

**Gran, Marsha J.**

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**From:** Waters, Thomas R.  
**Sent:** Friday, September 26, 2003 4:05 PM  
**To:** Gran, Marsha J.  
**Subject:** RE: Copy of Presentation

Here is the presentation and an abstract to go with it.  
Tom

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Abstract

Work-related musculoskeletal disorders (MSDs), such as low back pain, tendonitis, hand arm vibration syndrome and carpal tunnel syndrome account for a major fraction of the cost of work-related injury and illness in the United States, affecting more than one half-million workers each year. Published reviews of the scientific literature relating to MSDs have concluded that there is a moderate to strong relationship between physical and psychosocial stressors and development of MSDs and that the risk of having an MSD increases as the magnitude of the risk factors increase. It has also been shown that engineering controls can be highly effective in reducing risk of MSDs in the workplace. These findings are supported by anecdotal reports from industry experts. Additional research is needed, however, to further determine the relative contribution of the various risk factors, and their interactive effects on development of MSDs.



NACE Ergo  
es 2.ppt (1 M)

-----Original Message-----

**From:** Gran, Marsha J.  
**Sent:** Monday, September 22, 2003 3:16 PM  
**To:** Waters, Thomas R.  
**Subject:** Copy of Presentation  
**Importance:** High

Tom,

Could you please provide me with a copy of your presentation "Musculoskeletal Disorders: Conceptual Framework and Research Gaps," presented at the OSHA NACE meeting held in Washington, DC. Could you please provide an abstract with a copy of the presentation. We need to input this document into the

NIOSHTIC-2 database. Thank you for your cooperation in this matter. *Conf. Jan. 22, 2003*

Marsha Gran, EID, C-18  
533-8350

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# Musculoskeletal Disorders: Conceptual Framework and Research Gaps

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Division of Applied Research and Technology  
National Institute for Occupational Safety and Health

# State of the Research

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- During the past decade more than 4000 articles focusing on prevention of WMSDS have been published (National Library of Medicine).

# State of the Research

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- A number of high quality literature reviews have been published recently.

(Andersson, Buckle and Devereux, Ferguson and Marras, Frank et al., Katz et al., Krause et al., Moore, Rempel et al., Szabo, Viikari-Juntura, Silverstein, NIOSH, and NRC)

# Conceptual Framework from Reviews

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1. The basic model for development of WMSDs is understood.

