

Surveillance of Construction Workers in North Carolina, Ohio, and Missouri

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A study of North Carolina records of deaths over 10 years found that construction workers have a high risk of deaths from accidental falls from elevations, transportation injuries (as drivers, passengers, and pedestrians), and electrocutions, mostly when equipment contacts a power line or other electrical source (see table 1).

In the death records of 43,900 men for whom construction was listed as the usual occupation, even if they had retired, the analysis found a high risk of deaths for some trades for lung illnesses (such as lung cancers, asbestosis, emphysema, or silicosis) and diseases such as cirrhosis of the liver and mouth cancer, which are tied to a combination of factors, including tobacco use, alcohol use, and exposures to some solvents or metals (table 2).

John Dement and five coworkers at the Duke University Medical Center, in North Carolina, looked at all causes of deaths, not just those listed as work-related. That approach is important because no one knows how many construction workers die each year from illnesses that may have come from their jobs. The problem is workers may not get sick for many years after they've been exposed on the job to hazards like metal fumes that can cause cancer or to silica.

The authors used PMRs (proportionate mortality ratios), statistics that show the risk of death for construction workers compared with all men in North Carolina matched by race, age, and sex. For instance, roofers had a PMR for respiratory tuberculosis of 453, more than four times the usual risk.

For injuries, "struck by/against" and overexertion (sprains and strains), respectively, were the first and second most common cause of injury for each of the three groups (tables 4-6).

In terms of costs, falls were the most expensive of 838 carpenter claims in St. Louis (table 7). In North Carolina, of the 9,205 homebuilder claims, falls were the most costly claims for six of the trades: carpenters, drywall installers, insulators, masons, painters, and plumbers; roofers were not included in the data (table 8). (Costs were not calculated for the Ohio claims.)

The authors looked closely at 553 injuries by nail guns – "struck by" injuries – and found that

pneumatic nail guns caused more than 4% of workers' compensation claims. The tools caused 97% of puncture wounds in residential work, two-thirds of the time after a trigger mechanism safety doesn't work or is bypassed, causing an unwanted discharge or misfire.

Among the authors' recommendations:

- Careful compliance with OSHA standards to protect workers from exposures to silica and asbestos
- Research to prevent falls, transportation injuries, electrocutions (from contact with power lines), and "struck by" injuries, including those from nail guns
- Interventions to reduce sprains and strains from heavy and repetitive lifting, often in awkward postures
- Programs to prevent smoking and alcohol abuse.

Besides Dement, the researchers were Hester Lipscomb, Carol Epling, Tejas Desai, Leiming Li, and Barbara De Larco. For statistical reasons, the study focused on men, although some women who worked in construction were killed or injured. The work was done as part of CPWR's cooperative agreement with the National Institute for Occupational Safety and Health, NIOSH, which is part of the CDC.

For more information, contact CPWR, at 301-578-8500.

**1. Selected causes of deaths, male construction workers,
North Carolina, 1988-97**

Cause of death	(PMR) # of deaths	
Asbestosis	(270)	26
Electrocutions	(220)	73
Silicosis	(191)	10
Alcoholism	(142)	423
Homicide	(141)	1,379
Mouth and pharynx cancers	(132)	303
Accidental poisoning	(139)	359
Larynx cancer	(125)	151
Cirrhosis of liver	(125)	912
Accidental falls	(123)	317
Lung cancers	(113)	4,388
Pneumoconiosis	(112)	2,073
Transportation accidents	(108)	2,120

Note: Statistically significant ($p < 0.05$) proportionate mortality ratios for 10 years and 43,939 deaths (compared to male population matched for age, race, and sex in North Carolina), listed as usually working construction (SIC 15, 16,17), who lived and died in North Carolina; list is not all-inclusive. PMR above 100 means a higher risk of death; 200 shows twice the risk. Accidental poisoning usually involves alcohol. Mouth cancers may be tied to tobacco use and alcohol abuse. Pharynx includes nasal passages and area in back of throat. Transportation accidents include pedestrian deaths.

