Full Report
Workplace-based Return-to-work Interventions:
A Systematic Review of the Quantitative and Qualitative Literature
Volume 2

Full Report

Workplace-based Return-to-work Interventions: A Systematic Review of the Quantitative and Qualitative Literature

Volume 2

About this report:

Steering Committee:
Renée-Louise Franche[1, 2]
Kimberley Cullen[1]
John Frank[1, 2, 4]
Judy Clarke[1]
Ellen MacEachen[1, 2]
Sandra Sinclair[1, 3]
Emma Irvin[1]
Rhoda Reardon[1]
Anusha Raj[1]
Donald Cole[1, 2]
Victoria Pennick[1]

Methodological Consultants:
John Frank[1, 2, 4]
Sheilah Hogg-Johnson[1, 2]
Pierre Côté[1, 2]
Emile Tompa[1,2]

Reviewers:
Judy Clarke[1]
Donald Cole[1, 2]
Kimberley Cullen[1]
Renée-Louise Franche[1, 2]
Jaime Guzman[1, 2, 5]
Ellen MacEachen[1, 2]
Victoria Pennick[1]
Anusha Raj[1]
Sandra Sinclair[1, 3]
Dwayne Van Eerd[1]

External Reviewers:
Jeffrey P. Agunaldo[2]
Yuri Cvitkovich[6]
Phil Davis[6]
Farah Mawani[2]
Patrick Parnaby[3]
Jessica Polzer[2]
Janet C.M. Stewart[7]

Librarian and Library Staff:
Jeremy Dacombe[1]
Emma Irvin[1]
Dan Shannon[1]

Administrative Assistant:
Tazim Hirani[1]

[1] Institute for Work & Health, Toronto, Ontario Canada
[2] University of Toronto, Toronto, Ontario Canada
[3] McMaster University, Hamilton, Ontario Canada
[4] Institute of Population and Public Health, CIHR, Toronto, Ontario Canada
[5] Toronto Rehabilitation Institute, Toronto, Ontario Canada
[6] University of British Columbia, Vancouver, British Columbia Canada
[7] Queen's University, Kingston, Ontario Canada

Address correspondence to:
Renée-Louise Franche
Institute for Work & Health
481 University Avenue, Suite 800
Toronto, Ontario M5G 2E9
Email: rfranche@iwh.on.ca

Table of Contents

Page

List of Tables

Page

Workplace-based Return-to-work Interventions - A Systematic Review of the Quantitative and Qualitative Literature

Introduction

Employers, insurers and workers have expressed a growing interest in workplace-based return-to-work (RTW) intervention studies. However, studies in this area have been scarce and they have been conducted using a variety of research designs. In order to provide a comprehensive summary of the most effective workplace-based RTW interventions and to direct future research priorities in the area of return to work, a systematic literature review of international studies published since 1990 in this area was conducted by the Institute for Work & Health.

The concept of disability management applies to both work-related and non-work-related conditions. Consequently, our review examined interventions which target both work-related and non-work-related pain conditions. Although other physical and mental conditions are also in need of further evidence synthesis, we limited the scope to pain-related conditions to focus the review on a relatively homogeneous group of workers, and to keep the review process feasible and manageable. Our review was focused on workplace-based RTW interventions, and included clinical interventions which were closely tied to the workplace. Inclusion of healthcare provider (HCP) interventions was limited to 1) those which were initiated by the workplace and 2) those which were provided by HCPs who were physically and organizationally part of the workplace, such as occupational physicians based in the workplace. Other clinical interventions, such as managed care, were not included in our review.

Objectives

The first objective of this review was to synthesize evidence on effectiveness of workplace-based RTW interventions and strategies that assist workers with musculoskeletal (MSK) and other pain-related conditions to return to work after a period of work disability. Effectiveness is determined by examining evidence regarding the desirable consequences, such as reduced work disability duration or reduced levels of

pain, associated with workplace-based RTW interventions and strategies. Some studies included in the review take the analysis further by evaluating both the desirable consequences and costs associated with workplace-based RTW interventions and strategies. We refer to these types of analyses as economic analyses because they employ the methodology of economic evaluation of healthcare programs (30). Some of these studies measure consequences in natural units and others in dollars. In this review we synthesize evidence of studies that undertake economic analyses without distinguishing between the types of measures used for consequences since there are few studies that undertake such analyses.

The second objective of this systematic review was to expand our understanding of injured or ill workers' and stakeholders' experiences of the process of return to work, through inclusion of the qualitative research on return to work. Combining the quantitative and qualitative literature within a single systematic review is somewhat unique. This approach widens our understanding of the RTW process by drawing attention to issues and gaps in knowledge that may not have been taken into account in the quantitative studies.

The third objective of the review was to provide an assessment of the methodological strengths and limitations which characterize quantitative and qualitative studies conducted in this research field. This will provide guidance for future research to improve the overall quality of studies conducted in this field.

The knowledge gained from such as systematic review of the evidence is essential to developing the foundation for knowledge transfer and exchange for employers, insurance companies, workers, unions, and other stakeholders.

How Different is Our Systematic Review?

Our review differs from other systematic reviews in the following two aspects:

- We included quantitative studies, qualitative studies, and systematic reviews relative to workplace-based RTW interventions. Our inclusion of both quantitative and qualitative studies is a response to the growing consensus that both quantitative and qualitative studies are essential to the development of a complete

understanding of a social phenomenon, such as the implementation of workplace-based RTW interventions (43;117). Qualitative studies were included to ensure that a comprehensive picture of the RTW experience could be captured. The qualitative studies focused more on experiential and human aspects of return to work which were not highlighted in quantitative studies. Qualitative studies are well suited to identify barriers and facilitators of interventions (32), as well as implementation issues (81). Quantitative studies are better suited to answer questions related to the effectiveness of interventions in controlled environments.

- Most systematic reviews in the clinical area focus on studies using a randomized controlled trial design. Because of the wide variety of research designs used in studies of return to work, we cast a wide net to include the range of study designs used in the area of workplace-based RTW interventions. This was done also in response to the emerging framework which supports the adoption of a programmatic approach to the evaluation of interventions (87). There is much wisdom in taking this strategically staged approach where developmental research is first conducted, followed by implementation research, and finally by formal effectiveness research (42). In this framework, there is a “place” for experimental, quasi-experimental and observational study designs. All of these designs were included in our review.

Organization of the report

Our report begins with a detailed description of the methodology used to conduct the selection, quality appraisal, and data extraction of quantitative and qualitative studies. The next section presents a brief review of conceptual models of the RTW process, followed by a review of the systematic reviews for which data extraction was conducted. The synthesis of quantitative studies follows. It describes the best evidence synthesis guidelines used, the categorization of interventions and outcomes extracted from the studies reviewed, and the synthesis of evidence regarding select RTW intervention components. The synthesis of evidence for the qualitative studies follows, addressing the various themes which emerged from the review. We conclude the document with a

summary of our findings, synthesizing both quantitative and qualitative literature findings, with recommendations for future RTW interventions and for knowledge transfer and exchange.

One objective of this literature review was to provide a critical appraisal of the research conducted in this area, and recommendations for future research. This is addressed in two separate sections on quantitative and qualitative research found in the appendices. Along with figures and tables, the appendices also contain the data extraction summary tables for the systematic reviews, quantitative data, and qualitative data, which summarize the main findings of each study for which data was extracted. In addition, all papers related to all studies for which data was extracted are also included with this report.

Methods

Literature Search

The literature search included three strategies: A comprehensive and systematic review of electronic bibliographic databases; a review of the working papers from relevant research institutes; and a review of personal libraries. The search of bibliographic databases was run by one member of the review team (the librarian), however, all members of the steering committee (with backgrounds in clinical psychology, kinesiology, occupational therapy, anthropology, sociology, epidemiology, nursing, occupational medicine, and physiotherapy) were involved in the development of the search strategy.

Seven electronic databases were searched from 1990 to December 2003: MEDLINE, CINAHL, EMBASE, PsycInfo, Sociological Abstracts, ASSIA (Applied Social Sciences Index and Abstracts) , and ABI (American Business Index). Since the search terms/language of the databases were found to differ significantly, the terms used in the search were customized for each database. A list of the broad terms used in our search can be found in Table 1.1. in Appendix 1.

The search strategy combined two groups of keywords using an "AND" strategy (Appendix 2, Figure 2.1). The keywords in group 1 focused on RTW and workers' compensation terms, while the keywords in group 2 centred on the types of interventions and strategies. The terms within each group were OR'd. For a study to be considered for this literature review, at least one term from each list had to be found in any of the following: Title, abstract, case registry or MeSH subject headings. The search strategy included articles written in either English or French.

In addition to identifying studies from the bibliographic databases, peer-reviewed manuscripts from relevant research institutes were included in this review. The peer review process of the working papers produced by the following research centres was assessed: Institute for Work & Health (IWH), Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST), National Institute of Disability Management and Rehabilitation (NIDMAR), Canadian Workplace Research Network (CWRN), Finnish Institute of Occupational Health, Occupational Health and Safety Agency for Healthcare (OHSAH), National Institute for Occupational Safety and Health (NIOSH), RAND Institute,

W.E. Upjohn Institute, Liberty Mutual Research Centre, Danish National Institute of Social Research, and Workers' Compensation Research Institute (WCRI). Topical working papers from these institutions were retrieved for review, if we determined that the peer review process of these sources was adequate. In addition, the reference lists in all selected studies were manually checked for other applicable studies. The personal libraries of the authors were also searched for relevant studies.

Selection of studies

The title and abstract of each article was independently screened by at least two reviewers who then met to reach consensus. Full text articles were retrieved for those studies that appeared to meet the inclusion criteria (Table 1), and for those for which insufficient information was presented in the title, abstract, and key words to determine eligibility. A consensus method was used to resolve any disagreements between the two reviewers regarding study inclusion. A third reviewer was consulted for those studies in which agreement could not be reached.

Inclusion and exclusion criteria

Inclusion and exclusion criteria for eligible studies are presented in Table 1 below and discussed.

Table 1. Criteria for inclusion of studies

	Inclusion	Exclusion
Population of interest	Workers who are off work due to one of the following: · MSK condition · Pain-related condition that was neither short-duration/self-limiting nor malignant (e.g., arthritis, headaches), that was episodic or non-episodic, or that was associated with a degenerative or non-degenerative condition · Chronic pain OR A workers' compensation claimant population	Mental health conditions as a primary condition, phantom limb pain, short duration self-limiting pain (such as in post-operative, or dental pain), pain associated with a malignant condition
Nature of intervention	Interventions specifically aimed at improving RTW outcomes, including	Policies

	Inclusion	Exclusion
	· Disability management interventions and strategies · Case management practices, which could be implemented in the workplace · Education to workplace staff, insurance case managers, or workers · Intervention focusing on general organizational factors, but specifically aimed at improving RTW outcomes	General primary prevention ergonomic interventions Clinical interventions provided outside the workplace
Provider of intervention	Provided by the workplace, or by an insurance company (private or governmental) and which could be provided by the workplace Provided by a healthcare provider in very close collaboration with the workplace (e.g., ergonomic workplace site visit)	Provided by the healthcare provider with no or minimal integration with the workplace (e.g., signing a form allowing the worker to go back to work)
Receiver of intervention	Workers Workplace staff Case managers from insurance company	
Outcomes (Consequen-ces)	Self-reported time to return to work, time on benefits, total duration of lost time, recurrences (number and duration) Point-prevalence of status (e.g., back at work versus not back at work) RTW conditions (e.g. same job/employer/hours) Quality of work life after return to work Quality of life - mental health, functional status, general physical health during and/or after work interruption due to pain-related condition Medication taken during and/or after work interruption due to pain-related condition (particularly analgesics, opioids, NSAIDS, steroidal anti-inflammatories, antidepressants) Costs (healthcare costs, wage replacement costs, intervention costs)	Absenteeism which was unrelated to MSK or other pain-related conditions
Study design - quantitative	Randomized controlled trial (RCT), Non-randomized trial, Cross-sectional, Pre-post, Time series, Case control, Cohorts (retrospective and prospective) Systematic reviews	Non-comparative studies: case series, case study Narrative reviews

	Inclusion	Exclusion
Study design - qualitative	Interviews, focus groups	
Year of publication	1990 and after	
Source	Peer-reviewed papers, reviews, from MEDLINE, EMBASE, CINAHL, PsycInfo, Sociological abstracts, ASSIA (Applied Social Sciences Index and Abstracts) and ABI (American Business Index) Peer-reviewed reports from well-established research centers such as WCRI, IRSST, and IWH	Non-peer reviewed publications Books or book chapters
Languages	English and French	

10. Population of interest: Work-disabled workers with either MSK or other pain-related conditions met our inclusion criteria. In addition, studies which examined the impact of an intervention on a group of workers' compensation claimants were also included as it is estimated that approximately 70% of these claimants will have an MSK condition as an occupational injury. Studies examining mental health conditions as the primary condition of interest were excluded. However, if mental health was considered as a secondary condition in addition to an MSK or other pain-related condition as the primary condition, the study met the inclusion criteria. Short duration self-limiting pain (i.e., post-operative or dental pain), malignant pain (e.g., cancer), and pain from other conditions such as HIV, cardiovascular causes (e.g., heart attack, stroke), phantom limb pain, and spinal cord injuries were excluded.
11. Nature of intervention: Both interventions and strategies, specifically aimed at reducing the burden of work disability of workers already off work, met our inclusion criteria. Interventions were defined as planned intervention programs. These were typically offered in a limited number of workplaces, by the same team of providers, and were often offered as part of a research study. Their evaluation was often planned prior to the implementation of the program. An example of an intervention program is the Sherbrooke model which included three types of interventions, in addition to usual care (73-77). In contrast, strategies were approaches to improving RTW outcomes which did not necessarily occur as part of a planned intervention

program - these were typically examined in observational studies. Their evaluation was often initiated after the implementation. Examples of such strategies would be: Early contact with the worker, top management support for disability management (48;51;55). Studies that examined the effect of workers' compensation administrative policies on return to work or other high level legislative or regulatory policies, in the absence of a specific workplace intervention or strategy were excluded. The Institute for Work & Health has however recently released a systematic review on experience rating which is an example of a regulatory policy (110). Additionally, primary studies examining the following types of interventions were excluded as there have been previous systematic reviews focusing on the effectiveness of these interventions on return to work and the interventions are not primarily implemented in the workplace: Multidisciplinary rehabilitation (47;60), back schools (65;91;92;111), exercise classes (91;92), and work-conditioning (93).

