Original Article

Comparative Study of Organizational Measures on Helmet Use Rate in Trang Hospital Personnel

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Objective: To compare the efficacy of organizational measures on helmet use rate of the motorcycle driver and rider in Trang Hospital.

Materials and Methods: The present study was a prospective study comparing the helmet use rate before and after the measures including helmet policy, supportive and incentive organizational measure, and penalizing organizational measure. The personnel of Trang Hospital included 1,441 people. There were 637 drive-only personnel, 143 ride-only personnel and 443 drive-ride personnel. The helmet use rate was collected at the front gate of the hospital by closed circuit video camera monitoring during 07:00 am to 08:30 am every day for one week before and after the various measures. The mean helmet use rates were compared by the chi-square test was considered significant at the p value of less than 0.05.

Results: The increased rate of helmet use in driver after the supportive and incentive organizational measure and the penalizing organizational measure compared to the helmet use rate before the policy measures were statistically significant ($p<0.001$). Unlike the increased rate of helmet use in driver and rider after the policy measure compared to the helmet use rate before the policy measure were not statistically significant ($p=0.220$, 0.470, consecutively). The increased helmet use of the rider after the penalizing organizational measure was statistically significant when compared to the helmet use rate before the policy ($p<0.001$), and the supportive and incentive measure ($p=0.019$). However, the increased rate of helmet use in driver after the penalizing organizational measure compared to the helmet use rate after the supportive and incentive organizational measure were not statistically significant ($p=0.990$).

Conclusion: Only the policy measure has not significantly increased the rate of helmet use in both drivers and riders. The supportive and incentive organizational measure have significantly increased the helmet use rate in the drivers, but not significantly increased the rate of helmet use in the riders. However, the penalizing organizational measure has significantly increased the rate of helmet use in the riders, but not significantly increased the rate of helmet use in the drivers.

Keywords: Helmet implementation, Organizational measure, Head injury prevention, Motorcycle accident, Helmet use rate

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Road traffic injuries and deaths are still a major health problem in Thailand. According to the global road safety reports 2013, 2015, and 2018, Thailand has been ranked the third, second, and ninth highest death rate from road traffic accidents[1-3]. Among road traffic death, the motorcycle accident comprised of 74% of the death rate[4]. The death rate of motorcycle drivers and riders in Thailand was ranked first and third from the global annual report for road safety in 2015 and 2018, by country. The major cause of death in motorcycle accident was head injuries as reported in 88% of the cases[5].

According to Haddon Matrix[6], a motorcycle helmet is a measure that decrease death and injury rate from motorcycle accident. The helmet was reported to have an efficacy on decreasing the death rate by 42%. Additionally, it decreases head injuries from motorcycle accident[7]. As a result, the World Health Organization (WHO) has announced that the helmet policy is one of the 12 global road safety goals before 2030[8]. Despite of the road traffic act of 1979, the helmet use rate in Thailand has been low as shown in Figure 1[9]. There are many other measures that have ability to improve the helmet use rate such as organizational measures, educational measures, and economic measures. The author aimed to study and compare the efficacy of each organizational measures on helmet use rate on the personnel of Trang Hospital.

Objective

To study and compare the efficacy of each

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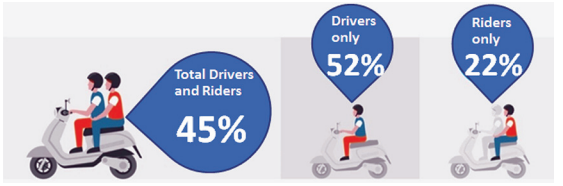

Figure 1. Demonstrate the helmet use rate of the motorcycle driver and rider in Thailand, 2018.

organizational measure on helmet use rate of the motorcycle driver and rider in Trang Hospital.

