Original

Hazard Warning Lights as a Nudge to Promote Workers' Safety Awareness and Fall Hazard Avoidance: A Pilot Study

Kunio Shibata[1)], Takuro Souji[2)], Satoko Iwasawa[3)] and Hiroyuki Miyauchi[4)]

[1)]Graduate School of Occupational Health, University of Occupational and Environmental Health

[2)]Department of Occupational Safety and Health Management, School of Health Sciences, University of Occupational and Environmental Health

[3)]Department of Preventive Medicine and Public Health, National Defense Medical College

[4)]Department of Environmental Management and Control, School of Health Sciences, University of Occupational and Environmental Health

(Received: June 13, 2024)

Abstract

Hazard warning lights provide visual warnings. Applied to nudge theory, hazard warning lights are meant to play the role of a nudge that voluntarily affects individual decision-making and awareness. This effect suggests that hazard warning lights could be useful to help prevent falls. However, their actual effectiveness has not been elucidated. The objective of this pilot study is to clarify whether or not hazard warning lights promote workers' safety awareness of ways to help prevent falls, resulting in reducing the general overall risk of falls. Hazard warning lights were installed in elderly care facilities in Fukuoka Prefecture. The safely awareness and behaviors of workers before and after the installation were compared using a questionnaire survey. The mean scores of items evaluated on five levels were compared between before and after by using a corresponding t-test. In addition, free-expression descriptions for "falls," "fall prevention," and "prevention of falls and collisions" were evaluated using a text-mining method. The item that showed a significant increase in score after the installation of hazard warning lights compared to before the installation, was the use of relevant equipment. Other items that improved included hazard perception, exercises to strengthen the legs and feet, and constant awareness of improvement. Analyses of text-mining revealed that more terms related to safety awareness appeared and appeared more frequently after the installation of the warning lights. These results therefore suggest that hazard warning lights promote safety awareness, including hazard perception and the benefit of making behavioral changes related to the reduction of falls. It is necessary to examine the long-term effects of hazard warning lights on safety awareness and behaviors related to fall prevention, using incident rates and behavioral observations as objective outcome measures. Because the effectiveness of the visual flashing warning lights help avoid hazards for falls was suggested in this study, it further suggests that it is possible to use such preventive ways of using such a nudge for other occupational hazards as well.

(JJOMT, 73: 177—185, 2025)

—Key words—

nudge theory, hazard warning lights, falls, safety awareness, behavior changes

Introduction

In Japan, accidents at work caused by falls are common, particularly so in elderly care facilities because many workers work on slippery floors and in environments with many obstacles[1)2)]. These situations not only threaten the health and safety of the workers, but also have a negative impact on the work efficiency. However, because it has been considered that these falls are not serious, existing preventive measures for falls are

not sufficient. Hazard warning lights work to indicate hazardous areas. They could also be used for fall prevention warnings. When a worker approaches areas subject to risks of falls, motion sensors detect the worker and turns on flashing lights as a warning of a possible hazard. The workers realize that is the area having the risk of a fall. The hazard waring lights use the pupil response to the stimulus of light. This response is an autonomic nervous system activity[3] and occurs unconsciously. Therefore, there is no psychological burden to disturb their concentration, so the workers are less likely to be interrupted. Applying nudge theory[4] based on behavioral economics to hazard waring lights, because hazard warning lights use visual stimuli to alert individuals of risk of falls, the lights are nudges that influence an individual's awareness and induce natural changes in behaviors, without using coercive measures, e.g., rules or punishments. The nudge naturally encourages individuals to change their behaviors to those that prioritizes their health and safety, resulting in taking measures to avoid possible hazards.

The costs required for this approach are low and highly practical. However, to our knowledge, there are no studies yet that have tested whether or not hazard warning lights trigger workers to promote their safety awareness, to encourage them to make behavioral changes to initiate safety-related actions that may prevent falls.

