# A Study on the Nursing Students' Subjectivity of Industrial Accidents

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**Abstract:** The objectives of this study are to understand the subjectivity of industrial accidents perceived by nursing students, to describe the characteristics of each type, and also to understand the categorization of industrial accidents, by applying the Q-methodology. Total 17 fourth-year students who performed the practice in Nursing Department of A university, were asked to classify total 34 statement sentences about industrial accidents. The collected data was analyzed by using the QUANL PC Program. In the results of this study, the nursing students' perception of industrial accidents was divided into three factors. The types of subjectivity of industrial accidents were 'social improvement request type', 'employer responsibility type', and 'cause removal type'. This study has provided the basic data for educating and understanding the nursing students' perception of industrial accidents in clinical site.

**Keywords:** Industrial Accidents, Nursing Student, Subjectivity, Q-Methodology, Nurses

## 1. Introduction
### 1.1. Background

The Article 2, Clause 1 of the Industrial Safety and Health Act defines an industrial accident as "a worker is killed, injured, or gets sick by structures, facilities, raw materials, gas, steam, and dust related to work, or operation or other works" [1]. In this case, both material aspect and personal aspect of workers have been considered, so that the range is wide. However, when writing the statistics of industrial accidents, it is usually counted as causing personal injury for the administrative expediency, so that only this case is called industrial accident [2].

In case when the chronic physical symptoms or permanent loss of functions are caused by industrial accidents, the pain caused by this changes the whole lives of workers and their families. As the loss of physical functions by industrial accidents could limit the movements of exercise and even daily life, the workers have limited roles in their home, workplace, and society, and the loss in social relation is caused, which works as a factor that makes it difficult for the victims to return to society. Especially, the injured workers who could not return to their workplace experience the economic hardship and alienation from society due to the severed social relations, and their negative psychological response could become a huge social problem [3]. The disabled by industrial accidents shows the severe depression and high anxiety originated from the sudden loss of physical functions and limited roles, and because of those psychological and social difficulties, they could lose the opportunities of rehabilitation or recovery of disabilities [4-7].

As the beings that should take care of victims of industrial accidents at hospital and industrial site, the nurses could become the victims of industrial accidents in the site where they are working for. According to the Article 16 of the Industrial Safety and Health Act, a health manager is a professional manpower assigned to workplace to assist the business owner or chief manager regarding the technical matters of health, and also to provide guidance/advices to the supervisor and staff in charge of safety, so that people with qualifications like doctor, nurse, industrial hygiene management engineer, and air pollution environmental engineer could be appointed as a health manager [1]. Thus, there are total 3,559 health managers assigned to domestic workplaces, and the manpower showing the biggest percentage is the occupational health nurse. Total 2,294 occupational health nurses(64.5%) are assigned to workplaces as health manager s[8]. Also, examining in the aspect of occupational health of hospital nurses, the nurses' health problems are the results related to nursing work, so that they should be the subjects of interest in regard of industrial accidents [9].

As the core manpower occupying the biggest part of healthcare site, with the most contacts with subjects, the nurses should provide the safe and high-quality nursing to subjects within limited time in the rapidly-changing healthcare environment [10]. When dealing with subjects in nursing site, the subjectivity of perception has lots of effects on their nursing. Thus, it is important to understand the perception targeting the nurses and pre-service nurses.

There are no researches on industrial accidents targeting nursing students. Thus, as a methodology originated from actant's perspective instead of researcher's hypothesis, for understanding the characteristics of each type according to humans' subjectivity structure [11], the Q-methodology considering the subjectivity of subjects is a suitable research method for verifying the type of nursing students' perception of industrial accidents as the nursing students' perception of industrial accidents is the subjective and unique experience of subjects.

Thus, this study aims to provide the basic data necessary for developing the differentiated educational programs according to the characteristics of each type of perception of industrial accidents, targeting the pre-

service nurses before entering the nursing site, by understanding the subjectivity structure of industrial accidents in the perspective of nursing students.

**1.2. Purpose**

The objectives of this study are to provide the basic data for presenting the strategies for the education of nursing students, and also to provide the information about nursing students dealing with industrial accident patients, by examining the types of subjective perception of industrial accidents and the characteristics of types targeting the students of nursing department by applying the Q-methodology. The concrete research objectives for this are as follows.

