



Presentation Title: Causal Chain Analysis and Data Driven Messaging

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I. Formative Evaluation – Planning

A comprehensive analysis of five years of incident data and circumstances was conducted to identify the prevalent root causes for fire related risk reduction strategies.

Causal chain analysis based on incident data was used to identify the prevalent root causes for fire-related risk reduction strategies. Causal chain analysis is a best practice because it examines the comprehensive set of circumstances that contribute to the fire or injury, beyond basic data typically collected. If the chain can be interrupted by an intervention, the risk will be reduced or not occur. Without such a root cause analysis, assumptions may not be correct, and actions may have little effect.

Three priority areas **to address were identified**. The first was that occupants attempted to fight the fire in 40% of residential structure fires occurring in Mt. Lebanon. This resulted in a delayed call to the fire department at least 15% of the time, and a significant injury risk, as 54% of our civilian fire-related injuries were people trying to fight the fire themselves. Working smoke alarms were another priority, as only 53% of Mt. Lebanon homes involved in a structure fire had one. The third priority was a significantly increasing trend in candle fires due to candles being unattended or too close to combustibles.

II. Process Evaluation - Implementation

Interventions addressing these three areas were:

- Home visits, along with messaging
- The message to get out and call 911
- The message to blow out candles when leaving a room

Messaging occurred across three main platforms. First was media, including a community magazine distributed monthly to all households as well as social media posts. Second was incorporation of the messages into the elementary school fire and life safety education program. Annually, the fire department delivers two lessons to every class in grades K through 5. This is approximately 300 classes per year, reaching 25% of all households in Mt. Lebanon. Third, messages were delivered personally during home visits as part of a door to door smoke alarm installation campaign in the

targeted two wards, and during post-fire neighborhood canvassing smoke alarm blitzes. The department conducts approximately 400 to 500 home visits annually.

III. Impact Evaluation – Short-Term Results

The percentage of Mt. Lebanon homes involved in structure fires that had a working smoke alarm increased from 53% to 69% in the five years since home visits were implemented. Candle fires were reduced 80% following an aggressive messaging campaign on candle safety. The percentage of residential structure fires in Mt. Lebanon where the occupant attempted to extinguish the fire fell from 40% to 32% in the five year since the get out and call 911 message was pushed. Further, the percentage of cooking fires fought by occupants dropped from 50% to 40%. Also important, there is greater buy-in by line personnel for community risk reduction efforts as they see the impact. It is more accepted as part of the organizational culture.

IV. Outcome Evaluation – Long-Term Results

In the five years since the intervention strategies were implemented, there has been a 7% reduction in the number of residential structure fires, and a 28% reduction in associated dollar loss. The dollar loss per structure fire has been reduced 20%.

Two fire fatalities occurred in the five years prior to implementation, with none occurring in the five years since. The rate of civilian fire-related injuries per structure fire has also decreased greater than 60%.

Smoke alarms installed through the home visits alerted in three residential structure fires, including one with a civilian rescue.

Recommendations for others:

- Use local data with a focused message increases effectiveness in achieving behavioral change.
- Utilize partnerships, such as the schools, to help get the message out, or the Red Cross for home visits.
- Conduct regular training for line personnel on fire prevention messages. Show the impact of department efforts to improve buy-in.
- Use a checklist or worksheet to guide officers in data collection at incidents.
- Create user fields in reports to identify factors supplemental to NFRIS data.

Conclusions:

Mt. Lebanon Fire Department was successful in reducing fire losses, fire deaths, and civilian fire-related injury rates using this approach. Intervention strategies focused on messaging related to escape, candles, and working smoke alarms.