Relative risks of ladder fatalities increase precipitously by age compared to other work fatalities in the US

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Objective

- To compare the impact of age on the relative risk of mortality from work-related ladder falls relative to other types of occupational injuries in the US
- Older workers are known to have higher occupational injury fatality rates than younger workers
  - Unknown if risk of fatal ladder injuries differs among older workers

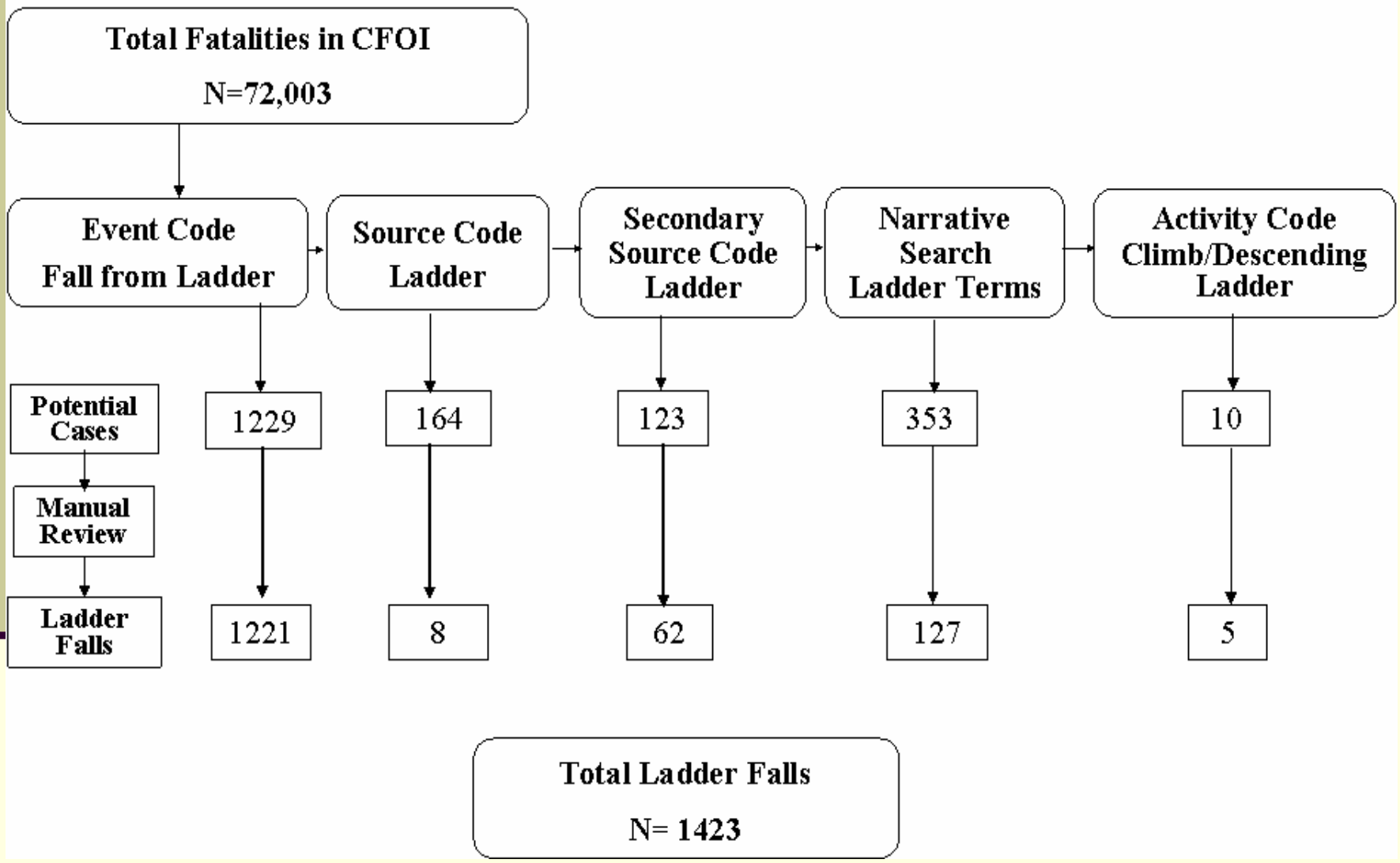
Methods

- US Census of Fatal Occupational Injuries (CFOI) research file for 1992-2003 used to identify ladder falls
  - Bureau of Labor Statistics (BLS) in collaboration with States uses multiple sources of information to identify, verify, and describe fatal worker injuries
  - CFOI collects extensive information on each workplace fatality including occupation, industry, worker characteristics, equipment involved, and circumstances of the event (including a narrative summary)
  - All cases verified for work-relatedness
    - Two or more independent source documents, or
    - Source document and follow-up questionnaire

Methods

- Potential fatal ladder falls identified sequentially from the CFOI Research File in the following order:
  - Cases coded as ladder fall event code,
  - Ladder as primary or secondary source codes,
  - Narrative text searches for ladder terms, and
  - Activity code involving ladders
- Cases then reviewed to determine if “true” ladder falls

Figure 1. Case Selection Algorithm to Identify Ladder Falls, CFOI, 1992-2003, US Civilian population.