   1) The nursing students' subjective perception of industrial accidents is categorized.

   2) The characteristics of each type of nursing students' perception of industrial accidents are analyzed and described.

**2. Materials And Methods**

**2.1. Study Design**

In order to achieve the objectives of this study, after considering the literature, media data, and preceding researches on industrial accidents, the subjectivity showing the types of subjective perception of industrial accidents is discovered targeting the nursing students who have experienced industrial accidents.

**2.2. Q-Population And Q-Sampling Selection**

To extract the comprehensive statements about the effects of industrial accidents focusing on the currently-enrolled students of nursing department, the Q-populations were drawn through the processes like consideration of domestic/foreign relevant literature, open-ended questionnaire, and individual in-depth interview. By drawing about 200 Q-populations through those processes, and then integrating the collected literature through the consideration of domestic/foreign relevant literature, around 100 Q-populations were finally extracted. After going through the procedure of reviewing and modifying the extracted Q-populations of this study, final 34 samples with high discrimination were selected.

**2.3. P-Sample Selection Method**

As a qualitative research emphasizing individuals' inertia focusing on differences in intraindividual semanticity or importance instead of interindividual differences, the Q-methodology is based on the small sample doctrine in which the characteristics are not clearly revealed when the P-sample gets larger because many people are concentrated in a single factor [11]. As the P-samples of this study, this study selected total 17 nursing students who voluntarily agreed on the participation in this study after fully explaining the objectives of this study to them.

**2.4. Q-Classification And Data Analysis Methods**

The Q-classification process is the process in which each individual creates the voluntary definition of industrial accident, and in this study, the research subjects who were selected as P-samples classified the statements of Q-samples in the forced normal distribution method [12]. Using the Q-cards, the data was collected from total 17 students of nursing department in OO university. It took mostly 30-45 minutes for each research subject to complete the Q-classification. In the distribution of Q-samples, the research subjects classified the statements selected as Q-samples into from strong affirmation to strong denial according to the importance based on their own opinions. The statement(Q1) about industrial accidents was classified on the basis of 12-point scale. After that, in relation to the statements classified into both extremes, the interviews with the subjects were conducted afterwards. As the Q-factor analysis, the Principle Component Factor Analysis(varimax) was used. The classification of types was selected by considering the results of variously inputting the number of factors and the total variance explained on the basis of Eigen value 1.0 or more. Regarding the collected data, this study scored the transformed scores(1-12) given to each focusing on the forcedly-distributed cards in the Q-sample distribution table. Coding the given transformed scores in the order of Q-sample number, they were processed with the principal component factor analysis by the QUANL PC Program. For the data analysis, the QUANL PC Program was used [13-15].

**2.5. Ethical Consideration For Research Subjects**

After asking the subjects for voluntary consent before research, they were explained that they could quit anytime during the research. In order to respect the subjects' rights, and also to guarantee their privacy and confidentiality of personal information, all the data collected through this study was processed, encoded, and Q-sorted anonymously in the whole processes of data analysis.

**3. Results**

**3.1. Structure Of Q Type**

In order to divide the nursing students' perceptions of diet by type, the answers to Q-samples. The distribution of 17 participants was 6 for the first type, 4 for the second type and 7 for the third type. As a result of dividing the group by similar responses to industrial accidents, it was divided into three types.

Participants in this research conveniently were extracted from 17 nursing college students who were found to have experienced more than one clinical practice in the nursing department in H University. The general characteristics of the research subjects are as shown in [Table 1]. The total number of people surveyed total 17 with the average age being 22.71±1.40, and 17.6 percent for boys and 83.4 percent for girls. Among them, 47.1 percent did not have a religion and 52.9 percent had a religion.