Therefore, we identified high-risk danger areas by conducting staff interviews in elderly care facilities and subsequently examined whether or not the installation of hazard warning lights in those care facilities would actually promote workers' safety awareness enough to encourage them to change their behaviors to help prevent unwanted falls. The aim of the present study is to elucidate any preventive effects of hazard warning lights as nudges or indicators to help prevent falls. The effects on the workers to encourage them to increase their perception to make behavioral changes when facing possible risks were examined using quantitative data scored and textual data collected from free-text descriptions using an anonymous, self-administered questionnaire.

Methods

Study design

This study was conducted as an intervention study using a time-series design.

Facilities studied

Two elderly care facilities (private retirement homes with in-house nursing care services) (A and B) in Fukuoka Prefecture in Japan were the facilities studied.

Hazard warning lights installation

Hazard warning lights were installed in kitchens, bathrooms, laundry areas, entrances, and exits of facilities where the risks of slips and falls were identified as high in preliminary interviews with the managers of the facilities. The lights were installed at heights higher than the height of the residents, where they would not disturb the elderly, live-in residents of the facilities. The light emitted a white color, flashed upon detecting a person, and automatically turned off three seconds after the person left the area.

Participants

The study participants included 46 workers, 27 and 19 from facilities A and B, respectively. All workers engaged in elderly care, nursing, rehabilitation, administration, and/or management. All workers received educational training for fall prevention on an irregular schedule as part of their occupational health and safety training. They were also educated on the hazard warning lights as alerts in areas of high risks for falls. Based on the research protocol and an informational document, the participants were informed about the characteristics of occupational accidents in elderly care facilities, particularly the high incidence of falls and their primary causes.

Questionnaire Survey and Data Analysis

Participants were given a self-administered questionnaire to investigate changes in safety awareness and behaviors before and after the installation of the warning lights. The interval between before and after installation was 1 month. The self-administered questionnaire was developed by interviewing the managers of two social welfare facilities in Fukuoka Prefecture[5]. It was essential to ensure both the validity and reliability of the

Table 1 Questionnaire items to assess workers' awareness of falls and fall prevention behaviors

No.	Item	No.	Item
1.	I am careful to make sure that I don't misunderstand anything or make mistakes.	14.	Even if items are not very high up, I use a footstool or a step-ladder when taking them down from high shelves.
2.	I am aware of hazardous locations in my workplace.	15.	I do exercises that strengthen my legs and back, such as squats.
3.	When lifting items, I ensure my posture does not hurt my back.	16.	I don't think there is a particular need to watch out for safety.
4.	I make sure to follow instructions when transferring residents.	17.	The conditions are safe, so I don't see any particular problems.
5.	I watch out for falls when the floor is slippery.	18.	I understand that safety is important, but it is difficult to implement in practice.
6.	When moving in hallways, I watch out for head-on collisions.	19.	Safety is important, and I pay attention to it.
7.	When the floor is wet, I am careful not to slip.	20.	In my daily routine, I make efforts to ensure I can do my work safely.
8.	When climbing up or down stairs, I am careful not to lose my footing.	21.	I'm careful that elderly live-in residents don't get injured.
9.	When moving items, I make sure the area around my feet is visible.	22.	I care about how I am respected at work.
10.	While pushing wheelchairs or stretchers, I am careful to ensure that the person in the wheelchair or on the stretcher is comfortable.	23.	I value methods that enable me to complete my work efficiently.
11.	I am careful when moving items so that I don't drop them.	24.	I value an environment that allows me to work comfortably.
12.	I walk slowly and carefully in corridor areas where visibility is poor.	25.	I am constantly thinking of ways to avoid hazards in my workplace.
13.	I wear anti-slip shoes at work.		

questionnaire. Validity refers to the extent to which the instrument accurately measures the intended construct, while reliability concerns the consistency of the results obtained from the same subjects. Both aspects were carefully considered during the development of the questionnaire. The questionnaire consisted of items shown in Table 1. The questions consisted of 25 items and asked about their safety awareness and behaviors related to hazard avoidance in their regular daily work. The questions were answered using a 5-point scale: 5. True, 4. Partially true, 3. Undecided, 2. Partially false, and 1. False. The mean scores between before and after the installation were compared using a paired t-test. We also applied the Bonferroni correction to account for multiple statistical tests. With this correction, the required p-value for significance was $0.05 / 25 = 0.002$. Analyses were conducted using IBM SPSS Statistics version 27.