12. Provider of intervention: Workplace-based interventions were defined as initiated by the workplace, or implemented in the workplace by an internal or external party. Examples of appropriate workplace-based interventions include: Ergonomic job modifications aimed at facilitating return to work, employer-initiated early contact with the work-disabled worker, and offers of work accommodation. As well, studies of RTW interventions provided by insurance companies, which could possibly be implemented in the workplace, also met our inclusion criteria.
13. Receiver of intervention: Interventions or strategies could target a number of possible recipients: Injured or ill workers, coworkers, supervisors, human resources personnel, occupational health personnel, or management. In addition, in the case of insurance providers, case managers as recipients of training met our inclusion criteria.
14. Outcomes (consequences) and costs: To meet our inclusion criteria, quantitative studies had to consider the following outcomes and/or costs: 1) Duration of work disability episode or number of episodes; 2) Point-prevalence of RTW status at a specified time (e.g., back at work or not) 3) RTW condition (e.g. same job/employer/hours); 4) Quality of work life after return to work; 5) Quality of life - mental health, functional status, general physical health during and/or after work interruption;

6) Medication taken during and/or after work interruption; 7) Outcomes (consequences) in conjunction with associated costs of alternative interventions/ strategies or simply the costs of alternative interventions (e.g., healthcare costs, wage replacement costs). Studies looking at absenteeism from work for reasons unrelated to MSK disorders or pain-related conditions as defined above were excluded.

In the qualitative component of the review, the notion of "outcomes" did not apply due to the nature of qualitative inquiry. Studies were included if they involved analysis of qualitative data such as interviews and focus groups relating to people's experiences with workplace-based RTW interventions/strategies, or the organizational dynamics relating to return to work, and if they generated conceptual themes on the basis of these data.

15. Study design: This review included quantitative and qualitative studies, as well as systematic reviews, from the scientific literature. These studies have very different design characteristics, therefore, the individual decision rules for study inclusion are presented separately for the quantitative and qualitative literatures.
    a. *Quantitative studies:* Due to the difficulties of conducting randomized or non-randomized controlled trials in workplaces, we found a highly heterogeneous group of study designs in this area of research. We therefore considered controlled trials, cohort designs, quasi-experimental designs, and cross-sectional designs. To categorize study design, the algorithm developed by Briss et al. (13) for The Task Force on Community Preventive Services was used (Appendix 2, Figure 2.2).
    b. *Qualitative studies:* Design of the qualitative studies could include both theoretically-informed and descriptive studies, involving interviews and focus groups. We also accepted some studies that involved a combination of qualitative and quantitative methods.
    c. *Systematic reviews*: In order to be included, literature reviews had to meet high standards of quality for systematic reviews, i.e. - have a clearly formulated question, use systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyze data from the included studies.

16. Date of publication: Studies published after 1990 were included in this review. We chose 1990 as our start-up date as it is the year the American Disability Act was implemented. We recognize that the act was implemented in the United States only and therefore is not directly relevant to many studies that were conducted in other countries. Nevertheless, the act had an impact at an international level and represents an appropriate and policy-based point of start-up.
17. Source: Peer-reviewed papers and reviews from the databases previously described were included. Working papers or reports from research institutes utilizing peer-review (i.e., having an external review panel) were included, even if they were not published in a peer-reviewed journal. Publications in non-peer reviewed formats, such as books, book chapters, opinion papers, letters to the editor and papers without sufficient data to assess quality and for data extraction were excluded. Letters to the editor and secondary papers (which generally did not include sufficient data for review alone) were retained and considered for clarification and additional data regarding the original studies.
18. Language: English and French.

Quality Appraisal

Quantitative Studies:

Quantitative studies which met the inclusion criteria for relevance to this review were assessed for methodological quality using a process that was developed by the authors based on previous work (19;25;80;102;116). The methodological quality of each study was rated independently by rotating pairs of nine reviewers, and then the individual pair of reviewers met to reach consensus for each study. If consensus could not be reached, one or more other reviewers were consulted in order to reach consensus. Two of the studies considered at quality appraisal were written by researchers at IWH (14;54). In order to minimize bias, the quality appraisal of these studies was conducted by a pair of external reviewers recruited through university contacts. These reviewers had no conflicts of interest in reviewing these papers.

The studies were assessed on 21 quality assessment criteria from the following categories: Study objectives, source population, study population, study power, exposure to intervention or strategy, confounding or intervening variables, outcome measures, study design, statistical analyses, and presence of serious flaws. These criteria were developed to be applicable to all study designs considered. Nine of the 21 questions were considered methodological strength (MS) criteria (Table 2), as established by consensus of reviewers. These MS criteria were chosen as the most critical criteria to be met to ensure adequate internal validity. The reviewers forwarded a study to data extraction stage under the following circumstances: 1) the study met all of the MS criteria; 2) the study did not meet all of the MS criteria, but the reviewers felt strongly that the study represented an important piece of work that should be included. Using this consensus approach, the reviewers were asked to rate their confidence in the findings reported in the study. There were three senior reviewers who reviewed the first set of studies (18 studies) considered by all rotating teams. This was done to ensure consistency among teams on interpretation of the quality appraisal criteria. Afterwards, the senior reviewers were consulted on the quality appraisal process on an

as-needed basis. Post hoc analyses revealed that of those studies that proceeded to data extraction, all met at least 75% of the MS criteria and 55% of these studies met 100% percent of the MS criteria.

Table 2: Methodological strength criteria used to determine whether a study proceeded to data extraction for the quantitative studies

1. Source population is identified.
2. Inclusion and exclusion criteria are described and appropriate.
3. Participation rate is greater than 40%, OR there are no major differences between participants and non-participants.
4. Follow-up is reported and loss to follow-up is less than 50%, OR there are no major differences between drop-outs and participants remaining in the analyses.
5. The intervention(s) or strategies are sufficiently described to allow reasonable replication.
6. Important confounding variables (including functional status, pain, co-morbidity, or physical demands) and co-interventions are controlled for, OR are distributed equally among groups.
7. Outcome is defined and measurable.
8. Design of the study is appropriate to answer the study question about the literature review's primary outcomes.
9. No other serious flaws were identified by the reviewers for this study.

The methodological quality of these studies was rated according to the following categories: Very high - 100% of the MS criteria met, High - 75 to 99% of the MS criteria met, Medium - 50 to 74% of the MS criteria met, Low - 0 to 49% of the MS criteria met. Other non-MS quality appraisal criteria were examined, but they were not factored into the quality ratings of the studies. Only those studies which were rated High or Very High quality were considered for data extraction.

Qualitative Studies

Qualitative studies which met inclusion criteria for relevance to this review were assessed for methodological quality using an adaptation of a process developed by the National Centre for

Social Research in the United Kingdom (103). Two researchers independently conducted the quality assessment for the majority of the studies (Table 3), and met for consensus. In order to avoid conflict of interest, four studies in which IWH employees were among the authors (6;31;39), were reviewed by pairs of individuals external to the Institute (recruited through university contacts). One additional external reviewer, with knowledge of both the French language and qualitative methods, was the second reviewer on one French language paper (7).

Table 3: Methodological strength criteria used to determine whether a study proceeded to data extraction for qualitative studies

1. How credible are the findings?
2. How has knowledge/understanding been extended by the research?
3. How well does the study address the original aims and purpose?
4. How well is the scope for drawing wider inference explained?
5. How defensible is the research design?
6. How well defended is the sample design/target selection of cases?
7. Sample composition/case inclusion - how well is coverage described?
8. How well was the data collection carried out?
9. How well was the approach to/formulation of the analysis conveyed?
10. How well are the contexts of data sources retained/portrayed?
11. How well has diversity of perspective and content been explored?
12. How well has detail, depth and richness of data been conveyed?
13. How clear are the links between data, interpretation and conclusions?
14. How clear and coherent is the reporting?

15. How clear are the assumptions/theoretical perspectives/values that shaped the form and output of the study?
16. What evidence is there of attention to ethical issues?
17. How adequately has the research process been documented?

To be consistent with accepted qualitative research methods, no fixed formula was used to determine inclusion of the qualitative studies. The major emphasis was, however, put on question 1, involving the overall credibility of the study. This judgment was carefully made on the basis of answers to the other 16 questions. Reviewers met to reach consensus on an overall rating of the study methodology as “Very High”, “High”, “Medium” or “Low”, with consideration of: How well the methods used in the study “fit” the study’s purpose, whether the context of the study was considered where appropriate, the adequacy of the analysis and/or sample, and the explanatory value of the study. Those studies judged to be of low quality were not kept for final data extraction.

Systematic Reviews

Reviews meeting our inclusion criteria for relevance for this review were assessed for methodological quality using Oxman and Guyatt’s (80) index of scientific quality of research overviews with slight modification. Several instruments for assessing quality of reviews exist; However, this index is the one which has been most extensively validated (58). The methodological quality of each review was rated independently by a pair of reviewers, who then met for consensus. There were 13 quality assessment criteria to be considered, and seven were considered MS criteria (Table 4). These MS criteria were chosen as the most critical criteria to be met to ensure adequate quality of the systematic review. In order for a study to be considered for data extraction, all seven criteria had to be met as we wished to restrict our focus only on the systematic reviews of highest quality.

Table 4: Methodological strength criteria used to determine whether a review proceeded to data extraction

1. Search methods are clearly stated.
2. Inclusion/exclusion criteria of studies are clearly reported.
3. Quality appraisal criteria for assessing the validity of the included studies are clearly reported.
4. Inclusion/exclusion criteria of studies are appropriate.
5. Quality appraisal criteria for assessing the validity of the included studies are appropriate.
6. Quality appraisal was conducted by two or more reviewers.
7. Methods used to combine the findings of the relevant studies are reported.

Data Extraction

Data was extracted from quantitative studies, qualitative studies, and reviews which were assessed to be relevant to our review and which met our quality appraisal criteria. In the quantitative and qualitative component of the review, the same procedure was followed, i.e., pairs of reviewers independently extracted data from the included studies, and then met to reach consensus. For the reviews, the information was summarized by one reviewer, and reviewed by a second.

Quantitative Studies

For the quantitative component, a standardized form was developed by the authors, based on existing forms and procedures (102;116). The pairs of reviewers extracted data on study design, research question, study population characteristics, participation rates and sampling strategy, inclusion/exclusion criteria, type of intervention/strategy, primary and secondary outcomes, results, feasibility, benefits and/or barriers, participation compliance, compliance sustainability, and effect sustainability. They also noted if any serious flaws, not captured by the quality appraisal criteria, were present in each study.

Qualitative Studies

For the qualitative component, reviewers extracted data on the research question, theoretical orientation of the study, study method, sampling strategy, participants, study context, analysis of data, reflexivity, study findings, and how/why the findings were relevant to workplace-based RTW interventions or strategies. These data were entered into a form which had been created specifically for this review.

Systematic Reviews

For the systematic reviews, the main conclusions of the review were summarized by consensus by a pair of reviewers. As well, the following information was summarized: Objectives of the review, methods, quality appraisal procedure used, and list of studies included.

Summary of Study Selection

To summarize the process adopted for this systematic review, after merging the citations identified from the electronic search of the seven databases, removing duplicate citations, reviewing personal libraries, reviewing reference lists from applicable studies, and reviewing peer-reviewed working papers from relevant research institutes, 4124 studies were reviewed for inclusion in this systematic review. Following the review of titles and abstract, and initial screening of full papers where necessary, a total of 35 quantitative studies, 15 qualitative studies and 15 systematic reviews met the inclusion criteria and were appraised further for methodological quality. An additional 30 papers were considered by the reviewers as supplemental or related articles to the primary article on the same study. A detailed breakdown of the flow of studies and of reviews from the initial search strategy to data extraction can be found in Appendix 2, Figure 2.3.

Eleven quantitative studies, 13 qualitative studies, and 9 systematic reviews met our quality appraisal criteria and proceeded to the data extraction stage. Critical appraisal of the quality of the research, including methodological details of each study reviewed for quality, methodological strengths and weaknesses, and recommendations for future research, were conducted for the quantitative and qualitative studies (Appendices 3 and 4). A list of all papers which were selected for quality appraisal and/or for data extraction is found in Appendix 5.1 for the quantitative studies, qualitative studies and systematic review papers. Additionally, a list of studies which were excluded after quality appraisal is found in Appendix 5.2. A summary of the

systematic reviews for which data was extracted is found in Appendix 6. Summary tables for systematic reviews, quantitative studies, and qualitative studies for which data was extracted are found in Appendices 7, 8, and 9, respectively. Copies of the papers of studies for which data was extracted, including all supplemental and related papers, are provided to this report.

Summary of RTW Conceptual Frameworks

In order to set the stage for reviewing current workplace-based RTW interventions within the larger context of the RTW process, we will briefly review the conceptual models of return to work.