Table I. General Characteristics

| Type | No | Age | Gender | Grade | Religion | FWS* |
|---|---|---|---|---|---|---|
| Type 1 | 1 | 22 | F | 4 | No | 1.3386 |
| | 3 | 23 | F | 4 | No | 1.9818 |
| | 6 | 21 | F | 4 | Christian | .7140 |
| | 11 | 21 | F | 4 | Catholic | .5966 |
| | 14 | 26 | M | 4 | Christian | 1.3215 |
| | 16 | 23 | F | 4 | No | 1.5014 |
| Type 2 | 4 | 22 | F | 4 | Christian | 1.0961 |
| | 10 | 25 | M | 4 | Catholic | .3052 |
| | 13 | 24 | F | 4 | Christian | 1.0122 |
| | 15 | 23 | F | 4 | No | .2843 |
| Type 3 | 2 | 22 | F | 4 | No | 1.6366 |
| | 5 | 21 | F | 4 | No | .7325 |
| | 7 | 22 | F | 4 | No | 1.6887 |
| | 8 | 22 | F | 4 | Christian | .4664 |
| | 9 | 22 | F | 4 | Christian | .6165 |
| | 12 | 23 | M | 4 | No | .7663 |
| | 17 | 24 | F | 4 | No | 1.1969 |

*FWS: factor weight score

### 3.2. Subjectibity And Type-Specific Characteristics Of Industrial Accidents

This study describes the characteristics of types of diet based on the statements that belong to individual types to analyze the nursing students' subjectivity of diet by types. Q-responses of P-sample (participating respondents) were classified into higher questions and lower questions and 3 factors were drawn. Among the participants, the participant with higher factor weight is the representative or ideal person who represents the concerned types.

To analyze the characteristics of individual types of industrial accidents, the study interpreted each type with statements having z-scores at least ±1. Our study had 6 participants with factor weight at least 1.0 in the type 1, 4 participants in the type 2, and 7 participants in the type 3.

As result of the analysis of the subjectivity of diet by using PC QUANL Program, 3 factors were found and took 52.98% of the total variants. The first factor was 37.75%, the second factor was 8.24%, and the third factor was 6.99%. Since the first factor explains the highest 37.75%, it is the biggest factor which explains most about the reason why [Table 2]. Out of the total 17 participants, 6 belonged to the first factor, another 4 belonged to the second factor, and 7 belonged to the third factor. It implied that the persons belonging to the same factor show the similar response.

Table II. Eigen Value, Variance, and Cumulative Percentage

| Hospitals | Type I | Type II | Type III |
|---|---|---|---|
| Eigen Value | 6.4181 | 1.4011 | 1.1875 |
| Variance(%) | .3775 | .0824 | .0699 |
| Cumulative( % ) | .3775 | .4600 | .5298 |

The correlation coefficients between the three factors are shown in [Table 3]. This shows the degree of similarity among the three types. The correlation coefficient between type 1 and type 2 is 0.212. type 1 and type 3 is 0.648, and 0.297 in type 2 and type 3. Type 1 and type 3 had a relatively high correlation with other types. However, the correlation between factors in the Q method is different from the factor analysis method in the quantitative research, and since it focuses on finding the factors without presupposing the complete independence between the factors, there is no controversy over the method of factor extraction based on the high and low correlation.

Table III. Correlations Between Factor Scores

| Hospitals | Type I | Type II | Type III |
|---|---|---|---|
| Type I | 1.000 | .212 | .648 |

| Type II | - | 1.000 | .297 |
| Type III | - | - | 1.000 |

### 3.3. Analysis Of Subjectivity Per Factor

The types of subjectivity of industrial accidents produced by this type analysis method could be presented as follows.

- Social Improvement Request Type: The subjects belonging to Type1 were total six people. The subjects of Type1 showed the strong affirmation to the statements like 'The standard for recognition of industrial accidents is too high(Z=1.66).', 'The field investigation is an important matter for the management of industrial accidents(Z=1.51).', and 'The basic investigation should be frequently performed for the prevention of industrial accidents(Z=1.45).'[Table 4]. The subject with the highest factor weight in Type1 was No.3(1.9818), and the statements that were affirmed the most were No.5 and No.15. The subjects of Type1 showed the strong denial to the statements like 'The occurrence probability of industrial accidents gets lowered in the capital area(Z=-1.16).', 'The occurrence frequency of industrial accidents gets lowered in larger companies(Z=-1.56).', and 'The occurrence probability of industrial accidents is high when the age is increased(Z=-1.53).'[Table 4]. The subject with the lowest factor weight in Type1 was No.11(0.5966), and the statements that were denied the most were No.19 and No.31.

