How Safe is Healthcare? Perceptions within the Healthcare Community and the General Public

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Abstract

Objectives: Complexity of health care is progressively increasing and with that the number of medical errors and adverse events are increasing to an alarming level. The purpose of this study is to assess the perception of healthcare safety within the healthcare community and the general public and examine the association between the perception regarding healthcare safety and the prior exposure to medical errors.

Methods: The study is a cross-sectional online survey. The online survey included basic demographics and a series of questions related to the knowledge and perception about healthcare safety and personal healthcare experience.

Results: 504 respondents completed the survey. 78.6% were healthcare workers. 84% reported one or more exposure to medical errors or adverse events. Most respondents (81.5%) estimated the rate of medical errors to be 1:100 or less. Only 29.3% of the respondents thought that medical errors are occurring more frequently than 10 years ago. 89.6% of the respondents thought that healthcare is a safe industry. Looking at Factors Predicting the Perception that Healthcare is Safe, there was no clear correlation with the exposure to medical errors except for surgical complications exposure (p-value=0.01, OR 21.4)

Conclusions: There is a strong indication in our data that perception of healthcare workers and public is far from the reality of the dangers of the healthcare system. There is a need to educate the public regarding the medical error rate and healthcare safety to help make patients and their families become partners in their care and to help healthcare workers better understand the limitations of healthcare processes that may affect patient safety and outcomes.

Keywords

Medical errors, patient safety perception

Introduction

Healthcare has become increasingly more complex, and with this increased complexity, the number of medical errors and adverse events has also increased, reaching an alarming level. Since the publication of the "To Err is Human report",[1-3] there has been a national drive towards addressing the hidden issue of medical errors and patient safety by examining their prevalence and underlying causes. Based on this premise, healthcare providers and educators have implemented procedural changes and produced protocols geared at better identifying and preventing errors. Advancements in technologies have included new safety features to ensure that medical errors ranging from the operating room to the charting of pharmaceutical information are minimized.[4-5] Yet, even with these innovations and precautions, there have been no major improvements in the rate of medical errors.[6-7] The current estimate of total annual deaths by medical errors in the United States is now 400, 000 in comparison to the previous estimate from 1999 of 44,000 to 98, 000 in the famous IOM report "to Err is Human".[8] Also,

while minor changes have been made, there have been no major systematic changes to our healthcare system to prevent or to more efficiently detect harmful events or adverse events.[4,9]

Nonetheless, even though the results have not been as desired, there is a growing consciousness within the medical community aimed at addressing medical errors. Surprisingly, however, there has been a paucity of research geared towards public and healthcare worker perceptions of healthcare safety. Data regarding the awareness of the magnitude of this problem is also lacking. So the question emerges: what is the public perception of medical errors? We sought to measure the perception and to evaluate how aware the general public and healthcare professionals perceive the state of the medical safety and the prevalence of the medical errors. This can then provide a framework on how to address the still growing issue of medical errors and how to better inform health care providers and the general public about this problem. The purpose of this survey is to assess public and healthcare worker perception of healthcare safety and quality of care as well as to assess the knowledge and attitude of patients, their relatives, and friends regarding healthcare safety. The study also examines the association between the perception regarding healthcare safety and the prior exposure to medical errors and adverse events.

Methods

The study is a cross-sectional online survey. The study procedures were approved by The Institutional Review Board. Participants in the study provided informed consent then were asked to respond to an online survey which included basic demographics and a series of questions related to knowledge of healthcare safety, perception of the healthcare system, and their personal experiences within that healthcare system.

Participants

Eligible participants were defined as adults over the age of 18 with at least one healthcare encounter within the last 12 months as a patient or a relative of a patient. Previous or current employment within the healthcare system was not an exclusion factor as long as the participants met the defined eligibility criteria.

Survey process

The survey was distributed online using social media (mainly Facebook). Personal networking was used to share the survey online without any restriction to the geographical location of the participants. The study was conducted over a three-month period.

