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Early risk predictors for acute low back pain

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...to advance scientific knowledge in the areas of workplace and highway injury prevention and mitigation, and return to work.



- Center for Safety Research
- Center for Disability Research
- Quantitative Analysis Unit

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LMRIS Research

- **Strategic**
 - Focus on areas of greatest societal burden
 - Business-relevant (loss prevention)
 - Multi-disciplinary
- **Non proprietary**
 - Publish in peer-reviewed scientific journals
- **International collaborations**
 - Harvard, Tsinghua, others
 - National institutes for health and safety

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Objectives

- Describe results of return to work factors in an occupational medicine early cohort study.
- Summarize factors associated with return to work in other cohort studies.
- Provide examples of early intervention strategies to address disability risk.
- Discuss methods for integrating risk factors in clinical care.

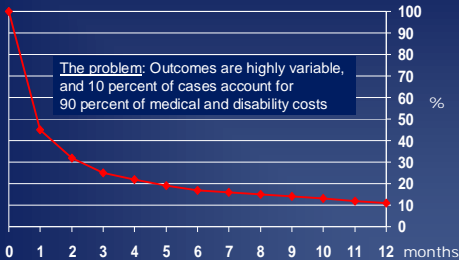
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Background

- Treatment guidelines for acute low back pain (ALBP) suggest conservative care, time, reassurance, and education.
- Although 80% of patients recovery quickly, 20% experience prolonged pain and disability.
- If high-risk patients could be identified at the time of intake, focused early intervention for these patients might prevent chronic pain and disability.

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RTW for musculoskeletal disorders



The problem: Outcomes are highly variable, and 10 percent of cases account for 90 percent of medical and disability costs

| Time until resuming usual work (months) | Percentage (%) |
|---|----------------|
| 0 | 100 |
| 1 | 60 |
| 2 | 45 |
| 3 | 35 |
| 4 | 30 |
| 5 | 28 |
| 6 | 26 |
| 7 | 24 |
| 8 | 22 |
| 9 | 20 |
| 10 | 18 |
| 11 | 16 |
| 12 | 15 |

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Public health models for risk reduction: The example of cardiovascular disease

- Demographic (non-modifiable)
 - age, gender, heredity
- Lifestyle
 - smoking, diet, physical inactivity, stress, alcohol
- Medical diagnostics
 - high blood cholesterol, high blood pressure, obesity/overweight, diabetes mellitus

American Heart Association, 2006

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Study design

- Prospective cohort study
- Patients with uncomplicated, work-related acute low back pain (ALBP).
- Focus on early outcomes (3 months).
- Early identification of high-risk cases.

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Participants

- 568 workers with work-related ALBP
- From 8 occupational health clinics
- Recruited by clinician prior to intake exam
- Most (80%) referred by employer
- All within 14 days of onset (Median = 2)
- 67% male
- Mean age = 36 years (range 18-79)
- 88% White, non-Hispanic
- Median job tenure = 3 years (range 0-42)

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Method

- Consent form
- Intake patient questionnaire
 - Demographic variables
 - Circumstances and severity of injury
 - Back Disability Risk Questionnaire (BDRQ)
- Clinician questionnaire
- 1-month phone interview (20 minutes)
 - \$25 payment
- 3-month phone interview (20 minutes)
 - \$25 payment

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Back Disability Risk Questionnaire

18 items (Shaw et al., 2001; Disability & Rehabilitation)

- Supervisor response to injury
- Mood and stress
- Pain severity ratings
- Health and wellness
- Physical demands of work
- Self-efficacy for recovery

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Clinician prognosis questionnaire

- Diffuse vs. localized pain
- Radicular pain
- Non-organic signs
- Symptom exaggeration
- Significant comorbidity
- Possible depression
- Outcome prediction:
 - Probable chronic LBP?
 - Time to return to work?