Also, in the questionnaire, there were free-text fields, in which participants were free to describe words associated with each of the terms: "falls", "preventing falls", and "preventing falls and collisions". Comparing the terms before and after the installation of the lights using the text-mining tool, UserLocal (https://textmining.userlocal.jp/), which performed term extraction and morphological analyses, the changes in risk perception and perceptions of preventive measures were qualitatively assessed. The terms given as responses during the 1-minute period allotted for the participants to write free-expressions are shown, and their font-size became larger according to their usage frequency, i.e., the number of instances they appear before and after the installation.

Ethical approval

The data were collected in accordance with methods approved by the ethics approval committee at the University of Occupational and Environmental Health, Japan (approval No. ER24-009). Participants were anonymized to ensure confidentiality, and the data collected were securely managed and analyzed.

Results

Fig. 1 demonstrates the items that showed significant differences in the comparison of the means of the 5-point scoring before and after the installation of the lights by a paired t-test. The means of the scores for "No. 2. I am aware of hazardous areas in my workplace", "No. 14. I use a stepladder or platform to pick up objects on shelves", "No. 15. I do leg and back exercises, including elements such as squats", and "No. 25. I always think of ways to improve my response to hazards in my workplace" were significantly higher after the installation compared to before. With the Bonferroni correction, the score for "No. 14. I use a stepladder or platform to pick up objects on shelves" was significantly higher after the installation than before. Table 2 demonstrates the

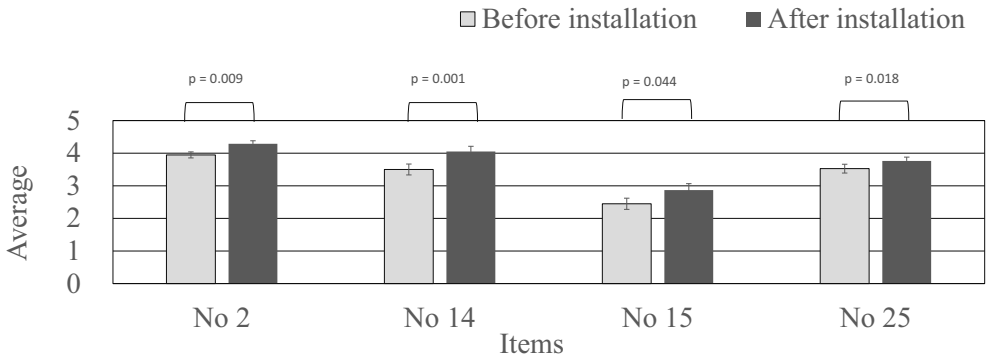

Fig. 1 Mean values of the 5-point scores of workers' related safety awareness of falls and fall prevention behaviors

No. 2, n = 37; No. 14, n = 37; No. 15, n = 37; and No. 25, n = 37. The participants answered questions related to specific items using a 5-point scale: 5. True, 4. Partially true, 3. Undecided, 2. Partially false, 1. False. Each item was scored and compared before and after the installation of the lights using a paired *t*-test. We also applied the Bonferroni correction to account for multiple statistical tests. With this correction, the required p-value for significance was 0.05/25 = 0.002. Bars represent mean values, and error bars indicate standard errors.

