Directions and challenges for future disability and disability management research

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# Disclosures

<table>
<thead>
<tr>
<th>Conflicts of interest</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relevant relationships with companies</td>
<td>None</td>
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</table>
Objectives

• Review of approaches used in disability management research, some results and some limitations.

• Identify gaps in research as an indicator of future research needs.
“Typical” Conceptual Model (Biopsychosocial) used in disability research

Risk factors (incidence) | Risk factors (duration)

**Proximal risk factors**
- Work-related factors
  - Job/tasks/occupation
  - Work organization
  - Policies/procedures
  - Demand/control/support
  - Employer-employee relations

**Individual & social factors**
- Diagnosis
- Age
- Gender/sex
- Education
- Prior health status/multimorbidity
- Prior sickness absence
- Family (civil status, children)
- Economic activity
- Health region

**Distal risk factors**
- Labor market
- Health care system
- Social benefits system
Primary prevention of disability

Risk factors (incidence)

Workplace factors
- Job/tasks/occupation
- Work organization
- Policies/procedures
- Demand/control/support
- Employer-employee relations

Individual & social factors
- Diagnosis
- Age
- Gender/sex
- Education
- Prior health status/multimorbidity
- Prior sickness absence
- Family (civil status, children)
- Economic activity
- Health region

Risk factors (duration)

Proximal risk factors

Distal risk factors

Labor market
Health care system
Social benefits system

“Healthy” worker → Health problem → Sickness absence → Return to Work
No return to work
Secondary prevention of disability (disability management)

"Healthy" worker → Health problem → Sickness absence → Return to Work

No return to work

Risk factors (incidence) | Risk factors (duration)

Workplace factors
- Job/tasks/occupation
- Work organization
- Policies/procedures
- Demand/control/support
- Employer-employee relations

Individual & social factors
- Diagnosis
- Age
- Gender/sex
- Education
- Prior health status/multimorbidity
- Prior sickness absence
- Family (civil status, children)
- Economic activity
- Health region

Proximal risk factors

Distal risk factors

Labor market
Health care system
Social benefits system
Tertiary prevention (disability management)

Risk factors (incidence)  Risk factors (duration)

Workplace factors
- Job/tasks/occupation
- Work organization
- Policies/procedures
- Demand/control/support
- Employer-employee relations

Individual & social factors
- Diagnosis
- Age
- Gender/sex
- Education
- Prior health status/multimorbidity
- Prior sickness absence
- Family (civil status, children)
- Economic activity
- Health region

Proximal risk factors

Distal risk factors
- Labor market
- Health care system
- Social benefits system

"Healthy" worker  Health problem  Sickness absence

Return to Work  No return to work
Disability management

Risk factors (incidence) | Risk factors (duration)

**Proximal risk factors**
- Workplace factors
  - Job/tasks/occupation
  - Work organization
  - Policies/procedures
  - Demand/control/support
  - Employer-employee relations

- Individual & social factors
  - Diagnosis
  - Age
  - Gender/sex
  - Education
  - Prior health status/multimorbidity
  - Prior sickness absence
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  - Economic activity
  - Health region

**Distal risk factors**
- Labor market
- Health care system
- Social benefits system

"Healthy" worker → Health problem → Sickness absence → Return to Work
No return to work
Simple statistics are still meaningful
OSHA Recordable Injury and Illness Rates
U.S. Private Industry, 1975 to 2012
(cases per 100 workers)

Percentage of all nonfatal injuries and illnesses, US

Simple statistics are still meaningful......but they don’t tell the whole story
...because the devil may be in the details.
Individual Factors
Diagnosis and sickness absence duration

Figura 1. Duración de la incapacidad temporal por contingencia común (episodios de más de 15 días en trabajadores del Régimen General de la Seguridad Social y episodios de más de 3 días en trabajadores del Régimen Especial de Autónomos) según grupos diagnósticos (mediana, percentiles 25 y 75, rango).

Fuente: Registros de incapacidad temporal (IT), 2002-2006, Mutua MC Mutual, España

Findings:

Musculoskeletal and trauma account for 40% of all lost work time episodes. Tumors and mental health disorders have the longest durations.
Median days away from work is a key measure of severity of injuries and illnesses. Injuries and illnesses become more severe as age increases, requiring 3 days away from work for workers aged 16 to 19 years old to 14 days for those workers 65 years and older. The rate of injuries and illnesses decreased from 2010 for workers 16 to 19 years old, and for workers 65 years and older.
Distribution of injuries and illnesses with days away from work and rates, by gender 2011

- **Private Industry Injuries and Illnesses**
  - Male: 62%
  - Female: 38%

- **State Government Injuries and Illnesses**
  - Male: 54%
  - Female: 46%

- **Local Government Injuries and Illnesses**
  - Male: 60%
  - Female: 40%

Injury and illness cases in state government were split relatively evenly between male and female workers, but male workers had a much higher rate. In local government, male workers had 60 percent of cases, and had a rate that was nearly double that of female workers.