The first conceptual model applied to return to work was the biomedical model. While it remains important not to lose sight of the physical realities of disability, the biomedical model, due to its narrow focus on physical illness and physical factors, soon became insufficient to explain work disability, a phenomenon involving complex social and psychological elements. In response to a growing dissatisfaction with the medical model, a descriptive model emerged identifying the structural components of return to work, which led to a recognition of the multifactorial nature of work disability (37;68;94). Frank and colleagues (37)characterize the main players involved in the RTW process as being the employer/workplace, the healthcare provider, the insurer, and the employee. Other researchers have refined the structural description of return to work, adding the psychiatric component (94), and economic, social and legislative factors (39;68).

In parallel to the structural description of work disability, its temporal aspect was incorporated in phase-specific models of disability. Phase-specificity models address the developmental character of the chronicity of disability (68;104). These models highlight the phase specificity of risk factors, of interactions with the social environment, and of interventions. Although models differ regarding the demarcation points between the Acute/Subacute/Chronic phases of disability, by six months post-injury, chronicity of work disability is established.

Recent conceptual models attempt to understand the actual mechanism of the impact of external factors on the worker and offer increased integrative and explanatory power relative to these impacts. The first integrative example is the biopsychosocial model (40;94) which includes the physiological, physical functioning, psychological, and social components of disability (95).

The second model, the Readiness for RTW model (34;35) considers two theoretical models as they apply to the behavior of returning to work: 1) the Readiness for Change Model originating from the field of health promotion (69;84;85) and 2) the phase-specificity models of occupational disability (68;104). Employee interactions with the workplace, the healthcare system, and the insurance system are considered as they impact on motivational dimensions of behavior.

Critical steps of empirical validation of a model concern its predictive value when tested within an intervention study. All models described highlight the multifactorial nature of work disability. There is now consensus that “all players need to get on the same side” (37), acknowledging that many actors are involved in the RTW process. However, a review on the causes of low back pain, and of effectiveness of intervention to prevent disability after its onset, goes further and suggests that to maximize effectiveness of interventions, they need to be closely tied to the workplace (38). This was also a recommendation included in the report to the Ontario WCB, in 1995, on the effectiveness of the community clinic intervention (99). The current review will focus on such workplace-based RTW interventions.

Summary of Review of Relevant Systematic Reviews

As a first step in the literature review, we wished to determine what systematic reviews of workplace-based RTW interventions had already been conducted. Our search yielded 15 systematic reviews meeting inclusion criteria, nine of which met our quality appraisal criteria and moved to data extraction (21;60;65;66;91-93;108;111). A detailed description of these reviews, along with summary tables of each review for which data was extracted, are found in Appendix 6 and 7 respectively.

In the selection process of the systematic reviews, we were more inclusive and considered reviews that examined interventions or strategies with a workplace-based component **or** that could potentially be implemented in a workplace setting. As such, of the nine systematic reviews, only two (66;108) were largely focused on workplace-based interventions, namely modified work (66) and general employment factors (108).

The nine systematic reviews covered the following interventions: Modified work (66;108), back schools (21;65;91;92;111), physical conditioning programs and exercise (91-93), multidisciplinary rehabilitation (47) and case management methods (91).

The outcomes of interest across the systematic reviews varied from return to work to quality of life outcomes such as pain, function and disability. Each of the reviews evaluated the evidence on their respective interventions of interest in terms of its effectiveness or effect on the outcome of interest. Given the multiple outcomes of interest in some reviews, effectiveness was loosely defined in these reviews to enable the synthesis of evidence. Consequently, for such reviews, it was not always possible to interpret the effectiveness of the intervention in terms of a particular outcome, such as return to work.

In summary, only two of the reviews focused on a workplace-based RTW intervention (66) or general work conditions (108). No systematic review attempted to obtain a comprehensive view of workplace-based RTW interventions. Our current systematic review provides some answers to this gap in knowledge. In addition, the following recommendations regarding the need for future reviews were made in the nine reviews:

1) To examine the effectiveness of various components of work modification

such as ergonomic and organizational modifications (66)

2) To examine the effectiveness of specific components of multidisciplinary rehabilitation e.g. work site visits (60)

3) To examine the cost effectiveness of interventions (65;111).

Our review adds to previous reviews in several ways. It focuses on a wide array of workplace-based interventions, and in that sense is comprehensive. We also incorporated the recommendations that emerged from the previous systematic reviews.

Systematic Review of the Quantitative Studies - The Essential Components of Workplace-based RTW Interventions

Before proceeding to the synthesis of the data extraction for quantitative studies, we will review the categorization of interventions and outcomes from the studies reviewed, and the best evidence synthesis guidelines used. The following tables are found in Appendix 1: 1) Summary of intervention characteristics for quantitative intervention studies (Table 1.2) 2) Summary of intervention characteristics for quantitative observational studies (Table 1.3) 3) Summary of outcomes and costs - Work disability duration, quality of life, costs (Table 1.4) 4) Summary of quantitative study characteristics, methodological quality, and intervention description (Table 1.5) 5) Summary of confounding variables, statistical analyses, outcomes and findings for quantitative studies (Table 1.6) 6) Work site visit characteristics by study for quantitative studies (Table 1.7). Detailed summary tables for each study are found in Appendix 8. A conceptual diagram summarizing the types of interventions found in the studies reviewed is found in Figure 2.4 of Appendix 2.

Categorization of interventions reviewed

Interventions used in the studies reviewed varied greatly. To assist us in making comparisons across studies and to interpret results, we adapted a conceptual model of intervention developed by Contandriopoulos and colleagues (22). These researchers have proposed a conceptual model of evaluation of interventions. Their model conceptualizes interventions as " systems of organized actions aiming to modify the anticipated course of a phenomenon in a given environment, in a given period of time, to provide a solution to a problematic situation. All systems of organized actions can be described in five components: A structure, actors and their practices, processes of actions, outcomes, and an environment" [1]. Their model has previously been applied to interventions aimed at keeping job attachment in injured workers (12).

[1] The cited text in quotation is a translation from the french text of the authors, in their 2000 publication.

Based on an adaptation of the model, we have developed a conceptual diagram (Figure 2.4 in Appendix 2) grouping all key interventions generated by data extraction in the intervention groups (no control group), using the model proposed by Contandriopoulos (22). To simplify the model, we have not included the targeted outcomes - diminishing duration of work disability, improving quality of life and health of worker, reducing costs associated with work disability.

In our adaptation of the model of Contandriopoulos, there are three types of structures posited by the model and which are inter-related. The first structure component, the *Organizational structure,* refers to workplace-based policies, rules, and regulations which govern how resources, such as power and financial resources, are allocated and exchanged. In the 11 studies reviewed, top management support for disability management, proactive RTW philosophy, and joint labour-management committee, emerged as organizational structure components relevant to return to work. Of the 11 studies, five studies (2;23;24;48;55;73-77;107;113-115) examined at least one organizational structure component (Tables 1.2 and 1.3 in Appendix 1).

The second structural component, the *Physical structure and human resources*, refers to the availability and organization of human resources, financial resources, information - this will be strongly linked to size and sector of the firm. To simplify our adapted model, we have combined “actors’ with “human resources”, which are separate components in Contandriopoulos’ original model. The most common actors in the studies reviewed were the worker, supervisor, ergonomist, and healthcare providers. In some cases they were third parties, as they were not a workplace staff member.

The third structure, the *Cultural structure* (referred to as *Symbolic structure* in Contandriopoulos’ original model), encompasses beliefs and values which impact on the communication amongst the actors and which impact on the organizational structure of a workplace. Cultural structures extracted from the 11 studies were the following: People-oriented culture, safety culture, and cooperative labour-management. Four of the 11 studies (2;23;24;48;55;73-77;107;113-115) examined at least one of the cultural structure components.

The *Environment*, which refers to the context in which a given intervention takes

place, includes social, legal, historical and economic factors. The environment influences all of the components of the model. Given that the 11 studies were conducted in different countries, the environment of studies varied greatly.

The central component to our diagram, *Process and practice*, refers to the activities by which resources are mobilized by actors to arrive at the targeted outcomes. We organized the emerging intervention components into three categories: Core Disability Management (Core DM), Additional DM Features, and Education. The *Core DM* were defined by two criteria: 1) They were frequently found in the interventions of studies reviewed 2) They are components which are well-established disability management activities (15;78) . The three components meeting those two criteria, the ***Core DM components***, were : Early contact with the worker, Contact between healthcare provider (HCP) and workplace, and Work accommodation offer.

- **Early contact** was specified as part of all studies, except in two studies (27;88-90).
- **Work accommodation** offer was part of all studies, except for one study (59).
- **Contact between HCP and the workplace** was part of all studies, except for two intervention studies (3;88-90), and two observational studies (14;27;54).

The ***Additional DM features*** are disability management practices which were either inconsistently found in the interventions studied, most of which have been endorsed as components which should be part of RTW interventions (15;78). They included work site visits, the practice of supernumerary replacements, combined occupational-clinical approach, presence of an RTW coordinator, supervisor-worker meetings to discuss work accommodation or overall RTW process (with or without 3rd party involvement), conflict resolution option, and general ergonomic practices.

- **Work site visits** were part of the intervention in only five studies (3;8-11;23;24;45;59;73-77;107;113-115). They were conducted by different types of providers.
- **Supernumerary replacement** options were part of two interventions only (23;24;88-90;107;113-115).
- **Highly integrated combined occupational-clinical approaches** were part of

five studies (8-11;23;24;45;59;73-77;107;112-115). Integration of clinical and occupational approaches was defined by the content of the interventions or by the fact that a clinical intervention was offered at the workplace, or by an occupational healthcare provider from the workplace as an integrated member of the workplace culture, practices, and daily operations.

- **A designated RTW coordinator**, in-house or third party, was found in six of the 11 studies (2;3;8-11;23;24;45;48;55;88-90;107;113-115) .
- **Specified meetings between supervisor and worker** were part of four studies (3;8-11;45;59;73-77).
- **Conflict resolution** or the option of dispute resolution refers to the specification of that function as part of the role of a provider (e.g. RTW coordinator) or to a course of action to resolve such disputes. The conflict resolution option was only specified as an aspect of the intervention in one study (3) which involved an intervention provided by insurance case managers.
- **General ergonomic practices** were specified in two studies (2;8-11;45).

Many interventions included educational practices. They targeted three types of audiences: Injured or ill workers, workplace staff or union representatives, and healthcare providers. None of the 11 studies proceeding to data extraction included education for insurance case managers. Workers received education through pamphlets (59), continuous education provided by the workplace (8-11;45;88-90), or inservices on ergonomic aspects of their work and healthy lifestyle (23;24;107;113-115). Workplace staff or union representatives received training in general disability management, in how to use medical restriction forms (8-11;45), training in participatory ergonomics (73-77), support as needed from third party disability management expert (3;88-90), pamphlet on disability management (112), continuous education (8-11;45;88-90), and safety training (2;48;55). Education to HCP included training in disability management guidelines (112), support from disability management experts (88-90), and continuous education on disability management by the workplace (8-11;45;88-90).

Overall, this overview of interventions specified in the 11 studies reviewed suggests the following:

- Since the majority of studies reviewed were published in the last five years, we observed a strong trend for work accommodations to now be an automatic component of RTW interventions in high quality studies of workplace-based interventions. The uptake of that strategy was good as observed in high quality studies.
- The inclusion of the following Core DM strategies was also frequent in the high quality studies: Early contact with worker and HCP-WP contact.
- Additional features of DM strategies were less consistently included in interventions: Work site visits, supernumerary replacements, presence of an RTW coordinator, combined occupational-clinical approaches, supervisor-worker meetings, conflict resolution options, and ergonomic practices. The conflict resolution option was part of only one intervention.
- Educational practices for various actors involved in the RTW process were part of some workplace-based RTW interventions.
- The cultural and organizational structures related to the RTW process were recognized and measured in some workplace-based interventions studies. The impact of a cooperative labour-management relationship, which often translates into a joint labour-management committee, was discussed in the studies reviewed. The impact of safety culture and people-oriented culture, as well as policies resulting from top management support for DM, were also measured in studies of workplace-based RTW interventions.

Categorization of outcomes examined

Two types of outcomes were considered in the literature review of the quantitative studies: Work disability duration and quality of life. In addition, studies that analyzed costs as well as outcomes were considered in a separate category. As noted, analyses of this type were categorized as economic analyses and are referred to as such throughout this document.

Work disability duration outcomes

Work disability duration remains the most commonly used outcome in RTW research. Many types of outcomes fall into this category: Time of first return to work, total work disability duration within a given time period, point-prevalence of RTW status at a given point in time, number of recurrences within a given time period, and average duration of recurrences. In all studies retained for data extraction, the work disability duration was obtained from administrative database or from self-report (Table 1.4 in Appendix 1). Differences between work disability duration obtained from administrative database and from self-report are well-known. Administrative database reflect time on benefits which does not necessarily concur with actual return to work. Previous research has documented how there is a great discrepancy between RTW measures from administrative database and self-reported return to work, which increases with time (28). It is therefore important to examine both types of outcomes.

Quality of life outcomes

We were interested in focusing on worker-centered outcomes, such as their quality of life. In this category, we found a wide spectrum of measures and constructs in the studies reviewed. Four main constructs emerged: General health, condition-specific functional status, symptom severity, and pain levels.

All constructs were measured by self–report using various instruments, most of which had established reliability and validity. Despite the fact that these constructs do not measure exactly the same phenomenon, they are highly correlated. For that reason, and to make the level of detail in the synthesis manageable with regards to its level of

detail, we collapsed across constructs to report on quality of life outcomes. Finer details of the instrumentation used are found in the data extraction tables of the studies.

It should be mentioned that we had also planned to conduct evidence synthesis regarding quality of work life as an outcome. However, none of the studies reviewed included such an outcome.

