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# Mediating Effect of Perception of Patient Safety Culturein the relationship between Safety Control and Patient Safety Management Activities of Geriatric Hospital Nurses

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**ABSTRACT**

The purpose of this study is to analyze the mediating effects of patient safety culture awareness in the relationship between safety control and patient safety management activities of nursing hospit al nurses. The subjects were 85 nurses in a total of 7 geriatric hospitals in Chungnam-do. Data were analyzed as descriptive statistics, Pearson's correlational coefficients, multiple linear regression and Sobel test. As a result of test the mediating effect in step 1, safety control had a significant effect on perception of patient safety culture (β=.44), in step 2, safety control had an effect on patient safety management activities (β=.38), in step 3, safety control had a positive effect on patient safety management activities (β=.20), and the perception of patient safety culture also had a positive effect on patient safety management activities (β=.39) and showed 26.8% explanatory power. Perception of patient safety culture was found to have a complete mediating effect. Education and environment should be prepared in consideration of the concepts of safety control and perception of patient safety culture so that patient safety management activities of geriatric hospital nurses can be performed well. The heads of hospitals should provide administrative and financial support in consideration of the patient safety culture.

**Keywords:** Perception of patient safety culture; Safety control; Patient safety management activities; nurses; Geriatric hospitals

## Introduction

Due to the rapid aging, the population aged 65 or older in 2020 is expected to increase to 15.7%, and it will continue to increase in the future to 20.3% in 2025 and 43.9% in 2060, and as Korea is expected to enter a super-aged society, various health and welfare policies for the elderly are needed.

The life expectancy of a 65-year-old survivor in 2018 was 20.8 years (18.7 years for men and 22.8 years for women), which is higher than the OECD average, and in 2019, the causes of death for elderly people over 65 years of age were in the order of cancer, heart disease, pneumonia, cerebrovascular disease, and diabetes, and in 2018, medical expenses per person and out-of-pocket medical expenses under the health insurance for seniors aged 65 and over were increasing compared to the previous year. Meanwhile, the number of welfare facilities for the elderly in 2019 increased every year to 79,382, and the elderly's residential space

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is also changing due to the increasing trend of elderly medical welfare facilities(Statistics Korea, 2020).

There are various places where the elderly can reside for the purpose of treatment and residence. Among them, geriatric hospitals are a type of hospital-level medical institution in which doctors, dentists, or oriental medical doctors conduct medical treatment mainly for inpatients, and are equipped with nursing beds to provide medical treatment for patients who need long-term hospitalization(Ministry of Government Legislation, 2021). In order to improve the quality of service of long-term care institutions such as geriatric hospitals and improve the quality of life for residents, the evaluation criteria for the second cycle of medical institution certification in effect from 2018, which includes major categories of institutional operation, environment and safety, beneficiary rights guarantee, and benefit provision process and results(Ga H., 2019), and safety is a very important factor, and patients should be able to receive high-quality services in a safe environment. Therefore, medical personnel including nurses, nursing assistants, and nursing care workers are doing their best to ensure patient safety. In specially nurses account for a very large proportion of health care workers, and are the most important personnel responsible for patient safety as medical personnel who communicate with patients in the most close situation 24 hours a day.

Meanwhile, patient safety management activities are activities taken by medical institutions and their workers to prevent accidents or incidents that may occur to patients, and are systematic activities that reduce, eliminate, and prevent risks that may occur within medical institutions(Lin L., 2006). Patient safety management activities tend to be used interchangeably with patient safety nursing activities. Nurse's patient safety management activities include patient identification, falls, sufficient explanation, infection, oral prescription, surgery/procedure, communication, fire safety, medical device management, oral prescription, medication nursing, bedsore prevention, transfusion nursing, and emergency situations(Park S. J.*et al.*,2012). In a study of nurses in general hospitals, nurses' attitudes toward patient safety management activities were moderate and their execution level was low compared to their attitudes and will(Kim M. W. *et al.*,2018), and efforts to increase them are needed. Basically, an individual may exhibit safety-related behavior according to his or her own will, so study aims to consider safety control as an element of this will. Safety control is an individual's cognitive ability that affects work in order to derive safe results during work, and a high degree of safety control gives positive benefits to physical and psychological health, reduces the indicators of negative safety outcomes, and consequently contributes to safety behavior (Kim K. K. *et al*., 2012).

