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The Effect of Hindsight Bias on Psychiatrists' Clinical Judgment: A Randomized Controlled Trials

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Abstract

Objectives: Hindsight bias is inevitable in retrospective peer reviews, especially in medical settings. Psychiatrists are highly at risk of hindsight bias, because of the repeated patient hospitalization and the use of medications with a lot of side effects. The goal of our study was to investigate the effect of hindsight bias on psychiatrists' clinical judgment.

Methods: We conducted our survey in 173 psychiatrists who participated in the congress of scientific society of psychiatrists in Iran in December 2010. A clinical vignette was presented to participants and they reviewed hypothetical cases in which patients with bipolar or psychotic features presented for psychiatric care. We informed two-thirds of the participants that a bipolar or psychotic feature accompanied patients' symptoms (hindsight group) but withheld outcome information from the other participants (control group). Participants were asked to estimate the likelihood of each differential diagnosis.

Results: Responses were compared between groups for suggestions of hindsight bias. The results indicate that hindsight bias plays a role in overestimating likelihood of psychotic disorder in these three groups (P value<0.05). Post-hoc analysis confirmed that this difference arises from difference in perceived probability of psychotic disorder without a significant difference in estimation of likelihood of mood disorder.

Conclusion: Psychiatry just like other specialties is vulnerable to hindsight bias and its consequences, such as inappropriate treatments and unnecessary hospital admissions. Our results indicate that psychiatrist who was informed with psychotic disorders, which its misdiagnosis would result in more adverse outcome, would be more prone to hindsight bias.

Keywords: Outcome bias; Psychiatry; Mood disorder; Psychotic disorder

Introduction

"It's much easier after the event to sort the relevant from the irrelevant signals. After the event, of course, a signal is always crystal clear. We can now see what disaster it was signaling since the disaster has occurred, but before the event it is obscure and pregnant with conflicting meanings" [1].

Hindsight bias, results in an unjustified increase in its perceived predictability, which leads to the famous phrase "of course it's clear." Hindsight bias is not deliberate, but is induced by what one researcher described as "creeping determinism," a process propelled by subconscious desire on the part of the expert to appear knowledgeable, intelligent, and unambiguous [2-5]. This type of bias is almost inevitable in retrospective peer review reports [4], in both medical and non-medical settings.

In recent years, considerable attention has been focused on diagnostic errors in the area of patient safety [6,7]. Repeated hospitalizations, approximately 40% of psychiatric inpatient are re-hospitalized within one year of discharge [8], and the numerous side effects of antipsychotic and anti-depressive medications [9,10] demonstrate the importance of proper diagnosis without hindsight bias.

Since psychiatry is more susceptible to such errors, these types of biases may lead to unnecessary admissions, excess therapeutic expenses, and increased side effects resulted from medications. Numerous studies have been conducted to assess the quality and susceptibility to bias in physicians [11-14]. LaBine et al. [15] and LeBourgious et al. [16] investigated whether psychiatrists are also susceptible to hindsight bias in various conditions, knowing about the higher incidence of misdiagnosis in this field. In the first study, the authors surveyed a sample of community residents and asked them to rate the quality of care. Half of the participants were informed if a suicide or homicide occurs shortly after the patients were released from the care. Participants who were informed about this outcome overestimated the likelihood that suicide or violence would occur at the time of the patient's release and observed trends for the hindsight group to rate care as being more frequently negligent [16]. Another study examined whether psychiatrists performing case reviews and estimating the risk of suicide and violence would provide responses suggestive of hindsight bias. The result supported the hypothesis that psychiatrists provided with advance knowledge of an adverse outcome would offer responses suggestive of hindsight bias [16].

The current study sought to evaluate diagnostic errors and related factors in the field of psychiatry, with the notion that reduction of these biases could eventually lead to better patient care and safety. We demonstrated that reporting the occurrence of an outcome consistently

increases its perceived likelihood, and change the psychiatrist's judgment and overestimation is more likely in low diagnosis probabilities.

Methods

Study design

This survey was conducted by a group of psychiatrists who participated in the Scientific Society of Psychiatrists Congress in Iran in December 2010. Of the 989 members of this society, 669 psychiatrists participated in the congress.

A clinical vignette with some probable differential diagnosis was designed. Two of these differential diagnoses were selected as the least probable, and the other as the most probable diagnosis based on suggestions of five members of National Psychiatric Board. Schizophrenia and bipolar disorder were the least and most probable diagnosis, respectively.