Economic analyses

Economic analyses considered the following four costs: Wage replacement costs, compensated healthcare costs, other healthcare costs, and intervention costs. The comparability of these analyses is limited by the fact that the various jurisdictions of the studies reviewed are associated with important differences in the way the compensation and the healthcare systems function. Since, few studies reported intervention program costs, it was not possible to calculate outcome/costs ratios, if it was not already reported.

Few studies used statistical analyses to evaluate the significance of differences in the costs associated with alternative interventions/strategies. The absence of use of statistical analyses observed deserves some discussion as it is related to two issues. First, claims costs data distribution are highly skewed as a small percentage of individuals incur the largest percentage of costs and this distribution violates the assumptions of normality (63). Due to the skewed distribution of costs, statistical analyses are more likely to result in non-significant results. Secondly, very small and statistically non-significant differences in costs can nevertheless translate into large net cost reduction at a population level - for that reason, many researchers choose not to use statistical analyses in their economic analyses. Therefore, we retained studies which did not use statistical analyses in the synthesis of studies that have undertaken economic analyses.

Although the different types of costs examined in the studies are not directly comparable, we combine studies across categories of costs as a first step to the synthesis of evidence, with details of the specific economic analyses undertaken and the results of the analyses being discussed.

Best evidence synthesis guidelines

The nature of the research in this area is marked by a high level of heterogeneity in

terms of study designs, types of interventions, population sampled, units of analysis, statistical analyses used, and jurisdictions. Such a high level of heterogeneity in various features of the studies precludes the use of meta-analysis to make comparisons. Consequently, we use a synthesis technique develop by Slavin known as “Best evidence synthesis” (100;101).

Best evidence synthesis is based on three aspects of the evidence on a particular subject matter: Quality, Quantity, and Consistency. Quality refers to the methodological quality of studies examining a given subject, quantity refers to the number of studies, and consistency refers to the consistency of results observed.

Studies investigating a particular relationship were ranked on a scale from strong evidence to no evidence, with moderate evidence, limited evidence, mixed evidence, insufficient evidence, coming between the two extremes. The specifics of our best evidence guidelines are found in Table 5. They are based primarily on the best evidence guidelines used in a systematic review of prevention incentives of insurance and regulatory mechanisms for occupational health and safety conducted by Tompa and colleagues from the Institute for Work & Health (110).

Table 5. Best evidence synthesis guidelines

Strong evidence
Minimum quality: Very high
Minimum number of studies: 3 very high quality studies
Consistency: Very high quality studies must all agree, and > 50% of high quality studies are consistent with very high quality studies.

Moderate evidence
Minimum quality: High
Minimum number of studies: 3 high quality studies
Consistency: > 100% of high quality converge on the same finding
OR
66% of very high quality studies converge on the same findings,
with> 50% of other studies are consistent with very high quality studies.

Limited evidence
Minimum quality: High
Minimum number of studies: 2
Consistency: Two studies converge on the same findings.

Mixed evidence
Minimum quality: High
Minimum number of studies: 2 or 3
Consistency: If there are two studies, they do not converge on the same findings. If there are three studies, only two are consistent.

Insufficient evidence
Minimum quality: High
Minimum number of studies: 1

No evidence
There are no high of very high quality studies on the subject.

Synthesis of evidence

In the studies reviewed, the RTW intervention always consisted of several components and across the studies, the mix of components varied. This limited the degree to which the evidence available can provide definitive answers. This is an important caveat which needs to be kept in mind throughout this literature review. In that regard, using a best evidence synthesis, where the evidence for a given component is considered across a group of studies, strengthens our synthesis approach.

Based on our inventory of intervention components found in the very high and high quality studies, and on our knowledge of the current state of disability management for return to work, we focused our best evidence synthesis on the relationship between the

three categories - work disability duration, quality of life, and economic analyses - and the following themes:

1. The three **Core DM components** - Early contact, Work accommodation, and Contact between HCP and the workplace
2. **Work site visit** component in interventions
3. **Supernumerary replacement** component in interventions
4. Presence of **RTW coordinator** in interventions
5. **Educational component** in interventions
6. **The relationship between healthcare provider and the workplace - A continuum of integration** (Narrative review)
7. **Cultural and organizational workplace factors**

We conducted a narrative review for item 6 focused on the issue of the relationship between healthcare provider and the workplace, as a best evidence synthesis was not possible due to the heterogeneity of the interventions involved. We considered studies with combined occupational-clinical interventions and the role of the healthcare provider. We did not focus a best evidence synthesis on the presence of supervisor-worker meeting as it was too confounded with the presence of a work site visit, with the work site visit at times being the forum for the meeting. We did not examine the option of conflict resolution as it was found in only one study (3). We also did not address the role of general ergonomic change in the workplace, as this was often offered with the first goal of primary prevention.

The Three Core Components

What is the impact of interventions with early contact with worker, work accommodation offer, and contact between healthcare provider and workplace?

Of the 11 intervention studies reviewed, six studies (2;8-11;45)(48;55)(73-77)(112)(23;24;107;113-115) included all three Core disability management components - Early contact with worker, work accommodation offer, and contact between healthcare provider and workplace**.** It is important to note that our labeling of the core disability management components were based not only on their endorsement by NIDMAR (78) and groups of researcher (15), but also by their high frequency in the studies reviewed. In that sense, we do not advocate that these three

components should be the only core components - the next sections of this report will address other important components of disability management and suggest they be core components of workplace-based RTW interventions.

Two studies were of very high quality - One American study was a prospective observational prospective cohort of workers with carpal tunnel syndrome (2) and the other study was a Canadian randomized controlled trial involving occupational, clinical, combined occupational-clinical, and usual care interventions (73-77). Four studies were of high quality (8-11;45)(48;55;112)(23;24;107;113-115): One American study was a cross-sectional survey of workplace RTW practices (48;55); The American study by Bernacki (8-11;45) was a before-after study without control group conducted in two large healthcare facilities; The Dutch study by Verbeek (112) was a randomized controlled trial focusing on training of occupational physicians in guideline-based intervention; The Canadian study by Yassi (23;24;107;113-115) was a non-randomized controlled trial conducted with injured nurses. These six studies will be examined in terms of their impact on work disability duration, quality of life outcomes, and costs.

Effectiveness: Work disability duration outcomes

The study conducted by Bernacki (8-11;45) did not use statistical analyses to examine the work disability duration outcomes. Consequently, it was not used in the best evidence synthesis for this outcome, and left five studies for consideration (2;48;55)(73-77)(112)(23;24;107;113-115).

The very high quality study by Loisel (73-77) included three intervention arms - occupational, clinical, combined occupational-clinical - and usual care. All three interventions included the three core disability management components. However, the three interventions differed in the intensity of the three components considered: 1) The contact with worker occurred earlier in the occupational and combined occupational-clinical interventions 2) The work accommodation component was of higher intensity in the occupational and combined interventions 3) The intensity of contact between healthcare provider and workplace was higher in the clinical and combined interventions, as compared to the two others. At the one year follow-up, when examining median time of work disability, the two interventions with the occupational component (occupational and combined occupational-clinical) led to a 49% reduction in work disability duration, as compared to the two interventions without. Participants obtaining the occupational component returned to work 1.91 times faster than participants in the other two interventions. The clinical component led to more modest reductions in work disability duration, which were not statistically significant. However, at the 6.4 year follow-up, the initial advantage of the occupational component disappeared: The occupational intervention led to a 45% reduction in mean total work disability duration as compared to usual care; The combined intervention led to a 70% reduction; The clinical intervention led to a 57% reduction. Taken together, this trial supports the effectiveness of the three core disability management components when offered concurrently.

One other Canadian study by Yassi (23;24;107;113-115), a high quality non-randomized controlled trial, also supported the effectiveness of the three core disability management components. Participation in this combined occupational-clinical intervention was predictive of shorter duration of lost-time claims during the study by as much as 45 days ($p<0.016$) at the one-year follow-up. The intervention offered to both

work-disabled and non work-disabled injured nurses led to 29% decrease in lost time (before-after comparison) as compared to a 51% increase in the group not receiving the intervention.

The high quality Dutch randomized controlled trial by Verbeek (112) examined the impact of an intervention involving training of occupational physicians in guideline-based management of low back pain. This study did not show positive impact of the intervention in terms of work disability duration.

Two observational studies, a very high quality prospective study by Amick (2) and a high quality cross-sectional study by Habeck (48;55) found the three components associated with reductions in work disability duration.

Taken together, the best evidence synthesis approach provides **moderate evidence** that the three core disability management components of early contact with worker, work accommodation offer, and contact between healthcare provider and workplace, have a positive impact on work disability duration. There is **insufficient evidence** to support the sustainability of this effect beyond 1 year following participation in the intervention program.

Effectiveness: Quality of life outcomes

The studies by Amick (2) Bernacki (8-11;45), and Habeck (48;55) did not include quality of life outcomes. Consequently, only the studies by Loisel (73-77), Verbeek (112), and Yassi (23;24;107;113-115) will be considered in the best evidence synthesis for quality of life outcomes.

In the study by Loisel (73-77), results regarding quality of life outcomes were mixed at the one year follow-up: Participants receiving the occupational intervention showed reduced symptom severity as compared to the other groups; however, differences in condition-specific functional status and pain level were non-significant. In the combined intervention, improvement in functional status only was observed. In the clinical intervention, only reductions in pain levels were observed, with no significant differences in functional status or symptom severity.

In the randomized controlled trial by Verbeek (112), there were no differences in pain intensity, condition-specific functional status, and general health perception at the 3

month and 12 month follow-ups.

In contrast, in the high quality study by Yassi (23;24;107;113-115), nurses receiving the intervention including the three core disability management components showed improved functional status at six months follow-up.

Overall, there is **mixed evidence** regarding the impact of interventions which include the three core disability management components on quality of life outcomes.

Economic analyses

Only three studies (8-11;23;24;45;73-77;107;113-115) considered costs. The high quality Bernacki study (8-11;45)used a before-after study design without control group to examine the impact of a comprehensive case management RTW intervention in two large American healthcare institutions. This intervention resulted in a meaningful reduction in costs, primarily associated with temporary total disability wage replacement and medical care costs. This analysis had factored in the program costs, when examining the program's performance over a 10 year period.

In the very high quality study by Loisel (73-77), at the one year follow-up, a cost-benefit analysis was conducted, calculated by subtracting additional intervention costs (as compared to usual care) from the costs saved in wage replacement by the interventions relative to usual care. Using this approach, the occupational intervention was less costly compared to usual care, but the clinical and combined occupational-clinical interventions were not. At the 6.4 year follow-up however, all experimental interventions were less costly than usual care. At the one year follow-up, the occupational intervention was more most cost-effective in terms of cost for each saved day on full benefits. At the 6.4 year follow-up, all interventions were more cost-effective than usual care.

In the high quality study by Yassi study (23;24;107;113-115), the intervention resulted in a reduction in total workers' compensation costs (includes wage replacement, medical assessment, and treatment costs) compared to standard care. When only the group of participants with lost-time claims was examined, participants in the intervention group had higher medical costs than in the standard care group, however this was more than offset by their lower wage replacement costs.

Overall, there is **moderate evidence** that interventions which include early contact with the worker, work accommodation offer, and contact between healthcare provider and workplace have meaningful impact on costs as well as consequences. There is **insufficient evidence** to support the sustainability of this effect beyond 1 year following participation in the intervention program.

- There is **moderate evidence** that the three core disability management components of early contact with worker, work accommodation offer, and contact between healthcare provider and workplace, reduce work disability duration.
- There is **insufficient evidence** to support the sustainability of the effect on work disability duration beyond 1 year following participation in the intervention program.
- There is **mixed evidence** regarding the impact of interventions which include the three core disability management components on quality of life outcomes.
- There is **moderate evidence** that interventions including the three core disability management components lead to a reduction in costs.
- There is **insufficient evidence** to support the sustainability of this effect on costs beyond 1 year following participation in the intervention program.

In all intervention studies, early contact occurred within the first 3 months following onset of work disability, and in some cases (3)(8-11;23;24;45;107;113-115), contact occurred within the first week of work disability. In addition, the person initiating the contact varied, as it could involve the workplace, an insurer, or a healthcare provider.

Regarding the work accommodation component, its effectiveness in reducing work disability duration is well-supported by a high quality systematic review (66). As well, two prospective cohort studies in this review (14;27;54) support the effectiveness of work accommodations in reducing work disability duration. Of interest is the finding by Hogg-Johnson and Cole (54) that work accommodations have the most significant impact

for 1) workers with decreasing pain levels but low functional status or recovery expectations or 2) workers with stable or worsening pain irrespective of functional status and recovery expectations. Those without workplace accommodation offers in these groups had significantly longer time receiving wage replacement than those who were offered workplace accommodations.

Regarding the contact between healthcare provider and the workplace, we have conceptualized this type of communication as occurring along a continuum - this will be discussed in greater detail in a subsequent section on healthcare providers.

Finally, there was mixed evidence regarding the impact of interventions with the three core disability management components on quality of life outcomes. This is obviously of concern. However, this finding needs to be considered with caution and relates to one of the most difficult question to resolve in the disability management area regarding early return to work - how early is too early? On the one hand, it may be expected that workers who return to work earlier experience lower levels of general health at the outset, with the intended goal of reaching later better health - the idea of "short-term pain for long term gain". However, there needs to be a limit respected in terms of how much pain, symptoms, and poor health workers should tolerate before they are considered to be no longer fit to return to work.