It is said that a high level of safety control reduces negative safety indicators (Huang Y. H. *e t al.*, 1999), which is equivalent to controlling oneself to perform safety regulations well in ordert o lower negative safety indicators in clinical life. It is also said that nurses with low personal cont rol have an effect on increasing burnout and decreasing safety awareness(Ramanujam R. *et al.*,20 09). Therefore, hospital policy support and personal support are needed to improve nurses' sense of control over safety and to create a working environment that can follow safe guidelines to prot ect patients and their own safety during nursing (Kim E. J., 2016).

As a result of the study of nurses at 7 small and medium sized hospitals, the degree of safety control was moderate, but the sense of safety control of nurses is a major factor influencing patie nt safety management activities(Kim E. J., 2016), and research on this is necessary. When fa-ced with a strong demand or conflict contrary to the safety system, a sense of safety control may prov

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ide clear judgment on actions contrary to safety (Han M. Y., 2015). Therefore research on safety control is required.

Meanwhile, as a result of analyzing patient safety management activities for nurses of 6 small and medium sized hospital with 150 beds to 300 beds in rural regions, it was stated that it was necessary to develop a program for cognitive change in order to promote patient safety culture activities ( Kim H. Y. *et al.,* 2013). In the study by Cho H. W. *et al.* (2012),patient safety management activities of nurses increased as patient safety culture awareness increased, and considering the factors of patient safety culture awareness, patient safety management activities can be improved. Patient safety culture is the prevention of accidents by finding the cause of repeated patient safety accidents and improving them, and it is a concept that emphasizes not only technical aspects, but also leadership that emphasizes patient safety, teamwork with effective communication, policies and procedures, efficient manpower management (Kim S. K.*et al.*,2010).Patient safety management activities of geriatric hospital nurses in a region were correlated with patient safety culture awareness (Kim M. W. *et al.,* 2018),we would like to improv e patient safety management activities by raising awareness of safety culture.

Therefore, the researcher analyzed the relationship between safety control of geriatric hospital nurses, perception of safety culture, and patient safety management activities, and by exploring whether a mediating effect is formed when adding patient safety culture awareness in the relationship between safety control and patient safety management activities the aim is to provide basic data for program development to promote patient safety management activities.

**Purpose**

1. Identify the general characteristics of nursing home nurses.
2. Identify the level of safety control, perception of patient safety culture, and patient safety management activities of nurses at geriatrichospitals.
3. Analysis of the relationship between safety control, perception of patient safety culture, and patient safety management activities of geriatric hospital nurses
4. Analysis the mediating effects of patient safety culture recognition in the relationship between safety control and patient safety management activities of nurses at geriatric hospitals.

## Methods

**Subjects**

The subjects of this study were 85 nurses working in 7 geriatric hospitals in a total of 7 geriatric hospitals in Chungcheongnam-do, 1 each in C and H-gun, 1 in A city, C city, and 2 in G city, and they were subjects who understand the purpose of the study, voluntarily expressed their willingness to participate, and agreed in writing, and they have clinical experience of more than 6 months and are people who directly perform care on patients.

The number of study subjects was calculated using the G-power 3.1.9.4 program. The number of samples required to maintain 2 predictor variables, effect size .15, significance level .05, power .85 required for regression analysis was 75, and in consideration of the 20% dropout rate, 90 people were surveyed, and the data of 85 people were finally used, excluding the questionnaire with poor responses.