# Model for WMSDs

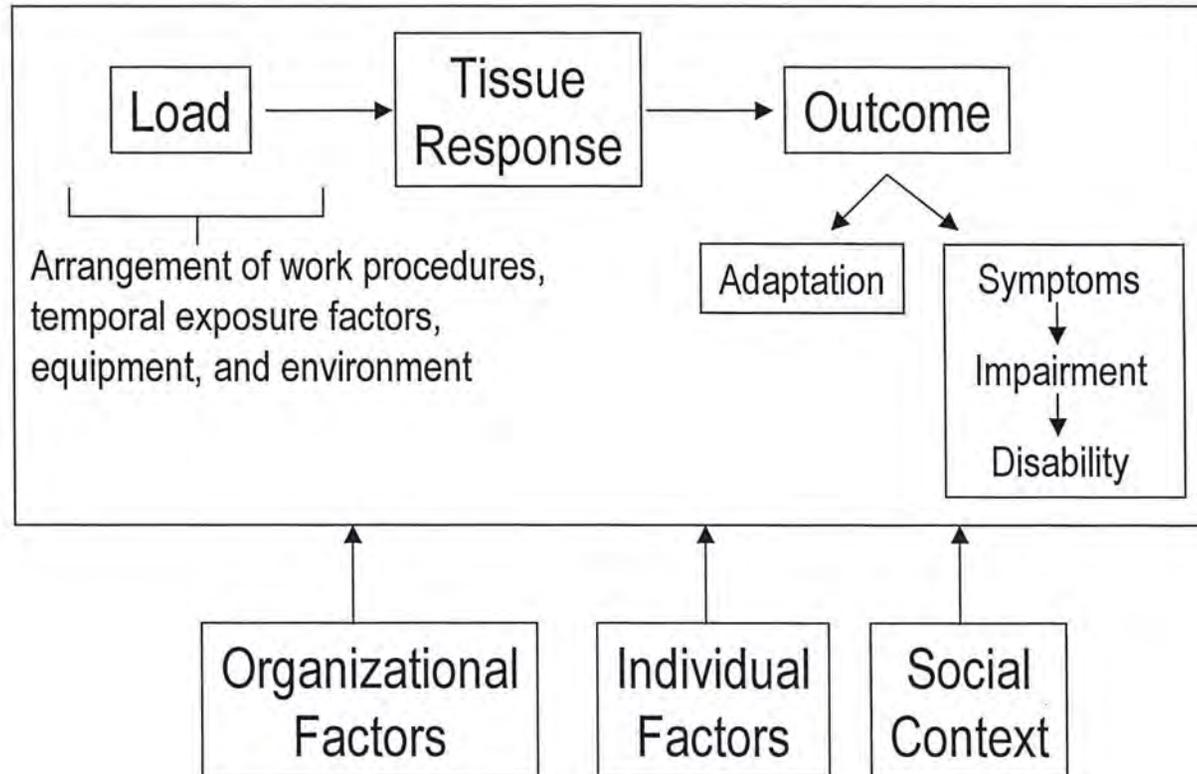


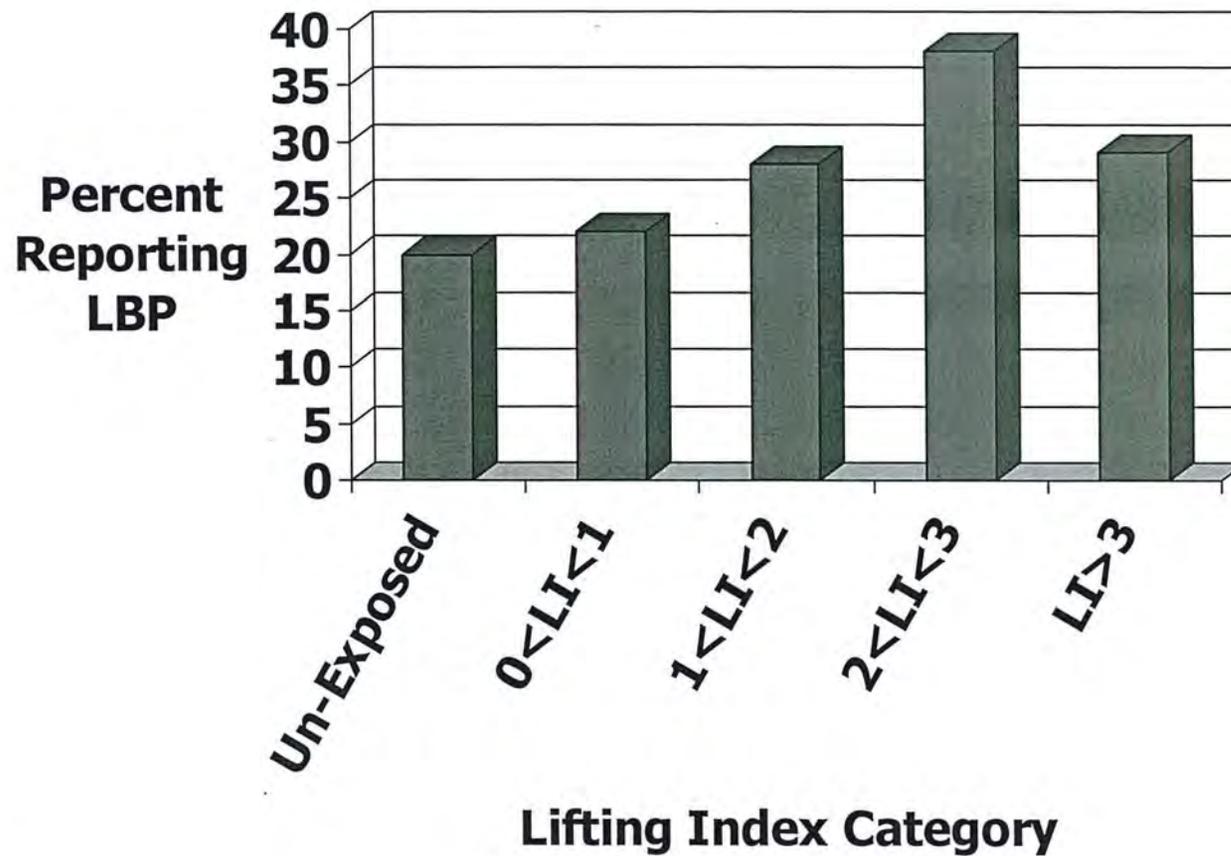
Figure 1 Conceptual model of factors that potentially contribute to musculoskeletal disorders