Certain methodological aspects of the studies examining quality of life outcomes need to be considered. First, the duration of follow-up periods had a maximum length of 12 months, which prevented examination of gains beyond this period of time. Secondly, most measures used to examine functional status were condition-specific (23;24;73-77;107;112-115); These are appropriate as they have been found to be more sensitive to change than general measures of functional status such as the SF-36 (44) and single-item general health assessments (61). In two studies however general measures of health or of symptom severity were used (73-77;112). However, the pattern of results did not reflect a measurement bias effect: Positive results were found for both condition-specific measures (23;24;73-77;107;113-115) and for general measures (73-77); Negative results were found for both condition-specific measures (73-77;112) and general measures (112). In addition, small sample sizes may have led to insufficient

power to detect significant differences. Finally, it remains unknown if work-disabled workers are in poorer health even prior to their work disability onset, which would impact on what can be reasonably expected in terms of health after return to work. Recent data from British Columbia shows that during the 12 month prior to making a claim for a work-related injury, healthcare workers had a higher utilization of general healthcare services compared to an age and gender-matched comparison population (64). This may suggest that some workers are in poorer health and more vulnerable to work place injuries.

The risks of returning workers too soon, such as risk of recurrence, or setting up negative expectations in co-workers regarding the general process of return to work, should not be underestimated. Future research is needed to further understand the complex relationships between worker health, workplace injuries, and RTW interventions.

Work Site Visits

What are the added benefits of work site visits as components of *Return-to-work* interventions?

Work site visits were inconsistently found in the RTW interventions reviewed. Of the 11 studies remaining for synthesis of evidence, five included a work site visit in their intervention**.** This may be associated to the fact that work site visits are usually conducted by a third party, with expertise in assessment of ergonomic and psychosocial demands of work, which represents costs for the workplace and requires coordination on the part of the workplace.

Three studies were of very high quality (3;59;73-77) , and two of high quality (8-11;23;24;45;107;113-115). The degree to which the design of each study addressed the question of the additional value of a work site visit varied. The three very high quality studies by Arnetz (3), Karjalainen (59), and Loisel (73-77) addressed the question of the additional value of the work site visit most directly.

The Swedish study by Arnetz (3), examined the impact of an insurer provided RTW-focused case management and focused on the work site visit component and work accommodation process, without a focus on clinical intervention. It included the

occupational case management intervention, and the reference group was usual case management.

The Canadian study by Loisel (73-77) included three interventions and usual care arm. Two of the interventions (occupational and combined occupational-clinical) included a work site visit, while the clinical intervention arm did not.

The Finnish study by Karjalainen (59) included a clinical mini-intervention group, a clinical mini-intervention + work site visit group, and a usual care group.

Compared to the three very high quality studies, the design of the Canadian study by Yassi (23;24;107;113-115) was not as directly focused on answering the question of the additional value of the work site visit. The intervention included work site visits, along with assessment and treatment by a physiotherapist, modified work, work hardening, education to workers, and supernumerary replacements. It was compared to usual care only. It was therefore more difficult to assess the incremental value of a work site visit.

In the American study by Bernacki (8-11;45), the work site visit was only one component of a very comprehensive array of disability management strategies - at the time, when RTW interventions were only beginning to be studied, this comprehensive approach was appropriate to answer the question - does everything work? In that regard, it is very difficult to assess which observed effects are attributable to the work site visit. No statistical analyses were conducted for any of the outcomes of focus for this literature review in the study by Bernacki (8-11;45). It will therefore not be included in the synthesis of evidence for work disability duration and quality of life outcomes, but the study will be retained for evidence synthesis of costs.

It is important to note the differences in the work site visits offered in the five studies reviewed (Table 1.7 in Appendix 1). Individuals from various disciplines were involved in conducting work site visits: Occupational therapists, ergonomists, and physiotherapists. The timing of the work site visits also varied: The occupational interventions in both the Arnetz (3) and Yassi (23;24;107;113-115) studies were marked by very early initiation (within first week of work absence), while in the Loisel study (73-77), the work site visit occurred after 6 weeks of work absence. The degree to which other healthcare and workplace individuals were involved also varied: At one end of the

continuum, in the Karjalainen study (59), the worker, the supervisor, company nurse, and company physician were all asked to attend the visit led by the physiotherapist, and the visit was followed by a written report to the company physician and the worker's GP, with a suggestion to also provide it to the manager of the worker. The other studies were less inclusive in the number of individuals involved in the visit, and the intensity of follow-up. The sampled population also varied. The most prominent difference in studies reviewed relate to the working status of participants. While in the Arnetz (3), Bernacki (8-11;45) and Loisel (73-77) studies, only work-disabled participants were included, the Yassi (23;24;107;113-115) and Karjalainen (59) studies included individuals who were symptomatic or who had made a workers' compensation claim, but who did not necessarily have a work absence.

The work site visit components of the interventions frequently included the presence of the supervisor during the visit or follow-up discussion in the presence of a third party, as in the studies by Bernacki, (8-11;45), Karjalainen, (59) and Loisel (73-77). In the Arnetz study (3), a meeting between supervisor and employer was part of the RTW intervention. The only study which did not specify the presence or role of the supervisor with regards to the work site visit was the study by Yassi (23;24;107;113-115). The importance of the role of the supervisor in the RTW process is increasingly being recognized, as will be apparent in our review of the qualitative studies in this area. The supervisor or manager can have a profound impact on the daily RTW trajectory of a worker, possibly more so than more distant parties. This possible confounding factor of presence and involvement of supervisor/manager needs to be kept in mind when examining the impact of work site visits.

Effectiveness: Work disability duration outcomes

In two of the three very high quality studies - Arnetz, (3); Loisel, (73-77), the interventions including a work site visit were associated with important reductions in work disability duration. In the study by Arnetz (3), at one year follow-up, the intervention with a work site visit led to a 27% reduction in total work disability duration. In the study by Loisel (73-77), at the one year follow-up, when examining median time of work disability, the two interventions with a work site visit (occupational and combined) led to a 49% reduction in

work disability duration, as compared to the two interventions without. The overall pattern of results in the Loisel study (73-77), where the two interventions with a clinical component led to much more modest reductions in work disability, suggest that the effective component in the combined approach was the occupational intervention (which included a work site visit). However, the initial advantage of the work site visit disappeared at the 6.4 year follow-up: The occupational intervention (with a work site visit) led to a 45% reduction in mean total work disability duration as compared to usual care; The combined intervention led to 70% reduction; The clinical intervention led to a 57% reduction.

In the study by Karjalainen (59), adding a work site visit to a clinical intervention of low intensity did not result in any reductions in work disability duration at the one year follow-up. However, the work site visit in this study was not of high intensity in terms of ergonomic input - it was focused on general “good back habits”. Recommendations of the physician included recommending a work accommodation in only 11% of the cases in the mini-intervention group, and 12% in the mini-intervention + work site visit group. The absence of effect for the work site visit also has to be tempered by fact that individuals participating in the study were not severely limited in their ability to work: First, they were not all off work when entering the trial, second, severity of work limitations at baseline was low. Only 67 to 79% of participants in each group reported at baseline that their pain had interfered, “quite a bit” or “extremely”, with work or daily life during the past week. Hence, it is possible that for individuals who were still functioning relatively well at work despite low back pain, a work site visit mainly focused on good back habits had limited impact on subsequent work absence. These results come in parallel with those reported by Hogg-Johnson & Cole (14;54), which show that work accommodations are most beneficial for workers with worsening or stable pain, poor functional status, and poor recovery expectations, but have little impact on less severely impaired workers (14;54) .

Turning to the high quality study by Yassi (23;24;107;113-115), this study showed that an early intervention with work site visits for both work disabled and non work disabled injured nurses led to 29% decrease in lost time (before-after comparison) as compared to a 51% increase in the group not receiving the intervention.

Overall, there is **moderate evidence** that programs which include work site visits result in reductions in work disability duration in the short-term, that is at one year follow-up. However, there is **insufficient evidence** to support the sustainability of this effect in the long-term as only one study examined the long-term impact at a mean of 6.4 year follow-up (73-77) . This finding is not surprising given that over time, the survival curve for return to work of lost-time claimants flattens to a degree to which very little improvement can be expected, when only the “most difficult” cases remain off work - it is in the middle portion of the curve, corresponding to time between 1 month to 1 year, where changes resulting from intervention are most likely.

Effectiveness: Quality of life outcomes

Four studies included a quality of life outcome (3;59;73-77). Of the three very high quality studies, evidence for a positive impact of interventions including work site visits on quality of life outcomes, as compared to interventions without a work site visit, was limited.

In the very high quality study by Arnetz (3), when returning to work, more participants in the intervention group reported feeling in better general health than in the control group. However, in absolute terms, only 22 % of workers in the intervention group and 9% in the control group actually reported feeling healthy and recovered. Furthermore, at the six month follow-up, there were no significant group differences in self-reported health, with 35% of the participants rating their health as “very good” or “fairly good”. This stands in marked contrast to assessments conducted in the general population where 80% rate their health as very good or fairly good (26).

In the very high quality study by Loisel (73-77), as discussed in the last section, results regarding quality of life outcomes were mixed. In the very high quality randomized controlled trial of Karjalainen (59), fewer participants receiving the intervention with a work site visit reported presence of daily pain as compared to the usual care group. Results were comparable however to the intervention group receiving the clinical mini-intervention without the work site visit, indicating no added benefit for the work site visit. Similarly, there were no benefits of adding a work site visit when considering measures of how bothersome pain was or interfered with daily activities. In contrast, in the

high quality study by Yassi (23;24;107;113-115), nurses receiving the intervention with a work site visit showed improved functional status at six months follow-up.

To summarize, the Arnetz study (3) did not provide evidence for a sustained positive impact on perceived quality of health; In the Loisel study (73-77), the evidence was mixed, and did not support a positive effect on quality of life outcomes; In the Karjalainen study (59), there was evidence for no impact of work site visits on quality of life; Only in the Yassi study (23;24;107;113-115) was there evidence for a positive impact on functional status. We conclude that there is **moderate evidence** that interventions which include a work site visit are **not** associated with gains in quality of life for injured and ill workers.

Economic analyses

All five studies with work site visits in their intervention considered costs in their analyses. Three of the five studies were very high quality studies. In the very high quality study by Arnetz (3), the authors reported a benefit-to-cost ratio of 6.8 from the intervention including the work site visit. However, the manner in which this ratio was calculated was not specified. Our own analyses led to a more modest benefit-to-cost ratio of 4.1, where benefits included a reduction in both compensation costs and reimbursement costs from health insurance, and costs included direct cost of the intervention. In the very high quality study by Loisel (73-77), with a follow-up of a mean of 6.4 years, all three interventions - occupational, clinical, and combined - were associated with reduced costs (both wage replacement costs and interventions costs were considered) and of cost-effectiveness (cost of each saved day on benefits). The remaining three studies (8-11;23;24;45;59;107;113-115) did not provide program and cost data which precluded calculation of outcome/cost ratios.

In the very high quality study by Karjalainen (59), the intervention with a work site visit resulted in meaningful savings in costs of diagnostic tests and radiological examinations as well as fewer visits to physiotherapists, as compared to the usual care group. The differences in costs were not statistically significant between the clinical mini-intervention and the usual care groups. Both the clinical mini-intervention and the mini-intervention + work site interventions resulted in reduced direct healthcare costs and

combined healthcare and wage replacement costs, however these were not statistically significant. As noted before, in the high quality study by Yassi (23;24;107;113-115) which included a work site visit, the intervention was associated with meaningful cost reductions. In the high quality study by Bernacki (8-11;45), the occupational case management intervention was associated with meaningful savings in compensation costs (both wage replacement and medical care costs). This analysis included the intervention costs, when examining the intervention's performance over a 10 year period.

Only in the studies by Loisel (73-77) and Karjalainen (59) were economic analyses conducted by examining their statistical significance.

Summary

Overall, there is **moderate evidence** that interventions which include work site visits lead to reduced costs.

- There is **moderate evidence** that programs which include work site visits result in reductions in work disability duration within the first year following participation in the intervention program.
- There is **insufficient evidence** to support the sustainability of this effect beyond 1 year following participation in the intervention program.
- There is **moderate evidence** that interventions which include a work site visit are **not** associated with gains in quality of life aspects.
- There is **moderate evidence** that interventions which include work site visits lead to a reduction in costs.

The absence of sustainability of the positive effects of work site visits on work disability duration is surprising and deserves further research. It suggests that follow-up visits or “booster visits” may be necessary to ensure that effects remain sustainable. One single visit with one follow-up meeting may simply not be of sufficient intensity over time to maintain the initial positive effects. However, it is important to note again that in view of the very nature of the shape of the survival curve for RTW events, the degree to which improvements can legitimately be expected at the very end of the curve, corresponding to impact on cases with longer duration of time elapsed since work disability onset remains extremely limited.

If work disability duration is reduced, one expects to observe parallel reductions in costs arising from compensation costs. This is indeed observed for both wage replacement costs and health coverage costs. This indicates that cost reductions are not only related to wage replacement savings, but also to decreased health services costs. In the case of European countries, where the health insurance system includes both injury-related and non-injury related costs, this would suggest decreased healthcare utilization and possible concurrent improvements in general health. However, in the context of the North American system, where covered healthcare costs included in these studies typically reflect only compensable injury-related health services costs, one can

not eliminate the possibility that the interventions do not result in cost reductions associated with workers' healthcare utilization of non-injury related services. The possible negative "cascading effect" (53) on health following an injury will not be captured by studies which only focus on injury-related healthcare costs. Future studies might consider a broader range of healthcare expenditures in their costs.