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## Instruments

### Safety control

The safety control tool developed by Anderson L. L. *et al.*(2004) and translated and used by Jeong S. K.(2009) was used, and as a result of the reliability test, question 3 was deleted and a total of 6 questions were used. It consists of a 5-point Likert scale of 1 point for “strongly disagree” and 5 points for “strongly agree”, where higher the score, the higher the self-control consciousness for patient safety. At the time of development, the reliability of the tool was Cronbach's α =.85, and in this study it was .83.

### Perception of patient safety culture

A Korean patient safety culture measurement tool developed by Lee S. G. (2015) was used. There are a total of 35 questions, and 7 questions were reverse-coded. The tool consisted of 9 lea dership questions, 4 patient safety policies/procedures, and 4 patient safety improvement systems as sub-factors at the organizational level. Sub-factors at the department level consisted of 6 team work questions and four non-punishment environment questions. Sub-factors at the individual lev el consisted of 5 questions of patient safety knowledge/attitude and 3 questions of patient safety p riorities.Each question is a Likert 5-point scale from 1 point of “strongly disagree” to 5 points of “strongly agree”, and the higher the score, the higher the PPSC. The reliability Cronbach's α at the time of tool development was .93 and in this study was .94.

### Patient safety management activities

The patient safety management activities tool used by Kweon M. S. (2016) was used. The content s consisted of 4 patient identification questions, 2 oral and telephone prescriptions, 4 administrati ve nursing questions, 1 treatment nursing, 3 infection control questions, 2 falls, 2 pressure ulcers, 1 crisis management question, and 1 safe environment question.Each question is on a 5-point Likert scale from 1 point of “strongly disagree” to 5 points of “strongly agree”. Higher scores mean higher patient safety management activities. The reliability of this tool was .96 in the study by Kweon M. S. (2016) and .96 in this study.

### Data collection

Researchers and research assistants were given permission after explaining the purpose and method of the study to the head of the nursing department at geriatric hospitals. The decision was made to collect non-face-to-face data due to the coronavirus situation, and a total of 90 questionnaires were sent to the nurses by mail to the nurses of a total of seven nursing hospitals located in A, C, and G-si, C and H-gun, in Chungcheongnam-do.

The research objectives and methods were guided, the written consent was signed, and the questionnaire was completed, and the entirety was collected by mail. It took about 10 minutes to fill out the questionnaire. As a token of appreciation, a small gift was provided to each subject.

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### Ethical consideration

Approval was acquired by the ethics committee of K University on the objective, methodology an d protection of rights of participants (KNU_
IRB_2021-20). During the study period the guidelines on ethical studies were observed.

The consent form included details on anonymity and confidentiality, and it was explained that participation in the study can be stopped at any time if he/she wants to discontinue the study even after consenting to participate in the study according to his or her voluntary will, and that there is no disadvantage. The data collected after the survey will be kept in a locked place and will be disposed of collectively after the study is completed.

### Data analysis

Using the SPSS/WIN 25.0 program, the general characteristics and safety control, perception of patient safety culture, and degree of patient safety management activitiesof nurses in geriatric hospitals were obtained from descriptive statistics of frequency, percentage, average and standard deviation. The relationship between safety control, perception of patient safety culture and patient safety management activities was calculated by Pearson's correlation coefficients. The mediated effect of patient safety culture recognition in relation to safety control and patient safety management activities was performed using multiple linear regression, and the mediation effect significance test was analyzed by the Sobel test.

## Result and Discussion

### General characteristics of subjects

The mean age of 85 geriatric hospital nurses was 47.08±12.34 years old and ranged from 25 to 68 years old. Nurses in geriatric hospitals were more than a majority in their 40s and 50s. Female nurses accounted for the majority with 95.3% (81 persons), and general nurses accounted for the majority, 70.6% (60 persons). Average total clinical experience was 14.02±9.69 years, 37.6% (32 persons) had clinical careers in 10-19 years. The geriatric hospitals experience was 5.70±4.48 years, and the period varied from 6 months to 21 years. 58.5 % (48 persons) had less than five years of clinical experience in geriatric hospitals.98.8% (84 persons) answered that they had experience in education about patient safety, the number of training was 0-4 times, and 35.3% (30 persons) received 4 times during a year and 35.3% (30 persons) received 1 time during a year. As for the academic background, 54.1% (46 persons) were college graduates and 72.9% (62 persons) answered that the average working hours per day was 8 hours [Table 1].