Data collection and analysis

Data was collected online using Google Forms to create a secure survey. Participant privacy was maintained and no reference was made to any hospital or any specific healthcare system in any part of the study. Data was collected on the age, sex, country of residence, educational level, and occupation of each participant. Data was collected regarding their knowledge of healthcare safety/quality and their personal perception of healthcare safety and quality based on their experiences. We also collected data regarding any previous exposure to medical errors or adverse events associated with the care provided to them or a relative. The type of exposure included the following: medical errors and adverse events that resulted in patient death or permanent

disability; surgical site infection and other healthcare associated infections; medication related adverse events; infusion related adverse events; patient falls; and identification errors.

Statistical analysis

Descriptive and inferential statistical analyses were accomplished using IBM Statistical Package Version 22.0 for Windows (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). Descriptive statistics for the responses are displayed in **Table 1**. Exposure to medical errors and adverse events are shown in **Table 2**. The knowledge, attitude, and perception of Healthcare safety of respondents are shown in **Table 3**.

Because of the risk of selection bias inherent in the survey process used for this study, 50% percent of the responses were selected randomly for inferential analyses. The data was checked for statistical assumptions including normality and multicollinearity. A main effects logistic regression model was constructed to determine which variables were significant predictors of the variable "How safe it is to be treated at a hospital?" with the outcome of interest being "not safe". Some variables were also excluded from the model because of suppression effect and for practical relevance to the outcome variable. Variability Inflation Factors (VIF) for all the independent variables were less than 2.5 (highest was 1.9). All of the categorical variables in the model were dummy coded appropriately. The Hosmer and Lemeshow Test had a p-value of 0.370, indicating the model is a good fit for the data. The overall prediction accuracy of the model was 92.1%. The Wald Test statistic, along with p-values and Odds Ratios (OR) for the variables in the final model, is shown in **Table 4**.

Table 1. Demographic Characteristics of Respondents

	Categories	N (%)
Age (years)		
	18-20	6 (1.2)
	21-30	91 (18.1)
	31-40	200 (39.7)
	41-50	138 (27.4)
	51-60	56 (11.1)
	>60	12 (2.4)
	Total	503 (100)*
Gender		
	Male	220 (43.7)
	Female	276 (54.8)
	Total	496 (100)*
Education		
	High School Diploma	21 (4.2)
	Associates Degree/Diploma	41 (8.1)
	Bachelor's Degree	284 (56.3)
	Master or PhD	138 (27.4)
	GED	3 (0.6)
	Others	17 (3.4)
	Total	504 (100)
Current Job		
	Healthcare Worker	394 (78.6)
	Non-Healthcare Worker	36 (7.2)
	Student	52 (10.4)
	Not Working	19 (3.8)
	Total	501 (100)*
Location		
	USA	119 (23.6)
	UAE	234 (46.4)
	Philippines	19 (3.8)
	Others	132 (26.2)
	Total	504 (100)

*Totals less than 504 are due to missing responses

Table 2. Exposure to Medical Errors and Adverse Events

	Categories	N (%)
Have you or a family member or friend been the subject of a medical error?		
	Yes	237 (47.7)
	No	260 (52.3)
	Total	497 (100)*
Do you know anybody who died or suffered permanent damage because of a medical error?		
	Yes	264 (52.9)
	No	235 (47.1)
	Total	499 (100)*
Have you or any family member or friend experienced a medication error?		
	Yes	224 (45.2)
	No	272 (54.8)
	Total	496 (100)*
Have you or any family member or friend had an infection acquired after surgery or during a hospitalisation?		
	Yes	226 (45.2)
	No	274 (54.8)
	Total	500 (100)*
Have you or a family member or friend ever experienced an identification error at a hospital or a clinic (for example, you were mistaken for somebody else)?		
	Yes	136 (27.2)
	No	364 (72.8)
	Total	500 (100)*
Have you or any family member or friend had a fall at a hospital?		
	Yes	86 (17.2)
	No	413 (82.8)
	Total	499 (100)*
Have you or any family member or friend experienced a complication during or after a surgical procedure?		
	Yes	225 (44.6)
	No	279 (55.4)
	Total	504 (100)
Have you or any family member or friend experienced a complication or side effect due to an infusion given at a hospital or a clinic?		
	Yes	111 (22.2)
	No	390 (77.8)
	Total	501 (100)*
Have you or any family member or friend ever experienced a side effect from a medication given at a hospital or clinic?		
	Yes	246 (49.1)
	No	255 (50.9)
	Total	501 (100)*