The studies discussed had other RTW intervention components in conjunction with the work site visit component. This of course limits the degree to which the effectiveness and cost reductions can be attributed to the work site visit. In particular, because work site visits and involvement of supervisor were so closely tied, it is possible that the supervisor plays an essential role in ensuring a positive impact of a work site visit. A meeting between the supervisor and employee in the presence of a third party may be a critical process to support the positive impact of a work site visit, and possibly to support a favorable RTW process. To go even further, it is also possible that the work site visit and supervisor involvement are so confounded that it is not possible at this point to ascertain which component, work site visit or supervisor involvement, is responsible for the observed effects.

Finally, there was moderate evidence that interventions with work site visits do not lead to quality of life improvements. This is obviously of concern as the quality of life indices of participants reflected a lower health status than the general population (3), however methodological issues and a consideration of what can be reasonably expected within the context of return to work qualify this finding.

Supernumerary replacement

What is the evidence for the effectiveness and impact on cost of supernumerary replacements as part of a RTW intervention?

Supernumerary replacements occur when financial support is available to cover the cost of an additional person to replace the injured or ill worker, while the worker is doing modified work. The funds can be provided by a state insurance company, such as in the case of the Norwegian study by Scheel (88-90) and of the Canadian study by Yassi (23;24;107;113-115). Private insurance companies or the employer can also cover the costs. These types of arrangements still occur very infrequently.

Supernumerary replacements could be powerful components of RTW interventions as they benefit multiple actors in the RTW process. They can remove the added burden to co-workers when a worker returns to work on modified duty. They can remove the burden of added costs of reduced productivity to the employer. They can also remove the pressure on a worker who returns to work on reduced hours or lighter duties as extra help is available to complete the work assigned.

Only two of the 11 studies reviewed included supernumerary replacements as part of the intervention (23;24;88-90;107;113-115). Furthermore, one of those studies, the Scheel study, was well designed to examine the effectiveness of an education and support program on the use of Active Sick Leave (ASL) by physicians, but not well designed to examine the impact of ASL per se, which included supernumerary replacements. For that reason, it will not be considered in the body of evidence of supernumerary replacements.

This leaves the one study of high quality by Yassi (23;24;107;113-115), which, as reviewed in the previous section, shows that the intervention with the supernumerary replacement component led to reductions in work disability duration and functional status, as well as to cost reductions. Given that only one study examined the impact of an intervention with supernumerary replacements, we conclude that there is **insufficient evidence** to support the effectiveness of this intervention component in terms of its impact on work disability duration and quality of life outcomes, as well as to support positive impact on costs. Clearly, more research is needed on this strategy for RTW

interventions.

- There is **insufficient evidence** to support the effectiveness a supernumerary replacement component in terms of it impact on work disability duration, quality of life outcomes, and costs.

RTW Coodinators

How critical is the role of RTW coordinators?

Of the 11 studies, six studies included the presence of RTW in the intervention, or strategies considered; Four intervention studies (3;8-11;23;24;45;88-90;107;113-115) included a designated RTW coordinator, in-house or third party, in their intervention, and two observational studies (2;48;55) examined the relationship between the presence of a RTW coordinator and RTW outcomes. One of the intervention studies was of very high quality (3), two of high quality (8-11;23;24;45;107;113-115), one observational study was of very high quality (2) and one of high quality (48;55). The sixth study by Scheel (88-90) focused on the impact of an education program on the uptake of the Active Sick Leave (ASL) intervention, and not on the impact of the ASL intervention per se. For that reason, we did not include that study in this best evidence synthesis. However, we will discuss it at the end of this section as it has implications regarding the role of RTW coordinators. The study by Bernacki (8-11;45) is included in the best evidence synthesis for the economic analyses only, as no statistical analyses were conducted for the work disability duration, and no quality of life outcomes were included in that study.

Effectiveness: Work disability duration outcomes

Regarding the work disability duration outcome, as we discussed before, the insurer-based case management intervention in the very high quality study by Arnetz (3) led to dramatic reductions in work disability duration outcomes, and it involved a third party RTW coordinator. The intervention in the high quality study by Yassi (23;24;107;113-115) involved an in-house RTW coordinator, and this intervention also led to significant reductions in work disability duration. In the very high quality observational study by Amick (2) of individuals undergoing surgery for carpal tunnel

syndrome, the “Disability Management” group of interventions included the presence of an in-house RTW coordinator and was associated with a rate of return to work at six months post-surgery twice as high as the one observed in the absence of the disability management group of interventions. These results were adjusted for age, gender, and baseline carpal tunnel syndrome severity. In the high quality study by Habeck (48;55), the presence of a designated RTW coordinator was included in the “Proactive return to work” group of interventions. This group of interventions was significantly associated with reductions in lost work days (total number of lost-time work days per 100 employees). In view of these results, there is **moderate evidence** that interventions and programs which include the presence of a RTW coordinator are associated with shorter disability duration.

Effectiveness: Quality of life outcomes

Regarding quality of life outcomes, the Arnetz study (3) case management intervention did not lead to improved perceived general health, while the intervention in the study by Yassi (23;24;107;113-115) led to improved functional status at six months follow-up. None of the other studies with interventions including the presence of a RTW coordinator examined quality of life outcomes. There is therefore **mixed evidence** that the presence of a RTW coordinator in an intervention program leads to improved quality of life.

Economic analyses

Regarding costs, the intervention in the study by Arnetz (3) led to reductions in both total compensation costs (wage replacements and health reimbursements) and health reimbursements only. The intervention in the study by Yassi (23;24;107;113-115) was also associated with important reductions in wage replacement costs for the workers with lost-time claims, and in both wage replacement and healthcare costs covered by the workers’ compensation system for injured workers with lost-time or non lost-time claims. In the study by Bernacki (8-11;45), in which the intervention included an in-house RTW coordinator, the program was associated with important reductions primarily in medical costs and temporary total disability costs - the calculation of savings combined both incidence and duration aspects of work disability. None of the observational studies included consideration of costs. There is therefore **moderate evidence** that interventions

which include a RTW coordinator lead to meaningful cost reductions.

- There is **moderate evidence** that interventions which include the presence of a RTW coordinator are associated with shorter disability duration.
- There is **mixed evidence** that the presence of a RTW coordinator in an intervention leads to improved quality of life.
- There is **moderate evidence** that interventions which involve a RTW coordinator lead to meaningful cost reductions.

The mix of levels of evidence for the three outcomes needs to be considered in light of the discussion regarding the role of RTW coordinators in the randomized controlled trial of Scheel (88-90). In this Norwegian study, two educational and support interventions (Passive and Proactive), aimed at increasing the use of ASL among physicians, were examined against usual information to physicians. A RTW coordinator was present in the Proactive intervention only. It was observed that the increase in use of ASL observed in the Proactive intervention as compared to the Passive intervention dropped to zero as soon as the RTW coordinators were withdrawn from the program. The presence of RTW coordinators therefore had an important impact on the implementation and uptake of the educational program. The authors attribute the effects of the Proactive intervention on the use of ASL by physicians to the facilitative and coordinative impact of the RTW coordinator. This is an interesting observation which relates to the type of human resources needed to help a RTW program work.

Due to the low number of studies involving a designated RTW coordinator, it was not possible to examine the impact of having a third-party RTW coordinator versus an in-house one. There are pros and cons to each option - while a third party may offer more neutrality and a possibly perceived higher level of confidentiality, an in-house RTW coordinator may be more familiar with the workplace culture and daily aspects of conditions of employment in the workplace. In light of the mixed levels of evidence found, future research should be conducted regarding the overall impact of the RTW coordinator role and the specifics of its role. Future research should also focus on evaluating the

impact of having a third party versus an in-house RTW coordinator.

Education Component

The role of education for injured or ill workers, the workplace, healthcare providers and insurance staff in workplace-based RTW interventions

RTW interventions can include educational components targeting the injured or ill workers, the workplace, healthcare providers and insurance staff. These can have a wide ranging impact as the RTW process can become part of the usual tasks of a workplace staff such as managers, or healthcare providers. Very frequently informal education takes place among RTW parties. However this section focuses on formal educational components only of RTW interventions.

The educational components included in the 11 studies were often informal in nature and poorly documented. Only a limited set of studies were available for the best evidence synthesis regarding formal educational components offered to physicians, to the workplace, and to workers. No studies were available on education for insurance staff.

Education to healthcare providers

Three studies included education to healthcare providers as part of their intervention program - Bernacki (8-11;45), Verbeek (112), Scheel (88-90). The two studies by Scheel (88-90) and by Verbeek (112) address the question of the impact of educational programs for healthcare providers most directly. In the high quality study by Bernacki (8-11;45), education to preferred organization physicians consisted of the development of medical management guidelines and RTW protocols. The nature and uptake of these educational components was poorly specified and informal. Consequently, we have not included the Bernacki study (8-11;45) in the best evidence synthesis.

In the very high quality randomized trial by Scheel (88-90), two types of educational interventions - Passive and Proactive - were offered to general practitioners to increase their use of an already available insurance supported program of Active Sick Leave (ASL). The two interventions were compared against usual information provided to general practitioners. There were no group differences in either work disability duration

outcomes or quality of life outcomes. No economic analyses were included in this study. The main reason underlying the absence of group differences in the outcomes of interest may lie in the very poor utilization of the ASL program in all three interventions. Only 11.5% of workers in the Control and Passive intervention groups received ASL, and only 17.7% in the Proactive intervention group. As well, only 20% of the general practitioners attended the continuing education workshop offered as part of the Proactive intervention. The absence of effects was therefore not surprising in view of the implementation problems of the program.

In contrast, in the high quality randomized controlled trial by Verbeek (112), the attendance of the occupational physicians to the training sessions was acceptable - each of the 10 monthly sessions was attended by at least 60% of the occupational physicians. Nevertheless, the level of compliance to the actual intervention guidelines was poor - 14.3% failed to encourage activity, 17.4% failed to assess if current treatment was appropriate, and 46.7% did not re-evaluate the patient within three weeks of initial contact. As discussed before, there were no group differences in work disability duration outcome or quality of life outcomes between the interventions (guideline-based intervention by occupational physicians + pamphlet to supervisors) and the reference group (pamphlet to supervisors only). No economic analyses were included. The absence of effects could possibly be due to the unsuspected effects of the pamphlet to supervisors. However, the design of the study does not allow to assess this.

Overall, based on the studies by Scheel (88-90) and Verbeek (112), we conclude that there is **limited evidence** that guideline-based educational interventions for physicians have **no** impact on work disability duration outcomes and quality of life outcomes. There is **no evidence** regarding the impact of guideline-based educational interventions for physicians regarding cost reduction.

Education to the workplace

Six of the 11 studies included education to the workplace in the interventions, or examined its impact on at least one of our outcomes of interest. Of those, three studies included educational components for workplace staff which were too informal, too low in intensity, or too poorly described to include in our synthesis of evidence

(8-11;23;24;45;88-90;107;113-115). In the study by Bernacki (8-11;45), training of supervisors and employees in performing various tasks was conducted on an as-needed basis. In the high quality study by Yassi (23;24;107;113-115), education for workers and their workplace was included in the intervention - inservices were offered on the intervention wards and included information on proper body mechanics, safe methods for patient lifts and transfers, and healthy lifestyle. However, the degree to which the inservices were attended by staff was not reported. In the study by Scheel (88-90), targeted information about ASL was offered to workers with back pain, the employers, the healthcare providers, and the insurance staff. The nature of the targeted information was not described and did not represent a large part in the intervention, as the intervention was focused on other educational components for physicians. These three studies are not included for the following reasons: 1) poorly described interventions can not be replicated 2) the impact of interventions components of very low intensity are most likely overridden by components of higher intensity in the intervention 3) the impact of intervention components for which the uptake or exposure is not specified can not be evaluated.

Studies retained for the best evidence synthesis for education to the workplace are the following: The randomized controlled trial by Loisel (73-77), the prospective observational study by Amick (2), and the cross-sectional observational study by Habeck (48;55).

In the very high quality study by Loisel (73-77), the occupational intervention of the study and the combined occupational-clinical intervention of the study included a high intensity educational component for selected employees: A two-day workshop was offered during which management of occupational risk factors for back pain, ergonomic analysis, and methods used in participatory ergonomics were discussed. As discussed before, the occupational component of both of these interventions of the study was associated with positive work disability duration outcomes as well as with cost reductions, but mixed results were obtained regarding quality of life outcomes.

In the very high quality observational study by Amick (2) and the high quality observational study by Habeck (48;55), safety training provided to the workplace was

associated with reduced work disability duration.

Overall, there is **moderate evidence** that education provided to the workplace leads to reduced work disability duration. As only one study was retained for best evidence synthesis regarding quality of life outcomes and financial outcomes, there is **insufficient evidence** to make any conclusions regarding the impact of formal education to the workplace regarding those outcomes.

Education for injured or ill workers

The education components for injured or ill workers in the studies reviewed were either of low intensity, poorly described, or the exposure or uptake of the education was not specified. As discussed before, this was the case in the studies by Yassi (23;24;107;113-115) and Scheel (88-90). In the study by Bernacki (8-11;45), the education provided to workers was informal and its description was general. The study by Karjalainen (59) included a pamphlet on back pain for workers in all three interventions of the trial, including the usual care group.

The study by Arnetz (3) included one-on-one formal education for workers with MSK disorder in its insurer-based case management intervention. Vocational training was offered to the worker, which included information on work tasks adapted to the employees' capacity, and a semi-structured personal diary about their experience of their training which included types of office tasks done, work postures, breaks, tasks associated with pain. As has been discussed before, this intervention was associated with positive work disability duration outcomes and cost reductions, but not with quality of life outcomes. However, the intervention was not offered to all participants in the intervention, only to individuals who required it - consequently the number of participants who were exposed to this one component of the intervention remains unknown.

These five studies were not included in the best evidence synthesis for one of the following reasons: 1) Education to workers was very informal; 2) Education was a small part of the overall intervention; 3) Education was offered in all interventions of a trial; 4) The number of participants exposed to the education was unspecified.