In the characteristics of Type1, the subjects thought that it would be necessary to improve the overall social gaze at industrial accidents, and the relevant social support policies and system. They viewed that it would be rare to be recognized as industrial accidents as the standard for recognition of industrial accidents was too high, and there should be the system for preventing or researching industrial accidents in advance. They also thought that the workers suffering from industrial accidents should be reduced through this social surveillance system, and the industrial accidents would grow into a social problem in the future without any social improvement. Thus, Type1 was named 'social improvement request type'.

- Employer Responsibility Type: The subjects belonging to Type2 were total four people. The subjects of Type2 showed the strong affirmation to the statements like 'The regular rotating shiftwork decreases the probability of occupational diseases(Z=1.72).', 'The workplace is fully responsible for industrial accidents(Z=1.71).', and 'The psychological fatigue could generate industrial accidents(Z=1.58).'[Table 4]. The subject with the highest factor weight in Type2 was No.4(1.0961), and the statements that were affirmed the most were No.24 and No.34. The subjects of Type2 showed the strong denial to the statements like 'The occurrence probability of industrial accidents gets lowered in the capital area(Z=-2.26).', 'The health education has huge effects on the prevention of industrial accidents(Z=-1.62).', and 'In many cases, the recognition path of industrial accidents is the mass media(Z=-1.43).'[Table 4]. The subject with the lowest factor weight in Type2 was No.15(0.2843), and the statements that were denied the most were No.19 and No.12.

In the characteristics of Type2, the subjects perceived that the biggest cause for the occurrence of industrial accidents would be employers' responsibility such as management of industrial site, employer's perception, and improvement of working environment. They said that the diseases caused by industrial accidents could get worsened by psychological fatigue and underlying diseases, so in order to prevent this, the employers should thoroughly manage the environment, and also lower the frequency of exposure through rotating shiftwork, if possible. The employers should always pay attention to the workers' health, have the perception of industrial accidents, and also make efforts to reduce the occurrence rate of industrial accidents. Thus, Type2 was named 'employer responsibility type'.

- Cause Removal Type: The subjects belonging to Type3 were total seven people. The subjects of Type3 showed the strong affirmation to the statements like 'The psychological fatigue could generate industrial accidents(Z=1.68).', 'The standard for recognition of industrial accidents is too high(Z=1.62).', and 'The field investigation is an important matter for the management of industrial accidents(Z=1.39).'[Table 4]. The subject with the highest factor weight in Type3 was No.7(1.6887), and the statements that were affirmed the most were No.6 and No.5. The subjects of Type3 showed the strong denial to the statements like 'The industrial accidents are originated from natural environment(Z=-1.90).', 'The occurrence probability of industrial accidents is low when the academic background is higher(Z=-1.89).', and 'The industrial accidents a lot occur to people with occupations of physical labor(Z=-1.78).'[Table 4]. The subject with the lowest factor weight in Type3 was No.8(0.4664), and the statements that were denied the most were No.1 and No.14. The Type3 focuses on the causes for industrial accidents. They said that the psychological fatigue or long working hours would increase the occurrence rate of industrial accidents, and it would be needed to reduce the occurrence of industrial accidents by understanding the causes, and also to establish the management system for harmful environments. They were negative on the opinion saying that they would be occurring in general natural environment, and also against the thought in which they would be occurring more in people related to physical labor. Thus, Type3 was named 'cause removal type'.

Table IV. Q-statements on industrial accidents type of representative items and Z-scores (N=17)

