Earthquake Early Warning: Societal and Public Policy Issues

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Presentation Objectives

- Focus on implementation of EEW in US
- Draw on social science studies of EEW
- Examine the planning environment
  - Who will use it?
  - How will it be used?
  - How will users respond?
  - What are the major policy issues?
- What will an EEW system look like in the US?

Social Scientific Studies of EEW

- 1988 Study by the California Geological Survey
- Exploration of developing an early warning capability was a TriNet objective.
  - Literature Review
  - User Survey
  - Policy Issue Review
- EEW system development as a multi-disciplinary task

Likely organizational users?

- Survey focused on four institutional sectors:
  - Emergency Services
  - Education
  - Health Care
  - Utilities and Life Lines
- Ultimately, available to all sectors and the public
- Most likely to be favorable to EEW if:
  - High risk perception
  - EEW had multiple uses
  - Provide risk information to employees or public

Who are the potential organizational users?

- Among sectors examined, 78.5% reported that EWS implementation was "likely" or "somewhat likely"
- Receptivity highest among emergency management agencies, but strong support in all four.
- Across all 4 sectors, 52.6% were willing to participate in a pilot test of an EWS

How will an EWS be used?

First some background from literature:

- Warning systems for other hazards provide only limited guidance
- Few "success stories" from existing EQ warning systems
- Must overcome myths and stereotypes of human response to warnings
- Depends on how policy issues are handled

How will an EWS be used?

On a basic level, an EWS will be used to:

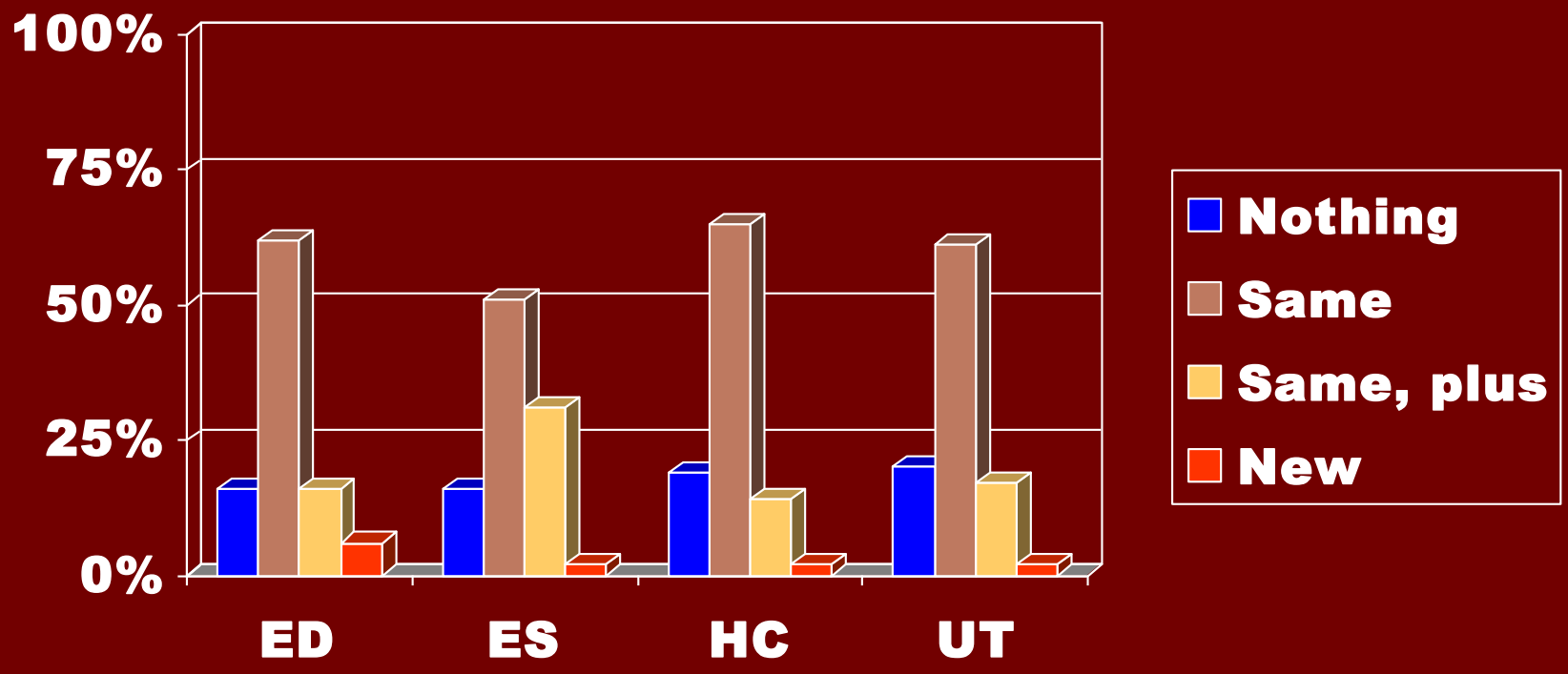
- Reduce the loss of life and injuries
- Mitigate hazards

How will an EWS be used?

