"focus activities and energy in effective and collaborative efforts to help address the fire problem in the United States"

Johns Hopkins Bloomberg School of Public Health
Johns Hopkins Center for Injury Research and Policy

2015

Vision 20/20
National Strategies for Fire Loss Prevention

NATIONAL SMOKE ALARM SUMMIT

EVIDENCE INFORMING ACTION: CONSENSUS PRIORITIES TO INCREASE THE USE OF SMOKE ALARMS IN U.S. HOMES

Prepared for:

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Executive Summary

On March 31, 2015 fifty-nine participants representing stakeholder groups such as the fire service, academia, government, non-profit, and private sector organizations, convened for a one-day Smoke Alarm Summit at Johns Hopkins Bloomberg School of Public Health. The goal of the Summit was to develop consensus recommendations on:

1 **Evidence-based and evidence-informed policy and practice interventions that will increase the installation and maintenance of smoke alarms in all homes in the United States**

2. **High priority research gaps that need to be addressed**

3. **Next steps to ensure that the findings from this meeting inform policy and practice.**

Data to identify the next steps and priorities for a national effort to increase the installation and maintenance of smoke alarms were obtained from experts who presented at the Summit and participants who provided feedback during and after the Summit. The top four action items identified, in order of priority are:

1. **Conduct a national census (or representative sample in-home survey) on the prevalence and characteristics of smoke alarms.**

2. **Promote fire department home safety visits that use best practices in installation and education.**

3. **Establish a task force (that includes fire service members and data users) to make recommendations on enhancing the utility of the NFIRS.**

4. **Encourage technology developments that would improve the utility and consumer friendliness of smoke alarms.**

I. INTRODUCTION

More than one-third (37 percent) of home fire deaths in the U.S. result from fires in which no smoke alarms are present.[1] Working smoke alarms have been proven to reduce the risk of dying in a home fire by half.[1] Increasing the installation and maintenance of smoke alarms in U.S. residences is needed to reduce fire-related fatalities. Understanding the reasons why many homes are unprotected or inadequately protected with smoke alarms is essential in order to increase their installation and maintenance.

Evidence collected by TriData from home visits in the field indicated that there were many unknowns with respect to the number of smoke alarms in homes and their functionality. This became a priority issue for Vision 20/20 Strategies and led to the partnership with Johns Hopkins Center for Injury Research and Policy to better understand what is known, what the data gaps are, and what specific data are needed to help increase the installation and maintenance of smoke alarms in U.S. residences.

II. PROCESS & PRIORITIES

The Summit

Potential Summit participants, representative of fire service, academic, governmental, non-profit, and private sector organizations, were identified and invited by Vision 20/20 and Johns Hopkins Bloomberg School of Public Health. The goal of the Summit was to develop consensus recommendations on:

1. Evidence-based and evidence-informed policy and practice interventions that will increase the installation and maintenance of smoke alarms in all homes in the United States

2. High priority research gaps that need to be addressed

3. Next steps to ensure that the findings from this meeting inform policy and practice.

Toward that end, the Summit was developed around three key content area modules: data on smoke alarms and fires, data on human behavior and attitudes, and smoke alarm technology (see Appendix for the Summit Agenda). Each module began with one or more experts in that content area presenting a summary and research findings about what is currently known. This was followed by a question and answer and discussion period to identify the gaps that require

further data and research. The last module of the day, "Next Steps," first provided a synthesis of the previous three modules and then gave a charge to the participants, at tables of eight, to list what they thought the next steps and priorities after the Summit should be. A representative from each table presented their list to the entire audience. The Summit was video-recorded, a transcriber took notes on the presentations and discussions, and index cards were provided at each table for participants to submit comments and questions anonymously.

Post-Summit

Ranking the Next Steps

Following the Summit, a document was created that summarized the key points and thoughts from the day by using the card comments from participants and transcribed notes. This document included a list of 9 "Next Steps" that were identified at the Summit. An email was sent to all of the participants asking them to **rank what they thought were the top three priorities from the list of 9 Next Steps** with #1 being the top priority, #2 being second priority, etc. Participants were also given the opportunity to review, comment on, and provide suggested corrections or revisions on the entire summary document and next steps. A link to the video-recording of the Summit was also provided.

A total of 33 participants responded with their rankings, 17 participants provided comments with their rankings, 2 participants made comments to clarify some points on the summary document, and 3 participants suggested minor edits and additions to the next steps.