| Factor | Type | No | Representative items | Mean(SD) | Z-score |
|--------|------|-----|----------------------|----------|---------|
| Factor1 (N=6) | Type1 | 5 | The standard for recognition of industrial accidents is too high. | 7.83(0.753) | 1.66 |
| | | 15 | The field investigation is an important matter for the management of industrial accidents. | 7.50(1.225) | 1,51 |
| | | 11 | The basic investigation should be frequently performed for the prevention of industrial accidents. | 7.17(1.169) | 1.45 |
| | | 2 | The industrial accidents could grow into a social problem. | 7.17(1.169) | 1.21 |
| | | 10 | There should be the follow-up management system for harmful environments. | 7.00(1.414) | 1.16 |
| | Type2 | 19 | The occurrence probability of industrial accidents gets lowered in the capital area. | 2.00(0.894) | -1.16 |
| | | 31 | The occurrence frequency of industrial accidents gets lowered in larger companies. | 2.33(0.816) | -1.56 |
| | | 13 | The occurrence probability of industrial accidents is high when the age is increased. | 2,67(2.066) | -1.53 |
| | | 30 | The occurrence frequency of industrial accidents is different depending on sex. | 2.50(1.049) | -1.46 |
| | | 14 | The occurrence probability of industrial accidents is low when the academic background is higher. | 2.50(1.517) | -1.43 |
| Factor2 (N=4) | Type3 | 24 | The regular rotating shiftwork decreases the probability of occupational diseases. | 7.50(1.291) | 1.72 |
| | | 34 | The workplace is fully responsible for industrial accidents. | 7.50(1.291) | 1.71 |
| | | 6 | The psychological fatigue could generate industrial accidents. | 7.25(1.258) | 1.58 |
| | | 7 | If there is an underlying disease, the occurrence frequency of industrial accidents is high. | 7.25(0.957) | 1.40 |
| | | 8 | The industrial accidents could be prevented by environmental coordination. | 5.75(2.872) | 1.35 |
| | Type4 | 19 | The occurrence probability of industrial accidents gets lowered in the capital area. | 2.50(1.732) | -2.26 |
| | | 12 | The health education has huge effects on the prevention of industrial accidents. | 2.75(0.500) | -1.62 |
| | | 29 | In many cases, the recognition path of industrial accidents is the mass media. | 4.00(1.000) | -1.43 |
| | | 14 | The occurrence probability of industrial accidents is low when the academic background is higher. | 4.75(3.862) | -1.40 |

| | | 16 | The people with minor abnormal findings from health screening do not cognize the severity of disease. | 3.75(1.708) | -0.94 |
|---|---|---|---|---|---|
| Factor3 (N=7) | Type5 | 6 | The psychological fatigue could generate industrial accidents. | 7.71(0.756) | 1.68 |
| | | 5 | The standard for recognition of industrial accidents is too high. | 7.29(1.604) | 1.62 |
| | | 15 | The field investigation is an important matter for the management of industrial accidents. | 6.86(1.345) | 1.39 |
| | | 10 | There should be the follow-up management system for harmful environments. | 6.71(1.254) | 1.21 |
| | | 20 | The probability of industrial accidents gets higher when the working hours are longer. | 6.57(2.070) | 1.17 |
| | Type6 | 1 | The industrial accidents are originated from natural environment. | 2.71(2.628) | -1.90 |
| | | 14 | The occurrence probability of industrial accidents is low when the academic background is higher. | 1.86(0.690) | -1.89 |
| | | 3 | The industrial accidents a lot occur to people with occupations of physical labor. | 2.43(1.512) | -1.78 |
| | | 19 | The occurrence probability of industrial accidents gets lowered in the capital area. | 2.71(0.951) | -1.44 |
| | | 31 | The occurrence frequency of industrial accidents gets lowered in larger companies. | 2.43(1.512) | -1.25 |

## 4. Discussion

In the results of this study, the types of subjectivity of industrial accidents perceived by nursing students were divided into Type1-'social improvement request type', Type2-'employer responsibility type', and Type3-'cause removal type', and this study aims to discuss the characteristics of each type.

The Type1 shown in this study was 'social improvement request type'. They thought that it would be necessary to have the social preventive measures or management for the occurrence of industrial accidents. If it is unavoidable to have the industrial accidents regardless of size or degree, the policies or regulations should be established more rationally and clearly to be helpful to workers. They said that the victims of industrial accidents would be still the relative weak in our society, so that it would be necessary to seek for the measures for protecting them.

