

I. Data

A. What Do We Know:

- Smoke alarms are an effective solution that can reduce fire deaths. They reduce the chance of dying in a fire by 50%.
- 2/3 of people who die in fires in the U.S. are doing so in a home that either does not have smoke alarms, or the alarms are not working.
- In 2013, 75% of all fire deaths happened in 1 or 2 family homes.
- Older adults and young children are at higher risk for home fire deaths than other population subgroups.
- 45 million smoke alarms are sold each year in the United States; it is assumed that this number is insufficient to provide adequate smoke alarm coverage.
- It is believed that many homes in the U.S. in reality do not meet the national standard of protection, specifically NFPA 72 (i.e., hard wired, one on every level, one in every bedroom, and interconnected).
- Some potential reasons why people do not have working smoke alarms are: older adults who live in a home for decades stop doing things in the home; smoke alarms are removed when people move; and smoke alarms are removed due to nuisance alarms.
- Disconnected or non-working power sources are leading reasons for smoke alarm failures in fires.

B. Gaps in Data Collection and Analysis:

- We don't know how many homes have working smoke alarms, the number of working alarms each home has, the type of sensing technology of the alarms, and the location of the smoke alarms. Self-reported survey data underestimates by about ½ the actual number of homes with working smoke alarms.
- If 2/3 of people are dying in fires where smoke alarms are either not present or not working, why is that the case? Are the alarms not present due to ignorance, indifference, neglect, or because they are perceived as a nuisance?
- What about the 1/3 of people dying in fires where smoke alarms are present and working – what types of fires are these, and what are the behavioral characteristics of the people who die (e.g. altered states, proximity to fire, disabilities)?
- Do we know the difference in smoke alarm coverage and characteristics between those who live in rental properties versus those who own their home?
- What is an optimum number of alarms per home for those who do not or are unable to meet the number specified in the national standard?
- We have problems with data collection via NFIRS: a) quality of information – not all questions being answered or not asking the right questions in the first place; and b) some questions we need answered are not included (i.e. type of alarm; demographic information, mental impairment as a factor).
- NFIRS is an important surveillance database that is overdue for an overhaul: a) a task group should be established to think about what code choices look like in NFIRS 6; and b) advocacy is needed with a funding agency to support an overhaul that will improve the data collection to be more useful in making data-informed decisions about smoke alarm needs.

II. Human Behavior and Attitudes

A. What Do We Know:

- It is possible that people don't feel a fire is an immediate threat, therefore, there is no immediate reward involved in having a working smoke alarm.
- In the fire prevention world there are many conflicting messages on smoke alarms. Conflicting messaging impacts the consumer because it is confusing, making them less likely to act and more likely to be skeptical of who to trust about smoke alarms. For this reason, we boil the message down to having at least 1 working smoke alarm in the home.
- We need different messages to account for cultural differences among the population.
- It is thought that people already know smoke alarms work, so telling them how great smoke alarms are will not make them think about alarms in a new way.
- Messaging about smoke alarms focuses on future benefits, but giving the audience a reason to care right now would be more compelling. Giving them an immediate reward - something they can feel or have after doing it right - is one way to do this.
- It is thought that the removal or disabling of alarms accounts for more inoperative situations than degradation of alarms, and there is some evidence that nuisance (unwanted) alarms are a significant factor in why people don't have alarms or they aren't working.
- Because people are confused about what the chirping means, smoke alarms need a consistent end of life signal.
- People may also not know about the importance of location and nuisance alarms (i.e., there should be no smoke alarm 10-20ft from cooking source, but if there is, it should be a photoelectric alarm not an ionization alarm to minimize nuisance alarms).
- You can't tell alarms apart just by looking at them. You can tell an old car from a new car, so alarms should work the same way.

