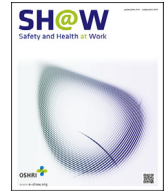




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Short Communication

Psychological Intervention for Post-traumatic Stress Disorder among Witnesses of a Fatal Industrial Accident in a Workers' Health Center



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ABSTRACT

Post-traumatic stress disorder (PTSD) is a serious problem not only among workers who experience industrial accidents but also among workers who witness such accidents. Early intervention is needed to prevent prolonged psychological problems. There has been no study conducted regarding the psychological problems of and interventions for bystander workers in Korea. This study introduces the experience of intervention on psychological problems at the Busan Workers' Health Center workers who witnessed their colleagues' death. An investigation and an intervention were conducted according to the Korean Occupational Safety and Health Agency (KOSHA) Guide. In total, 21 individuals including indirect observers showed statistical differences on scores of the Impact Event Scale Revised and the Patient Health Questionnaire 9 after the intervention. Future interventions and research involving a larger sample size over a longer period are needed. The KOSHA Guide could be a useful tool for urgent psychological intervention in the event of major workplace disasters.

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Workers suffering from industrial accidents have significantly high levels of anxiety and depression, which highlights the necessity of intervention [1]. Moreover, the prevalence of post-traumatic stress disorder (PTSD) among workers who experienced industrial accidents was high, and the symptoms persisted for a long time [2]. In addition to workers who experience accidents, witnesses of accidents also have serious psychological problems. A study on firefighters who observe accidents frequently showed high prevalence of PTSD [3]. PTSD among workers who have witnessed industrial accidents has a negative effect on their mental health in the long term, and it is thus necessary to prevent chronic problems through early intervention. There are a few studies that investigate psychological problems among observers of fatal industry accidents [4]. However, there are few studies on the psychological problems of, and interventions for, the witnesses in Korea.

In an accident, a worker died after being trapped between metal rolls while working at night shift in July 2016 in a fabric and artificial leather company in Busan metropolitan city. All coworkers in that factory observed the accident. After 4 days, the employer of the company asked the Busan Workers' Health Center to intervene and analyze the psychological problems of the observers. This study introduces the experience of intervention on the psychological

problems of fellow workers who witnessed death, improves the problems identified in the process, and suggests directions for future psychological interventions.

An investigation and intervention plan was settled by the Korean Occupational Safety and Health Agency (KOSHA) Guide H-36-2011 [5] titled "Guidelines for early response to acute stress in the event of a major disaster at a workplace." Survey items included the Impact Event Scale Revised (IES-R), the Primary Care PTSD screen (PC-PTSD), the Patient Health Questionnaire (PHQ-9), the Suicidal Ideation questionnaire (SIQ), and the Cut Down, Annoyed, Guilty, Eye Opener (CAGE) questionnaire.

In response to the request from the workplace, a psychologist and an industrial hygienist from our center visited the company, and the psychologist, industrial hygienist, and occupational physician developed an intervention plan according to the schedule shown in Table 1. Sessions 1–3 were planned to be conducted over 3 consecutive days, and Session 4 was planned to be conducted within 1 month after Session 3.

We analyzed the effects of psychological interventions. Continuous variables in all questionnaires, except the SIQ, were compared before and after the intervention. The analysis used the paired *t* test to compare data before and after the psychological

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Table 1

Disaster response group counseling protocol: From trauma to reality, to take me back