In case of patients injured by industrial accidents, they could have problems like convalescence for a long time and difficulty to return to workplace because of tough adjustment to society and psychological anxiety about physical damage caused by unexpected accidents, so that the early rehabilitation intervention is important. To solve this problem, it would be needed to vitalize the rehabilitation programs that could increase the rehabilitation accessibility and effectiveness by strengthening the psychological stability function. The rehabilitation service essential to the disabled by industrial accidents should focus on the functional recovery to the state before the industrial accidents by maximizing their abilities, and also emerging from the psychologically-maladjusted state [16], and the rehabilitation policies for the disabled by industrial accidents should be approaching, so that they could be integrating with society after industrial accidents. The social integration of the disabled by industrial accidents means the victims of industrial accidents feel well-being by returning to their family life, social activities, and occupational activities based on normal lifestyle through the reorganization of physical, psychological, and social functions [17]. The social integration of the disabled by industrial accidents could be achieved only when it is combined with medical or economic support and rehabilitation service. However, in reality, it is very rare to find the systematic and practical rehabilitation service for helping the disabled by industrial accidents to return to society.

As the factors having effects on the social integration of the disabled by industrial accidents, the physical functions as abilities to perform daily living activities and the socio-psychological factor have important effects on it, which implies the necessity of various socio-psychological interventions for accelerating the social

integration of the disabled by industrial accidents. In other words, to accelerate the social integration of the disabled by industrial accidents, there should be the integrated rehabilitation policies and various rehabilitation services that could improve not only their physical functions, but also socio-psychological functions.

The Type2 was 'employer responsibility type'. They thought that the employers should take actions in relation to the occurrence frequency of industrial accidents and follow-up management because the working environment or working condition that could be the direct causes for industrial accidents would be influenced by employers' management philosophy and efforts for the improvement. They thought that the employers' interest and support would influence the prevention of industrial accidents and even follow-up management, which could influence the overall industrial accident policies and system.

In case of the worker health enhancement program performed in workplaces, the occupational environment factor also has huge influence as much as the workers' personal element [18]. Thus, it would be required to develop/provide the customized health enhancement program the most suitable for construction workers by multilaterally analyzing the occupational characteristics of construction site and the characteristics of construction workers. Also, as the workers perceive more benefits obtained from the programs provided in the organizational level than the programs in the individual level [19, 20], there should be the intervention in the organizational level as well for the effective program. Okamura et al.,(2014) argued that it would be necessary to implement the programs targeting the whole workers rather than the individual counseling programs targeting the high-risk group, and also to carry out the multi-dimensional programs handling various risk factors, for the prevention of cardiovascular diseases in workers [21]. Carnethon et al.,(2009) said that it would be possible to draw some changes in actions for the prevention of cardiovascular diseases in workers only when various policy programs in the workplace level were accompanied by [22]. Thus, for the effective prevention of cardiovascular diseases in construction workers, there should be some changes of policies within workplace together.

Carnethon et al.,(2009) is presenting the possible elements of policies at workplace and such concrete methods for practicing them[19]. Hirsch, Homer, Trogdon, Wile, & Orenstein(2014) present the concrete intervention methods by classifying the interventions for the decrease of cardiovascular diseases into four categories such as treatment, support of behavior, health enhancement, and policies, and then argue that it is the most effective when the interventions belonging to those four categories are performed at the same time [23]. Thus, in case when planning a program for the prevention of cardiovascular diseases, it would be necessary to analyze the environmental characteristics of workplace by considering various causes for cardiovascular diseases, and then to select and apply a policy suitable for the characteristics of workplace in the multilateral category among the intervention measures presented by preceding researches. Also, if it is combined with education and counseling as the approach in the individual level, it could be a very effective program for the prevention of cardiovascular diseases in construction workers.

The Type3 was 'cause removal type'. This type paid attention to causes for the occurrence of industrial accidents, and the causes that could worsen the disease or symptom after occurrence. They thought that there should be some efforts to prevent and decrease the physical and psychological pains caused by industrial accidents by removing such causes. They said that this could even reduce the social cost required for the healthcare and enhancement of workers.

In the individual aspect, the industrial accidents cause the physical damage, psychological pain, and temporary or permanent loss of labor, which is led to the unhappiness of whole family. In the corporate aspect, due to the problems with production by loss of labor force and damage to machine and facilities, it becomes a factor that obstructs the corporate management [24]. In the social aspect, because of the increase of people with physical disabilities or the bereaved, some problems like the economic hardship they go through are rising [25]. Thus, it is important to prevent the industrial accidents in the aspect of individual, corporate management, and society.