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Occupations & Injury types

- 17% Health care
- 14% Transportation
- 10% Retail
- 10% Sanitation
- 9% Warehousing
- 9% Mechanical
- 7% Manufacturing
- 7% Construction
- 5% Public service
- 4% Airport
- 66% Overexertion
- 17% Bodily reaction
- 10% Falls
- 7% Other

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Work status at one month

| Work Status | Percentage |
|------------------------------------|------------|
| Full duty | 50% |
| Full duty (but accomplishing less) | 18% |
| No return to work | 16% |
| Modified duty | 16% |

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Initial clinician ratings and 1-month RTW

| Variable | Significance test |
|---------------------------|-------------------|
| Non-organic signs | NS |
| Pain diffusion | NS |
| Radicular pain | NS |
| Likely to become chronic? | NS |
| Significant comorbidity | NS |
| Body Mass Index | NS |
| Medical comorbidity | NS |
| Functional limitations | $p = .01$ |
| Depression | $p = .03$ |
| RTW expectation | $p = .001$ |

Shaw et al., SPINE 2005, 30(5), 572-580

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Patient questionnaire: Data reduction

- Principal component analysis of 14 BDRQ patient ratings identified 5 factors:
 - Supervisor response (5 items)
 - Mood (2 items)
 - Pain (2 items)
 - Wellness (3 items)
 - Physical job demands (2 items)

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Independent variables from patient questionnaire

- Patient ratings:
 - 5 factor scores from BDRQ
 - Self-efficacy for returning to normal work within 4 weeks
- Demographics:
 - Age, gender, education, marital, income, ethnicity
- Health and injury:
 - Injury type, BMI, smoking, prior back pain
- Work circumstances:
 - job tenure, company size, modified duty, when reported injury, any lost work days

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Relative risk (RR) for RTW at one month after LBP (N = 291)*

| Factor | Relative Risk (RR) |
|---------------------------|--------------------|
| Modified work available | 2.69 |
| Reporting delay | 0.72 |
| Job tenure | 1.67 |
| Expectations for recovery | 2.25 |
| Job demands | 0.57 |
| Pain intensity | 0.69 |
| Age | 0.68 |
| Work modifiable (MD) | 3.14 |
| Est. RTW (MD) | 0.70 |

*Shaw et al., SPINE, 30(5), 572-580.

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Model classification

Predicted:

| Observed: | Return to work | No return to work | % correct |
|-------------------|----------------|-------------------|-----------|
| Return to work | 155 | 66 | 70.1 |
| No return to work | 18 | 52 | 74.3 |

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- ## Other results: Nine published reviews (2000-2005)
- Crook et al., *J Occup Rehab* 2002.
 - Hartvigsen et al., *Occup Environ Med* 2004.
 - Hoogendorn et al., *Spine* 2000.
 - Linton, *J Occup Rehabil* 2001.
 - Linton (in Nachemson & Jonsson, ed.), 2000.
 - Pincus et al., *Spine* 2002.
 - Shaw et al., *Disabil Rehabil* 2001.
 - Steenstra et al., *Occup Environ Med*, 2005.
 - Waddell, *The Back Pain Revolution*, 2004.
- Shaw, Linton, & Pransky (in press), *J Occup Rehabil*

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- ## Demographic factors
- Older age
 - Female gender
 - Higher socioeconomic status

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- ## Biomedical factors (after red flags)
- History of LBP with work absence
 - Time lapse before pursuing treatment
 - Radicular findings
 - “Specific” vs. “non-specific” diagnosis

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- ## Workplace factors (1)
- Physical demands
 - fast work pace (self-report)
 - Heavier physical demands (self-report)
 - Type of occupation (construction, warehousing)
 - Social/managerial
 - Lack of social support (validated scales)
 - Lack of control (validated scales)
 - Less job tenure (years with employer)
 - Lack of modified duty options (yes/no)
 - Delayed report of injury (days)

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- ## Workplace factors (2)
- Worker perceptions about work
 - Job dissatisfaction (validated scales)
 - Monotonous work (validated scales)
 - Job stress (validated scales)
 - Belief work is dangerous (yes/no)
 - Emotional effort of work (single rating)