Also depends on length of warning, the survey looked at two time frames:

- 10 seconds of warning
- 50 seconds of warning

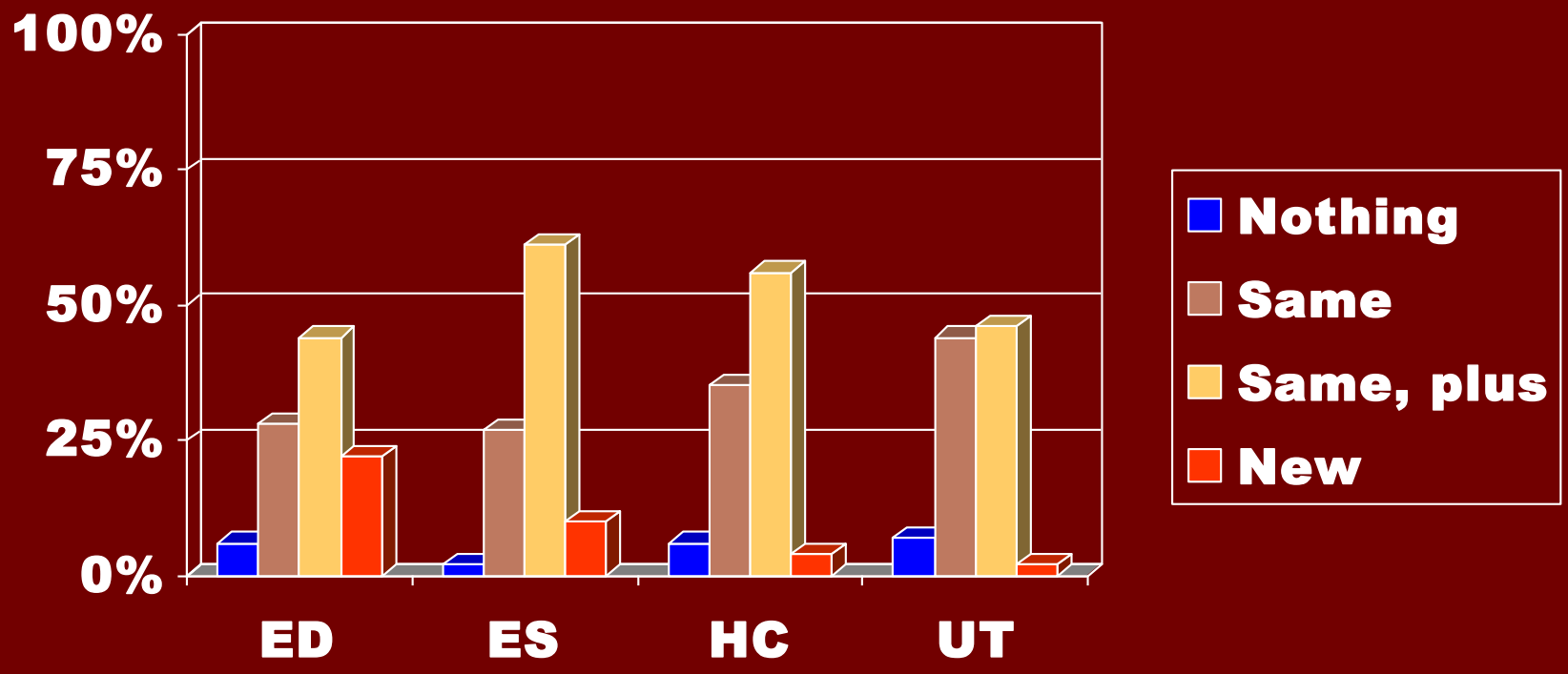
Earthquake Response With 10 seconds Warning



Some "New" Actions: 10 Seconds

- Notify staff in facility
- Protect vulnerable (e.g. students, patients)
- Shut down equipment (e.g. computers, utilities)
- Cease hazardous work (e.g. surgery, hazmat)
- Seek cover/move clear of objects that may fall
- Notify field staff
- Clear elevators
- Activate back-up communications equipment

Earthquake Response With 50 seconds Warning



Some "New" Actions: 50 Seconds

- Evacuate facilities
- Notifications beyond immediate facility
- Initiate emergency response plans
- Turn on emergency generators
- Move equipment to safe locations
- Direct traffic away from underpasses
- More extensive protection of vulnerable
- Shut down hazardous operations

How will users respond?

Social science research on warning suggests that:

- People won't panic but "normalcy bias" must be overcome
- Warning compliance is more complex than just hearing and acting
- False alarms are not a deal breaker

False Alerts
Number of False Alerts Considered "Tolerable"

Alert -> Earthquake -> No damage

- 54% reported could tolerate infinite # of false alerts

Alert -> No earthquake

- 10% reported could tolerate infinite # of false alerts

Major Policy Issues

What are the major EWS-related policy issues?

- Roles and Responsibilities
- Legal Liabilities
- Funding
- User Defined Issues

Roles and Responsibilities

How will an EWS be organized and managed? Key organizations involved:

- US Geological Survey
- California Emergency Management Agency
- California Geological Survey
- Universities (Caltech, UC Berkeley)
- FEMA

Legal Liabilities

Could the organizations responsible for issuing a warning be sued for some alleged failure of the system to function properly?

Absolutely! How can these constraints be mitigated?

Reducing Potential Liability

- Lead agency should be public entity
- Warning should be issued by policy-level official (e.g. agency director)
- Carefully consider involvement of private entities
- Make EWS available to everyone

Funding

What type of funding is at issue?

- To maintain a robust seismic network
- To develop EWS technology
- To train EWS users
- To implement at user facilities

Challenges and Opportunities

- Must maintain perspective—EWS just one strategy for EQ loss reduction
- Not yet a scientific consensus on EEW
- Robust seismic networks are prerequisite to EWS—adequate funding is not assured
- A lead agency is needed to develop and implement an EQ EWS
- There is a potentially receptive body of users who are willing to adopt an EWS

Thank You!