Prioritizing the Rankings

The rankings from participants were tabulated. Based on these rankings and feedback from participants, some of the Next Steps were combined with others and **four top priorities emerged**. Another email was sent to participants with the top four priorities identified and a **request for them to rank order the four in order of priority**. The Next Steps that did not make the top four and were not merged with other steps were still included in the email to provide participants another opportunity to comment on them.

A total of 36 participants responded with their priority rankings. 10 participants provided comments along with their rankings. The results indicate the top four action items, in order of priority, as:

1. **Conduct a national census (or representative sample in-home survey) on the prevalence and characteristics of smoke alarms.** Consider including:

- number of working alarms
- placement of alarms
- types of alarms, batteries, interconnectivity
- type of property
- awareness of recommendations for protection
- reasons for not having alarms
- experiences with nuisance alarms and fires

2. **Promote fire department home safety visits that use best practices in installation and education.** Consider including:

- smoke alarm testing
- best smoke alarm locations
- encouraging resident-purchased alarms followed by home safety visits
- making this an AFG funding priority

3. **Establish a task force (that includes fire service members and data users) to make recommendations on enhancing the utility of NFIRS.** Consider including:

- how to increase the reliability and validity of NFIRS data system
- strategies to support complete and accurate reporting
- strategies to expand utilization of the data for informing policy and prevention

4. **Encourage technology developments that would improve the utility and consumer friendliness of smoke alarms.** Consider including:

- 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
- recommendations in the 2012 Home Smoke Alarms: A Technology Roadmap
- tamper-proof long-life batteries
- low frequency sound as the alert

Next Steps that did not make the top four, but could be incorporated into them as appropriate, are to 1) Actively promote the use of less sensitive alarms in the kitchen and/or better placement/location of smoke alarms; 2) Actively promote the use of 10-year sealed alarms while we wait on improved technology; and 3) Focus on aging populations so as to avoid having an increasing fire death rate per capita given our aging population.

III. SUMMIT SUMMARY (by Summit Module)

Module 1: Data on Smoke Alarms and Fires

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%.[1]
- Two-thirds of people who die in fires in the U.S. are living in a home that either does not have smoke alarms or the alarms are not working.[2]
- In 2013, 76% of all fire deaths happened in 1 and 2 family homes, apartments, and manufactured housing.[3]
- Older adults and young children are at higher risk for home fire deaths than other population subgroups (NFPA, Demographic and other characteristics related to fire deaths, 2010.[4]
- It is thought that about forty-five million smoke alarms are sold each year in the United States and that this number is insufficient to provide adequate smoke alarm coverage.
- Most homes in the U.S. do not yet have the protection required in recent editions of NFPA 72 (i.e., one on every level, one in every bedroom, outside each sleeping area, and interconnected. New homes should have hard-wired alarms).[1]
- Smoke alarm failures usually result from missing, disconnected, or dead batteries.[1] People are most likely to remove or disconnect batteries because of nuisance activations.[1] Some other potential reasons why people do not have working smoke alarms are thought to be: 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.[1]

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 overestimates by about half the actual number of homes with working smoke alarms.
- If two-thirds 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 one-third 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.

Module 2: 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.
- People already believe that smoke alarms work, so telling them how great smoke alarms are will not make them think about alarms in a new way.[5]
- 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.[6]
- 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,[7] 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 really know why people don't buy alarms, why they don't maintain them, and why they disable them?
- 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?

Module 3: 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. Enforcement of national model fire codes or property maintenance codes is an effective method for ensuring the minimum number of smoke alarms are installed and maintained.

- Some states have either an inspection or seller affidavit requirement to ensure the minimum number of smoke alarms are present and working at the time of sale of the home.
- 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).
- It is thought that hush features can help prevent people from removing the batteries from their alarms.
- It is thought that new technology (i.e., bed shakers, low frequency alarms) should provide a better solution for alarms for alerting and waking up those who are deaf, or severely hard of hearing, and children. It was suggested that strobes may not be effective at waking all types of deaf people.
- There is evidence that alarms with long life (lithium) batteries and tamper resistant housings last significantly longer than alarms powered with alkaline batteries.[8] 90% of lithium battery alarms were functional 3 ½ years after installation.[9]
- 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. This could include a change to NFPA 72 and/or UL 217 to require a standard mounting bracket and 120v connector from all manufacturers.

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?
- Can installation be simplified?