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Personal factors (1)

- Behavioral
 - Perceived functional limitation (validated scales)
 - Fear avoidant beliefs (validated scales)
 - Pain behavior (validated scales)
- Cognitive
 - Pain intensity (0-10 rating)
 - Somatization (validated scales)
 - Pain catastrophizing (validated scales)
 - Poor expectations for recovery (single item)
 - Poor rating of general health (single item)

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Personal factors (2)

- Emotional (abbreviated scales)
 - Distress
 - Depressed mood
 - Anxious mood

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Effective clinical interventions to improve RTW: Physical

- PT with CBT approach
- Progressive exercise
- Progressive resistance
- Functional restoration
- Light mobilization
- Active exercise
- Fitness program

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Effective clinical interventions to improve RTW: Behavioral

- Cognitive behavioral therapy
- Graded activity
- Reassurance
- Self-management instruction
- Problem solving skills training
- Coping skills training
- Gradual exposure
- Activity scheduling
- Monitoring of automatic thoughts
- Cognitive restructuring
- Education
- Relaxation
- Stress management

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How can these results be used to guide clinical care in occupational medicine settings?

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Patient-provider communication

- ACOEM Guidelines:
 - Involve patients in decision-making
 - Therapeutic alliance critical
 - Work out strategies for work modification
 - Address patient concerns (financial, job security, family, role alteration)
 - Manage patient expectations
- Royal College of General Practitioners:
 - Assessment should include psychological, occupational, and socioeconomic factors.
 - Management and the advice given to patients should consider and allow for psychosocial factors.

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Clinical history taking: Tell me about...

- Your health in general.
- The type of work you do.
- Your employer (modified duty, job tenure, reluctance to report injury).
- How you'll deal with the pain.
- How soon you expect to recover.

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Employee concerns about RTW – Focus group results

51% coping with pain (tolerating, managing, preventing)

16% resume physical tasks (sit, stand, carry, bend, push/pull, etc.)

27% obtaining help if needed (supervisor, co-workers, physical accommodations, flexibility)

6% other job demands (quantity, quality, speed, role)

Shaw et al., Disabil Rehabil 2005; 27:1269-1281

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Doctor talked about your job?

Dasinger et al. (2001), JOEM 43(6), 515-525

% Patients with work-related LBP

| Response | % Patients |
|------------|------------|
| A lot | 32 |
| Some | 28 |
| A little | 27 |
| Not at all | 11 |
| Don't know | 4 |

(N = 325 OLBP cases with lost work time)

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Doctor understood your job?

Dasinger et al. (2001), JOEM 43(6), 515-525

% Patients with work-related LBP

| Response | % Patients |
|--------------|------------|
| Very well | 33 |
| Fairly well | 36 |
| Not too well | 18 |
| Not at all | 10 |
| Don't know | 4 |

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Did your doctor tell you...?

Dasinger et al. (2001), JOEM 43(6), 515-525

% Patients with work-related LBP

| Advice | Yes (%) | No (%) | Maybe (%) |
|-------------------|---------|--------|-----------|
| Avoid reinjury | 65 | 30 | 5 |
| Modify job | 60 | 35 | 5 |
| Work restrictions | 68 | 28 | 4 |
| Ready to RTW | 65 | 30 | 5 |

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Proactive communication and RTW

Dasinger et al. (2001), JOEM 43(6), 515-525

| Acute Phase | Proactive Level | Relative RTW rate |
|-------------|------------------|-------------------|
| >30 days | proactive - high | 1.15 |
| >30 days | proactive - low | 1.0 |
| <30 days | proactive - high | 1.39 |
| <30 days | proactive - low | 1.0 |

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What predicts overall patient satisfaction with care (1 month)?

Shaw et al. (2005), JOEM 47, 1036-43.