# Conceptual Framework from Reviews

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2. Risk of WMSDs increases as the magnitude of the physical factors increase

# Conceptual Framework from Reviews



# Conceptual Framework from Reviews

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3. Engineering controls can be highly effective in reducing risk of WMSDs.

# Conceptual Framework from Reviews

## ***Government Accounting Office Report (GAO)***

- Analyzed ergonomic programs at 5 companies in varying industries.
- All had shown significant benefits, particularly reduced worker's compensation costs.
- All contained the core elements.
- Each program was adapted to meet site-specific conditions.

# Conceptual Framework from Reviews

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4. Interventions make good business sense  
when done correctly

↓ business costs (production & WC costs)

↑ product quality & worker productivity

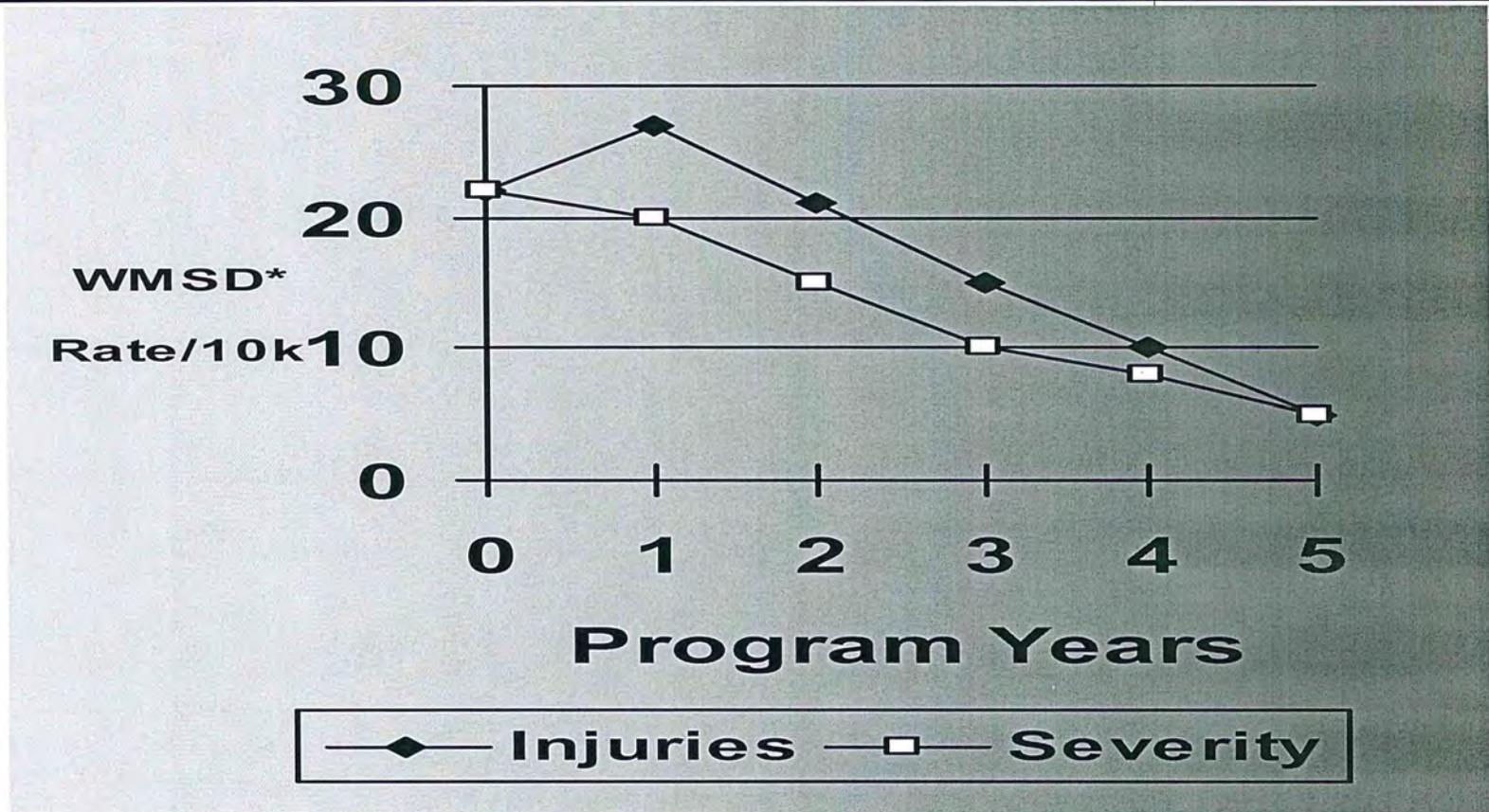
↑ worker safety, health, and morale

# Conceptual Framework from Reviews

***In January, 1997, NIOSH and OSHA co-sponsored an “Effective Practices” Ergonomics Conference in Chicago, Illinois.***

- **More than 1000 attendees**
- **80+ speakers**
- **Wide range of industries represented**

# Conceptual Framework from Reviews



***Return on investment  
may take 2-5 years***

\* For illustration purposes only, not actual data

# Conceptual Framework from Reviews

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5. Intervention effectiveness is dependent upon a number of factors

# Conceptual Framework from Reviews

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6. The basic principles of intervention are applicable across industries, but customization will be needed.

