

## Article

# The effects of patient education on patient safety: can we change patient perceptions and attitudes?: Lessons from the Armed Forces Capital Hospital in Korea

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## Abstract

**Objective:** Strategies to promote patient involvement in medical error prevention have been implemented, but little is known about the effects of education on changes in perceptions and attitudes about patients' own safety.

**Design:** We administered a survey to military personnel admitted to the Armed Forces Capital Hospital. Responses were classified according to perception and attitude.

**Setting:** Single military hospital in Korea.

**Participants:** A total of 483 completed surveys were included in our study; 252 of the respondents received safety education at admission.

**Methods:** We provided educational program material to one-half of the patients at admission (intervention group). The other one-half of patients received no safety education (non-intervention group). We then performed two rounds of a self-administered survey, based on whether the patient received patient safety education. Cronbach's alpha was calculated to determine scale score reliability. Regression analysis was used to evaluate associations between education and change in scores.

**Results:** Scores for perception and attitude were greater in the intervention group. The results of the regression analysis revealed that compared with the non-intervention respondents, the respondents who received education had higher perception (estimate: 7.809,  $P < 0.0001$ ) and attitude scores (estimate: 5.539,  $P < 0.0001$ ).

**Conclusion:** Our study results suggested that patient education was associated with higher scores in both perception and attitudes about safety. To improve patient engagement in this area, efficient

methods that encourage patient empowerment should be developed. Specialized health care providers who provide patient level education are needed to achieve a satisfactory patient safety climate.

**Key words:** patient safety, patient education, surveys

## Introduction

Since a report released by the Institute of Medicine (IOM) in 1999, perceptions about patient safety have received significant attention in the area of health care [1, 2]. Health care providers, policy makers and others now recognize the importance of patient safety. The concept of error and failure in health care delivery has been suggested as part of a strategy to protect patients from adverse events [3, 4]. This concept is structurally complex and consists of multifaceted processes that are associated with patient outcomes. Concept-related factors associated with patient safety and interventions for improvements in the safety climate have been suggested. Some study results suggest that hospital characteristics such as the organizational culture and the in-hospital safety climate are important for improvements in patient safety [5–7]. Other study results suggest that the role of the health care providers in assuring patient safety, and changes in their perceptions, are associated with health outcome improvements [8–10]. The external factors surrounding the patient are important for safety, but the patient as a key factor affecting improvements in health care should not be ignored [11, 12].

Recently, ‘patient-centeredness’ has been considered as important for improvements in health care [13]. Broad construct is one of the various ways that this concept has been described; broad construct includes the patient’s role and responsibility [14]. This concept implies that the patient can choose personally meaningful and realistic goals and act spontaneously during the health care process. The patient is willing to participate and engage in their own safety and changes in behavior to prevent medical errors. The objective is achieved via patient empowerment; self-direction for improvements in health is facilitated [15]. To promote patient empowerment, appropriate interventions, including information and education, have been considered as important components of the methodology [16]. Patient involvement in safety is associated with better patient outcomes [17, 18]. Some study results have suggested that an educational program is associated with patient empowerment [19, 20]. However, other results have suggested that there are no positive effects of education that promote patient empowerment [21, 22]. Although many study results suggest that education is associated with improvements in patient empowerment, there is a lack of evidence about whether education can improve patient perceptions and attitude. The effects of education also vary by individuals’ characteristics and would be different in specific groups, such as military personnel [23, 24].

Korea has a conscription-based military system. Individuals enter the Korean army within a specific age range (i.e. 18–28 years). Members of the conscripted groups are young, easily accept (i.e. obey) an order, and have a high level of education. The expected effects of education are greater compared with the general population. Conscriptees are discharged from the army when the service term is finished, but the knowledge acquired while in the army would be expected to have life-long effects. Military personnel are, therefore, considered to be important subjects for intervention.

The aim of our study was to evaluate the effects of safety education on patient perceptions and attitudes toward safety in military

personnel. We included analysis of clinical severity, medical department and education to identify individuals potentially susceptible to the effects of education.