Materials and Methods

The present study was a prospective study comparing the helmet use rate before and after implementing measures about the helmet policy. The organizational measures were supportive, incentive, and penalizing measures. There were 1,441 people working and riding at the Trang Hospital. There were 637 drive-only, 143 ride-only, and 443 drive-ride personnel. The helmet use rate was collected at the front gate of the hospital by closed circuit video camera monitoring during 07:00 am. to 08:30 am. every day for one week before and after the various measures were implemented. Each measure duration was three months between November 2018 and December 2019. The measures to increase the helmet use rate were as follows:

1. ***Policy measure***: The hospital director proclaimed that a 100% helmet policy was in force for drivers and riders of the hospital personnel. A warning billboard at the hospital gate was posted.

2. ***Supportive and incentive organizational measure***: Helmet seminars were organized for all hospital personnel who are the motorcycle drivers and the riders. Free helmets were distributed to the low-income drivers or riders. Good-quality low-price helmets were provided to the hospital personnel.

3. ***Penalizing organizational measure***: The security guard gave helmet warning to the hospital personnel who did not wear the helmet. The hospital personnel who did not wear the helmet were not allowed to enter the hospital. Finally, the hospital director signed the warning letter to the hospital personnel who did not wear the helmet.

The helmet use rate before and after each measure were collected for one week. The mean rates were calculated and compared during each period by chi-square test. A p-value of less than 0.05 was used as significant level.

The present study was approved by the Ethics Committee of Trang Hospital (reference No. 0032.102/7702).

Table 1. Demographic data of the motorcycle usage of Trang Hospital personnel

Category	Male; n (%)	Female; n (%)	Total; n (%)
Driver and rider	51 (18.8)	392 (33.5)	443 (30.7)
Only driver	183 (67.5)	454 (38.8)	637 (44.2)
Only rider	8 (3.0)	135 (11.5)	143 (10)
No motorcycle usage	29 (10.7)	189 (16.2)	218 (15.1)
Total	271	1,170	1,441

Table 2. Efficacy of each measure on motorcycle driver helmet use rate

Driver	Wearing helmet; n (%)	Not wearing helmet; n (%)
Period before policy	167 (87.4)	24 (12.6)
Period after policy	205 (91.1)	20 (8.9)
Period after supportive and incentive organizational measure	277 (98.9)	3 (1.1)
Period after penalizing organizational measure	282 (99.3)	2 (0.7)

Results

The results were as follows:

As shown in Table 1, most of motorcycle usage in Trang Hospital personnel was only driver (44.2%), follow with both driver and rider (30.7%) and only rider (10%). Likewise, only driver predominated in both male and female personnel (67.5% and 38.8%).

As shown in Table 2, the increased rate of helmet use in driver after the policy measure compared to the helmet use rate before the policy measure were not statistically significant (p=0.220). The increased rate of helmet use in driver after the supportive and incentive organizational measure and after the penalizing organizational measure compared to the helmet use rate before the policy measure were statistically significant (p<0.001). The increased rate of helmet use in driver after the supportive and incentive organizational measure and after the penalizing organizational measure compared to the helmet use rate after the policy measure were statistically significant (p<0.001). However, the increased rate of helmet use in driver after the penalizing organizational measure compared to the helmet use rate after the supportive and incentive organizational measure were not statistically significant (p=0.990).

As shown in Table 3, the increased rate of helmet

Table 3. Efficacy of policy measure on motorcycle rider helmet use rate

Rider	Wearing helmet; n (%)	Not wearing helmet; n (%)
Period before policy	6 (14.6)	35 (85.4)
Period after policy	9 (21.4)	33 (78.6)
Period after supportive and incentive organizational measure	8 (32.0)	17 (68.0)
Period after penalizing organizational measure	13 (68.4)	6 (31.6)

Table 4. The mean helmet use rate in each period of organizational measures

	Driver wearing helmet (%)	Rider wearing helmet (%)
Before policy	87.4	14.6
After policy	91.1	21.4
After supportive and incentive organizational measure	98.9	32.0
After penalizing organizational measure	99.3	68.4

Table 5. The efficacy of each organizational measure on helmet use rate of motorcycle drivers and riders