# Research Gaps

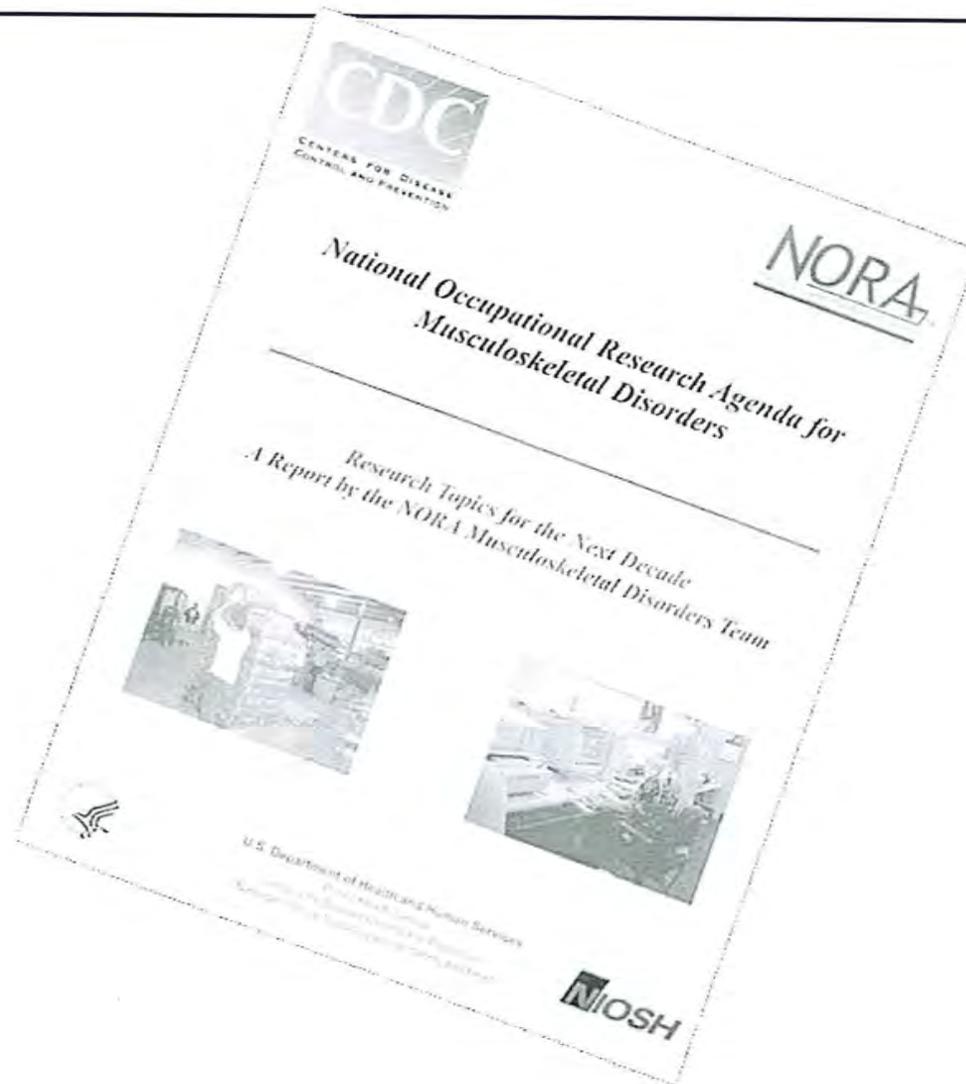
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- Two national groups identified the most significant research gaps related to WMSDs

NIOSH NORA MSD Team (2001)

NRC NAS (2001)

# NORA MSD Research Agenda



# Research Gaps

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## Five Main Areas of Focus

- Surveillance
- Etiologic and Medical
- Intervention
- Methodological
- Specific Topics

# Key Research Gaps

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## I. National studies of WMSDs

1. Ongoing hazard survey
2. Prospective and cross sectional epidemiological studies of dose/response

# Key Research Gaps

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- II. Improve tools for exposure assessment (dose).
  1. Increase user friendliness
  2. Increase sensitivity and specificity
  3. Should consider physical and psychosocial factors
  4. Tools should be multipurpose –for design, surveillance, and evaluating causality

# Key Research Gaps

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## III. Improve definitions of health outcomes

1. Need to develop and validate standardized case definitions for WMSDs
2. Develop precise diagnostic tools
3. Improve guidelines for effective treatment and return to work

# Key Research Gaps

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## IV. Clarify the interaction of risk factors

Further Investigate:

1. Interaction between physical and psychosocial factors
2. Effects of individual factors

# Key Research Gaps

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## V. Disease Causation

- Mechanobiology studies (animal studies, etc.)
- Biomechanical studies
- Psychosocial stress

# Key Research Gaps

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## VI. Interventions Effectiveness

1. Develop and test new engineering controls
2. Evaluate cost/benefits of interventions
3. Demonstrate relative effectiveness of interventions, such as engineering controls vs administrative (training and placement) vs personal protective equipment, etc.

# Applying the Research

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- Documentation Available
  - Easy Ergonomics (CAL OSHA)
  - Exposure and intervention information on maritime industry on the NIOSH web site
  - Simple solutions document for agriculture
  - OSHA web site
  - Washington State web site and documents
  - Several hundred NIOSH HETA reports
  - NIOSH Lifting Equation

# Applying the Research