How gender.....not just sex......is handled matters.....

**TABLE I.** Final Models for “at Least One Absence for Respiratory Problems” Among Workers in Poultry Slaughterhouses and Canneries in France

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Model derived for female workers</th>
<th>Model derived for male workers</th>
<th>Model derived for both sexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>3.1 (1.2 – 7.8)</td>
<td>0.9 (0.3 – 2.7)</td>
<td>1.5 (0.8 – 3.0)</td>
</tr>
<tr>
<td>Cold, humidity, drafts</td>
<td>2.2 (1.3 – 3.9)</td>
<td>1.4 (0.5 – 3.4)</td>
<td>2.1 (1.3 – 3.3)</td>
</tr>
<tr>
<td>Temperature &lt; 9 °C</td>
<td>0.8 (0.4 – 1.2)</td>
<td>3.0 (1.6 – 5.7)</td>
<td>1.2 (0.8 – 1.9)</td>
</tr>
<tr>
<td>Dissatisfied with work relations</td>
<td>0.2 (0.1 – 0.9)</td>
<td>0.8 (0.2 – 2.7)</td>
<td>0.4 (0.2 – 1.1)</td>
</tr>
<tr>
<td>Children &lt; 6</td>
<td>2.3 (1.4 – 3.6)</td>
<td>1.3 (0.7 – 2.4)</td>
<td>1.7 (1.2 – 2.5)</td>
</tr>
<tr>
<td>Female sex</td>
<td>—</td>
<td>—</td>
<td>1.3 (0.9 – 1.9)</td>
</tr>
</tbody>
</table>

From Messing et al. [1998a].

Co-existing morbidities matter

**FIGURE 1** Case closure probability according to the number of co-diagnoses appearing over the course of the sickness absence episodes between 2004 and 2007.

Guidelines

- Official Disability Guidelines (Work Loss Institute) – “ODG” (http://www.worklossdata.com/)
- Medical Disability Guidelines (Reed Group) – “MDGuidelines” (https://www.mdguidelines.com/)
- Occupational Medicine Practice Guidelines (American College of Occupational and Environmental Medicine)- now part of Reed Group (https://www.acoem.org/PracticeGuidelines.aspx)
## MD Guidelines: Predictive Model

### Benchmark Against the Predicted Duration

<table>
<thead>
<tr>
<th>Required Values</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ICD-9-CM Code</td>
<td>724.2</td>
<td>48.1</td>
</tr>
<tr>
<td>Lumbago; Low Back Pain; Low Back Syndrome; Lumbalgia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>35</td>
<td>+0.6</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>+0.2</td>
</tr>
<tr>
<td>Job Class</td>
<td>Sedentary</td>
<td>+0.1</td>
</tr>
<tr>
<td>Region (ZIP 1st digit)</td>
<td>Central US (6 or 7)</td>
<td>35.5 Days</td>
</tr>
</tbody>
</table>

### Manage Toward the Optimum Duration

#### Physiological Recovery Times

**Days Saved Calculator**

- **Start Date:** 9/2/2014

#### Days for the Sedentary Job Class

- **Nonspecific treatment, low back pain:**
  - **Minimum:** 0 Days
  - **Optimum:** 1 Day
  - **Maximum:** 14 Days

- **Days:** 13.5
- **Predicted Return Date:** 9/15/2014
- **Physiological Return Date:** 9/3/2014

12.5 days can be saved on this case by meeting the optimum physiological recovery time for nonspecific treatment, low back pain.

### Co-existing Medical Conditions

- **Primary:** ICD-9-CM
  - 0 Days
- **Secondary:** ICD-9-CM
  - 0 Days
- **Tertiary:** ICD-9-CM
  - 0 Days

### Other Factors

- **Worker’s Comp:** No
  - 0 Days

### Predicted Days of Disability

- **Calculate:** 13.5 Days
- **Clear:**

Source: Medical Disability Guidelines/Reed Group (https://www.mdguidelines.com/)
Evidence-based Return to Work Guidelines

- Increasingly being mandated in the U.S.
- Evidence evaluation is rigorous in all three of the discussed guidelines, but details are lacking on:
  - Effect of data sources on estimates/bias
  - Statistical methodology employed
  - Evaluation of their effectiveness in improving case management of sickness absence...i.e., the ultimate outcome.

de Boer et al, 2015 [under review]
Comparison of duration guidelines (de Boer et al, Eur J Public Health, in press)