Organizational measures	Driver	Rider
Policy	No	No
Supportive and incentive organizational measure	Yes	No
Penalizing organizational measure	Yes	Yes

in the rider after the policy measure and after the supportive and incentive organizational measure compared to the helmet use rate before the policy measure were not statistically significant (p=0.470, 0.090, consecutively). In contrary, the increased rate of helmet use in the rider after the penalizing organizational measure compared to the helmet use rate before the policy measure were statistically significant (p<0.001). The increased rate of helmet use in the rider after the supportive and incentive organizational measure compared to the helmet use rate after the policy measure were not statistically significant (p=0.38). However, the increased rate of helmet use in the rider after the organization measure compared to the helmet use rate after the policy measure were statistically significant (p<0.001), and the increased rate of helmet use in the rider after the penalizing organizational measure compared to the helmet use rate after the supportive and incentive organizational measure were statistically significant (p=0.019).

According to Table 4, each organizational measure has increased the mean percentage of helmet use rate of the motorcycle drivers and riders. The author's findings were demonstrated in Table 5. To compare the efficacy of organizational measures to each period of measure, the results are shown in Table 6.

Discussion

There are various measures to increase the helmet use rate in the population such as the law measure and law enforcement measure. In the US, the helmet use rate was significantly decreased after the cancellation of the helmet law, consequently, the death rate and injury rate from road traffic injury increased[10]. In Thailand, the helmet use rate was significantly increased in both motorcycle drivers and riders after the helmet law enforcement was done by checkpoint settings[11]. The organizational measure is one of the effective measures to increase helmet use rate in a variety of organizations such as factories[12], healthcare workplaces[13], and education institutes[14] as reported in literature. There also was a significantly increase in helmet use rate in Trang Hospital in the present study.

There are various effective organizational helmet measures reported in the literature. The promotion of organizational measures such as education activities to increase the use of helmet and the helmet distribution have significantly increased the helmet use rate. Germeni et al[15] has reported that helmet promotion program has efficacy on motorcycle safe behaviors. Rivara et al[16] has showed that the lowering of helmet price has increased the helmet use rate. The present study showed that there is also significant increase in

Table 6. Comparative efficacy on helmet use rate of the motorcycle drivers and riders after each measure

Comparing organizational measure	Driver	Rider	Baseline measure
Supportive and incentive organizational measure	Significant increase	No efficacy	Policy Measure
Penalizing organizational measure	Significant increase	Significant increase	Policy Measure
	Insignificant increase	Significant increase	Supportive and incentive organizational measure

the helmet use rate of the driver, but there is no change on the helmet use rate of the riders.

The author has found that penalizing organizational measures increases significant the helmet use rate of both motorcycle drivers and riders. Servadei et al[17] reported an increase of helmet use rate from 19.5% to 97.5% in Italy after penalizing organizational measures were implemented. As in Thailand, Ichikawa et al[18] reported a significant increase in helmet use rate together with the decrease of death and injury rate from road traffic accidents after penalizing organizational measure.

According to the literature, there is no comparative study of each organizational measure. The author's findings demonstrate that policy measure has no efficacy on helmet use rate while the supportive and incentive organizational measures have efficacy only on the driver helmet use rate. The penalizing organizational measures have significantly increased the rider helmet use rate.

There is some limitation of the present study because it was a before-after comparison in possibly different groups of drivers and riders. The advantage is that it is convenient to collect and not intervening in the daily activity of the personnel. The disadvantage is that it cannot strongly conclude the efficacy of each measure.

Conclusion

Only policy measure has not significantly increased the rate of helmet in both drivers and riders. The supportive and incentive organizational measure has significantly increased the rate of helmet in the drivers, but not significantly increased in the riders. However, the penalizing organizational measure has significantly increased the rate of helmet in the riders but has not significantly increased the rate of helmet in the drivers.

What is already known on this topic?

1. The organization measures have increased helmet use rate.

2. The helmet use has decreased the severity of traumatic brain injury.

What this study adds?

1. The organization measures that increase driver helmet use rate include supportive and penalizing organizational measure.

2. The organization measures that increase rider helmet use rate is penalizing organizational measure only.

Conflicts of interest

The author declares no conflict of interest.