B. Gaps in Knowledge of Human Behavior and Attitudes:

- What one single message should we focus on? What could be a single tagline on smoke alarm safety?
- We don't know how many people listen to messages from the fire service. Are there plans to do more campaigns to sell smoke alarms?
- How do we make smoke alarms or fire safety cooler (i.e. exciting, impressive)?
- What role does consumer confusion play in not owning alarms (i.e. too many choices)?
- Do we know why people don't buy alarms, why they don't maintain them, and why they disable them (despite evidence of nuisance factor)?
- To what extent does ignorance about the alarm functions (e.g. end of life chirp) impact the issue of working smoke alarms?
- To what extent does physical ability impact purchase, installation, and maintenance of smoke alarms?
- To what extent does economic condition impact the purchase, installation, and maintenance of alarms?
- To what extent does disabling result from the battery reminder chirping as opposed to cooking-related nuisance alarms?
- What are the most effective ways to distribute smoke alarms and educate the public in home visiting programs?

III. Smoke Alarm Technology

A. What Do We Know:

- NFPA 72 is the minimum installation/maintenance standard for protection, but it is estimated that millions of homes do not meet that standard.
- The current and future technology (and testing to meet standards) must balance the need between being able to alert early enough for safe egress, and too much sensitivity that creates too many unwanted alarms.
- We need to make the decision-making simple for the public about their options when buying smoke alarms (Photoelectric vs. ionization).
- Certain sensing technologies exist (i.e., photoelectric and “smart” alarms with microprocessors) that tend to activate less than others from the principal cause of unwanted alarms (i.e. cooking practices).
- Hush features can help prevent people from removing the batteries from their alarms.
- New technology (i.e., bed shakers, low frequency alarms) provides a better solution for alarms for alerting and waking up those who are deaf, or severely hard of hearing, and children. What do we really know about strobes? It was suggested that strobes are effective at waking the culturally deaf but not other types of deaf people.
- There is evidence that alarms with long life (lithium) batteries and tamper resistant housings last longer than alarms powered with alkaline batteries. However, it was stated that lithium batteries fail at a predictable rate. There is a lot of ongoing battery technology research, but it will probably be 10 years before the next generation of battery options (e.g., sulfur-lithium) are available.
- It is easier to have interconnected alarms now that they do not have to be hardwired, but the industry does not agree on how to do interconnected alarms.
- If installation includes hiring an electrician, it can be a barrier. We should make it easy for people to install alarms without cutting into drywall or calling an electrician.

B. Gaps in Smoke Alarm Technology:

- To what extent does interconnectivity solve problems of fire deaths, both in populations that die when an alarm is present and operating and populations that die where smoke alarms are not present or not operating?
- To what extent does interconnectivity play a role in not replacing alarms due to different specifications that don't allow interchangeable parts from different manufacturers?
- To what extent does the hush feature reduce nuisance alarms?
- How many deaths are caused by attic fires? Is it worth the expense to make smoke alarms suitable for attics?

IV. Next Steps:

- Conduct a national census (or representative sample in-home survey) on the number of working alarms and types of alarms in homes, including data to differentiate between rental and owner occupied homes, knowledge of NFPA 72 standard, reasons for not having alarms, and experiences with nuisance alarms, interconnectivity, lithium batteries, and fires.
- Establish a task force to make recommendations on how to revise NFIRS data system and develop strategies to increase compliance with data collection and expand utilization of the data.
- Support efforts to encourage effective reporting from the fire service.
- Continue efforts to promote home safety visits with smoke alarm installations (e.g., best practices that include education).
- To reach the goal of having millions of alarms installed, we must engage the public in a fashion that encourages those who can to purchase their own.
- Actively promote the use of less sensitive alarms in the kitchen.
- Actively promote the use of 10-year sealed alarms while we wait on improved technology.
- Focus on aging populations so as to avoid having an increasing fire death rate per capita given our aging population.
- Encourage more technology changes that improve the utility of alarms and human interaction (e.g., making them useful or linked to other technologies that won't work unless the alarm does, self-checking alarms or those that alert when they need servicing).