Methods

- Narrative text in investigation reports used to code fall height and circumstances
- Age-specific rates and relative risks calculated using estimates of employed population and hours worked
  - Current Population Survey, US Bureau of Labor Statistics

Results

- 1423 fatal ladder falls identified
  - 98% were male.
  - Among the identified ladder falls, 202 (14%) had not been previously coded as ladder falls by CFOI.
    - Of 1229 coded as ladder falls by CFOI 8 (0.7%) were not ladder falls but had been miscoded
- Fatality rate ladder falls 0.9/millon workers
  - Rate increases with age
  - Relative risk almost 14-fold higher for oldest group compared to youngest

Ladder fall fatality rates by employed population, CFOI 1992-2003

Employed Population			
Age	**Number (%)**	**Rate 95% CI**	**Relative Risk**
16-24	67 (4.7%)	0.29 (0.22-0.36)	1.00 Ref
25-34	218 (15.3%)	0.58 (0.50-0.65)	2.00 (1.52-2.63)
35-44	320 (22.5%)	0.76 (0.67-0.84)	2.62 (2.02-3.41)
45-54	335 (23.6%)	1.03 (0.92-1.14)	3.56 (2.74-4.63)
55-64	294 (20.7%)	1.88 (1.66-2.09)	6.51 (4.99-8.49)
65+	187 (13.2%)	4.02 (3.45-4.60)	13.94 (10.54-18.42)
Total	1421 (100%)	0.91 (0.86-0.96)	

Ladder fall fatality rates by hours worked, CFOI 1992-2003

FTE Population based on hours worked						
Age	**Number (%)**		**Rate**	**95% CI**	**Relative Risk**	
16-24	67	(4.7%)	0.36	(0.28-0.45)	1.00	Ref
25-34	218	(15.3%)	0.58	(0.50-0.65)	1.60	(1.21-2.10)
35-44	320	(22.5%)	0.75	(0.67-0.84)	2.08	(1.60-2.70)
45-54	335	(23.6%)	1.03	(0.92-1.14)	2.83	(2.18-3.68)
55-64	294	(20.7%)	1.99	(1.76-2.22)	5.50	(4.22-7.17)
65+	187	(13.2%)	5.72	(4.90-6.54)	15.80	(1.95-20.89)
Total	1421	(100%)	0.95	(0.90-1.00)		

Relative risk of fatalities by age comparing ladder fall deaths to other falls from elevation, 1992-2003 CFOI

	Ladder Falls N=1,421			Other falls elevation N=6,273		
Age	**Rate /million**	**Relative Risk**	**(95% CI)**	**Rate /million**	**Relative Risk**	**(95% CI)**
16 to 24 years	0.29	1.0	Ref	2.63	1.0	Ref
25 to 34 years	0.58	2.0	(1.5 – 2.6)	3.26	1.2	(1.1 – 1.4)
35 to 44 years	0.76	2.6	(2.0 – 3.4)	3.75	1.4	(1.3 – 1.6)
45 to 54 years	1.03	3.6	(2.7 – 4.6)	4.27	1.6	(1.5 – 1.8)
55 to 64 years	1.88	6.5	(5.0 – 8.5)	5.86	2.2	(2.0 – 2.5)
65 years +	4.02	13.9	(10.5 – 18.4)	11.53	4.4	(3.9 – 4.9)
Total	0.91			4.02		