- Female gender
- Lower pain rating
- Less functional limitation
- Earlier RTW
- Took problem seriously
- Advised to prevent re-injury
- Explained my condition clearly
- Tried to understand my job

$R^2 = .17$

$\Delta R^2 = .20$

(At 3 months, $R^2_{\text{outcome}} = .21$, $\Delta R^2_{\text{communication}} = .11$)

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On-going prospective study of patient-provider communication

- Clinicians (N = 20)
 - PAs, NPs, MDs
 - Occupational health clinics
- Patients (N = 100 pre, 100 post)
 - Occupational low back pain
 - Recruited at first clinic visit
 - English-speaking
 - Working age adults, ages 18+

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Procedure

- Prospective cohort study (or interrupted case series)
- Sequential recruitment of 7 patients
 - consent
 - survey
- All visits audio-taped for 1 month
- 1- and 3-month follow-up (phone)
- \$75 payment to patient

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- How can these results be used to guide employer-based intervention?

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| Return to work Intervention components | Reduces disability duration | Reduces claim costs | Improves quality of life |
|--|-----------------------------|---------------------|--------------------------|
| Early contact from employer | + | + | +/- |
| Employer offer of accommodation | ++ | + | +/- |
| Contact between employer and provider | ++ | + | +/- |
| Ergonomic work site visit | + | + | +/- |
| Presence of RTW coordinator | + | + | Insufficient evidence |

Review of 10 studies; Franche et al., J Occup Rehabil 2005; 15:607-631.

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Engineering model for accommodating work injuries

Create A Match

Goals: Minimize Risk Factors
Optimize Work Methods

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Optimizing the response of industrial supervisors to work injuries

- goals of a pilot training program:
 - Recognize role to prevent disability
 - Communicate with injured workers
 - Understand ergonomic risk factors
 - Improve accommodation efforts
- Overall messages:
 - Involve workers in problem-solving
 - Offer of job accommodation
 - We want you back!

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Content of pilot training program

- 4 hours duration
- Expert presenters, peer discussion
- Videotape vignettes (wrong way, right way)
 - Report of injury
 - Out of work
 - Return to modified work
- Ergonomics primer (accommodation)
- Work-related musculoskeletal disorders
- Active listening skills
- Problem solving skills training
- Case simulations in small groups

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Perceptions of injured workers

| | Pre-training | Post-training |
|---------------------------------|--------------|---------------|
| ■ Satisfied with supervisor | 68% | 83% |
| ■ Felt blamed | 17% | 0% |
| ■ Discouraged from filing | 5% | 0% |
| ■ Felt penalized | 8% | 4% |
| ■ Took my pain seriously | 67% | 87% |
| ■ Talked with me privately | 55% | 92% |
| ■ Helped to modify my work | 45% | 57% |
| ■ Helped to decrease discomfort | 44% | 80% |

Pransky et al., Assist Technol 2001, 13(2), 131-138.

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Workers comp claim costs

Figure 2: Workers' compensation indemnity costs for new claims before and after implementation of supervisor training workshops to optimize injury response.

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Long-term results

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- How can early assessment of risk factors be used to improve ALBP outcomes at the individual level?

**Option A:
Intervene for high risk patients only**

- <10 weeks low back pain, unable to resume work
- 70 of 700 (10% high risk)
- Groups:
 - 22 high risk with intervention (HR-I)
 - 48 high risk with no intervention (HR-NI)
- Multidisciplinary functional restoration
Gatchel, Polatin, Noe et al., J Occup Rehabil 2003.

