

Reducing Knee Morbidity among Carpetlayers

SHIRO TANAKA, MD, MS, SHIU T. LEE, MS, WILLIAM E. HALPERIN, MD, MPH, MICHAEL THUN, MD, MS,
AND A. BLAIR SMITH, MD, MS

Abstract: Carpetlayers have a high prevalence of occupational knee morbidity, partly attributable to their use of the knee kicker to stretch carpet for wall-to-wall installation. While a mechanical alternative "power stretcher" is available, knee kickers are still widely used. A questionnaire survey indicated that unavailability of the mechanical stretcher at installation sites was a major factor for continued use of the knee kicker. Strategies to reduce use of the knee kicker are discussed. (*Am J Public Health* 1989; 79:334-335.)

Introduction

There are approximately 99,000 carpetlayers in the United States.¹ They file workers' compensation claims 108 times more than expected² for "knee joint inflammation attributed to kneeling, striking against a stationary object, etc." Both kneeling and use of the knee kicker were significantly related to their knee morbidity.³

A knee kicker is made of cast aluminum and weighs about 2 kg. Every carpetlayer owns one. To stretch carpet, it is pressed onto carpet by a hand and its padded end is kicked with the suprapatellar area. The average impact force exceeds 3,000 Newtons repeated about 140 times per hour⁴ (Figure 1).

As an alternative, a mechanical stretcher using the lever and cogs is available. It weighs about 20 kg by itself; the total weight with accessories and the case may reach 40 kg (Figure 2). Customarily, it is provided by employers (contractor or carpet dealer) and assembled for on-site use. We examined the reasons for carpetlayers choosing between these two devices.

Method

As part of a health hazard evaluation on carpetlayer's knee problems, pertinent questions were included in a self-administered questionnaire to assess their use of the mechanical stretcher and subjective evaluation of the tool. The questionnaire was mailed to members of the local floorlayers union; only those who "have ever used a mechanical stretcher" were instructed to proceed with the subsequent questions.

Respondents were asked to estimate the ratio of using the two carpet stretching devices. Questions concerning the attributes of the mechanical stretcher included the ease of use, portability, safety to the knee, speed and quality of carpet installation, and availability at job sites. For each attribute, respondents were asked to choose one of four graded responses about the device with an implied comparison to the knee kicker.

From the Division of Surveillance, Hazard Evaluations and Field Studies, National Institute for Occupational Safety and Health, Cincinnati, Ohio. Address reprint requests to Shiro Tanaka, MD, MS, R-16, NIOSH, CDC, USPHS/DHHS, Robert Taft Laboratory, 4676 Columbia Parkway, Cincinnati, OH 45226. This paper, submitted to the *Journal* May 6, 1988, was revised and accepted for publication August 29, 1988.



FIGURE 1—A Carpetlayer Using a Knee Kicker

Results

One hundred and thirty-two (78 per cent) of 170 union members returned the questionnaire. The local union included subsets of other tradesmen, such as interior decorators, whom we excluded from our analysis, restricting it to the 94 (71 per cent) of respondents who reported ever using a mechanical stretcher. All respondents were males; 47 per cent used the knee kicker more often, 20 per cent used both tools about equally, and 33 per cent used the mechanical stretcher more often. Mean ages were similar in these three groups.

The majority of respondents reported that the mechanical device was easy to use, "saved" the knees, and achieved a better quality of installation more quickly (Table 1). However, almost 60 per cent said it was difficult to carry around; about one-third felt that it slowed down the job, and 39 per cent reported it was not always available at the job site.