Since no studies were considered appropriate for best evidence synthesis, there is **no evidence** regarding the impact of formal education for workers on work disability

duration, quality of life, and costs. It should be noted that our search strategy did find two studies examining the impact of educational pamphlets for injured workers (52;106), however, these studies did not meet our quality appraisal criteria and did not move to the data extraction level.

Education for insurance staff

Of the 11 studies, only the study by Scheel (88-90) included an educational component for insurance staff. As mentioned before, this "targeted information" was too informal, of too low intensity, and too unspecified to remain in our best evidence synthesis. There is consequently **no evidence** regarding the impact of formal education to insurance staff on work disability duration, quality of life, and costs. It should be noted that our literature search strategy did find one study examining the impact of an education program for insurance case managers (33;72). However, this study did not meet our quality appraisal criteria and did not move to the data extraction level.

- There is **limited evidence** that guideline-based educational interventions for physicians have **no** impact on work disability duration outcomes and quality of life outcomes.
- There is **no evidence** regarding the impact of guideline-based educational interventions for physicians regarding costs.
- There is **moderate evidence** that formal education provided to the workplace leads to improved work disability duration outcomes.
- There is **insufficient evidence** regarding the impact of formal education to the workplace on quality of life and costs.
- There is **no evidence** regarding the impact of formal education for workers on work disability duration, quality of life, and costs.
- There is **no evidence** regarding the impact of formal education for insurance staff workers on work disability duration, quality of life, and costs.

Summary

Studies of guideline-based educational programs for physicians highlight the great implementation challenges of these programs. The failure of these studies to lead to

positive RTW outcomes can be attributed to the poor uptake and poor compliance of the targeted audience, the physicians. More research should be devoted to improve how well knowledge can be transferred and how well new knowledge can lead to changes in healthcare provider behavior.

The absence of formal educational components for workers was surprising. Without attributing the cause of the work disability to the worker, it remains important for workers to share the responsibility of their recovery and their return to work with their healthcare providers and their workplace. Education to the worker may facilitate this process and future research should explore such an avenue. Education to worker has typically occurred in the rehabilitation area with programs such as back schools. Mixed results were reported regarding their effectiveness in our review of systematic reviews, but very few back schools reviewed were offered in the workplace.

Few studies examining education to workers and their workplace included quality of life outcomes. This remains concerning and future research should consistently include quality of life outcomes relevant to workers themselves.

The nature of the education components for the workplace varied in nature. In the study by Loisel (73-77), the two-day workshop was primarily focused on questions of participatory ergonomics and occupational risk factors for back pain. In the observational studies by Amick (2) and Habeck (48;55), safety training provided by and at the workplace was the educational component of interest. Both types of education in these three studies were associated with positive RTW outcomes. Of note is the fact that the education involved both primary and secondary prevention as they focused not only on RTW issues, but also on risk factors and safety.

Other types of education for the workplace should be examined in future research, such as workshops specifically targeting managers and supervisors and emphasizing their roles, workshops training human resources staff as RTW coordinators, etc. Many studies reviewed alluded to the presence of informal education to the workplace - the importance of such informal education should not be underestimated. It is often through these informal exchanges that individuals gain the knowledge and the motivation to try new ways of doing things. Due to the poorly specified nature of these informal

intervention components, we did not include them in our best evidence synthesis on the impact of education to the workplace. However, these informal exchanges will be reflected in two other components of this literature review - the qualitative literature, and the best evidence synthesis of organizational and cultural factors of the workplace.

The Relationship Between Healthcare Provider and the Workplace: A Continuum of Integration

The healthcare provider and the workplace as a continuum of integration - What works? When does it work?

We observed various degrees of healthcare provider (HCP) to workplace (WP) contact, and have conceptualized it as a continuum of HCP-WP integration. At one end of the spectrum, there is the simple act of an HCP calling the WP and having a brief communication. At the other end, we find an integrated clinical and occupational approach where both workplace-based and clinical components are combined (23;24;59;73-77;107;113-115). What level of integration is necessary? How much clinical input is enough? Can it be too much?

Two of the four observational studies (2;48;55) found a significant relationship between the presence of a simple HCP-WP contact and reduced work disability duration outcomes. Of the five intervention studies retained for evidence synthesis (8-11;23;24;45;59;73-77;107;112-115) four had both simple HCP-WP contact as part of the interventions *and* combined clinical-occupational interventions (23;24;59;73-77;107;112-115). Our discussion will focus on these four intervention studies as they incorporate more detail about the type of HCP-WP interaction involved.

The combined occupational-clinical interventions varied in the degree to which they emphasized one or the other component. They also varied in the type of healthcare

providers involved. All of them involved a physician, but other disciplines were frequently involved such as occupational therapists, ergonomists, physiotherapists, and nurses.

Interventions varied in their degree of emphasis on either intervention component - the occupational or the clinical. There were also different disciplines of providers involved. Given this great diversity in interventions and providers, it was not appropriate to use a best evidence synthesis to the question of the most effective combined clinical-occupational interventions. In addition, differences in policies surrounding healthcare utilization by patients, in coverage of services, and in payment of physicians, diminish the comparability of these studies. We will therefore discuss these studies using a narrative approach to synthesis, focusing on the studies most directly related to the following healthcare provider issues:

- **What is working?** What types of combined occupational-clinical approaches work?
- **When does it work?** Is there an optimal window of opportunity for a combined occupational-clinical approach?

What is working? What types of combined occupational-clinical approaches work?

Three studies (59;73-77;112) address more directly the question of the effective component(s) of a combined occupational-clinical approach since their design includes a combined approach compared to at least one intervention involving either a clinical or occupational component only.

The Loisel randomized controlled trial

The randomized controlled trial by Loisel (73-77) offers a unique opportunity to examine the question of which component, occupational or clinical, or the combined approach, is the most effective component. The study included a usual care group and three types of interventions - occupational, clinical, and combined occupational-clinical. Overall, at the one year follow-up, despite the fact that the combined approach resulted in the highest rate of return to work for regular work, further analyses reveal that this effect was primarily a result of the occupational component within that intervention. Indeed, the RTW rate for the two groups receiving the occupational component was 1.91 higher than for those without the occupational component. In contrast, the two groups receiving the

clinical component only did not show any differences in RTW rate as compared to the two groups without the clinical component.

Regarding quality of life outcomes, although one could expect increased benefits from the clinical component as it may be more focused on pain reduction, symptom severity reduction, and improvements in functional status, the combined approach resulted in improved functional status only. The two groups receiving the occupational component showed improvements in symptoms severity only.

Regarding economic analyses, in the one-year follow-up, although the occupational intervention resulted initially in more important cost reductions compared to the other three interventions of the trial, at the 6.4 year follow-up, all three intervention arms presented advantages in terms of cost reductions with the combined approach being slightly more advantageous. Although statistically non-significant, the cost reductions showed the potential to have a large economic impact when considered at a population level. As well, in the 6.4 year follow-up, the combined approach resulted in much shorter total work disability duration (mean of 126 days receiving wage compensation) than the usual care group (418 days), followed by the clinical only intervention (179 days) and the occupational intervention (228 days).

Taken together, these results suggest that up to one year post-injury, the "occupational only" approach is more advantageous, however in the long-term, the impact on cost reduction and the impact on work disability duration are relatively equivalent across groups, with a slightly more important advantage for the combined approach. As has been discussed, this may due to the very nature of the RTW course, where the number of "hard-to-help" individuals remaining off work one year or more post-injury remains so low that it is difficult to show statistically any improvements. The results of the study need to be considered with caution in view of the small sample size of each intervention arm.

The Karjalainen controlled trial

In contrast to the Loisel study, the Karjalainen (59) study shows that adding an occupational component such as a work site visit conducted by a physiotherapist had no additional value beyond the benefits brought on by a low intensity clinical intervention, the

“mini–intervention”, provided by an off-site insurance physiatrist . The mini-intervention consisted of a basic clinical intervention, information, reassurance, support and simple advice regarding good back habits. Individuals receiving both components of the intervention showed no difference in work disability duration, and in most quality of life indices as compared to the usual care group, while individuals receiving the clinical component only showed differences with the usual care group. As mentioned before, the absence of an effect for a work site visit needs to be tempered by the fact that the participants were not severely work disabled and by the fact that the work site visit did not have a high level of ergonomic input. The visit was more focused on providing reinforcement of the advice on good back habits at work provided by the insurance physiatrist. The visit also involved sending a written report to the company’s physician and the worker’s GP. The worker was encouraged to provide a copy of the report to the supervisor. Therefore, the combined approach (mini-intervention + work site visit) was highly integrated but did not involve a strong ergonomic component. In this study, the most effective component appears to be the guideline-based clinical mini-intervention, which involved a strong focus on workplace factors within the context of the consultation with the insurance physiatrist.

The Verbeek randomized controlled trial

The Dutch randomized controlled trial by Verbeek (112) had two arms - an intervention group and a reference group. The reference group involved providing a pamphlet to supervisors outlining the disability management principles of staying in contact with workers, gradual return to work, and referring the worker to a GP if necessary. The intervention arm involved training of occupational physicians in guidelines for management of low back pain, as well as the same pamphlet offered in the reference group. There were no group differences in work disability duration or in quality of life indices, and the rate of recurrence was higher in the intervention group (51% over a one year period) as opposed to the reference group (25%). The study therefore showed no additional value of a guideline-based clinical intervention provided by an occupational physician, over the impact of a control intervention involving a supervisor pamphlet. Given that there were no “usual care” group, it was not possible to assess the impact of

either study arm as compared to usual care. Very long durations of work disability are generally observed in the Netherlands but the RTW rates observed at 12 months for both arms of this study were high (86% for the reference group, and 93% for the intervention group). This may suggest that both arms of the trial were effective in reducing work disability duration. The higher rate of recurrences in the guideline-based clinical intervention group is perplexing - it raises the possibility that the intervention was provided too soon (workers had to be off work for 10 days or more to be eligible for participation) in that a higher rate of recurrences could be due to iatrogenic effects of the intervention.

Results of the study need to be considered in light of several methodological weaknesses: 1) There was a high cross-over from the reference group to the intervention group in that 24% of workers in the reference group requested and received a consultation with an occupational physician within the first 3 months 2) The RTW management provided by the supervisor only was restricted to the first 3 months of the intervention. Afterwards, workers in both groups had access to the occupational physicians if they had not yet returned to work, so that interventions became quite similar after 3 months of follow-up 3) The small sample size and reduced statistical power could explain the absence of a detectable effect of the intervention. 4) Despite high attendance to the training sessions on the guidelines (each of the 10 sessions was attended by 60% of the physicians), there was an important degree of non-compliance in the occupational physicians as many of them did not follow the guidelines provided. These methodological weaknesses point to a “watering down” of differences between the two study interventions, as well as to a less than optimal implementation of the guideline-based intervention. The absence of differences between the two study arms therefore needs to be interpreted with great caution.

Finally, the “reference group” may actually have been more than a reference group: The impact of the educational pamphlet to the supervisors may have been underestimated, and may have been more potent that what would be appropriate for a “reference group”. Previous studies have found pamphlets to have some effectiveness in reducing work disability duration (16;106), while other studies have not (52). It is

therefore possible that the high RTW rates at 12 month follow-up could be attributed to the low-cost provision of a pamphlet to supervisors on established disability management guidelines.

When does it work? Is there an optimal window of opportunity for a combined occupational-clinical approach?

Studies reviewed showed great variability in the timing of their combined occupational-clinical approaches. Beginning with the earliest time of contact with the worker, in the study by Yassi (23;24;107;113-115), workers were contacted by the coordinating nurse of the program within a week of their injury - this program was quite "fast -tracked" throughout its duration and a true example of early intervention. In the study by Verbeek (112), involving guideline-based intervention by occupational physicians, workers had to be off work for 10 days or more to be eligible for the study - their appointment with the occupational physician was scheduled "as soon as possible", however the timing of the appointment relative to the time of their injury or first day off work remains unknown. Similarly, in the study by Karjalainen (59), workers had to have had problematic back pain for a duration between 4 to 12 weeks, but the timing of the intervention relative to the onset of their problematic back pain was unknown - however, based on study design, it can be deducted that the intervention was offered at least within 3 months of entry in the trial. At the tail end of the continuum of timing of the intervention, in the study by Loisel (73-77), eligible workers had been off work for a duration of 4 to 12 weeks; The occupational intervention was offered at 6 weeks, the clinical intervention after 8 weeks, and the combined occupational-clinical approach in the same sequence.

The timing of the combined approach was therefore clearly early in the study by Yassi (24;25;106;111-113) and later in the Loisel study (73-77). For the other studies by Verbeek (112), and Karjalainen (59), the timing relative to the injury or to first day off work was uncertain.

It is important to distinguish between phases of pain episodes and phases of work disability. The phases of pain episodes have as their starting point the onset of symptoms, while phases of work disability have the first day off work as their starting point. The

terminology of “Acute/Subacute/Chronic” has been applied to both types of episodes - pain (37;104) and work disability (68).

We will now consider studies which included injured workers who were not necessarily work-disabled (23;24;59;107;113-115). In the study by Yassi (23;24;107;113-115), the early provision of a combined approach with a stronger emphasis on the occupational component led to positive results - given the early nature of the intervention, most participants in this study were most likely in the acute phase of their back pain episode. In the Karjalainen study (59), the provision of later combined intervention equally balanced between occupational and clinical components (minimal clinical intervention + work site visit) led to negative results. The (59)provision of the clinical component alone, a guideline-based clinical intervention of low intensity, was effective. Participants were most likely in the sub-acute phase of their back pain episode. In the above two studies, it is not possible to disentangle any differential effects for work-disabled vs non work-disabled participants. However, the studies suggest that provision of an integrated approach focused more on the occupational component is effective for individuals in the acute phase of back pain episodes, while the provision of a more clinically-focused intervention of low intensity is effective for individuals in the sub-acute phase of their back pain episode.