Participants were divided into three groups. Participants in groups A and B were informed of the definite diagnosis to be the least and most probable diagnoses, suggested by members of the National Psychiatric Board, respectively. Then they were asked to fill out questionnaires to rank more probable diagnoses based on their own interpretation of the case scenario. Participants in group C, the control group, were presented with the scenario without any additional explanations and were asked to rate the likelihood of their probable diagnoses. Subjects devoted 15 minutes to complete each questionnaire.

Instructions

Demographic data including age, sex, graduation year, clinical experiences, hospital or private practice, and university position were collected. The participants were asked to read the scenario and explain their differential diagnoses and also to evaluate the probability of each diagnosis in the light of the information appearing in the passage. The main part of case description was the same for all the three groups: "A young white male who appears to be in his early 20s presents to the psychiatric emergency room. The patient is highly agitated and directly threatening; he is throwing his food tray and yelling. He is paranoid about staff poisoning him and appears to be responding to internal stimuli. You have no data or history on this patient, but the patient clearly poses a risk to staff and self. The patient is unable to converse with staff at all".

No additional explanations were provided for the control group participants. However, for (Group A) participants, the scenario was continued as follow: "After six months, the patient was brought back to the hospital and after one month of admission and complementary examinations, is treated as a schizoaffective patient." For participants in (Group B), the final diagnosis was introduced as bipolar disorder.

Statistical analyses

In the study by Fischoff [15], the probability of the estimates before and after knowing about outcomes were 31% and 58% respectively. For calculating the sample size, we used comparison of two proportions formula with a confidence interval of 95%, and the power of the study was 80%. At least 70 participants were estimated in each sub-experiment. Data were analyzed and percentages among groups are compared using chi-square test. P values less than 0.05 were considered statistically significant. Analysis of variance (ANOVA) test and post-hoc analysis were used for comparison between groups.

Results

A total of 240 subjects were enrolled in this study. Of these, 173

completed the questionnaire. Table 1 summarizes the basic information of participants. There were no significant differences in the basic demographic characteristics between groups.

Figure 1 shows the frequency of each diagnosis in groups A and B, in which schizoaffective and bipolar disorders were reported as the definite diagnosis in their respective scenarios, and that in group C. Next, we sought to determine if the differences in the frequency of preferred differential diagnosis within different groups were significant (Table 2).

The likelihood of choosing schizoaffective disorder as the diagnosis for the scenario had significant difference between three groups (P<0.05). Post-hoc analyses revealed that this difference arose from differences between the frequencies in group A and the other groups (Table 3).

Although there was a lower likelihood of choosing bipolar disease within group A than in group B and C, the difference was not statically significant (Figure 1).

Finally, we divided the entire differential diagnoses into two categories, psychotic and non-psychotic disorders (Figure 2). Subsequently, ANOVA was used to compare the frequency of each category between groups. The probability of choosing psychotic disorder as the final diagnosis significantly differed among the three groups (P<0.05). Post-hoc analysis confirmed that this difference comes from higher frequency of this diagnosis within group A. However, there was no significant difference in the frequency of mood disorder between the three groups.

Discussion and Conclusion

Our study emphasizes the view that receipt of outcome knowledge affects subject's judgment in the direction predicted by the creeping determinism hypothesis. Our results were in agreement with other studies conducted regarding this issue [6,17,18].

Like other specialties, psychiatry is vulnerable to this bias. One advantage of our study over earlier works is the nature and importance

Types	Group A	Group B	Group C	P
Number of participants, n (%)	52	63	58	-
	30.1%	36.4%	33.5%	-
Age, mean	36.8	38.4	38.8	0.5
Male (%)	41 (80.4%)	37	42	
		65%	78%	0.14
Faculty member, n (%)	9 (17.6%)	8	14	14
		13.3%	25%	0.26
Assistant professor	9	7	12	
Associate professor	0	0	0	-
Full professor	0	0	0	-
Private, n (%)	9	14	11	-
	18.8%	23.7%	19.6%	-
Hospital	21	19	22	-
(Percentage)	43.8%	32.2%	39.3%	-
Both	18	26	23	-
(Percentage)	37.5%	44.1%	41.1%	-
Years of clinical resume, mean	8.31	10.1	10.37	0.27