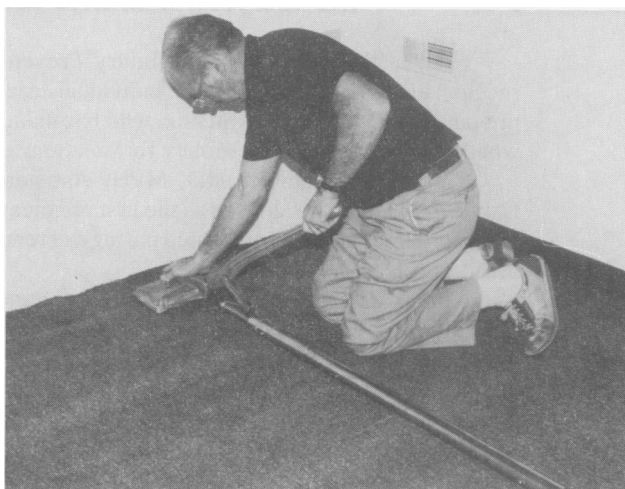


FIGURE 2—A Carpetlayer Using a Mechanical Stretcher

TABLE 1—Favorable or Unfavorable Attributes of the Mechanical Stretcher (MS) with Implied Comparison to the Knee Kicker

Mechanical Stretcher (is):	Very Favorable About MS % ^a	Some-what Favorable about MS %	Somewhat unfavorable about MS %	Very Unfavorable About MS %	Mechanical Stretcher (is):
Easy to use	47.9 ^a	45.7 ^b	6.4 ^c	0 ^d	Difficult to use
Easy to carry around	7.4	33.0	41.5	18.1	Difficult to carry around
Saves my knees	71.3	24.5	4.2	0	Harmful to my knees
Helpful in doing a quick job	33.0	34.0	29.8	3.2	Slows down my job
Helpful in doing a better job	87.2	9.6	3.2	0	Not as good as knee kicker
Available	60.7 ^e	22.3 ^f	17.0 ^g	0 ^h	Unavailable

*Percentages of each row add up to 100%.

a) Very easy, b) fairly easy, c) fairly difficult, or d) very difficult to use.

e) Always, f) usually, g) sometimes, or h) never available.

A logistic regression analysis showed that the “availability” and “save knee” factors were associated with the increased use of the mechanical stretcher.*

Discussion

Why do carpetlayers continue to use the knee kickers which are traumatic to their knees while a safer alternative is available?

Observation of carpet installation reveals that the knee kicker is kicked with two different intensities—mild and strong. Milder kicks are applied initially to engage the edge of carpet onto the tacks (which have been nailed to the perimeter of the floor), or when installing carpet in small confined spaces such as a closet.⁴ In contrast, very forceful kicks are applied in normal installations to get a good stretch. The latter is likely to be most harmful to the knee, and should be totally replaced by using the mechanical stretcher. This survey sheds some light onto what could be done to increase the use of the mechanical device and reduce the use of the knee kicker.

The perceived shortcomings of the mechanical stretcher were: unavailability at the job sites, difficult portability (heavy and bulky), and cumbersome to use. The unavailability or non-use factor may be due to the initial higher cost of the mechanical stretcher (\$400) compared to the knee kicker (\$75) or failure of an employer to provide enough of the mechanical stretchers for each work crew to use; another economic factor might be that, if use of the mechanical stretcher slowed down the speed of installation for some carpetlayers, the employer would be reluctant to encourage its use.

*Availability: O.R. = 2.27, 95% CI = (1.35, 3.85); “Save” knee: O.R. 2.04, 95% CI = (1.02, 4.17); The questionnaire, detailed tabulations, and regression analysis data will be provided upon request to the first author.

Several strategies are suggested to increase the use of the mechanical stretcher:

- Building contractors, carpet dealers and trade unions could initiate or intensify educational efforts to emphasize the potential health hazard of using the knee kickers and encourage carpetlayers to rely more on the mechanical stretcher.
- Carpetlayers could be trained to become proficient in using the mechanical stretcher regardless of the room size.
- Employers should be encouraged to provide an adequate number of mechanical stretchers for each work crew.
- The portability issue could be addressed by such engineering approaches as attaching casters to the carrying case, or inventing a light-weight pneumatic stretching device.
- Consumers could be educated about the health hazards of the knee kicker and encouraged to specify the use of the mechanical stretcher for quality installation.
- A regulatory requirement could stipulate that employers provide each carpetlayer with a mechanical stretcher at job sites.

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