*Totals less than 504 are due to missing responses

Table 3. Knowledge and Perception of Hospital Safety

	Categories	N (%)
What did the "To Err is Human" report show?		
	Medical errors are decreasing due to safer technology	80 (15.9)
	Medical errors are decreasing due to better-trained physicians	38 (7.5)
	Up to 98,000 patients die in the US every year because of medical errors	92 (18.3)
	Up to 12,000 patients die in the US every year because of medical errors	17 (3.4)
	I am not familiar with this report	277 (55.0)
	Total	504 (100)
What is your estimate of the medical error rate for patients treated in hospitals?		
	1:10	93 (18.5)
	1:100	157 (31.2)
	1:1000	139 (27.6)
	1:10000	63 (12.5)
	1:100000	40 (7.9)
	3.4 per million	12 (2.4)
	Total	504 (100)
Do you think that medical errors are less frequent now than 10 years ago?		
	Yes	355 (70.7)
	No	147 (29.3)
	Total	502 (100)*
How frequently do you think physicians perform hand washing or disinfection before entering the room or performing a physical examination?		
	< 30%	79 (15.7)
	30%-50%	114 (22.7)
	51-70%	104 (20.7)
	71-90%	118 (23.5)
	> 90%	88 (17.5)
	Total	503 (100)*
How safe is it to be treated at a hospital?		
	Safe	449 (89.6)
	Not safe	52 (10.4)
	Total	501 (100)*

*Totals less than 504 are due to missing responses

Table 4. Factors that Predict Perceptions of Hospital Safety

	Wald	df[a]	p-value	OR[b]
Age	6.495	5	0.26	-
Gender	0.252	1	0.61	-
Education	3.057	5	0.69	-
What is your current job?	0.14	3	0.98	-
Do you live in the USA?	2.683	3	0.44	-
What is your estimate of the medical error rate for patients treated in hospitals?	9.293	5	0.10	-
Do you think that medical errors occur less now than 10 years ago?	5.005	1	0.03*	5.574
Have you or any family member or friend been the subject of a medical error?	1.54	1	0.22	-
Do you know anybody who died or suffered permanent damage because of a medical error?	6.248	1	0.01*	0.048
Have you or any family member or friend experienced a medication error?	0.523	1	0.47	-
Have you or any family member or friend acquired an infection after surgery or during a hospitalisation?	0.625	1	0.43	-
How frequently do you think physicians perform hand washing or disinfection before entering the room or performing a physical examination?	5.2	4	0.27	-
Have you or any family member or friend ever experienced an identification error at a hospital or a clinic (for example, you were mistaken for somebody else)?	0.166	1	0.65	-
Have you or any family member or friend had a fall at a hospital?	0.421	1	0.52	-
Have you or any family member or friend experienced a complication during or after a surgical procedure?	6.161	1	0.01*	21.398
Have you or any family member or friend experienced a complication or side effect due to an infusion given at a hospital or a clinic?	0.048	1	0.65	-
Have you or any family member or friend ever experienced a side effect from a medication given at a hospital or clinic?	4.499	1	0.03*	0.133

*p-value significant at an alpha level of 0.05
[b]df reflects the number of categories in the variable.
[a]OR is reported for variables that were significant predictors.