Table 2 The mean values of the 5-point scores of participants on the questionnaire for workers' related safety awareness of falls and fall prevention behaviors before and after the installation of the warning lights

Item No.	*n*	Before installation		After installation		p-value
		mean	SD	mean	SD	
1.	36	4.33	0.63	4.39	0.65	0.54
3.	38	4.26	0.64	4.39	0.60	0.28
4.	37	4.22	0.67	4.32	0.63	0.29
5.	38	4.66	0.53	4.61	0.55	0.49
6.	38	4.53	0.56	4.5	0.60	0.71
7.	38	4.66	0.48	4.63	0.49	0.71
8.	38	4.50	0.65	4.61	0.55	0.25
9.	37	4.49	0.61	4.59	0.50	0.32
10.	37	4.43	0.65	4.51	0.61	0.45
11.	38	4.55	0.56	4.66	0.48	0.21
12.	38	4.39	0.60	4.47	0.65	0.47
13.	36	4.08	0.91	4.14	0.93	0.69
16.	37	1.62	0.92	1.62	0.95	1.00
17.	37	1.89	0.84	2.08	1.09	0.15
18.	36	2.89	1.12	2.89	0.95	1.00
19.	37	4.38	0.55	4.35	0.72	0.80
20.	36	3.53	0.91	3.64	0.90	0.38
21.	36	4.61	0.55	4.58	0.55	0.74
22.	35	3.60	1.04	3.54	0.89	0.70
23.	36	4.19	0.71	4.39	0.65	0.09
24.	36	4.28	0.62	4.28	0.70	1.00

P-value for the two-taledpaired *t*-test

mean values before and after the installation for the remaining items that did not show significant differences.

The results of the text analyses are presented in Fig. 2–4. Fig. 2 demonstrates the results of a text-mining for free-expression terms associated with "falls". The word "scary" only appeared before the installation. The words "safety", "slip", "risk management", "dangerous, and "muscle strength" appeared after the installation of the lights. Fig. 3 demonstrates the results of text-mining for free-expression terms associated with prevention of falls. The term "anti-slip" appeared before the installation only. After the installation, the words "handrail", "polite", and "barrier-free" appeared. Fig. 4 demonstrates the results of the text-mining for "prevention of falls

Fig. 2 Results of textual analyses related to "*falls*"
The terms given as responses during the 1-minute period allotted for the participants to write free-expressions

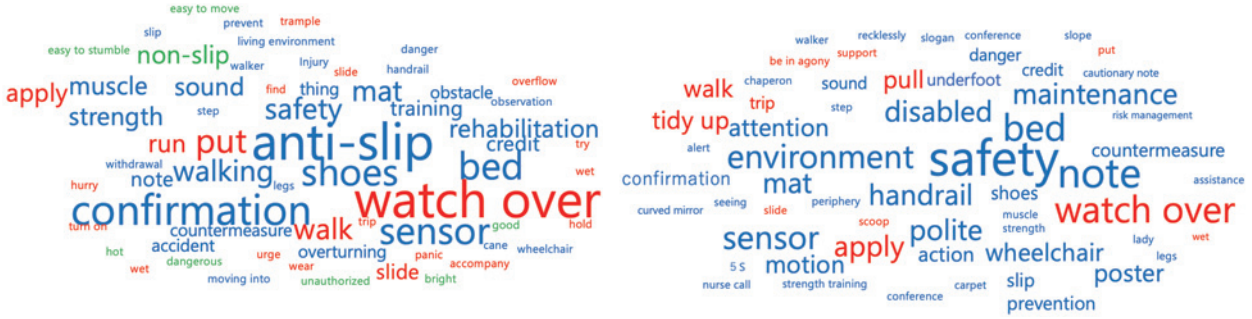

Fig. 3 Results of textual analyses related to "*prevention of falls*"
The terms given as responses during the 1-minute period allotted for the participants to write free-expressions

Fig. 4 Results of textual analyses related to "*prevention of falls and collisions*"
The terms given as responses during the 1-minute period allotted for the participants to write free-expressions

and collisions". Comparing before and after the installation, there were no remarkable differences in the terms that appeared. The size of the words "safety", "polite", "danger", and "shoes" became much larger.