## Materials and methods

### Study participants and data collection

The survey is designed as a quasi-experimental study. We performed two rounds of distribution of a self-administered survey to inpatients based on whether or not the patient received patient safety education. First, we distributed the survey from 11 December 2015 to 18 December 2015 to patients who were hospitalized during this period. Second, we performed 4 weeks of patient education (21 December 2015 to 15 January 2016) and distributed the survey to these patients during the period of 18 January 2016 to 22 January 2016. All of the survey participation was voluntary; individuals agreed or declined to participate after we provided information about the study. A total of 308 participants (first round, patients who did not receive education) and 285 participants (second round, patients who received education) were included in the study population. Overall, 48 of these respondents completed the survey during the first and second rounds. We excluded the results of these patients from the overall analysis and evaluated their responses separately (Appendix). Surveys from 14 respondents who did not answer all of the questions were also excluded from the analysis. Data from a total of 483 participants (first round: 252; second round: 231) were included in the analysis.

### Patient safety education

The education process was performed in phases (i.e. (i) introduction (5 min): purpose of the education, (ii) video (5 min): patient rights information, (iii) education (10 min): the role of the patient and a safe medical environment, using power-point data and (iv) finish (10 min): provide pamphlet and explanation about pamphlet to the patient). We also provided time to freely discuss patient safety after the education was finished. We considered that this phase would be motivating to the patients because they were sharing knowledge with each other; we encouraged between-patient discussions. Registered ward nurses used pamphlets to provide daily additional education to patients who had difficulty receiving education because of movement limitations.

### Questionnaire

We reviewed results of questionnaires that included patient safety topics and changed the wording of the perception and attitude questions to make the items more applicable to the patient [25–28]. The perception and attitude about patient safety questions consisted of 10 items containing questions. We limited the number of survey items for several reasons. First, we wanted to provide questions that were easy for the patient to answer. Second, increased numbers of items in a survey may reduce response rates. Third, we wanted to

reduce survey-related pressure. The Likert scale (1 = disagree strongly, 2 = disagree slightly, 3 = neutral, 4 = agree slightly, 5 = agree strongly) was used to score each of a total of 20 items. Negatively worded items were reverse-scored to matched the direction of the positively worded items. A score of 50 was the total value that could be assigned to each section. The survey also included demographic and background questions (e.g. age, marital status, education level, medical department, length of stay, prior admission experience, patient clinical severity [based on first day of admission] and risk of falling) (Appendix).

### Reliability and validity analysis

The reliability of the finalized questionnaire was evaluated using Cronbach's alpha for each composite to assess the extent to which the respondents consistently answered theoretically similar items in each composite. The level of Cronbach's alpha was calculated as 0.922 and 0.714 for perception and attitude, respectively. A greater value for alpha indicated better reliability; an acceptable level was  $\geq 0.7$  [29]. The face validity of the questionnaire was assessed by patient safety specialists before it was administered. We also used a construct validity test to examine how well the questionnaire evaluated the patient's perceptions and attitudes. By most criteria, the survey showed an acceptable fit of perceptions, but poor validity for attitudes [30–32] (Appendix).

### Ethical considerations

The Institutional Review Board (IRB) of the Military Health Policy Research Center, Armed Forces Nursing Academy (IRB number: 1 044 257-201 512-HR-034-02) approved the study protocol.

### Statistical analysis

The distribution of each categorical variable was examined using an analysis of frequencies and percentages;  $\chi^2$  tests were performed to examine associations with readmission. Analysis of variance was also performed for continuous variables to compare mean and standard deviation values. In the fully adjusted model, all variables were entered simultaneously. Multiple linear regression analysis was performed to identify associations of these variables with patient safety perception and attitude, while controlling for potential confounding variables. Subgroup analyses for patient clinical severity, medical department and education level were also performed. All statistical analyses were performed using SAS statistical software version 9.4 (SAS Institute, Cary, NC, USA). A  $P < 0.05$  was considered to indicate a statistically significant difference.