Session	Goal	Contents	Methods
1	Helping to understand and reassure maladaptive responses after trauma	<ul style="list-style-type: none"> – Introduction of experts and relationship formation – Explanation of the purpose of psychological education – Introduction of the response to and progress of traumatic events 	<ul style="list-style-type: none"> – Introduction to therapists and reading condolence messages – Listening to group members mind state – Self administration of questionnaire for high-risk group screening * Materials needed: questionnaire
2	Stabilization through affection control group therapy	<ul style="list-style-type: none"> – Safety Zone Technique (art therapy) (10 min) – Butterfly Hug Technique (10 min) – Blockade Exercise (20 min) 	<ul style="list-style-type: none"> – Evaluating changes and status after Session 1 – Introduction and implementation of treatment techniques – Sharing one's feelings * Materials needed: drawing paper, coloring tools, meditation music
3	Exercise relaxation reaction and return to normal life (together with mourning)	<ul style="list-style-type: none"> – Exploration and practice of psychological and physical relaxation methods – Writing a letter to the deceased – Exploration of the positive and negative effects of disasters – Sharing a plan for daily return 	<ul style="list-style-type: none"> – Introduction of breathing and relaxation methods and encouraging their daily practice – Writing a letter of mourning to the deceased – Describing and thinking about post-traumatic recovery – Planning to return to daily life and sharing what is on one's mind *Materials needed: meditation music, stationary, writing instruments
4	Post evaluation and additional counseling (conducted 1 mo after the session)	<ul style="list-style-type: none"> – Retest of the questionnaire of the Session 1 – Strengthening and encouraging progress 	<ul style="list-style-type: none"> – Checking how well education and counseling is applied in daily life. – Evaluating whether sharing and support have changed scores or not

intervention and the nonparametric test (Wilcoxon signed-rank sum test) for small numbers that did not have a normal distribution. All items were categorized according to the KOSHA Guide [5] as follows: IES-R: low (score < 22) and high; PC-PTSD: low (score < 3) and high; PHQ-9: low (score 1–4), minimal (score 5–9), minor (score 10–14), moderate (score 15–19), severe (score 20–27); and CAGE: low (score < 2) and high. Statistical analysis for categorical variables before and after intervention used Fisher's exact test. The statistical significance level was $p < 0.05$ and, because the sample size was small, the borderline significant level was set as $p < 0.1$. This study was reviewed by the Institutional Review Board of KOSHA (IRB No. 2017-IRB-07).

Primary individuals for the intervention included eight coworkers of the bereaved worker (direct observers, $n = 8$). Secondary individuals who worked in the next line and also observed the accident included nine coworkers (indirect observers, $n = 9$). On Day 1, a clinical psychologist conducted group education. On Day 2 and Day 3, the psychologist and an assistant provided counseling. Screening test results of the 1st day revealed seven high-risk workers. After the 3rd day, the number of high-risk workers reduced to three. Among these three workers, two were referred to a psychiatrist. Managers ($n = 4$) were requested to join the intervention program 1 week after the workers' schedule. Two of the four managers were in the high-risk group after the screening test of the Session 1; one remained high-risk after the Session 3 and was referred to the psychiatrist.

The results of score changes of continuous items such as IES-R, PC-PTSD, PHQ-9, and CAGE are given in Table 2.

In total IES-R and PHQ-9, the results showed statistically different changes after intervention. Direct observers and indirect observers had marginal statistical differences with regard to IES-R after intervention. Indirect observers had marginal statistical differences with regard to PHQ-9 after intervention.

The results of score changes of categorical items including SIQ are shown in Table 3.

Overall, IES-R and PHQ-9 had statistically different changes after intervention, similar to the results of the continuous items. Indirect observers showed statistical differences with regard to IES-R and PHQ-9 after intervention, whereas direct observers showed no

statistical differences with regard to IES-R after intervention, which was different from the results of the continuous items.

Although the results were supposed to be followed-up 3 months after the intervention according to the KOSHA Guide H-36-2011 [5], further follow-up including Session 4, which was originally planned, was not possible because of poor cooperation from the company.

This paper shows the effectiveness of psychological intervention on witnesses of fatal industrial accidents. Since PTSD has prolonged effects, our results cannot be generalized to chronic status. Hence, it is necessary to observe and hold interventions for those who suffer from psychological problems and who are categorized as high-risk workers for at least 3 months, which might be possible with support from authoritative organizations, such as the Ministry of Employment and Labor and KOSHA. Although almost all items showed improvement after intervention, those with statistically significant differences were not many. This problem could be the