Discussion

This study was carried out to determine whether or not hazard warning lights, which have the role of a nudge, promote safety awareness and induce behavioral changes. A nudge[3] is originally defined as a gentle poking or prodding from the side with the elbow for the purpose of informing or signalling something. As a policy instrument[6], it is defined as using behavioral science (behavioral insight) to help individuals actively take

action that leads to better outcomes for them. It is characterized by how the decision-making environment is enhanced to influence the individual's decision-making process, without the use of rules or penalties. In addition, because of the use of light stimuli, it is considered to be effective even if the language is not shared among the participants. The Nudge Unit (BIT) was established in 2010 and applies to nudge theory in the UK Government. EAST, developed by the BIT, stands for "Easy, Attractive, Social, and Timely" and is considered an effective method to promote behavior change. This was the first attempt to examine where hazard warning lights would serve most effectively as nudges — where "EAST", i.e., Easy, Attractive, Social, and Timely elements, which immediately draw people's attention, were effective to help prevent falls in occupational medicine scenarios, e.g., hospitals, nursing homes, long-term care, rehabilitation and post-acute care settings.

Nudge theory has been applied in various fields because it is highly effective and relatively inexpensive. There were, including in workplaces, other than in medical settings, reported cases where nudge theory has been used to increase physical activity[7)–23)] and decrease the tendency to sit or rest inactively for long periods of time[24)–32)].

The aim of this study was to clarify the effectiveness of hazard warning lights along with providing education on fall prevention and on the safety awareness and behavioral changes necessary to help prevent falls. Accordingly, we conducted a unique questionnaire survey.

Significant increases in the mean scores were observed for the following items comparing the participants' safety awareness before and after the installation of the warning lights: Using a platform or stepladder, even for a moment, when taking objects from a shelf, by the Bonferroni correction. Also increases in the mean scores were observed for the following items comparing the participants' safety awareness before and after the installation of the warning lights: Being aware of hazardous areas in the workplace; Doing leg and back strengthening exercises, including elements such as squatting; and Constantly thinking of remedial measures to deal with hazards in the workplace. These results suggested that workers improve their safety awareness within hazardous areas of the workplace and increase their willingness to make improvements. The use of a footstool or stepladder when taking an object off a shelf; and Strengthening their legs and feet were also suggested as behavioral changes that ought to be made to further help avoid hazards. It is possible that the warning lights promoted workers' safety awareness and behavioral changes for the prevention of falls. These observed concerns regarding safety awareness and behavioral changes, potentially induced by the visual warning-light stimuli in hazardous areas, may contribute to a reduction in falls.

By text-mining, for the terms associated with "falls", the terms "safety", "slip", "risk management", "dangerous", and "muscle strength" appeared after the installation of the warning lights. The word "scary" only appeared before the installation. For "fall prevention", after the installation, the terms "handrail", "polite", "barrier-free", and "watch over" appeared. The term "anti-slip" only appeared before the installation. Comparing before and after the installation, for "prevention of falls and collisions", the size of the terms became much larger for: "safety", "polite", "danger", and "shoes". Although using text-mining does not always clearly show the differences between before and after, the participants' free associations with the terms after the installation were mostly related to safety, e.g., "safe" and "polite".

The results of this study suggest that hazard warning lights applying nudge theory promote workers' safety awareness and encourage them to make changes in their behaviors related to the prevention of falls. In Japan, because many workers in elderly care hospitals, nursing homes, long-term care, rehabilitation and post-acute care facilities are foreigners, some of whom therefore have a limited ability to read Japanese signs declaring warnings; for those people, as well as the regular Japanese workers, warning lights would be particularly effective to help prevent falls.