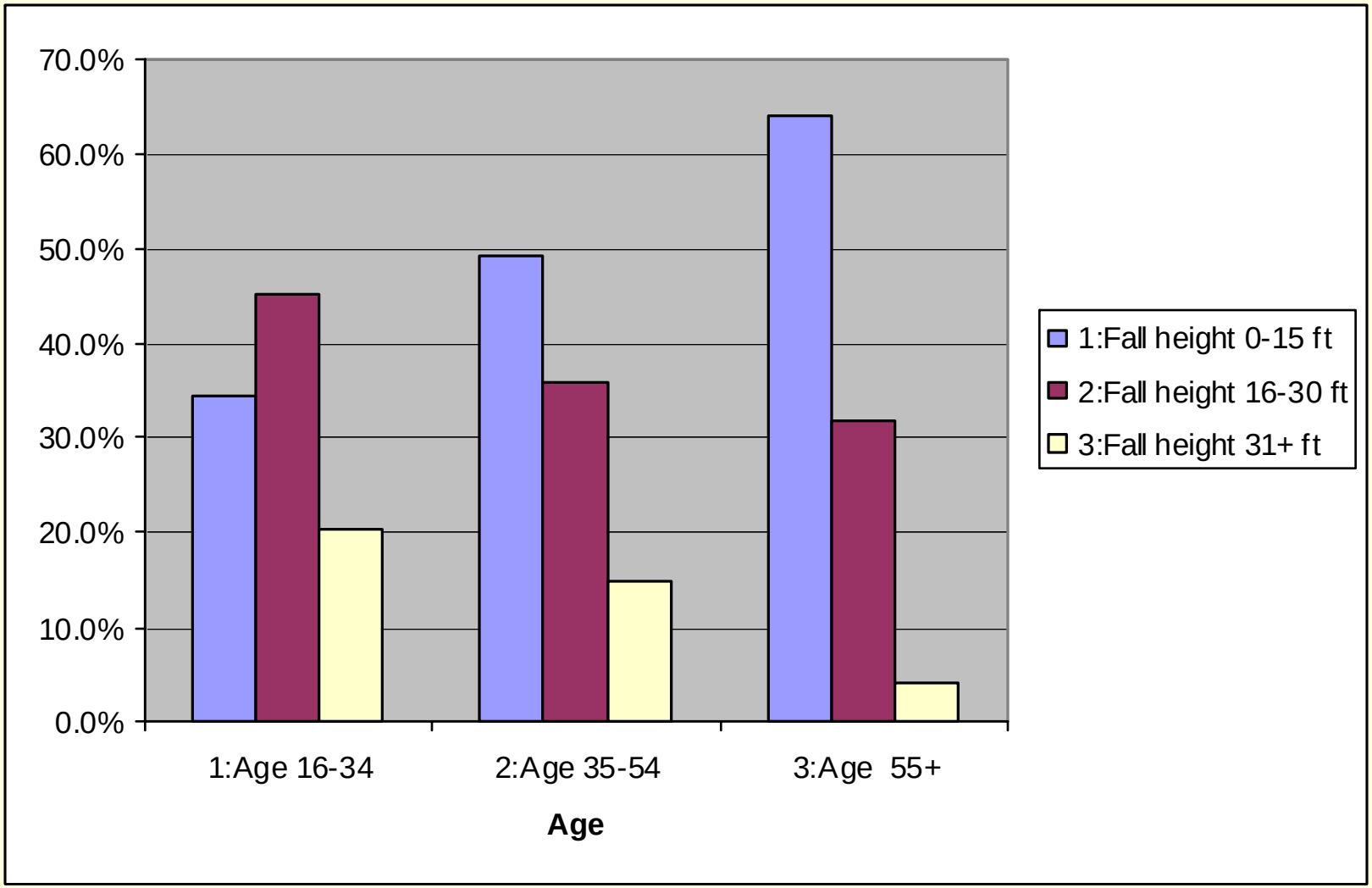
Relative risk of fatalities by age comparing ladder fall deaths to other falls from elevation and all occupational injury fatalities

	Ladder Falls N=1,421	Other Falls Elevation N=6,273	All Work Injury Deaths Excluding Ladder Falls N=71,087
Age	**Relative Risk**	**Relative Risk**	**Relative Risk**
16 to 24 years	1.0	1.0	1.00
25 to 34 years	2.0	1.2	1.26
35 to 44 years	2.6	1.4	1.31
45 to 54 years	3.6	1.6	1.43
55 to 64 years	6.5	2.2	1.90
65 years +	13.9	4.4	4.02

Results (continued)

- Both immediate and delayed death rates higher
- Fall circumstances similar across all age groups
- Fatalities in older workers occur from lower heights
  - Mean height feet
    - 16 ft. for ages 55+ vs. 29 ft. for ages 16-34

Fall height distribution (%) by age group for fatal falls US, CFOI 1992-2003



Discussion

- Multiple case finding techniques useful means of identifying specific injury causes such as ladder falls
  - Identified 14% more ladder fall fatalities than coded data.
  - Narrative text analysis a valuable case identification tool to supplement coded data
  - Four index terms identified an additional 127 cases not identified by coded data
- Narrative text provides valuable information on causes and circumstances
  - Fall height available on 44% cases

Discussion (continued)

- Increased fatality risks for falls for older workers much greater for ladders when compared to other fatal injuries, including falls from elevations not involving ladders
  - Exposure data on ladder use unknown
  - Both immediate and delayed death rates higher
- Fall circumstances were similar across age groups
- Interventions that provide more stable work platforms, including safer alternatives to ladder use will protect all workers, not just older workers

Questions or Comments?

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