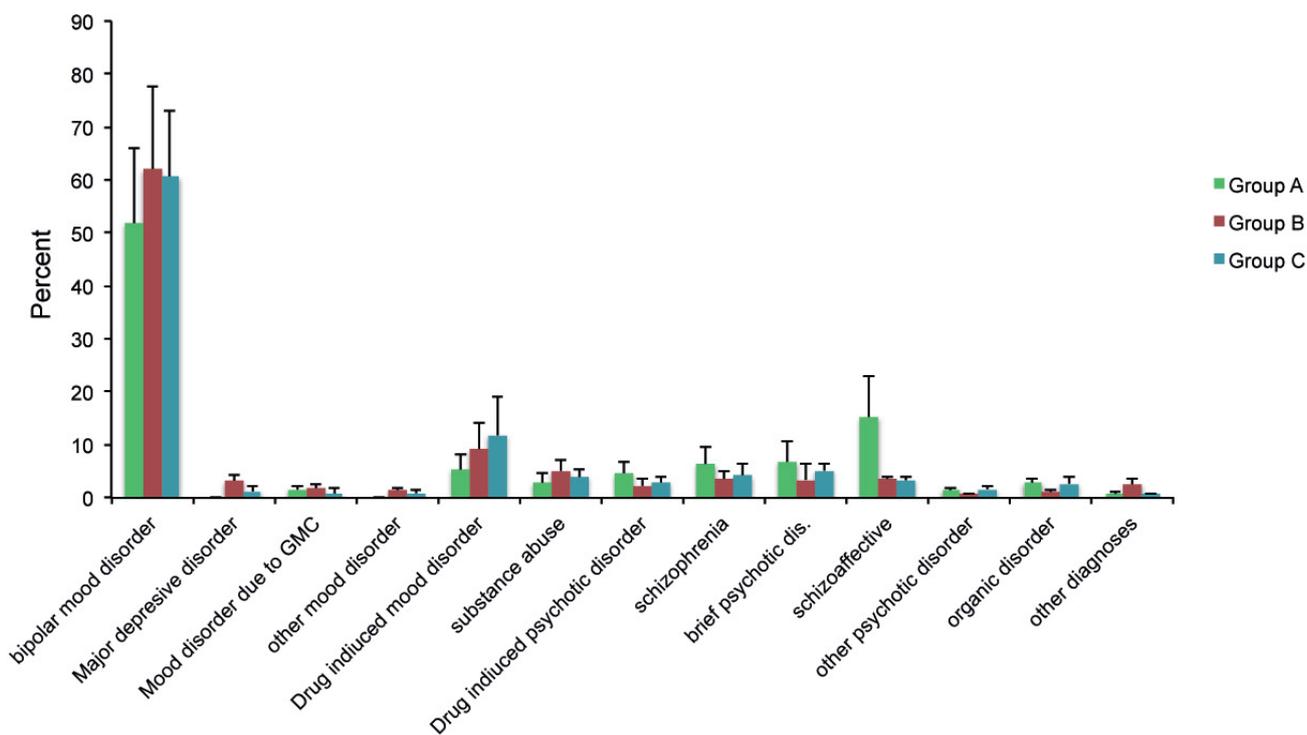**Table 1:** Baseline characteristics of the study participants.

Figure 1: Differential diagnoses and their probabilities in patients in Group A, B and C. Each bar represents mean level of the differential diagnoses. All data are shown as mean ± S.D. *p<0.05.

Disorders		Sum of Squares	df	Mean Square	F	p
Bipolar mood disorder	Between Groups	3317.574	2	1658.787	2.905	0.057
	Within Groups	97055.559	170	570.915		
	Total	100373.133	172			
Major depressive disorder	Between Groups	291.601	2	145.8	2.548	0.081
	Within Groups	9727.232	170	57.219		
	Total	10018.832	172			
Mood disorder due to GMC	Between Groups	34.056	2	17.028	0.767	0.466
	Within Groups	3773.424	170	22.197		
	Total	3807.48	172			
Other mood disorder	Between Groups	52.439	2	26.22	1.407	0.248
	Within Groups	3167.214	170	18.631		
	Total	3219.653	172			
Drug induced mood disorder	Between Groups	1147.519	2	573.76	2.443	0.09
	Within Groups	39929.001	170	234.876		
	Total	41076.52	172			
Substance abuse	Between Groups	140.256	2	70.128	0.526	0.592
	Within Groups	22650.46	170	133.238		
	Total	22790.717	172			
Drug induced psychotic disorder	Between Groups	145.47	2	72.735	0.551	0.578
	Within Groups	22455.975	170	132.094		
	Total	22601.445	172			
Schizophrenia	Between Groups	244.639	2	122.319	0.831	0.437
	Within Groups	25026.633	170	147.215		
	Total	25271.272	172			
Brief psychotic disorder	Between Groups	333.867	2	166.934	0.929	0.397
	Within Groups	30540.988	170	179.653		
	Total	30874.855	172			