There were several limitations in this study. First, this study uses a time-series design. This design involves a within-group comparison of the same subjects during an intervention period and a non-intervention period. It has the advantage of controlling for many potential confounders. However, its level of evidence is considered lower than that of a cluster randomized controlled trial (c-RCT). Second, participants were recruited from only two facilities, and the sample consisted of only 46 participants. A small sample size may increase the likelihood of random error. Third, there are several confounding factors in this study. To begin with,

there is the Hawthorne Effect. The mere fact of being observed and participating in a study may have led workers to report improved awareness and behaviors. Next, there is confounding from education. All participants received educational training on fall prevention and the warning lights. The observed effects could be partially or entirely due to this educational component rather than the lights themselves. However, distinguishing between the effects of education and those of the warning lights is difficult. Finally, the study relies on self-reported outcomes. The primary outcomes are based entirely on a self-administered questionnaire. Self-reported data are susceptible to social desirability bias, whereby participants may respond in ways they believe are favorable to the researchers. The study would have been strengthened by the inclusion of objective outcome measures, such as observed safety behaviors or, ideally, data on actual falls and near-miss incidents. These factors limit the validity of the data. In future studies, c-RCT with objective outcome measures (e.g., incident rates, behavioral observation) and increasing the number of sites and participants will be required. Because the questionnaire items were only considering the 1-month period before and after the installation of the warning lights, it was only possible to assess the short-term effect of the safety awareness and behavioral changes afforded by installing those hazard warning lights. Therefore, the assessment of the long-term effects of hazard warning lights should be evaluated in future studies. Furthermore, it will be necessary to examine whether or not the effects on awareness and behavioral changes actually lead to a reduction in accidents, slips, and near-misses of falls.

According to the nudge theory, nudge visual stimuli do not force changes in behaviors but encourage active decision-making, to induce behavioral changes due to often unconscious and/or spontaneous changes participants make in their own safety awareness. With pre-education, the hazard warning lights played the role of a nudge. There is also a high potential for visual stimuli to act as nudges to generate measures in other settings concerning accident prevention in the workplace.

Acknowledgements

This study was supported by a Grant-in-Aid for Scientific Research from the Ministry of Health, Labor and Welfare, Occupational Safety and Health Comprehensive Research Project (23JA1003). The authors thank Robert E. Brandt, Founder, CEO, and Chief Medical Editor of MedEd Japan, for editing and formatting the manuscript.

References

1) Shibata K: Fall injuries among older workers: current situation and preventive measures. Occup Health J 48: 238—242, 2025.
2) Japan Industrial Safety and Health Association: Report on the results of a survey on health and safety measures in social welfare facilities. pp24-34, 2016. https://www.jisha.or.jp/Portals/0/resources/research/pdf/201603_01_All_1.pdf (accessed 2025-6-8).
3) Miyauchi H, Aoki T: Evaluation of Eye Fatigue for VDT Work Using Optical Response Analysis. Japan Society for Safety Engineering 60: 93—100, 2021.
4) Thaler RH, Sunstein CR: Nudge, Improving Decisions about Health, Wealth, and Happiness. Yale University Press, 2008,
5) Miyauchi H, Syoji T: The use of sensor-based fall prediction lights to induce hazard avoidance behaviour — Verification in social welfare facilities and universities. The Ministry of Health Labour and Welfare Health Labour Sciences Research Grant Comprehensive occupational health and safety research project. Research contributing to the promotion of occupational accident prevention initiatives through behavioural economic approaches such as 'nudges', (23JA1003) Research Report pp36-45, 2023. https://mhlw-grants.niph.go.jp/system/files/download_pdf/2023/202322012A.pdf (accessed 2025-6-7).
6) Dolan P, Hallsworth M, Halpern D, et al: MINDSPACE Influencing behaviour through public policy. Cabinet Office, Institute for Government, 2010,
7) Bellicha A, Kieusseian A, Fontvieille A-M, et al: A multistage controlled intervention to increase stair climbing at work: effectiveness and process evaluation. Int J Behav Nutr Phys Act 47: 13—14, 2016.
8) Bennett D, Maclochlainn D, McMullan L: Point of decision prompts and signposting footprints improve stair use in a UK city centre office. Ulster Med J 87: 130—132, 2018.
9) Deery CB, Hales D, Viera L, et al: Physical activity calorie expenditure (PACE) labels in worksite cafeterias: Effects on physical activity. BMC Public Health 19: 1596, 2019.
10) Engelen L, Chau J, Bohn-Goldbaum E, et al: Is Active Design changing the workplace? — A natural pre-post experiment looking at health behaviour and workplace perceptions. Work 56: 229—237, 2017.

