This item was submitted to [Loughborough's Research Repository](#) by the author.
Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

Effectiveness of interventions for preventing injuries in the construction industry: results of an updated Cochrane systematic review

PLEASE CITE THE PUBLISHED VERSION

https://doi.org/10.1007/978-3-319-96068-5_49

PUBLISHER

© Springer

VERSION

AM (Accepted Manuscript)

PUBLISHER STATEMENT

This is a pre-copyedited version of a contribution published in Bagnara, S. ... et al. (eds.) 20th International Ergonomics Association (IEA2018): Volume VIII: Ergonomics and Human Factors in Manufacturing, Agriculture, Building and Construction, Sustainable Development and Mining published by Springer. The definitive authenticated version is available online via https://doi.org/10.1007/978-3-319-96068-5_49

LICENCE

CC BY-NC-ND 4.0

REPOSITORY RECORD

van der Molen, Henk, Prativa Basnet, Peter L.T. Hoonakker, Marika M. Lehtola, Jorma Lappalainen, Monique H.W. Frings-Dresen, Roger Haslam, and Jos H. Verbeek. 2019. "Effectiveness of Interventions for Preventing Injuries in the Construction Industry: Results of an Updated Cochrane Systematic Review". figshare. <https://hdl.handle.net/2134/34819>.

Effectiveness of interventions for preventing injuries in the construction industry: Results of an updated Cochrane systematic review

Henk F. van der Molen¹, Prativa Basnet², Peter L.T. Hoonakker³, Marika M. Lehtola⁴, Jorma Lappalainen, Monique H.W. Frings-Dresen¹, Roger A. Haslam⁵, Jos H. Verbeek²

¹Academic Medical Center, University of Amsterdam, Department: Coronel Institute of Occupational Health, Amsterdam Public Health research institute, PO Box 22700, 1100 DE Amsterdam, the NETHERLANDS

²Cochrane Work Review Group, Finnish Institute of Occupational Health, Kuopio, FINLAND

³Center for Quality and Productivity Improvement, University of Wisconsin, Madison, Madison, WI, USA

⁴Promotion of Occupational Safety, Finnish Institute of Occupational Health, Kuopio, FINLAND

⁵Loughborough Design School, Loughborough University, Leicestershire, UK

`h.f.vandermolen@amc.nl`

Abstract. Various interventions to prevent occupational injuries in the construction industry have been proposed and studied. This continuing updated Cochrane review systematically summarizes the most current scientific evidence on the effectiveness of interventions to prevent injuries associated with construction work. Search terms that covered the concepts of 'construction workers', 'injury', 'safety' and 'study design' were used to identify intervention studies in five electronic databases up to April 2017. Acceptable study designs included randomized controlled trials (RCT), controlled before–after studies (CBA) and interrupted time series (ITS). In total 17 studies, 14 ITS and three CBA studies, from the US (6), UK (2), Italy (3), Denmark (1), Finland (1), Austria (1) Germany (1) Spain (1), Belgium (1) met the inclusion criteria. Most studies were at high risk of bias. There is very low-quality evidence that introducing regulations as such may or may not result in a decrease in fatal and non-fatal injuries. There is also very low-quality evidence that regionally oriented safety campaigns, training, inspections or the introduction of occupational health services may not reduce non-fatal injuries in construction companies. There is very low-quality evidence that company-oriented safety interventions such as a multifaceted safety campaign, a multifaceted drug workplace programme and subsidies for replacement of scaffolds may reduce non-fatal injuries among construction workers.

Keywords: Occupational Injury, Interventions, Prevention, Construction Industry, Systematic Review

1 Introduction

Various interventions to prevent occupational injuries in the construction industry have been proposed and studied. This continuing updated Cochrane review¹ systematically summarizes the most current scientific evidence on the effectiveness of interventions to prevent injuries associated with construction work.