Schizoaffective	Between Groups	5143.357	2	2571.679	19.395	0
	Within Groups	22541.498	170	132.597		
	Total	27684.855	172			
Other psychotic disorder	Between Groups	27.455	2	13.727	0.41	0.665
	Within Groups	5698.314	170	33.519		
	Total	5725.769	172			
Organic disorder	Between Groups	130.566	2	65.283	0.732	0.482
	Within Groups	15156.348	170	89.155		
	Total	15286.913	172			
Other	Between Groups	143.533	2	71.766	2.604	0.077
	Within Groups	4684.502	170	27.556		
	Total	4828.035	172			

Table 2: Comparing differential diagnoses in three sub experiments using ANOVA.

Groups	Subset for alpha = 0.05	
	1	2
group C (n=58)	3.36	-
group B (n=63)	3.43	-
group A (n=52)	-	15.29
p	0.975	1.000

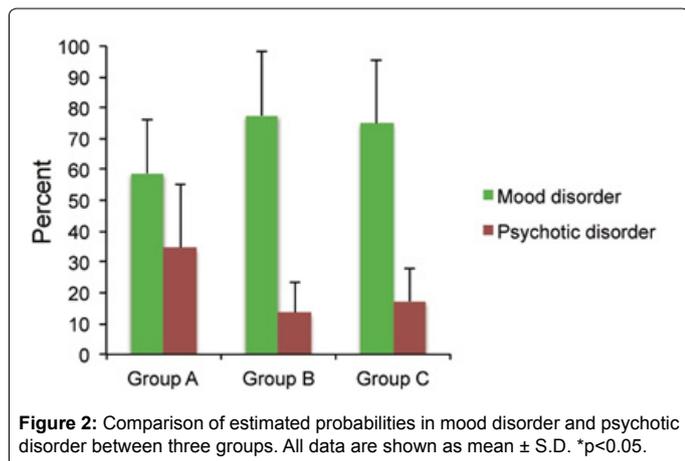**Table 3:** Post hoc analysis of probability of schizoaffective disorder in three groups.

Figure 2: Comparison of estimated probabilities in mood disorder and psychotic disorder between three groups. All data are shown as mean ± S.D. *p<0.05.

of making the correct diagnosis between psychotic and mood disorders, which avoids improper prescription of antipsychotic drugs and inappropriate hospital admission that affects the patient's quality of life.

In our study, (group A) participants, who were given schizoaffective disorder as the definitive diagnosis, estimated the probability of this disorder to be 15.29%, but this disorder was reported at 3.36% and 3.43% in (groups B and C), respectively. In other words, reporting an outcome's occurrence consistently increases its perceived likelihood and change psychiatrist's judgment.

On the other hand, (group A) estimated probability of bipolar disorder to be 51.9%, whereas it was estimated to be 61.2% and 60.6% in (groups B and C), respectively. Clearly, psychiatrists, who know about the outcome, exaggerate the likelihood estimates through unconscious process, but this difference was not statistically significant.

Our findings suggest that if an outcome is less probable, hindsight bias will be more probable. In other words, schizoaffective disorder, a diagnosis with 3% probability, increased to 16% in (group A). These results were supported by the results of Fischoff [17], in which it was found that overestimation is more likely in low probabilities.

According to the study by Croskerry [6], if a person is aware of

occurring heuristics, he/she will attempt to prevent its occurrence. Since our study was conducted in a group of psychiatrists, whom it seems are more aware of cognitive bias and heuristics than the others, future studies on the influence of hindsight bias on general practitioners in making definite diagnosis should seek to find a better interpretation of these data. This may be why there was no significant difference between the perceived likelihood of bipolar disorder in three groups. Moreover, in order to prevent bias related to psychiatrists' opinion regarding disease probability for differential diagnoses, we did not present them with a list of diagnoses. However, this method leads to underestimation of probability of some of the less possible diagnoses.

Acknowledgement

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