Results

Respondent Characteristics

Demographic characteristics of survey respondents are shown in **Table 1**. Of the 504 completed responses, 119 were from the USA and the rest were from 9 other countries (United Arab Emirates (UAE), the Philippines, Saudi Arabia, UK, Ireland, Australia, Iraq, Libya, and Lebanon). Most of the respondents were healthcare workers (394) with high level of education (83.7% of the respondents have Bachelor, master or PhD degree). This average educational level differed from those that were reported in the 2013 U.S. Census (33.1% with a college or graduate degree).

Exposure to Medical Errors and Adverse Events

424 respondents (84%) reported one or more exposures to medical errors or adverse events. 52.9% knew of someone who died or suffered permanent damage because of a medical error (the highest positive response rate), and 17.2% had been exposed to a fall at a hospital whether it was in regard to themselves, a friend, or a family member (the lowest positive response). Other positive responses ranged from 22.2% to 49.1%.

Knowledge and perception of hospital safety

The survey included questions regarding knowledge of patient safety reports and estimates of medical errors and trends. The "To Err is human" report and similar studies and surveys estimated the rate of medical errors in hospitalized patients to be close to 10%, again with no evidence of improvement during the most recent years. Only 18.3% of the respondents were able to answer correctly the question regarding "to err is human report" while 55% were not even familiar with the report. Most respondents (81.5%) estimated the rate of medical errors to be 1:100 or less and only 29.3% of the respondents thought medical errors were occurring more frequently than 10 years ago. 89.6% of the respondents believed healthcare to be a safe industry.

Perception that Healthcare is Safe

Although 84% of the respondents had one or more exposures to medical errors or adverse events, 89.6% of the respondents believe healthcare is safe in response to the question "How safe is it to be treated at the hospital". Because of this contradiction, we looked at the predictors for hospital safety using logistic regression analysis. A random sample (250 respondents) was used for the regression analysis to reduce the risk of selection bias during the survey process. The regression model used the "not safe" answer as the outcome of interest to the question "How safe to be treated at the hospital" as the dependent variable. The other variables as shown in **Table 4** were the independent variables. Exposure to a surgical complication was the most predictive of the perception that healthcare is not safe with odd ratio of 21.398 (p=0.013). Exposure to medication side effects and knowing somebody close who died or suffered permanent damage because of medical injury, surprisingly, were significant predictors of the perception of safety in healthcare.

Discussion

To Err is Human: Building a Safer Health System[1] was a report issued in November 1999 by the U.S. Institute of Medicine (I.O.M) that has resulted in an increased awareness of U.S. medical errors and more enthusiasm for patient safety. The report was based upon analysis of multiple studies by a variety of organizations and concluded that between 44,000 to 98,000 people die each year as a result of preventable medical errors. For comparison, fewer than 50,000 people died of Alzheimer's disease and 70,000 died of diabetes mellitus in the same year.[10] The report also showed based on two large studies that adverse events occurred in 2.9 and 3.7 percent of hospitalizations, respectively. 6.6 % and 13.6% of adverse events led to death, respectively. In both of these studies, over half of these adverse events resulted from medical errors and could have been prevented. As troubling as this information may be, it may even be more troublesome considering that some evidence suggests physician reporting of medical errors to be lacking.[11-13]

The vast majority of the respondents (84%) had at least one personal exposure to a medical error (themselves, to a family member, or to a friend): 47.1% of the respondents knew somebody who died or suffered permanent damage because of medical errors, 45.2% had an exposure to hospital associated infections or surgical site infections, and 44.6% to a complication of a surgical procedure. These findings are consistent with the available epidemiological data regarding the prevalence of medical errors and adverse events. In spite of that, most of the respondents (89.6%) felt that healthcare is a safe industry.