References

1. World Health Organization. Global status report on road safety 2013: The global burden of road traffic deaths [Internet]. 2013 [cited 2020 Sep 24]. Available from: https://www.who.int/violence_injury_prevention/road_safety_status/2013/report/en/.
2. World Health Organization. Global status report on road safety 2015: The global burden of road traffic deaths [Internet]. 2015 [cited 2020 Sep 24]. Available from: https://www.who.int/violence_injury_prevention/road_safety_status/2015/en/.
3. World Health Organization. Global status report on road safety2015: Estimated road traffic death rate per 100,000 population [Internet]. 2018 [cited 2020 Sep 24]. Available from: https://www.who.int/publications-detail/global-status-report-on-road-safety-2018.
4. Bureau of Epidemiology Department of Disease Control Ministry of Public Health, Thailand. Annual epidemiological surveillance report 2016. Nonthaburi: Bureau of Epidemiology; 2017.
5. Umar R. Helmet initiatives in Malaysia. In: Soom MAM, Yahya A, Rukunudin IH, editors. Proceedings of the 2nd world engineering congress. Kuching, Sarawak, Malaysia, Institution of Engineers, July 2002.
6. Haddon W Jr. The changing approach to the epidemiology, prevention, and amelioration of trauma: the transition to approaches etiologically rather than descriptively based. Am J Public Health Nations Health 1968;58:1431-8.
7. Liu BC, Ivers R, Norton R, Boufous S, Blows S, Lo SK. Helmets for preventing injury in motorcycle riders. Cochrane Database Syst Rev 2008;(1):CD004333.
8. World Health Organization. Violence and injury prevention. Global road safety performance targets: 12 global road safety performance targets [Internet]. 2017 [cited 2020 Sep 24]. Available from: https://www.who.int/violence_injury_prevention/road_traffic/road-safety-targets/en/.
9. Thailand Road Safety Observatory (TRSO) [Internet]. 2019 [cited 2020 Sep 24]. Available from: http://trso.thairoads.org/statistic/helmet.
10. Ulmer RG, Preusser DF. Evaluation of the repeal of motorcycle helmet laws in Kentucky and Louisiana [Internet]. Washington, D.C.: National Highway Traffic Safety Administration; 2003 [cited 2006 Jul 4]. Available from: https://icsw.nhtsa.gov/people/injury/pedbimot/motorcycle/kentuky-la03/.
11. Jiwattanakulpaisarn P, Kanitpong K, Ponboon S, Boontob N, Aniwattakulchai P, Samranjit S. Does law enforcement awareness affect motorcycle helmet use? Evidence from urban cities in Thailand. Glob Health Promot 2013;20:14-24.
12. Jafaralilou H, Zareban I, Hajaghazadeh M, Matin H,

Didarloo A. The impact of theory-based educational intervention on improving helmet use behavior among workers of cement factory, Iran. J Egypt Public Health Assoc 2019;94:1.
13. Shruthi MN, Meundi AD, Sushma D. Determinants of helmet use among health-care providers in urban India: Leveraging the theory of planned behavior. J Educ Health Promot 2019;8:24.
14. Batin GJ, Valencia LR, Binasbas D, Revilla JJ. Implementation of the No-Helmet No-Travel policy in Candon city. Candon City, Ilocos Sur: Republic of the Philippines Region 1 Candon National High School Senior High School; 2017.
15. Germeni E, Lionis C, Kalampoki V, Davou B, Belechri M, Petridou E. Evaluating the impact of a school-based helmet promotion program on eligible adolescent drivers: different audiences, different needs? Health Educ Res 2010;25:865-76.
16. Rivara FP, Thompson DC, Thompson RS, Rogers LW, Alexander B, Felix D, et al. The Seattle children's bicycle helmet campaign: changes in helmet use and head injury admissions. Pediatrics 1994;93:567-9.
17. Servadei F, Begliomini C, Gardini E, Giustini M, Taggi F, Kraus J. Effect of Italy's motorcycle helmet law on traumatic brain injuries. Inj Prev 2003;9:257-60.
18. Ichikawa M, Chadbunchachai W, Marui E. Effect of the helmet act for motorcyclists in Thailand. Accid Anal Prev 2003;35:183-9.