Factors Associated with Falls in Apprentice Carpenters

Vicki Kaskutas, Ann Marie Dale, Hester Lipscomb, John Gaal, Mark Fuchs, Bradley Evanoff

Washington University School of Medicine, St. Louis, MO, USA; Duke University, Durham, N.C., USA; Carpenters' District Council and Carpenters' Joint Apprenticeship Program, St. Louis, MO, USA

CDC/NIOSH and CPWR Grant #U54OH00830703 "Fall Prevention Among Residential Carpenters".

Background

- Construction is dangerous - 1,226 fatal work injuries in 2006
- 428 fatalities (35%) due to falls - 9% increase since 2005
- Residential construction - 45% of fatalities, 19% reportable injuries due to falls
- Challenges in residential construction - small crews, geographically dispersed, rapidly changing work environment, fast paced

Study Aims

- Overall study: Evaluation of fall prevention curriculum in apprentice carpenters
- This study: Analysis of baseline data used for curriculum development
  - Identify personal and work-related risk factors associated with falls from height
  - Further explore falls from ladders, the most common type of fall reported

Methods

- Questionnaire of carpenters at joint union/contractor apprenticeship program
- Questionnaire Development
  - 72-item questionnaire developed with input from experienced and apprentice carpenters
  - Questionnaire includes:
    - age
    - length/type of construction experience
    - size of contractor
    - falls in past year
    - work tasks
    - training experience
    - fall protection knowledge

Methods

- Multi-item scales developed for:
  - safety climate
  - crew behavior
  - risk perception
  - confidence in performing tasks
- Scale reliability
  - 4-12 items; Cronbach's alpha ranged from 0.60-0.92

Results

- 1,025 apprentices participated
- Mean age = 26.0 (range 18-49)
- Response rate 98.8%

INCREDIBLE enthusiasm and cooperation from Carpenters' Joint Apprenticeship Program

Results

- 16% (164) apprentices experienced a fall from height in past year
- 51% knew someone who had fallen from a height
- Mean estimated height of fall was 9 ft.
- 91% of falls did not result in medical care or lost work time
- Fell from:
  - ladders (30%)
  - truss/top plate (16%)
  - scaffolds (10%)

Worker Identified Factors Contributing to Falls

- Personal factors:
  - balance (28%)
  - slip/trip (23%)
- Work process factors included:
  - equipment set-up (18%)
  - speed of work (17%)
  - defective/improper equipment (12%)
  - lack of fall protection (7%)
  - coworker behavior (9%)
- Environmental factors:
  - weather (20%)

Training and Risk Perception

- 47% of the apprentices reported using step-ladders at the work site before being trained; 44% used extension ladders on the job without previous training
- Workers perceived a low risk of falling for step and extension ladder use, compared to a much higher risk rating for setting trusses and performing work on the top plate

Independent Associations- All Falls

	All Falls N=795, Falls=137 **OR (95% CI)**
> 6 Months of Residential Work in Past Year	**1.6 (1.0-2.6)**
High Number of Different Work Tasks Performed	**1.4 (1.0-2.1)**
Journeyman Apprentice Ratio < 1:1	1.3 (0.9-1.8)
Low Confidence	1.3 (0.9-1.9)
Unsafe Crew Behavior	**1.6 (1.1-2.4)**

Independent Associations- Ladder Falls

	Ladder Falls N=763, Falls=42 **OR (95% CI)**
> 6 Months of Residential Work in Past Year	1.6 (0.7-3.7)
High Number of Different Work Tasks Performed	**4.5 (2.0-10.0)**
Journeyman Apprentice Ratio <1:1	1.6 (0.8-3.1)
Employer Size (compared to large) Small Medium	 1.4 (0.6-3.1) **2.4 (1.1-5.5)**
Unsafe Safety Climate	1.8 (0.9-3.7)
Low Confidence	1.4 (0.7-2.8)
High Risk Perception	**2.3 (1.2-4.8)**

Limitations

- Cross-sectional Study
  - Directionality between associations may be a problem
  - Possible response bias among some participants
- Apprentice Carpenters
  - May not represent carpenters as a whole

Conclusions

- 16% reported fall from height in past year
- Apprentices who spent more time in residential construction had a greater risk of falling
- Falls were more common in small and medium size contractors
- Apprentices who performed a greater variety of work tasks had a greater risk of falling
  - This may be due to greater exposure to fall risks or inadequate skill development
  - Suggests that apprentices be allowed to develop expertise in fewer work tasks prior to assignment of new tasks

Conclusions

- Apprentices who reported that their work crew followed safe work practices were less likely to have had a fall
  - Suggests that the work environment is important in fall prevention
- Future research should be directed at residential construction and work processes to identify and ameliorate specific conditions that increase fall risks, including:
  - difficulty using fall arrest during home construction
  - the fast pace of home building
  - effect of home design on construction worker safety