- What is the next generation of battery options?
- What can "smart" alarms do to increase installation and improve maintenance?

Module 4: 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 with a hush feature 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).

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IV. Participant Directory

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Fire is Everyone's Fight™

Smoke Alarm Summit – Evidence Informing Action
March 31, 2015

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V. MOVING FORWARD

A small task group is being formed that will follow up on the issues presented in this report. It will be comprised of a balanced group to marry the technology, data collection, human behavioral and educational messaging necessary to make progress. This task force will report to Vision 20/20 on their progress in six months and that report will be made public.

APPENDIX: SUMMIT AGENDA, RECORDINGS & MATERIALS

Vision 2020 and the Johns Hopkins Center for Injury Research and Policy Present
The Smoke Alarm Summit: Evidence Informing Action
Tuesday, March 31, 2015

Feinstone Hall
Johns Hopkins Bloomberg School of Public Health
615 N. Wolfe Street, Baltimore, MD 21205

The goal of this meeting of expert stakeholders is to develop a consensus set of recommendations on:

1. Evidence-based and evidence-informed policy and practice interventions that will increase the uptake and maintenance of smoke alarms in all homes in the United States
2. High priority research gaps that need to be addressed
3. Next steps to ensure that the findings from this meeting inform policy and practice.

Agenda

7:30 – 8:30 Breakfast

8:30 – 9:00 Welcome, Introductions, and Overview of the Day
Jim Crawford, Vision 20/20
Andrea Gielen, JHCIRP
Bobby Halton, FDIC International

9:00 – 10:15 Module 1: Smoke Alarms and Fires: What do the data say?

Marty Ahrens, NFPA

- Who dies and who survives in fires in the U.S. and why?
- Which subgroups are particularly vulnerable?
- What is known about the presence and performance of smoke alarms in home fires?

Discussion

- What are the data gaps?
- How can these gaps be addressed?

10:15 – 10:30 Break

10:15 – 10:30 Break

10:30 – 12:00 Module 2: Smoke Alarm Installation and Maintenance: What role does human behavior play?

Phil Schaenman, Tri-Data Division, System Planning Corporation
- What have we learned from the CRR programs about smoke alarm installation and maintenance?
- What do we know about firefighters' interest and skills in CRR programs?

Zack Boileau, Salter>Mitchell
- What does research tell us about what smoke alarm messages resonate and with whom?
- What do people feel is the relevance and importance of having working smoke alarms?

Elise Omaki, JHCIRP
- What do people know and believe about home fires and smoke alarms?
- What have we learned from community sweeps about their impact on smoke alarm installation, maintenance, and cost benefit to society?

Discussion
- What are the gaps in understanding the role of human behavior?
- How can these gaps be addressed?

12:00 –1:15 Lunch

Remarks: Dr. Michael Klag
Dean, Johns Hopkins Bloomberg School of Public Health

Maggie Wilson
Supervisory Fire Program Specialist, DHS/FEMA

1:15 – 3:15 Module 3: Smoke Alarm Installation and Maintenance: What role does technology play?

Panelists: Laurence J. Dallaire, Chair of subcommittee of NFPA 72
Tom Cleary, NIST
Amanda Kimball, NFPA
Richard Roberts, Honeywell
Lawrence McKenna, USFA

Moderator: Keshia Pollack, JHCIRP

Discussion

- How can technology be used to make maintaining smoke alarms easier for people? How do we balance NFPA72 requirements with feasibility and costs to consumers?
- How do we balance sensitivity and adequate egress time with unwanted alarms? Can we reduce the need to use the hush feature?
- How can technology be used to meet the needs of especially vulnerable populations?
- What are the gaps in understanding the role of technology?
- How can these gaps be addressed?

3:15 – 3:30 Break

3:30 – 4:50 Module 4: What are the next steps to ensure that the results of this meeting can inform policy and practice in the short term and long run?

Shannon Frattaroli, JHCIRP: Synthesis of Modules 1-3 and Charge to Group for Discussion Tables

Group Discussion Tables

Group Reports

4:50 – 5:00 Concluding Remarks
Bobby Halton
Andrea Gielen
Jim Crawford

The following link will take you to the Summit summary document, the transcribed notes, five videos of the presentations and discussions, the PowerPoint presentations, and the supporting material:

http://strategicfire.org/model-performance/fire-prevention-symposium-materials/2015-smoke-alarm-summit/. The password is summit.