## Results

A total of 483 completed surveys were included in the analysis; 252 (52.5%) of the respondents received the patient safety education. The mean age of the respondents was 23.2 years, most were unmarried ( $n = 429$ , 88.8%) and had graduated from college ( $n = 435$ , 90.1%). The proportion of patients with a greater condition of clinical severity was not high among the total respondents ( $n = 49$ , 10.1%) (Table 1).

The mean composite score was higher in patients who received education in both perception and attitude. The mean perception score was higher for the group of respondents who were admitted to the department of surgery and received education. The results for the attitude scores were similar for this group (Table 2).

The results of the regression analysis indicated that compared with the non-intervention respondents, the respondents who received education had higher perception, and attitude, scores. Respondents who were admitted to the department of internal medicine had lower scores in both perception and attitude, compared with respondents admitted to the department of surgery (Table 3).

We performed subgroup analyses by patient clinical severity, medical department and education. The results of the patient clinical severity subgroup analysis indicated that there were different magnitudes of the effect of education on patient safety for both perception and attitude. The increased score in perception was higher in patients with higher clinical severity conditions. The attitude score was higher in patients with lower clinical severity conditions. The medical department subgroup analysis revealed that the size of the effect of education on the change in score was large in respondents who were admitted to the department of internal medicine. The results of the education subgroup analysis indicated that the magnitudes of the effects were similar for both college and high school graduate respondents; only college graduate respondents had significant increases in attitude score (Fig. 1).

## Discussion

Patient safety is an important component of quality of care. Preventable medical errors can reduce unnecessary resource use and waste of health expenditures [2]. The most important thing is that the reduction of medical errors can save the patient's life [33]. Positive patient attitudes about engaging in their own safety combined with the medical staffs' efforts to improve safety can have synergistic effects. To increase patient engagement in their own safety, we provided safety education and performed a survey to evaluate changes in their perceptions and attitudes.

Overall, the patients who received education about patient safety scored significantly higher in the areas of perception and attitude. Our results suggested that education is important for improvements in patient safety perceptions and attitudes. These results were similar to the results of previous studies, which indicated that patient involvement results in the patients understanding their role and importance [34, 35]. These study results suggest that educational campaigns directed at the patient can lead to positive attitudes about their own safety and motivate changes in behavior. The results of other studies suggest that the role of the patient is limited and is a smaller part of the overall factors that affect safety [36, 37]. The traditional point of view was that the patient's role was limited; information was unbalanced and because patients are not expert in this area, they cannot actively engage in their treatment. Patient-centeredness is now important to health care providers and policy makers; these groups have recognized the importance of self-directional management to improvement in health [11, 13, 14, 20]. To reach the goal of patient-centeredness, adequate health information and health management education should be provided to the patient. Education during hospitalization should induce patients to be interested in their health and in the surrounding environment, and motivate changes in harmful behavior. These changes would motivate improvements in the independent role and the safety of the patient. However, because the changes would differ by individual characteristics, our evaluation included patient clinical severity, medical department and level of education subgroup analyses.

The subgroup analysis revealed that the effects of education on perception and attitude were different between subgroups. The increased score in perception was greater in the group of patients

**Table 1** General characteristics of respondents

(Unit: N/M, %/SD)