**Table 1:General characteristics of subjects (N=85)**

| Variables | Categories | Number (%) | M±SD |
|---|---|---|---|
| Age(years) | Less than 39<br>40-49<br>50-59<br>More than 60 | 21(24.7)<br>25(29.4)<br>24(28.2)<br>15(17.6) | 47.08±12.34 |
| Gender | Male | 4(4.7) | |

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| | | | |
|---|---|---|---|
| | Female | 81(95.3) | |
| Position | General nurse<br>Charge nurse<br>Head nurse | 60(70.6)<br>7(8.2)<br>18(21.2) | |
| clinical experience (years) | Less than 10<br>10-19<br>More than 20 | 30(35.3)<br>32(37.6)<br>23(27.1) | 14.02±9.69 |
| geriatric hospitals experience (years) | Less than 5<br>5-10<br>More than 11 | 48(58.5)<br>16(18.8)<br>20(24.4) | 5.70±4.48 |
| Education about patient safety(times) | Yes<br>No | 84(98.8)<br>1(1.2) | |
| Number of training(number) | 0<br>1<br>2<br>3<br>4 | 1(1.2)<br>30(35.3)<br>21(24.7)<br>3(3.5)<br>30(35.3) | |
| academic background | college<br>Bachelor<br>Master degree | 46(54.1)<br>34(40.0)<br>5(5.9) | |
| average working hours | 8 hours<br>9-10 hours<br>Over 11 hours | 62(72.9)<br>16(18.8)<br>7(8.2) | |

**Degree of safety control, perception of patient safety culture, and patient safety management activities in subjects**

The safety control score of the subjects was 3.94±0.57 out of 5 points, and the degree of patient safety culture measurement was 3.85±0.38 points, and the degree of patient safety management activities was 4.46±0.43 points out of 5 points. The level of safety control and recognition of pati ent safety culturewas abnormal and patient safety management activities were high among nurses in working geriatric hospitals [Table 2].

**Table 2: Degree of Safety Control, Perception of Patient Safety Culture, and Patient Safety Management Activities in Subjects (N=85)**

| Variables | M±SD | Range |
|---|---|---|
| Safety control | 3.94±0.57 | 1~5 |
| Perception of patient safety culture | 3.85±0.38 | 1~5 |
| Patient safety management activities | 4.46±0.43 | 1~5 |

**Correlation between safety control, perception of patient safety culture, and patient safety management activities in subjects**

Safety control and perception of patient safety culture (r=.44, p<.001), safety control and patient safety management activities (r=.38, p<.001), and perception of patient safety culture and patient safety management activities (r=.48, p<.001) all showed moderate positive correlation.

In other words, the higher the sense of safety control, the higher the level of patient safety culture awareness, the higher the level of safety control, the higher the patient safety management

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activity, and the higher the patient safety culture awareness, the higher the patient safety management activity [Table 3].

**Table 3 Correlation between safety control, Perception of Patient Safety Culture, and Patient Safety Management Activities in Subjects (N=85)**

| Variables | Safety control r(p) | Perception of patient safety culture r(p) | Patient safety management activities r(p) |
|---|---|---|---|
| Safety control | 1 | | |
| Perception of patient safety culture | .44(<.001) | 1 | |
| Patient safety management activities | .38(<.001) | .48(<.001) | 1 |

**Mediating effects of perception of patient safety culture in the relation between safety control and patient safety management activities in subjects**

As a result of examining the multicollinearity between the dependent variable and the independent variable before analyzing the parametric effect, the Durbin-Watson index for autocorrelation was 1.69, which was close to the independent variable 2. The multicollinearity between the independent variables was a VIF index of 1.24, which was less than 10, and the tolerance limit was 0.80, which was less than 1.0.