• Literature review
• 4 guidelines from social insurance institutions (France, Serbia, Spain and Sweden)
• 4 guidelines from private organisations (1 Netherlands, 3 US)
• Direct comparison hampered by coding differences (ICD version, level of aggregation)
• Duration defined as minimum, maximum, and optimum or mean or median and percentile distribution, stratified to age and work requirements
Comparison of duration guidelines
(de Boer et al, Eur J Public Health, in press)

• In a sample of 5 diagnoses, there was overlap in expected duration but also differences.
• Guidelines are developed differently (pragmatic expert consensus, registry data, other guidelines, non-systematic reviews, etc.).
• Formal evaluation of their effectiveness is lacking.
System Factors
SA DURATION BY HEALTH REGIONS (Catalonia)

811,790 SA episodes followed to case closure (2005).

- Investigar para conocer, conocer para decidir, decidir para mejorar la salud de los trabajadores -

SA DURATION BY CASE MANAGEMENT SOURCE (Catalonia)

## Temporary sickness absence benefits: a tale of 3 countries.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Netherlands</th>
<th>Spain</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits offered (work and non work-related)?</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Who certifies?</td>
<td>Occupational doctor or insurance company advisor</td>
<td>Primary care doctor or occupational health insurance doctor</td>
<td>Any doctor</td>
</tr>
<tr>
<td>Maximum duration?</td>
<td>24 months</td>
<td>12 months with possible extension</td>
<td>12 months with possible extension</td>
</tr>
<tr>
<td>Sick pay (% of base salary)</td>
<td>At least 70%</td>
<td>At least 60% (80% if work-related)</td>
<td>80% (partial salary replacement allowed)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Salary + insurance</td>
<td>Registered in social security system</td>
<td>Some income from work or unemployment benefits</td>
</tr>
<tr>
<td>Waiting period</td>
<td>From day 1</td>
<td>From day 1 (work-related) or day 4 (non work-related)</td>
<td>From day 1</td>
</tr>
<tr>
<td>Who pays?</td>
<td>Employer/insurance company x 24 months</td>
<td>Employer to day 14, then social insurance</td>
<td>Employer to day 14, then social insurance</td>
</tr>
<tr>
<td>Return to work plan?</td>
<td>Required</td>
<td>Optional</td>
<td>Required</td>
</tr>
</tbody>
</table>

Workplace Factors
Working conditions (workplace factors) as a determinant of the “natural history” of sickness absence

Figure 1  Simplified theoretical model of natural history of sickness absence.

Workplace factors: Organizational Support

Organizational Return to Work Support and Sick Leave Duration: A Cohort of Spanish Workers With a Long-Term Non–Work-Related Sick Leave Episode

Maite Sampere, MD, MSc, David Gimeno, PhD, Consol Serra, MD, PhD, Manel Plana, MD, José Miguel Martínez, PhD, George L. Delclos, MD, PhD, and Fernando G. Benavides, MD, PhD
Finding: Workers in companies that provided specific return to work programs and support returned to work earlier.
Workplace factors: RTW Expectations

Return to Work Expectations of Workers on Long-Term Non-Work-Related Sick Leave

Maite Sampere · David Gimeno · Consol Serra · Manel Plana · Juan Carlos López · José Miguel Martínez · George L. Delclos · Fernando G. Benavides
Workplace factors: RTW Expectations

Finding: Self-perceived time and return to work expectations are important prognostic factors for return to work, regardless of health condition.
SHORT REPORT

Effect of working conditions on non-work-related sickness absence

M. Sampere¹,², D. Gimeno²,⁻⁴, C. Serra²,⁻⁴,⁻⁵, M. Plana¹, J. M. Martinez²,⁻⁴, G. L. Delclos²,⁻⁴,⁻⁶ and F. G. Benavides²,⁻⁴

¹Medical and Health Care Services Division, Mutual Midat Cyclops (MC MUTUAL), C/Provença 321, 08037 Barcelona, Spain, ²Center for Research in Occupational Health (CiSAL), Department of Experimental and Health Sciences, Universitat Pompeu Fabra, Barcelona, Spain, ³Southwest Center for Occupational and Environmental Health, Division of Epidemiology, Human Genetics and Environmental Sciences, The University of Texas School of Public Health, San Antonio Campus, San Antonio, TX, USA, ⁴CIBER de Epidemiología y Salud Pública, Barcelona, Spain, ⁵Occupational Health Service, Parc de Salut MAR, Barcelona, Spain, ⁶Southwest Center for Occupational and Environmental Health, Division of Epidemiology, Human Genetics and Environmental Sciences, The University of Texas School of Public Health, Houston, TX, USA.
Finding: Hazardous physical working conditions are associated with longer duration of non-work-related sickness absence. Workplace interventions could conceivably shorten this duration.
Individual x Workplace Factors
7 Principles for Successful Return to Work (IWH systematic review, 2014)