	Education		Total	P-value
	Yes	No		
Age	23.6 ± 7.1	22.8 ± 6.4	23.2 ± 6.8	0.2216
Marital status				
Single	219 (51.1)	210 (49.0)	429 (88.8)	0.2111
Married	33 (61.1)	21 (38.9)	54 (11.2)	
Education				
High school	24 (50.0)	24 (50.0)	48 (9.9)	0.8686
College	228 (52.4)	207 (47.6)	435 (90.1)	
Rank				
Private	47 (57.3)	35 (42.7)	82 (17.0)	0.5329
Private first class	79 (54.1)	67 (45.9)	146 (30.2)	
Corporal	48 (45.7)	57 (54.3)	105 (21.7)	
Specialist	28 (49.1)	29 (50.9)	57 (11.8)	
Officer	50 (53.8)	43 (46.2)	93 (19.3)	
Type of army				
Army	228 (51.7)	213 (48.3)	441 (91.3)	0.4099
Air force	9 (47.4)	10 (52.6)	19 (3.9)	
Navy	15 (65.2)	8 (34.8)	23 (4.8)	
Medical department				
Department of internal medicine	44 (54.3)	37 (45.7)	81 (16.8)	0.7626
Department of surgery	208 (51.7)	194 (48.3)	402 (83.2)	
Length of stay	10.4 ± 6.0	9.8 ± 5.9	10.1 ± 6.0	0.2617
Surgery				
Yes	89 (53.3)	78 (46.7)	167 (16.8)	0.7931
No	163 (51.6)	153 (48.4)	316 (83.2)	
Prior admission experience				
Yes	54 (59.3)	37 (40.7)	91 (16.8)	0.1607
No	198 (50.5)	194 (49.5)	392 (83.2)	
Interest in health information				
Low	149 (50.3)	147 (49.7)	296 (16.8)	0.3561
High	103 (55.1)	84 (44.9)	187 (83.2)	
Patient clinical severity				
High	20 (40.8)	29 (59.2)	49 (10.1)	0.1265
Low	232 (53.5)	202 (46.5)	434 (89.9)	
Risk of falling				
High	12 (42.9)	16 (57.1)	28 (5.8)	0.4111
Low	240 (52.8)	215 (47.3)	455 (94.2)	
Total	252 (52.2)	231 (47.8)	483 (100.0)	

N, number; M, mean; SD, standard deviation.

with higher clinical severity conditions. The effect of education on change in attitude was weaker in patients with surgery and those with at most a high school education. One plausible explanation is differences in motivation to change behavior; i.e. education might have improved perceptions, but not enough to motivate specific actions, because a change in attitude requires more powerful motivation [38, 39]. In addition, the degree of response to education is likely associated with the individual's health condition (e.g. difficult to initiate action) or other characteristics (e.g. carefully change their behavior in response to the health condition). Some patients may require more intervention to be motivated to engage in their own safety.

Because patient safety was emphasized by the IOM report, efforts to improve the safety climate in the hospital were suggested, such as practices for patient safety and education for health care providers. Most of these efforts are focused on health care providers and lack intervention into the patient's perspective. This may contribute to increasing patients' knowledge gaps throughout their

treatment process. Patient education can help to reduce the patient's knowledge gap and positively affect their attitude toward safety. Thus, health care providers must consider efficient methods for improving motivation of patient behavior, and these efforts should be performed continuously by well-trained health care providers. In addition, providers must consider the effects of education on patient safety while taking into account patient characteristics that might lead to different results in the patients. Furthermore, a patient reporting system may also be considered a method for improving the attitudes of patients toward their safety.

Our study had several strengths. First, we educated patients about safety and evaluated changes in perception and attitude at the patient level. Many previous studies have aimed to evaluate changes in perceptions and attitudes of medical staff. There has been a lack of evidence about change at the patient level. Our study provides valuable results to policy makers and health care providers, which can be used to improve patient safety. Second, to the best of our knowledge, our study was the first to evaluate the effects of

**Table 2** Relationship of patient safety perception and attitude with demographic characteristics(Unit: M, SD, *P*-value)