As a result of analyzing the effect of the parameters, safety control, an independent variable in step 1 regression analysis, had a statistically significant effect on the parameter perception of patient safety culture (β=.44, p<.001), and the explanatory power of perception of safety culture was 19.6%. In the second-stage regression analysis, the independent variable, safety control, had a significant effect on the dependent variable, patient safety management activities (β=.38, p<.001), and the explanatory power for patient safety management activities was 14.3%.

In step 3, in order to test the effect of perception of patient safety culture, a mediating variable, on patient safety management activities, which is a dependent variable, as a result of regression analysis with safety controland perception of patient safety culture as predictive factors and patient safety management activities as dependent variable, safety control was not found to have an effect on patient safety management activities (β=.20, p=.056), and perception of patient safety culturehad a positive effect on patient safety management activities (β=.39, p<.001), and it showed 26.8% of explanatory power.

As a result of comparing the β values, it was confirmed that perception of patient safety culture showed a total mediating effect as much as 0.18. The β value of .20 in step 3 was lower than the β value of .38 in step 2, and since the effect of safety control was reduced by the parameter perception of patient safety culture, the completely mediated effect of perception of patient safety culture was confirmed. As a result of confirming the significance of the mediating effect coefficient, it was statistically significant (Z=2.86, p=.002) [Table 4].

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**Table 4: Mediating Effect of Perception of Patient Safety Culture in the relation between Safety Control and Patient Safety Management Activities**

| Variables | B | β | t | *p* | $R^2$ | Adj.$R^2$ | F | *p* |
|---|---|---|---|---|---|---|---|---|
| Step1: Safety control→ perception of patient safety culture | .30 | .44 | 4.49 | <.001 | .196 | .186 | 20.18 | <.001 |
| Step2: Safety control → patient safety management activities | .29 | .38 | 3.72 | <.001 | .143 | .133 | 13.84 | <.001 |
| Step3: Safety control, perception of patient safety culture → patient safety management activities | | | | | .268 | .250 | 14.98 | <.001 |
| 1. Safety control → patient safety management activities | .16 | .20 | 1.94 | .056 | | | | |
| 2. Perception of patient safety culture → patient safety management activities | .45 | .39 | 3.74 | <.001 | | | | |
| Z= 2.86, p=.002 | | | | | | | | |

## Discussion

Safety control and perception of patient safety culture of geriatric hospital nurses were positively related to patient safety management activities, and in the relationship between safety control and patient safety management activities, perception of patient safety culture showed a complete mediating effect.

As a result of reviewing previous studies on patient safety nursing, the term patient safety management activities is being used interchangeably with safety nursing activities. The safety control of nurses in small and medium hospitals had a positive correlation with safety nursing activities, and was found to be a factor (β=.30) influencing safety nursing activities. Safety control is a cognitive ability related to producing safe results when performing work, and it was consistent with the results of this study as it refers to controlling oneself to follow the guidelines according to safety regulations(Kim E. J., 2016).

A sense of safety control is the application of an individual's perceived sense of control over a task to patient safety (Anderson L. *et al*., 2004).It is an individual's ability to influence the overall nursing practice in relation to eliciting patient safety outcomes in performing nursing tasks (Jung S. K., 2010). The safety control supervision is highly relevant to safety management activities because it greatly affects the performance of safety management activities in occupations where there is a high demand for task completion, such as nursing (Jung H. E., 2013; Jung S. K., 2010). The higher the sense of safety control, the better the safety results (Huang Y. H. *et al*., 2005), and the better the safety management activities are (Turner N. et al., 2011).This cognitive ability of safety control makes it possible to perform patient safety management activities well, so training to improve safety control is required.

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In addition, the safety control of nurses in university hospitals has a positive relationship with the perception of patient safety culture, and the influence on safety control included communication, teamwork, and leadership of the perception of patient safety culture(Kim K. J., 2016), and this was similar to the results of this study. The patient safety culture is an achievement that forms a factor that drives many discretionary behaviors of health and medical professionals toward making patient safety the highest priority (Lee S. G., 2015).