- Strong workplace commitment to health and safety (at all levels)
- Availability and offering of modified work
- RTW planners ensure plan supports returning worker without disadvantaging others
- Supervisors trained in work disability prevention and RTW planning
- Employer contacts worker early and in a considerate manner
- Designated RTW coordinator
- Good communication between employer and healthcare providers

Institute for Work and Health, 2014: http://www.iwh.on.ca/seven-principles-for-rtw
Some “new” statistical techniques that are useful in evaluating individual x workplace factors
Latent trajectory analysis

Jung and Wickrama, 2008.
Latent trajectory analysis

Jung and Wickrama, 2008.
Latent trajectory analysis

There may be two different subgroups of individuals following different trajectories.

- Worsening mental health: \( \hat{y}_{it}^{j=1} = \hat{\beta}_0^{j=1} + \hat{\beta}_1^{j=1} \cdot x_{it}. \)
- Recovering mental health: \( \hat{y}_{it}^{j=2} = \hat{\beta}_0^{j=2} + \hat{\beta}_1^{j=2} \cdot x_{it}. \)

Jung and Wickrama, 2008.
Trajectories of work functioning scores after return to work from a sick leave due to a common mental disorder.

Ubalde-Lopez et al, 2015 [under review]
Trajectories of work functioning scores after return to work from a sick leave due to a common mental disorder.

Finding: within the increasing score trajectory work functioning level decreased over time with the higher baseline multimorbidity. Multimorbidity did not affect the other 3 trajectories.
Other statistical approaches

- **Multi-level modeling**: allows separate consideration of individual-level variables (and their variance) and organizational/contextual-level variables (and their variance), before integrating them into a final model.

- **Conditional frailty models**: allows consideration of:
  - Event dependence
  - Heterogeneity across individuals
Conditional frailty models

Heterogeneity and event dependence in the analysis of sickness absence


Isabel Torá-Rocamora (isabel.tora@upf.edu)
David Gimeno (David.Gimeno@uth.tmc.edu)
George Delclos (George.Delclos@uth.tmc.edu)
Fernando G Benavides (fernando.benavides@upf.edu)
Rafael Manzanera (rafael.manzanera@gencat.cat)
Josefina Jardi (josefina.jardi@gencat.cat)
Constança Alberti (constanca.alberti@gencat.cat)
Yutaka Yasui (yyasuiua@gmail.com)
José Miguel Martínez (jmiguel.martinez@upf.edu)
Finding: Conditional frailty models are useful when repeated sickness absence events occur within the same individual, as they allow simultaneous analysis of event dependence and heterogeneity due to unknown, unmeasured or unmeasurable factors. Can be used with either Cox or Poisson approaches.
Conceptual Model

• Does the biopsychosocial model cover relevant themes for other stakeholders involved in disability management?
• Are there other considerations?
• Do researchers and employers communicate well?
• Do they share common views and outcomes?
Employer perspectives

• Rarely published in the “mainstream” scientific literature
• More present in the “grey” literature
• More anecdotal, personal experience, policy and “how to” oriented
• Primarily a large company perspective
• Little to nothing on small to medium-sized companies or self-employed workers

Hopkinton Working Group. Liberty Mutual Disability Research Institute, Oct. 2015 [work in progress]
Employer “models”

- Medically driven
- Financially driven
- Employee-oriented
- Organizational culture-oriented

Hopkinton Working Group. Liberty Mutual Disability Research Institute, Oct. 2015 [work in progress]
Research needs and next steps

• Individual factors
  – With a view towards an ageing population
  – Conceptually sound consideration of gender differences
  – Greater incorporation of co- and multi-morbidity
  – More “person-centered” (perhaps phenotypes) rather than “variable-centered” (e.g., latent trajectory analysis, multiple correspondence analysis, perhaps cluster analysis)
Research needs and next steps

• Workplace factors
  – Applicability to small and medium enterprises
  – Applicability to self-employed workers
  – Incorporation of employer-relevant perspectives
Research needs and next steps

• Individual x Workplace
  – Use of large, “big picture” databases
  – More translational research (from the “ideal” controlled study to a “post-marketing” approach)
  – Use of “new” (and “newer”) study design and statistical analytical approaches
References

• Benavides FG et al. *J Epidemiol Comm Health* 2001; 55: 368.
• de Boer WEL et al. *Eur J Public Health* 2015 [in press].
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• Torá Rocamora I et al. *BMC Medical Research Methodology* 2013; 13: 114
• Ubalde-Lopez M et al. *J Occup Rehab* [under review].
Thank you.