	Intervention <sup>a</sup>					
	Perception		<i>P</i> -value	Attitude		<i>P</i> -value
	Yes	No		Yes	No	
Marital status						
Single	39.9 ± 6.1	32.0 ± 8.6	0.3570	37.9 ± 4.3	32.3 ± 5.9	1.0000
Married	38.8 ± 5.8	32.8 ± 6.6		38.6 ± 3.8	33.5 ± 6.4	
Education						
High school	40.6 ± 5.1	31.0 ± 11.5	0.5726	36.5 ± 5.8	32.0 ± 7.7	0.4611
College	39.7 ± 6.2	32.2 ± 8.0		38.1 ± 4.0	32.4 ± 5.7	
Rank						
Private	39.9 ± 5.8	33.5 ± 7.8	0.7129	37.7 ± 4.0	32.9 ± 6.5	0.2030
Private first class	39.1 ± 6.0	32.2 ± 8.1		37.9 ± 4.4	32.9 ± 5.3	
Corporal	40.0 ± 6.7	30.5 ± 8.9		38.9 ± 3.7	31.2 ± 5.2	
Specialist	41.0 ± 5.6	35.3 ± 8.3		38.7 ± 4.2	33.6 ± 6.0	
Officer	39.6 ± 6.2	30.5 ± 8.4		37.2 ± 4.7	32.0 ± 7.0	
Type of army						
Army	39.8 ± 6.2	32.1 ± 8.4	0.8618	37.9 ± 4.2	32.4 ± 5.9	0.9507
Air force	39.3 ± 6.2	30.6 ± 8.9		38.4 ± 4.3	32.9 ± 6.9	
Navy	39.3 ± 4.6	32.1 ± 9.2		38.5 ± 4.9	32.5 ± 6.3	
Medical department						
Department of internal medicine	38.2 ± 6.0	29.8 ± 7.6	0.6557	37.4 ± 4.2	27.9 ± 5.0	0.0017
Department of surgery	40.1 ± 6.1	32.5 ± 8.5		38.1 ± 4.3	33.3 ± 5.7	
Surgery						
Yes	40.6 ± 5.8	32.8 ± 8.8	0.8724	37.8 ± 4.7	33.6 ± 5.3	0.1300
No	39.3 ± 6.2	31.7 ± 8.2		38.1 ± 4.0	31.8 ± 6.1	
Prior admission experience						
Yes	38.5 ± 5.8	29.5 ± 7.9	0.3621	37.6 ± 4.1	31.8 ± 5.9	0.5861
No	40.1 ± 6.2	32.5 ± 8.5		38.1 ± 4.3	32.5 ± 5.9	
Interest in health information						
Low	39.0 ± 6.1	32.4 ± 8.4	0.0146	37.7 ± 4.5	32.5 ± 5.5	0.6203
High	40.9 ± 5.9	31.5 ± 8.5		38.4 ± 3.8	32.2 ± 6.6	
Patient clinical severity						
High	37.8 ± 6.6	34.0 ± 7.6	0.0604	37.2 ± 3.3	31.5 ± 5.3	1.0000
Low	39.9 ± 6.0	31.8 ± 8.5		38.1 ± 4.3	32.5 ± 6.0	
Risk of falling						
High	41.6 ± 5.2	33.8 ± 6.0	0.5200	38.3 ± 3.2	30.5 ± 4.3	0.3454
Low	39.7 ± 6.1	31.9 ± 8.6		38.0 ± 4.3	32.5 ± 6.0	
Total	39.8 ± 6.1	32.1 ± 8.4	<0.0001	38.0 ± 4.2	32.4 ± 5.9	<0.0001

M, mean; SD, standard deviation.

<sup>a</sup>Intervention indicates a patient safety education program in our study. Patients who have received an education program are classified as 'Yes'.

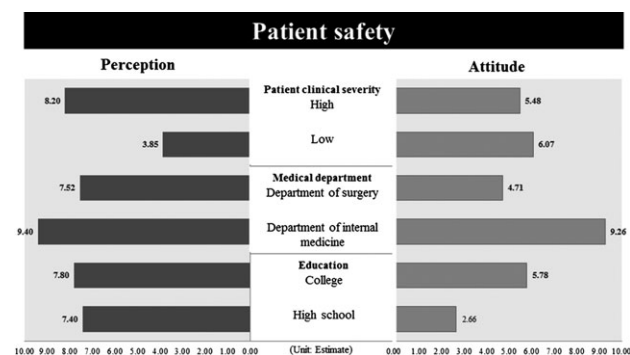
education on changes in perceptions and attitudes in military personnel in Korea. Military personnel are important subjects because education during the service term can have life-long effects. Finally, our results suggested that education at the patient level improves patient safety.

