakes. This creates a double-edged sword, potentially fostering a long-term negative attitude toward openly discussing errors in group settings (Asakawa et al., 2022). Therefore, enhancing physicians' awareness about their medicolegal rights and duties could alleviate their ongoing anxiety about being sued for malpractice.

More than two-thirds of the participants agreed that disclosing MEs to patients helps physicians keep professional integrity and strengthens patient trust in physicians. Disclosure is crucial to the physician-patient relationship (Renkema et al., 2014). For cardiologists with long-term relationships with their patients, maintaining a trusting relationship is crucial for ongoing care and patient adherence to treatment plans. Our findings align with the results reported by El Sayed et al. (2021) study that among physicians who would disclose errors, 21% stated that concealment would destroy doctor-patient relationship, 18% thought that patient has the right to know, and 16% think that disclosure increases patients' confidence in them. Disclosing MEs can help rebuild trust and demonstrate a commitment to ethical practice and patient-centered care. It addresses the patients' need for details about the quality of care and their current health status. This transparency aids in obtaining informed consent for the treatment of errors' consequences and potentially leads to reduced compensation (Mohammadi et al., 2019; Renkema et al., 2014).

More than two-thirds of the participants concurred that disclosing an ME to colleagues could benefit professional relationships between physicians and their colleagues, as it would enable them to learn from errors and determine whether they have made the same clinical judgment and decision. The findings align with the study by Mansour et al. (2020), where over half of the physicians indicated a necessity to share the burden of a medical error to seek support and to assess whether their clinical decisions would have remained unchanged. Research indicates that physicians exhibit a greater interest in others' failure narratives than in clinical advice (Asakawa et al., 2022). Additionally, the presence of role models and mentors for medical students or physicians markedly improves their capacity to disclose medical errors by providing an experiential learning framework.

Regarding the reporting of MEs, over 80% of participants concurred that institutional reporting is crucial for preventing future incidents. Nonetheless, 87.2% indicated that the absence of supportive forums or policies for reporting may hinder the reporting process. In the context of MEs reporting, 51.1% of participants who committed MEs reported their errors to the institution. The results align with the findings of Alsulami et al. (2019), who reported that 80% of participants recognized the significance of reporting MEs. Despite 90% of participants being aware of how to report their MEs, 44.8% failed to

report any MEs. Mansour et al. (2020) observed that a majority of participants believed that reporting medication errors to institutions could enhance the quality of care for future patients.

Regarding the consequences of disclosing MEs, more than 60% of participants anticipated negative reactions from patients and their families, adverse publicity from news or media, blame from colleagues, potential disciplinary action from professional bodies, and the risk of malpractice litigation as likely outcomes of such disclosures. Irani et al. (2024) identified barriers, including concerns regarding patient and companion reactions, misinterpretation of incidents, and heightened anxiety.

Health workers and medical students often perceive a lack of necessity in reporting medical errors, possibly due to apprehensions regarding potential punitive consequences. A culture of blame among medical professionals is implicitly evident (Koleilat et al., 2024). The challenges associated with disclosing medical errors extend beyond the apprehension of informing patients about the incident. Discussing MEs with colleagues may also lead to potential negative outcomes, including the possibility of being assigned blame. Moreover, these challenges encompass the potential for legal liability (Bell et al., 2017).

Supportive organizational environments and positive incentives are crucial in encouraging incident disclosure. Barriers to reporting include a lack of organizational support, insufficient knowledge of incident reporting systems, and unclear understanding of what constitutes an error. In contrast, transparent communication, accountability, and learning from mistakes are essential for improving patient safety (Irani et al., 2024).

Accordingly, increasing educational initiatives and training about ME disclosure and reporting among healthcare practitioners will establish a no-shame, no-blame culture within the institution and will create a safe environment for physicians and promote a culture of transparency (Alsulami et al., 2019; Bell et al., 2017; El Sayed et al., 2019)

Increasing the implementation of safety practices and training programs for future physicians enhances their ability to prevent medication errors (Koleilat et al., 2024). About 53% of physicians indicated that their decision to disclose medical errors may be influenced by the recent Egyptian law regarding medicolegal liability. In the realm of the effect of the law on behavior, it is widely recognized that the law serves as a crucial instrument for influencing

both personal and professional conduct (Guillod, 2013). However, most participants (75.7%) demonstrated inadequate or limited understanding of the components of Egyptian law pertaining to medicolegal liability. Filling this knowledge gap is essential, as knowledge and attitude may influence practice.

The study provides valuable insights into cardiologists' attitudes and challenges regarding the disclosure of medical errors, which can inform the development of policies and training programs aimed at enhancing the disclosure process and ultimately fostering a safer healthcare environment.

V. Conclusion

The study found that a significant percentage of participating cardiologists indicated they performed MEs, most disclosing these to patients and reporting them to institutions. Despite the implementation of favorable practices, a significant number of cardiologists exhibited inadequate knowledge regarding medical errors and their disclosure, coupled with a neutral stance on the matter. A significant number of subjects believed that Egyptian law concerning medicolegal liability would influence the decision to disclose medical errors. The findings may guide legal reforms to promote transparent communication without legal repercussions, thereby fostering a culture of safety and accountability, which could improve patient care and trust in the healthcare system.

VI. Recommendations

Further research on the disclosure of MEs across various healthcare specialties and settings is recommended. In addition, we recommend enhancing existing educational initiatives and implementing supportive reporting systems to improve the disclosure and reporting of MEs, ultimately leading to improved patient care.

VII. Limitations of the study

Self-reported questionnaires may be influenced by social desirability effects, recall bias, and selection bias. The reliance on a specific sample may affect the generalizability of the results.

Declarations

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This work was self-funded by authors.

Ethical approval

The study was approved by Research Ethics committee (REC) of Faculty of Medicine, Suez Canal University, Egypt (Reference number; #5317).

Data availability statement

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of interest

The authors declared that there was no conflict of interest.

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