Table 2

Scores of continuous items of questionnaires before and after intervention

Item	Participant	Before intervention		After intervention		p^*
		Mean	SD	Mean	SD	
IES-R	Direct observers	30.9	13.3	19.3	11.4	0.083
	Indirect observers	25.8	10.0	16.7	5.8	0.092
	Managers	26.3	23.1	13.5	18.4	0.194
	Total	27.8	13.7	17.0	10.7	<0.001
PC-PTSD	Direct observers	2.1	1.2	1.8	1.4	0.587
	Indirect observers	1.8	1.0	1.0	1.1	0.143
	Managers	1.3	1.5	0.5	1.0	0.505
	Total	1.8	1.2	1.2	1.2	0.056
PHQ-9	Direct observers	7.8	4.9	6.0	4.5	0.429
	Indirect observers	6.9	3.7	3.2	4.1	0.075
	Managers	5.0	6.4	4.8	6.9	> 0.99
	Total	6.9	4.6	4.5	4.7	0.031
CAGE	Direct observers	0.9	1.1	0.8	1.4	0.683
	Indirect observers	0.6	0.9	0.9	0.8	0.337
	Managers	0.5	0.6	1.0	1.4	0.874
	Total	0.7	0.9	0.9	1.1	0.309

CAGE, Cut Down, Annoyed, Guilty, Eye Opener; IES-R, Impact Event Scale Revised; PC-PTSD, the primary care post-traumatic stress disorder screen; PHQ-9, Patient Health Questionnaire; SD, standard deviation.

* The p value was obtained using paired t test and Wilcoxon signed-rank sum test.

Table 3
Changes to categorical items of questionnaires before and after intervention

Items	Direct observers					Indirect Observers					Managers					Total					
	Before		After		<i>p</i>	Before		After		<i>p</i>	Before		After		<i>p</i>	Before		After		<i>p</i>	
	<i>N</i>	%	<i>N</i>	%		<i>N</i>	%	<i>N</i>	%		<i>N</i>	%	<i>N</i>	%		<i>N</i>	%	<i>N</i>	%		<i>N</i>
IES-R	Low	2	25.0	5	62.5	0.315	3	33.3	8	88.9	0.050	2	50.0	3	75.0	> 0.99	7	33.3	16	76.2	0.012
	High	6	75.0	3	37.5		6	66.7	1	11.1		2	50.0	1	25.0		14	66.7	5	23.8	
PC-PTSD	Low	5	62.5	6	75.0	> 0.99	7	77.8	8	88.9	> 0.99	3	75.0	4	100.0	< 0.99	15	71.4	18	85.7	0.454
	High	3	37.5	2	25.0		2	22.2	1	11.1		1	25.0	0	0.0		6	28.6	3	14.3	
PHQ-9	Low	1	12.5	4	50.0	0.277	1	11.1	7	77.8	0.006	2	50.0	3	75.0	> 0.99	4	19.1	14	66.7	0.002
	Minimal	5	62.5	2	25.0		7	77.8	1	11.1		1	25.0	0	0.0		13	61.9	3	14.3	
	Minor	1	12.5	2	25.0		1	11.1	1	11.1		1	25.0	0	0.0		3	14.3	3	14.3	
	Moderate	1	12.5	0	0.0		0	0.0	0	0.0		0	0.0	1	25.0		1	4.8	1	4.8	
	Severe	0	0.0	0	0.0		0	0.0	0	0.0		0	0.0	0	0.0		0.0	0.0	0.0	0.0	
SIQ	No	7	87.5	7	87.5	> 0.99	9	100.0	9	100.0	NA	4	100.0	4	100.0	NA	20	95.2	20	95.2	< 0.99
	Yes	1	12.5	1	12.5		0	0.0	0	0.0		0	0.0	0	0.0		1	4.8	1	4.8	
CAGE	Low	8	100.0	8	100.0	NA	9	100.0	9	100.0	NA	4	100.0	4	100.0	NA	21	100.0	21	100.0	NA
	High	0	0.0	0	0.0		0	0.0	0	0.0		0	0.0	0	0.0		0	0.0	0	0.0	

*The *p* value was obtained using Fisher's exact test.

CAGE, Cut Down, Annoyed, Guilty, Eye Opener; IES-R, Impact Event Scale Revised; NA, not available; PC-PTSD, the primary care post-traumatic stress disorder screen; PHQ-9, Patient Health Questionnaire; SIQ, Suicidal Ideation questionnaire.

result of the small sample size. Future intervention and studies with a larger sample size and over a longer period will be needed. In addition, the KOSHA Guide could be a useful tool for urgent psychological intervention in the event of a major disaster at a workplace.

Conflicts of interest

No potential conflicts of interest relevant to this article were reported.

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