A research by Lee & Song(2006) reported that the occurrence rate of industrial accidents was low in case when a safety manager and health manager were appointed as a full-time worker [26]. According to a research by Hong, Jeon & Kim (2011), the sex and service career of workers are related to the occurrence of industrial accidents, and there are many characteristics having effects on the industrial accidents [27].

As the factors causing musculoskeletal diseases, the fatigue, painful posture, and repetitive work are mentioned [28]. Also, as the causes for the occurrence of musculoskeletal diseases, the personal factors such as age [29], sex, and physical condition of workers, socio-psychological factor, work systematic factor, and non-occupational factor are known to be involved in [30]. In case of musculoskeletal disease symptoms, the risk of occurrence gets higher in case when the physical factor and socio-psychological factor work complexly [31], and its high relation with stress has been reported as well [32, 33].

A research by Hanecke, Tiedemann, Nachreiner & Grzech-sukalo(1998) pointed out the risk of working for a long time by reporting that the risk of safety accidents would be geometrically increasing from nine hours of working [34]. Many researches reported that the long-hour working would have negative effects on the physical/psychological health and safety of workers [35-37]. There is a report that the degree of appeal for subjective fatigue was significantly high in case when the weekly working hours were long [38]. According to a report, once the working hours are extended, the lack of sleep, drowsiness, fatigue, and the increase of defective

product rate are caused, and the hours of occupational exposure to harmful substances are increased, which is eventually harmful to the health and safety of workers [39].

Meanwhile, if the working hours are reduced, the resting time is increased and the fatigue is naturally decreased, which is led to the decrease of occurrence probability of industrial accidents [40]. There is also a report that the rate of industrial accidents is decreased when the working hours are decreased [41]. Like this, there are various causes related to industrial accidents. If some efforts to remove or decrease them are preferentially performed, it would be efficient to relieve the occurrence rate of accidents and symptoms.

This study explored the nursing students' subjective perception of industrial accidents, and then divided it into three types for the analysis. Before starting this research, the researcher thought that it would be necessary to change the basic perception of industrial accidents first. This change would be helpful for the active treatment and overcoming of industrial accidents, and also make it possible for the patients injured by industrial accidents to successfully return to society. In the characteristics of each type, they were divided into 'social improvement request type' regarding the introduction of national/social polices and system for industrial accidents as the priority, 'employer responsibility type' regarding the necessity for the employers to perceive the responsibility for industrial accidents, and also to put efforts for the improvement, and 'cause removal type' regarding the necessity to manage the factors that could trigger the increase of causes for or the occurrence rate of industrial accidents, and symptoms as the priority.

This research on the subjectivity would be helpful for changing the perception of industrial accidents in our society. Moreover, this study could be used as the basic data for the development of differentiated educational programs, by presenting the subjectivity structure of nursing students' perception of industrial accidents as pre-service healthcare providers, and the characteristics of each type.

However, this study only targeted a university, and it did not consider the factors having effects on the perception of industrial accidents when selecting the subjects, so that it is limited to generalize the results of this study. Thus, it would be necessary for a follow-up research to additionally verify the types by composing the Q-samples with various backgrounds [42-44].

## 5. Conclusion

This study aimed to establish the basic data necessary for presenting the change in the perception of industrial accidents and the direction of approach for nurses, through the subjective data analyzed by exploring the nursing students' subjective perception of industrial accidents, by applying the Q-methodology. In the results of this study, it was divided into total three factors. The types of industrial accidents perceived by nursing students were 'social improvement request type', 'employer responsibility type', and 'cause removal type'.

This study has provided the basic data for establishing the measures for the improvement of attitude and perception of industrial accidents in the future, by categorizing the nursing students' subjectivity of industrial accidents. As this study analyzed the types of perception of industrial accidents and also verified the characteristics targeting the nursing students, it is expected to see the development of educational programs considering the characteristics of each type. This study also suggests an additional research on the analysis of types after selecting the samples by considering various factors, and a qualitative research for verifying various factors having effects on nursing the subjects of industrial accidents [45].

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