Patient safety culture refers to individual and organizational patterns based on shared beliefs, values, and ongoing exploration to prevent injuries or accidents to patients that may occur in the process of delivering medical services (Lee S. G., 2015).In particular, since mutual support and leadership in the areas of communication and teamwork perception, which are components of the perception of patient safety culture, can be important factors in inducing safety management behavior, problem solving, and performance, in addition to the efforts of members to increase the degree of perception of patient safety culture, therefore policies and systems should be supported. Also, a positive patient safety culture influences reduced mortality, reduced first aid failure rates, reduced medical errors, and increased patient satisfaction (Havens D. S. *et al.*,1999). Several safety experts have also argued that patient outcomes have improved by positively changing the patient safety culture of healthcare institutions (Krumberger, 2001), and scores calculated by the institution's patient safety culture measurement tools reflect employee safety performance (Castle N. et al., 2006).Regional small and medium sized hospital nurses responded positively to manager attitude, accident reporting frequency, communication and feedback, and teamwork in the 12 factors of patient safety culture awareness. The frequency of incident reporting, interdepartmental patient transfers, patient safety levels in the work department, organizational learning and improvement activities, and cross-departmental teamwork have had a significant impact on safety management activities (Kim H.Y.*et al.*, 2013). Nurses at nursing homes should also consider these factors to raise awareness of this patient safety culture.

Patient safety management activities are nursing activities conducted by nurses to promote patient safety management, which refers to systematic activities to identify, improve, and prevent problems or possible problems during the course of care. Patient safety management activities mainly presented in Korea shall focus on carrying out appropriate activities to prevent and manage safety accidents (Kweon M. S., 2016).

Therefore, in order to promote patient safety management activities of geriatric hospital nurses, individual safety control should be increased and patient safety culture should be spread so that patient safety culture in the hospital can be felt well formed. Moreover, the spread of patient safety culture has a completely mediated effect and should be considered as a more important factor.The role of leadership is paramount to form an organizational culture to promote patient safety. Leadership should make efforts and actions to overcome the blame culture, as it is the biggest factor that hinders the formation of a culture of patient safety.Since the importance of safety culture has been highlighted, safety leadership has been recognized as a new concept that influences the organization's safety culture, safety values of its members, safety attitudes, and safety behaviors(Zohar D. *et al*., 2007). Also, education and training should be provided to create a non-punitive environment and to have knowledge and attitude on patient safety, and above all, the hospital environment should be improved to a patient safety system. In order for this culture to be established, patient safety policies and procedures must be systematically established, and hospital leaders and managers must prioritize these efforts. Teamwork among members is also expected to play a major role in the formation of a safety culture. A systematic patient safety

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culture shall be spread by prioritizing patient safety and exercising teamwork. This process will complete the patient safety cultural awareness of nursing hospital nurses.

This study is significant in that it provided an understanding of patient safety management activities through confirming that the perception of patient safety culture had an important effect on enhancing patient safety management activities in nurses caring for elderly patients in geriatric hospitals, a long-term care facility, and confirming how safety control and perception of patient safety culture act on patient safety management activities.

## Conclusion

According to the results of this study, safety control and perception of patient safety culture of geriatric hospital nurses were positively correlated with patient safety management activities.

Also, in the relationship between nurse safety control and patient safety management activities, perception of patient safety culture had a complete mediating effect, and to enable geriatric hospital nurses to consider safety as a top priority and carry out safety management activities, safety-related safety reporting and education systems, policies and procedures, leadership, teamwork, communication, patient safety improvement activities, and patient safety culture related to non-punishment environments should be recognized, and efforts should be made to spread these cultures.

It is recommended to develop an intervention program that can enhance a sense of safety control by mediating patient safety culture awareness so that nurses at nursing hospitals can perform patient safety management activities well.

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