2 Methods

Search terms that covered the concepts of 'construction workers', 'injury', 'safety' and 'study design' were used to identify intervention studies in five electronic databases up to April 2017. Acceptable study designs included randomized controlled trials (RCT), controlled before–after studies (CBA) and interrupted time series (ITS). To obtain comparable and reliable results from included ITS studies, data from original papers were extracted and reanalyzed according to recommended methods for analysis of ITS designs for inclusion in systematic reviews. Re-analysis with autoregressive modelling made it possible to estimate regression coefficients corresponding to two standardized effect sizes for each study: change in level, and change in slope of the regression lines before and after the intervention. Data were standardised by dividing the outcome and standard error by the pre-intervention standard deviation as recommended by Ramsay 2001² and entered into Review Manager 5 (RevMan 5) as effect sizes. An ITS study was eligible for inclusion when i) there were at least three time points before and after the intervention, irrespective of the statistical analysis used, and ii) the intervention occurred at a clearly defined point in time. CBA studies were eligible for inclusion when the outcome was measured in both the intervention and control group before and after the introduction of the intervention. We used the GRADE approach for assessing the evidence and results.

3 Results

In total 17 studies, 14 ITS and three CBA studies, from the US (6), UK (2), Italy (3), Denmark (1), Finland (1), Austria (1) Germany (1) Spain (1), Belgium (1) met the inclusion criteria. Most studies were at high risk of bias. The ITS studies evaluated the effects of the introduction or change of regulations which laid down safety and health requirements for the construction sites (N = 9), a safety campaign (N = 2), a drug-free workplace programme (N = 1), a training programme (N = 1), and safety inspections (N = 1) on fatal and non-fatal occupational injuries. One CBA study evaluated the introduction of occupational health services such as risk assessment and health surveillance, one evaluated an training programme and one evaluated subsidy for the replacement of scaffoldings.

The regulatory interventions at national or branch level may not have a considerable initial effect (effect size of -0.33; 95% confidence interval (CI) -2.08 to 1.41) and no sustained effect (effect size of -0.03; 95% CI -0.30 to 0.24) on fatal and nonfatal injuries (9 ITS studies). Inspections may not result in a considerable reduction (effect size of 0.07; 95% CI -2.83 to 2.97) of non-fatal injuries (one ITS study).

Introduction of occupational health services may not result in a decrease of fatal or non-fatal injuries (one CBA study). Safety training interventions may not result in a significant reduction of non-fatal injuries (one ITS study and one CBA study).

In companies that received subsidies non-fatal injuries from falls to a lower level may decrease more (risk ratio at follow-up: 0.93; 95% CI 0.30 to 2.91) than in companies that do not receive subsidies (1 CBA study). A multifaceted drug-free workplace programme at the company level may reduce non-fatal injuries in the years following implementation by -7.6 per 100 person-years (95% CI -11.2 to -4.0) and in the years thereafter by -2.0 per 100 person-years per year (95% CI -3.5 to -0.5) (one ITS study).

A safety campaign intervention may result in an initial and sustained decrease in injuries at the company level (one ITS study) but not at the regional level (one ITS study).

The quality of the evidence was rated as very low for all interventions.

4 Conclusions

There is very low-quality evidence that introducing regulations as such may or may not result in a decrease in fatal and non-fatal injuries. There is also very low-quality evidence that regionally oriented safety campaigns, training, inspections or the introduction of occupational health services may not reduce non-fatal injuries in construction companies.

There is very low-quality evidence that company-oriented safety interventions such as a multifaceted safety campaign, a multifaceted drug workplace programme and subsidies for replacement of scaffoldings may reduce non-fatal injuries among construction workers.

Additional strategies are needed to increase the compliance of employers and workers to the safety measures that are prescribed by regulation. An evidence base is needed for the vast majority of technical, human factors and organisational interventions that are recommended by standard texts of safety, consultants and safety courses.

References

1. van der Molen HF, Basnet P, Hoonakker PLT, Lehtola MM, Lappalainen J, Frings-Dresen MHW, Haslam R, Verbeek JH. Interventions to prevent injuries in construction workers. Cochrane Database of Systematic Reviews 2018, Issue 2. Art. No.: CD006251. DOI: 10.1002/14651858.CD006251.pub4.
2. Ramsay C, Grimshaw J, Grilli R. Robust methods for analysis of interrupted time series. 9th Annual Cochrane Colloquium; 2001 October; Lyon, France. Lyon, 2001.