11) Eves FF, Webb OJ, Griffin C, et al: A multi-component stair climbing promotional campaign targeting calorific expenditure for worksites; a quasi-experimental study testing effects on behaviour, attitude and intention. BMC Public Health 12: 423, 2012.
12) Finkelstein EA, Haaland BA, Bilger M, et al: Effectiveness of activity trackers with and without incentives to increase physical activity (TRIPPA): a randomised controlled trial. Lancet Diabetes Endocrinol 4: 983—995, 2016.
13) Losina E, Smith SR, Usiskin IM, et al: Implementation of a workplace intervention using financial rewards to promote adherence to physical activity guidelines: a feasibility study. BMC Public Health 17: 921, 2017.
14) Meyer P, Kayser B, Kossovsky MP, et al: Stairs instead of elevators at workplace: cardioprotective effects of a pragmatic intervention. Eur J Cardiovasc Prev Rehabil 17: 569—575, 2010.
15) Moloughney BW, Bursey GE, Fortin RB, et al: A multicomponent intervention to encourage stair use in municipal buildings. Am J Health Promot 33: 57—69, 2019.
16) Nomura T, Katayama K, Kashiwa T, et al: Maintenance of the rate of stair use over a long-term period using a stair climbing campaign. J Occup Health 56: 511—518, 2014.
17) Olander EK, Eves FF: Effectiveness and cost of two stair-climbing interventions-less is more. Am J Health Promot 25: 231—236, 2011.
18) Patel MS, Asch DA, Rosin R, et al: Individual versus team-based financial incentives to increase physical activity: a randomized, controlled trial. J Gen Intern Med 31: 746—754, 2016.
19) Puig-Ribera A, Señé-Mir AM, Taylor-Covill GHA, et al: Signage interventions for stair climbing at work: More than 700,000 reasons for caution. Int J Environ Res Public Health 3782: 16—19, 2019.
20) Ruff RR, Rosenblum R, Fischer S, et al: Associations between building design, point-of-decision stair prompts, and stair use in urban worksites. Prev Med 60: 60—64, 2014.
21) Swenson T, Siegel M: Increasing stair use in an office worksite through an interactive environmental intervention. Am J Health Promot 27: 323—329, 2013.
22) Van Calster L, Van Hoecke A-S, Octaef A, Boen F: Does a video displaying a stair climbing model increase stair use in a worksite setting? Public Health 149: 11—20, 2017.
23) Van Hoecke A-S, Seghers J, Boen F: Promoting stair climbing in a worksite and public setting: Are footprints enough? Am J Health Promot 32: 527—535, 2018.
24) Cooley D, Pedersen S: A pilot study of increasing nonpurposeful movement breaks at work as a means of reducing prolonged sitting. J Environ Public Health 128: 376, 2013.
25) Cooley D, Pedersen S, Mainsbridge C: Assessment of the impact of a workplace intervention to reduce prolonged occupational sitting time. Qual Health Res 24: 90—101, 2014.
26) Evans RE, Fawole HO, Sheriff SA, et al: Point-of-choice prompts to reduce sitting time at work: a randomized trial. Am J Prev Med 43: 293—297, 2012.
27) Gilson ND, Ng N, Pavey TG, et al: Using participatory approaches and real time computer prompts to reduce occupational sitting and increase work time physical activity in office workers. J Sci Med Sport 19: 926—930, 2016.
28) Green N, Sigurdsson S, Wilder DA: Decreasing bouts of prolonged sitting among office workers. J Appl Behav Anal 49: 717—722, 2016.
29) Mackenzie K, Goyder E, Eves F: Acceptability and feasibility of a low-cost, theory-based and co-produced intervention to reduce workplace sitting time in desk-based university employees. BMC Public Health 15: 1294, 2015.
30) Maylor BD, Edwardson CL, Zakrzewski-Fruer JK, et al: Efficacy of a multicomponent intervention to reduce workplace sitting time in office workers: a cluster randomized controlled trial. J Occup Environ Med 60: 787—795, 2018.
31) Swartz AM, Rote AE, Welch WA, et al: Prompts to disrupt sitting time and increase physical activity at work, 2011–2012. Prev Chronic Dis 11: 130318, 2014.
32) Urda JL, Lynn JS, Gorman A, Larouere B: Effects of a minimal workplace intervention to reduce sedentary behaviors and improve perceived wellness in middle-aged women office workers. J Phys Act Health 13: 838—844, 2016.

