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High-rise study shows importance of large crew

A multi-group study on how best to deploy crews at high-rise fires could change response strategies

PHOENIX — A new study shows that a six-firefighter crew responding to low, first alarm is the most effective way to knock down a high-rise fire and rescue victims.

The time it took to perform both the knock down and rescues increased as members were removed from the crew. Interestingly, the times also increased when the same number of firefighters were deployed, but arrived in additional rigs after multiple alarms were struck.

The study was funded by an AFG grant and constructed and executed by the National Institute of Standards and Technology. The International Association of Fire Chiefs, International Association of Fire Fighters, CFIA-Risk Urban Institute and Worcester Polytechnic Institute participated in the study.

"How big a fire gets and how much danger it poses to occupants and firefighters are largely determined by crew size and how personnel are deployed at the scene," said lead researcher Jason Averill, a NIST fire protection engineer.

"It's not simply that larger crews have more people. Larger crews are deployed differently and, as a result, are able to perform required tasks more quickly."

Larger crews were able to complete several task simultaneously, where smaller crews had to do them sequentially.

An analysis of 14 critical tasks — those undertaken when potential risks to building occupants and firefighters are greatest — found that three-member crews took almost 12 minutes longer than crews of four, 21 minutes longer than crews of five, and 23 minutes longer than crews of six to complete all tasks.

Four-person crews took nine minutes and 11 minutes longer than five- and six-member crews, respectively.

A three-person crew, the study found, would have to fight a fire 60 percent more intense than would a six- member crew when all other variables were the same.

Researchers used a vacant 13-story building, simulating fire on the 10th floor. They ran 48 experiments with more than 6,000 firefighters. In addition to the experiments, researchers also ran 48 computer- modeling simulations that looked at various fire-growth scenarios.

"Prior to this experiment, some fire departments attempted to deploy with smaller crews on each piece of apparatus," explains Lori Moore-Merrell of the International Association of Fire Fighters, a co-principal investigator for the study.

"The logic suggested that, if the fire is big enough, just send more units, but it ignores the fact that larger crews have tactical advantages that reduce risk exposure to people and firefighters.

"Crews of six and even five can carry out crucial tasks in parallel rather than in series. Saving time can save occupant lives and prevent firefighter injuries and property damage."

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