We think this contradiction between respondent exposure to medical errors and adverse events and their perception regarding the safety of healthcare is one of the major obstacles for improving healthcare safety. When healthcare workers, patients, families, and friends encounter a minor medical error or a near miss, they tend to consider it to be an exception and therefore minimize the significance of the event. The impact of a major adverse event may be more significant but regardless of the degree of harm associated with medical errors, the response and the attitude is completely different than that encountered in other industries. In aviation industry, for example, with a defect rate of approximately 1 per 2 million opportunities, the perception of safety and attitude toward defects and errors are completely different. If the "To Err is Human Report" was about airplane accidents in the USA with an annual death rate of 98,000, we can imagine that there would be a total reengineering of the whole industry within a short period of time. In contrast to the healthcare industry, the response to the report and to the alarming epidemic of medical errors was slow and relatively inefficient as illustrated by the most recent data regarding medical errors.[8] The great initiatives by I.O.M., Agency for Healthcare Improvement (IHI), Agency for Healthcare Research and Quality (AHRQ), The Joint Commission (TJC) and other agencies that are promoting patient safety, have made huge progress in the field of patient safety and quality of care, but healthcare is still far from achieving defect free processes like these achieved in other industries.[4]

Yet this is not the most troubling point. Considering the skew towards healthcare workers in our sample (78.6%), the most troubling point is that this misperception is predominantly reflected amongst healthcare workers, the subset of society that should be the most aware of healthcare errors and risks. If the old adage of recognizing the problem is the first step holds true, then as a healthcare community, we have not even taken the first step in addressing out healthcare concerns and restructuring our systems and processes. There is a need for major system redesign

and reengineering in many healthcare processes to achieve a better and more effective healthcare system, but if we are oblivious to these problems, then our first duty must be to make those who are most fundamental to the system, its workers, aware of the severity of the problem.

On the other hand, patients and their loved ones are important contributors to healthcare safety by becoming active participants in their care. A good example of that is the patient identification process and surgical time out procedures that require patients to participate in the precautions. Having the right perception regarding the status of patient safety and the limitations we have currently in many processes will make patients and their families better partners. We think that our study points to a major challenge in improving patient safety: the attitude and perception of patients and families in addition to that of healthcare workers as discussed above. There are limitations to our study and its application to the public; however, we tried to overcome the potential bias introduced into the analytics by selecting a random sample of 250 respondents out of the whole cohort. Even if it is difficult to evaluate the severity of the misperception in the public, it is clear that society perceives healthcare to be far safer and efficient than it truly is. Interestingly, among all the independent variables, only surgical complications exposure significantly predicted the perception of safety of healthcare. In contrast, exposure to medication side effects and having a friend or relative who died or suffered permanent damage because of medical injury unexpectedly improved the perception of safety. All other independent variables did not significantly predict the perception of safety in the regression model. Overall, it seems that respondents felt that healthcare is safe regardless of the exposure to medical errors and adverse events.

Due to the disproportionate amount of responses from healthcare workers, and the comparably smaller amount of responses from non-healthcare workers, we feel the results of the study apply more to healthcare workers' perception of healthcare safety. There are two potential reasons that may explain why we attracted more healthcare worker responses than other subsets of the population. First and foremost, our means of distributing the survey was through social media. Since we ourselves are healthcare professionals and by extension are a part of a network of healthcare workers locally and internationally, it is not a stretch to assume that our survey may reach a higher portion of healthcare professionals than is representative of the general population. Second, our survey may attract a higher response rate from the medical community due to the provocative nature of the subject and its direct impact on their own work and livelihood. Therefore, they may have a greater interest in responding or at least feel more inclined to consider it. Since social media was used for distribution in this study, it is difficult to properly assess the effect of non-response bias.

Conclusion

There is a need to educate healthcare workers regarding medical errors rate and the current status of healthcare safety. There is also a strong indication in our data that public perception may also be far from the reality of the dangers of the healthcare system. Any effective means of problem solving must first address that there is a problem and understand the scope of that problem. Educating healthcare workers and patients about the true state of our healthcare system is essential to accomplishing that goal. This will help to make patients and their families real partners in their care and help healthcare workers to better understand the limitations in healthcare processes that may affect patient safety and the outcome of care.

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