2. Selected causes of deaths, by trade, male construction workers, North Carolina, 1988-97

<i>Occupation</i>	<i>Cause of death (PMR)</i>
Brick/stone masons, tile setters	Asbestosis (400), accidental falls (169)
Carpenters	Alcoholism (171), homicide (161)
Concrete, terrazzo finishers, glaziers	Liver cirrhosis (204)
Drywall installers	Asbestosis (2,639), accidental poisoning (227)
Electricians	Alcoholism (178)
Insulators	Asbestosis (10,700), homicide (209), lung cancer (173)
Laborers	Mouth cancer (261), alcoholism (149)
Operating engineers	Emphysema (172)
Painters, paperhangers, plasterers	Alcoholism (198), accidental poisoning (192), throat/neck cancer (178), homicide (169), liver cirrhosis (158)
Plumbers, pipefitters, steamfitters	Asbestosis (1,214), liver cirrhosis (158)
Roofers	Respiratory TB (453), mouth cancer (299), accidental falls (285), throat/neck cancer (218), homicide (204)
Welders, cutters	Silicosis (1,932), asbestosis (938), accidental falls (310)

Note: Selected statistically significant ($p < 0.05$) proportionate mortality ratios for deaths (compared with male population in North Carolina matched for age, race and sex), over 10 years listed as usually working construction (SIC 15, 16,17), who lived and died in North Carolina; list is not all-inclusive. PMR above 100 means a higher risk of death; 200 shows twice the risk. Accidental poisoning usually involves alcohol. Mouth cancers may be tied to tobacco use and alcohol abuse. Transportation accidents include pedestrian deaths.

3. Leading causes of injuries, by trade, residential construction, North Carolina, 1996-99

	<i>Cause of injury</i>	<i>% of total for trade (no. of claims for that cause)</i>
Brick, stone masons	Overexertion	26% (107)
Carpenters	Struck	26% (1,085)
	Overexertion	18% (762)
Concrete, terrazzo finishers	Overexertion	26% (107)
	Struck by	25% (105)
Drywall installers	Fall from elevation	28% (70)
	Overexertion	22% (55)
Electricians	Struck by	21% (108)
	Cut	21% (107)
Insulators	Fall from elevation	28% (21)*
Mechanics, repairers	Struck by	20% (118)
	Cuts	18% (106)
Operating engineers	Struck by	28% (55)
Painters, paperhangers	Fall from elevation	24% (106)
	Overexertion	22% (99)
Plumbers	Overexertion	24% (62)
	Struck by	23% (60)

*Insulators had the highest estimated rate of falls 1997-98, followed, in order, by carpenters and drywall installers, then painters; but laborers and roofers were not included in these comparisons.

Note: Based on 9,205 claims filed with North Carolina Residential Homebuilders' Association for 41 months, July 1996-November 1999. Laborers and roofers were not included; numbers for welders were too small to be useful. Data include 16 fatal injuries.

**4. Most common causes of injuries,
North Carolina residential contractors, July 1996 - November 1999**

<i>Cause of injury</i>	<i>% of total</i>	<i>Number of claims</i>
Struck by/against	23%	2,130
Overexertion	21%	1,922
Cut	17%	1,552
Fall from elevation	14%	1,247

Note: 7,500 contractors, 41 months, 9,205 claims to self-insured compensation fund of the North Carolina Homebuilders' Association; data exclude laborers and roofers.

5. Most common causes of injuries, Ohio union contractors, 1994-97

<i>Cause of injury</i>	<i>% of total</i>	<i>Number of claims</i>
Struck by/against	50%	1,888
Overexertion	14%	516
Abraded	9%	325
Fall from elevation	6%	232

Note: 13,487 carpenters, 45 months, 1/1/94-9/30/97; 3,806 workers' compensation claims with details available; rates based on union hours logged.

**6. Most common causes of injuries,
St. Louis residential carpenters, 1995-99**

<i>Cause of injury</i>	<i>% of total</i>	<i>Number of claims</i>
Struck by/against	26%	215
Overexertion	18%	151
Cut	8%	68
Fall from elevation	8%	68
Puncture wound	7%	57

Note: 5 years, 1995-99, 838 claims.

**7. Ranking of injuries by total and median workers' compensation costs,
St. Louis residential carpenters, 1995-99**

<i>Injury</i>	<i>Total cost</i>	<i>Median</i>	<i>Number</i>
Fall from elevation	\$1,667,000	\$2,631	68 claims
Overexertion	\$980,000	\$782	151 claims

Struck by/against \$796,000 \$450 215 claims

Note: 5 years, 1995-99, from total 838 claims, St. Louis. The median is the midpoint; half the claims cost more and half cost less.

8. Most costly injuries, by trade

North Carolina residential contractors, July 1996 - November 1999

- Falls from elevations (carpenters, drywall installers, insulators, masons, painters, plumbers)
- Overexertion (electricians, concrete and terrazzo, mechanics, engineers and managers)
- Struck by (operating engineers)

Note: 7,500 contractors, 41 months, 9,205 claims to self-insured compensation fund of the North Carolina Homebuilders' Association; data exclude roofers.