Our study had some limitations. First, we included only one general hospital in the military hospital population, so our results are not representative of the entire military patient population. However, AFCH is the largest hospital in Korea, has an important role in treating patients, and has a case mix of mostly acute patients and high levels of treatment. In addition, the research population lacks generalizability, and the educational effect of older patients with severe illness may vary from patient to patient. Second, our study design could not provide evidence of causality between education and improvement in patient safety. We were unable to administer the survey to the same patients because we could not control patient discharge date and length of stay. It was only possible to administer the survey during specific periods, and

it was administered to different patients based on whether or not they received education. However, we did evaluate a small subset of patients before and after education, and our main findings did not change (Appendix). Third, we could not adjust unmeasured patient clinical or individual characteristics that potentially affect changes in patient safety perceptions and attitudes. Fourth, the survey items were limited compared with other surveys of patient safety. We reviewed previous surveys and changed them for use at the patient level. However, the number of items was limited because we decided that inclusion of many items was not suitable for this survey. We decided to administer a short form survey to achieve higher response rates. Furthermore, we evaluated face validity before conducting the survey, but attitude appeared to have poor validity in our construct validity test. Further studies based on the items with high validity would be needed. Finally, we could not consider health care providers' characteristics. Different levels of skill might have affected patient safety perceptions and attitudes. In addition, since Korea has a military system based on

**Table 3** The association between education and patient safety perception and attitude(Unit: estimation, SD, *P*-value)

	Patient safety					
	Perception			Attitude		
Intervention						
Yes	7.809	0.652	<0.0001	5.539	0.454	<0.0001
No	Ref	–	–	Ref	–	–
Age	0.122	0.084	0.1444	0.008	0.058	0.8847
Marital status						
Single	0.263	1.741	0.8798	–2.683	1.212	0.0269
Married	Ref	–	–	Ref	–	–
Education						
High school	–0.041	1.101	0.9704	–0.859	0.766	0.2623
College	Ref	–	–	Ref	–	–
Rank						
Private	2.181	1.370	0.1115	2.390	0.954	0.0122
Private first class	1.323	1.255	0.2918	2.167	0.874	0.0132
Corporal	0.809	1.316	0.5386	1.850	0.916	0.0434
Specialist	4.047	1.431	0.0047	3.194	0.996	0.0013
Officer	Ref	–	–	Ref	–	–
Type of army						
Army	0.274	1.546	0.8594	–0.409	1.076	0.7036
Air force	–0.980	2.215	0.6582	–0.126	1.542	0.9349
Navy	Ref	–	–	Ref	–	–
Medical department						
Department of internal medicine	–2.519	0.978	0.01	–3.003	0.681	<.0001
Department of surgery	Ref	–	–	Ref	–	–
Length of stay	0.031	0.059	0.6047	–0.028	0.041	0.4983
Surgery						
Yes	0.686	0.755	0.3635	0.147	0.526	0.7793
No	Ref	–	–	Ref	–	–
Prior admission experience						
Yes	–2.681	0.925	0.0037	–0.060	0.644	0.9261
No	Ref	–	–	Ref	–	–
Interest in health information						
Low	–0.583	0.699	0.4038	–0.424	0.487	0.3835
High	Ref	–	–	Ref	–	–
Patient clinical severity						
High	0.257	1.401	0.8545	0.237	0.976	0.8082
Low	Ref	–	–	Ref	–	–
Risk of falling						
High	3.428	1.775	0.0534	0.058	1.236	0.9625
Low	Ref	–	–	Ref	–	–



**Figure 1** The results of the subgroup analysis of the effect of education on patient perceptions and attitudes, by patient clinical severity, medical department and education. \*Note: The results indicate scores for respondents who received patient safety education compared with those of respondents who did not receive safety education. \*Bold font indicates a statistically significant result ( $P < 0.05$ ).

conscription, other countries that adopt other military systems may be different. Further studies that control these factors should be performed.

In conclusion, our study results suggested that education was important for improving patient perceptions and attitudes about their own safety while in the hospital. To improve patient engagement, efficient educational methods and methods to encourage motivation are needed. Specialized health care providers should provide education at the level of the patient to achieve improvements in the patient safety climate. Finally, more patient-level studies are needed to improve patient engagement and provide adequate evidence in this area.

### Supplementary material

Supplementary material is available at *International Journal for Quality in Health Care* online.

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