Reprint request:
Hiroyuki Miyauchi, Ph.D.
Department of Environmental Management and Control, School of Health Sciences, University of Occupational and Environmental Health, 1-1, Iseigaoka, Yahatanishi-ku, Kitakyu shu, 807-8555, Japan.

別刷請求先 〒807–8555 北九州市八幡西区医生ケ丘 1—1
産業医科大学産業保健学部作業環境計測制御学講座
宮内 博幸

転倒災害の回避と働く人の安全意識向上を促すナッジとしての危険予知灯：予備的研究

柴田　国夫[1)]，庄司　卓郎[2)]，岩澤　聡子[3)]，宮内　博幸[4)]

[1)]産業医科大学大学院医学研究科産業衛生学専攻
[2)]産業医科大学産業保健学部安全衛生マネジメント学講座
[3)]防衛医科大学校医学教育部医学科衛生学公衆衛生学講座
[4)]産業医科大学産業保健学部作業環境計測制御学講座

—キーワード—
ナッジ理論，危険予知灯，転倒，安全意識，行動変容

危険予知灯は視覚に基づいて危険を知らせるものである．ナッジ理論に当てはめると，この危険予知灯は，自発的に個人の意思決定や意識向上に影響を与える「ナッジ」の役割を果たすとされている．この危険予知灯は転倒防止につながる可能性があるか，実際の効果は検証されていない．本研究は，危険予知灯がナッジの役割を果たし，転倒リスクを低減する意識向上を促すかどうかを検証することを目的とするパイロット研究である．その効果を検証するため，福岡県内の高齢者福祉施設にライトを設置し，設置前後1カ月の労働者の危険認知と行動変容を質問紙調査により比較した．25項目の選択肢については5段階でスコア化し前後の得点を対応のある t 検定で比較し更に多重性の問題にはボンフェローニ補正で評価した．また，自由記載を設けテキストマイニング手法で評価した．危険予知灯設置前後でスコアが有意に増加した項目は，「関連する用具の使用」のみで，増加した項目は「労働者の危険認知」と，「足腰を鍛える運動」と「改善を常に意識すること」であった．テキストマイニングの分析では，設置後，意識と安全に関する用語がより多く出現した．危険予知灯は，危険認知を含む安全意識を向上させ，転倒減少に関連する行動変容を促進することが示唆された．今後，対照群を考慮しつつ長期的な効果の検証および客観的指標であるヒヤリハット件数や災害発生数とした研究が必要である．本研究で転倒の危険回避に対する視覚刺激の有効性が示唆されたことから，ナッジである視覚刺激を用いた予防策を他の労働災害にも応用できる潜在的な可能性があると考える．

［COI開示］本論文に関して開示すべきCOI状態はない

（日職災医誌，73：177—185，2025）