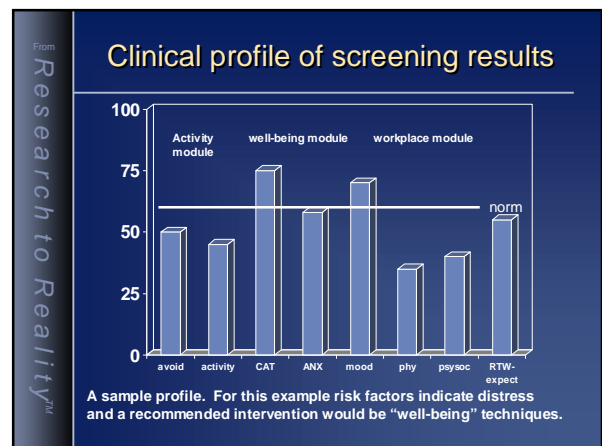
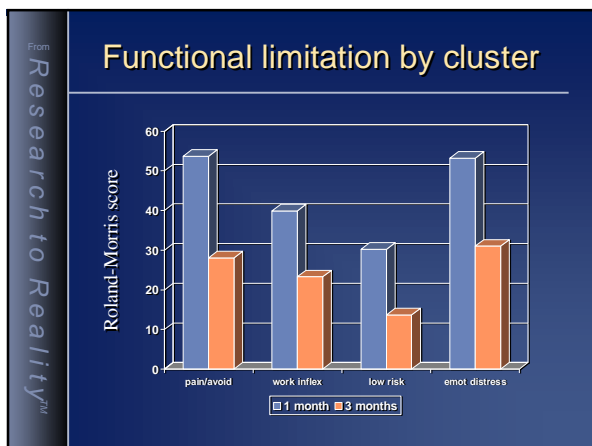
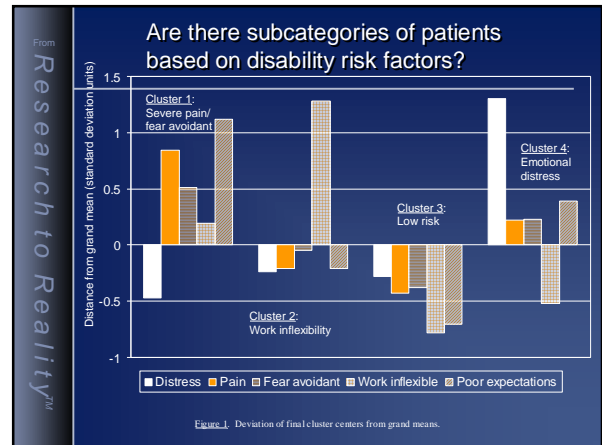
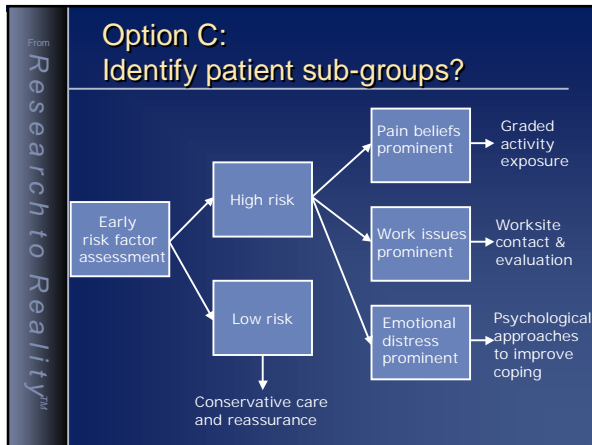
| Group | % Return to work |
|-------|------------------|
| HR-I | 91% |
| HR-NI | 69% |
| LR | 87% |

**Option B:
Intervene on a single risk factor**

- Work-related musculoskeletal disorders
- <2 years work absence
- 10-week Pain Disability Prevention (PDP) program focusing on:
 - pain catastrophizing
 - fear of movement/re-injury
 - perceived disability
 - depression
- Administered by specially trained psychologists in community settings.

| Group | Return to work |
|---------|----------------|
| PDP | 60% |
| Pop avg | 18% |

Sullivan, Ward, Tripp et al., J Occup Rehabil 2005.



Summary

- Many prospective studies of RTW
- Psychosocial & workplace factors are key
- Multidisciplinary treatment optimal for high-risk patients
- Workplace intervention is key
- Opportunities for improving clinical care
 - Integrating risk factor assessment
 - Addressing pain beliefs and distress
 - Facilitating workplace accommodation

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more secure lives."*

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