We will now turn to studies which only included participants who were work-disabled. In the study by Verbeek (112), participants had at least 10 days of work disability when they received the guideline-based intervention by the occupational physician, and they were therefore in the acute or sub-acute phase of work disability. In this study a combined occupational-clinical intervention with a heavier emphasis on the clinical component was provided in the acute or sub-acute phase of work disability and did not lead to any positive effects as compared to the reference group of supervisor pamphlet.

In the study by Loisel (73-77), participants had at least 6 weeks of work disability when they received the combined approach which was balanced between the occupational and clinical component, and they were therefore primarily in the sub-acute phase of work disability. The balanced combined approach provided in the sub-acute

phase of work disability led to positive effects.

To summarize, the findings suggest that, for symptomatic individuals who may not be work-disabled yet and who are in the acute phase of back pain, an early combined approach with a heavier focus on the occupational component is effective (23;24;107;113-115). It should be noted however that the study by Yassi (23;24;107;113-115) did not address whether or not this approach might have been “too intensive” as it was not compared to a lower intensity intervention other than usual care. For individuals in the sub-acute phase of a back pain episode who may not necessarily be work-disabled (59), a clinical intervention of low intensity was effective. It should be noted that our systematic review, focused on workplace-based interventions, was not designed to capture studies involving clinical interventions only. It is therefore difficult to examine the results of this study in relation to other studies focused on clinical interventions.

For studies with workers who were all work-disabled, the study by Verbeek (112) suggests that in the acute or sub-acute phase of work disability, a combined approach delivered by occupational physicians led to no benefits beyond those related to a supervisor pamphlet. The methodological limitations of that study have been discussed earlier. By contrast, a combined approach equally involving occupational and clinical components of high intensity offered in the sub-acute phase of work disability led to positive results (73-77).

These studies suggest that in the early phases of work disability, a low intensity guideline-based clinical intervention is appropriate (59). The high intensity combined approach in the Yassi study (23;24;107;113-115) was also effective, but it remains unexplored if the high intensity was necessary. For individuals in later phases of disability, a high intensity combined approach led to optimal outcomes (73-77).

Summary

Overall, our conclusions are limited by the high degree of heterogeneity of interventions in the studies reviewed. While the methodologically weaker study by Verbeek (112) does not support the added value of a guideline-based combined intervention delivered by occupational physicians, the two very high quality studies of

Karjalainen (59) and Loisel (73-77) suggest that the effective components of the combined occupational-clinical approaches may lie in the incorporation of a strong participatory ergonomic component or in a minimal guideline-based and work-specific clinical consultation. These two studies were offered to different samples, one composed of work disabled individuals only in the study by Loisel (73-77), the other to individuals who were symptomatic but not necessarily work-disabled (59). In accordance to a phase-specific model (37;68), different components of combined approaches may be optimal for different phases. In addition, the high rate of recurrences in the intervention provided by the occupational physicians raises the issue of potential iatrogenic effects of a clinical intervention provided too early. In the area of low-back pain, such iatrogenic effects have been noted before (38).

It is critical to recognize the role of the healthcare provider in the RTW process as an essential link to the workplace. However, the above studies raise the issue of the degree to which and the manner in which the healthcare provider should be involved. The healthcare provider may need to be involved in an intervention of high work-specificity but of low intensity early on in the process such as in the study by Karjalainen (59). The study by Yassi (23;24;107;113-115) suggests that a combined approach of higher intensity with a strong occupational component is also effective in the acute phase - it remains to be explored if a similar workplace-based intervention of lower intensity would have been equally effective. If the work disability persists into the chronic phase, it remains unclear if a more intensive clinical component more closely linked to the workplace will have the anticipated benefits. The evidence provided by the Loisel trial demonstrates that the occupational component of the combined intervention remained more potent than the clinical one, arguing for possibly less intensive involvement of the healthcare provider than the one implemented in the trial in later phases of work disability. Future research is needed to clarify the nature and intensity of healthcare provider involvement in later phases of work disability for optimal RTW process.

- In the acute phase of back pain episodes, healthcare providers can improve the stay-at-work and RTW processes by providing a clinical guideline-based intervention of low intensity but high work-specificity.

- An example of high work-specificity is offered in the guideline-based mini-intervention provided by an insurance physiatrist and physiotherapist in the study by Karjalainen (2003):
  - Clinical examination
  - Light mobilization and graded activity program
  - Prescribed exercises
  - Reassurance about prognosis
  - Recommendation to stay active and avoid bed rest
  - Prescribed sick leave if necessary
  -1.5 hour consultation with physiotherapist focusing on assessment of daily activities including work activities.
- In subacute phases, combined occupational-clinical interventions with a strong occupational component, involving a high degree of ergonomic input, have been effective in leading to optimal RTW process.
- There is a need for future research exploring the optimal intensity and nature of the healthcare provider role in the RTW process of workers in the chronic phase of work disability.

Cultural and Organizational Workplace Structures

What impact do cultural and organizational structures within the workplace have on RTW outcomes?

The *cultural structure* within a workplace embodies the beliefs and values of the workplace actors. This then impacts on both the organizational structure of the company and communication between workplace parties. The *organizational structure* of a workplace refers to the policies, rules, and regulations which govern how resources are allocated and exchanged. Employers have become increasingly more involved in creating internal policies to manage occupational injuries (49;98). However, because the cultural structure within a workplace plays such an important role in the development of these policies, it is very difficult to disentangle the unique contribution of the organizational structure on RTW programs, without considering the workplace culture. Therefore, we will focus our synthesis of the evidence on the three cultural structures identified in the 11 studies: People-oriented culture, safety culture, and cooperative labour-management. A discussion of the three organizational structures identified will be

considered in light of these cultural structures. These include: Support from top management for disability management initiatives, endorsement of proactive RTW policies, and the use of joint labour-management RTW committees. Two very high quality studies: Amick (2) and Loisel (73-77) and three high quality studies: Habeck (48;55), Yassi (23;24;107;113-115), and Bernacki (8-11;45) examined at least one of these components.

People-oriented Culture

This component examines an organization's willingness to cultivate a "people-first" attitude within its work environment. It was considered in the two observational studies by Habeck (48;55) and Amick (2). A people-oriented culture is demonstrated through the company's ability to foster trust between management and labour, and its commitment to empower workers in the decision-making process by sharing and seeking important information with workers cooperatively.

In the cross-sectional study by Habeck (48;55), examining the association between workplace policies and practices, and of work disability duration, a significant association was found between the people-oriented culture scale and the lost workday rate (total number of lost workdays per 100 employees). Companies with higher ratings of people-oriented culture demonstrated significantly fewer lost workdays per 100 employees. This study did not have quality of life outcomes or economic analyses.

In the prospective cohort study by Amick (2) of patients undergoing surgery for carpal tunnel syndrome, six months post-surgery, the rate of return to work was nearly twice as high for workers who perceived a higher level of people-oriented culture in their workplace. This study did not consider quality of life outcomes or costs.

In view of these results, there is **limited evidence** that a people-oriented culture in the workplace is associated with reductions in work disability duration. There is **no evidence** regarding the impact of people-oriented culture on quality of life and costs.

Safety Culture

Safety culture is a broad measure, which examines a company's commitment to safety issues. Safety culture is demonstrated in several ways including: Active safety leadership (top management support of safety policies through an investment of

company resources and people's time to promote safety); Safety diligence (company activities intended to keep workers safe, such as good housekeeping, equipment maintenance, timely accident investigations to correct and prevent future risks to workers); Safety training (the act of providing timely and accurate information on potential hazards and applicable safe work practices for all employees). This cultural structure was identified in the two observational studies (2;48;55).

In the cross-sectional study conducted by Habeck (48;55), high levels of active safety leadership and of safety diligence were significantly associated with lower lost workday rates (total number of lost workdays per 100 employees). In the prospective cohort by Amick (2) of carpal tunnel surgery patients, the components of safety culture (active safety leadership, safety diligence, and safety training) were combined into one scale. In this study, six months post-surgery, the rate of return to work was 1.6 times higher for workers who perceived a higher safety culture in their workplace.

In light of these findings, we conclude that there is **limited evidence** that a safety culture in the workplace is associated with reductions in work disability duration. As mentioned previously, neither of these observational studies examined quality of life outcomes or costs. Therefore, there is **no evidence** regarding the impact of safety culture on quality of life and costs.

Two organizational structures identified in these studies were closely related to safety culture: Support from top management for disability management initiatives and endorsement of proactive RTW policies. These two factors can be easily linked together in the studies. In the Bernacki study (8;9;9-11;45), the intervention was initiated by management and it introduced several proactive RTW strategies targeted to assist injured workers in getting back to work. The Loisel study (73-77) also received top management support. Workplaces volunteering for this study required management commitment to the intervention program. Management was responsible for identifying workers filing claims for back injury. The three active intervention arms were assessing the effectiveness of proactive occupational and clinical RTW strategies. In the Yassi study (23;24;107;113-115), management was an active supporter of the intervention program. The early intervention program given to study wards included several

proactive RTW strategies which have been discussed in detail earlier in this report.

Cooperative Labour-Management Relationship

Establishing a cooperative working relationship between employers and workers' representatives has been identified as an important criteria in the success of RTW programs (49;57;78;98). Of the 11 studies, only three studies - two of very high quality: Amick (2) and Loisel (73-77) and 1 high quality: Yassi (23;24;107;113-115), described this factor within the study. In other studies, no information was provided on the unionization status of workplaces.

Work disability outcomes

In the prospective cohort conducted by Amick (2), cooperative labour-management involvement in RTW programs was included as a component of the "disability management" group of interventions. The rate of return to work six months post-surgery was 2.24 times greater for workers reporting that their workplace was actively engaged more often in these groups of interventions, than for those that did not.

The Loisel intervention study (73-77) was characterized by a high level of union involvement. Both the occupational intervention arm and the combined intervention arm included an ergonomic work site visit that was attended by both employer and union representatives. These parties were also part of the team, which also included the ergonomist, employee, and supervisor, that made specific ergonomic recommendations to the employer based on the outcome of the work site visit. This joint labour-management team was considered an *organizational structure* within the context of cooperative labour-management. As discussed earlier, the two interventions that included the work site visit were associated with significant reductions in disability duration, at both the one-year and the 6.4-year follow-up, as compared to the other two interventions; however at the 6.4 year follow-up, the advantage for the occupational intervention over the clinical intervention disappeared.

For the Yassi (23;24;107;113-115) intervention study, the cooperative relationship between labour and management was demonstrated by the approval of the intervention program by the following departments within the hospital: Human resources, nursing management, and nurses' union. With this union supported intervention, significant

reductions in work disability duration were achieved over a one year period post-intervention.

Overall, there is **moderate evidence** that interventions with cooperative labour-management relationships lead to important reductions in work disability duration.

Quality of life outcomes

Only two of the four studies examined quality of life outcomes: Loisel (73-77) and Yassi (23;24;107;113-115). As discussed previously, the results for the Loisel study (73-77) were mixed. In the Yassi study (23;24;107;113-115), the early intervention program led to improved functional status at six months post-injury for injured nurses as compared to those on the control wards. Based on the results from these two studies, there is **mixed evidence** that interventions with cooperative labour-management relationships lead to improved quality of life.

Economic analyses

Only two of the four studies examined costs: Loisel (73-77) and Yassi (23;24;107;113-115). In the Loisel study (73-77), all three interventions (occupational,

clinical, and combined) were associated with reduced costs. In the Yassi study (23;24;107;113-115), the early intervention program was associated with significant cost reductions. Based on these findings, there is **limited evidence** that interventions with cooperative labour-management relationships lead to reductions in costs.

- There is **limited evidence** that a people-oriented culture in the workplace is associated with reductions in work disability duration.
- There is **no evidence** regarding the impact of people-oriented culture on quality of life and costs.
- There is **limited evidence** that a safety culture in the workplace is associated with reductions in work disability duration.
- There is **no evidence** regarding the impact of safety culture on quality of life and costs.
- There is **moderate evidence** that interventions with cooperative labour-management relationships lead to important reductions in work disability duration.
- There is **mixed evidence** that interventions with cooperative labour-management relationships lead to improved quality of life.
- There is **limited evidence** that interventions with cooperative labour-management relationships lead to cost reductions

Summary

Evidence from these five studies suggests that the three components of cultural structure examined in these studies (people-oriented culture, safety culture and cooperative labour-management relationships) are associated with important reductions in work disability duration. Their impact on quality of life and costs cannot be assessed since these outcomes were included in too fewl studies.

The cooperative labour-management relationship factor is complicated by two main issues: First, these intervention programs also included other RTW components (e.g., work site visits, supernumerary replacement, early contact with the worker) which limits the ability to draw inference on the unique effectiveness of cooperative

labour-management relationships on RTW interventions. Second, the nature of management and labour involvement in these interventions varied significantly. In both the Loisel (73-77) and Amick (2) studies, management and union parties were active participants in the intervention program, while in the Yassi study (23;24;107;113-115), union and management parties simply endorsed the implementation of the intervention. It is difficult to determine what level of involvement is necessary to be effective.

The literature is increasingly recognizing the impact of corporate culture on work disability outcomes (2;48;96;98), and yet these factors were not captured in many of the studies included in this review. While there may be measurement burden related to gathering this data for some of these variables (e.g., administering a scale to measure people-oriented culture), this is not always the case. For example, only 18% of the studies in this review documented whether or not workplaces were unionized, a readily available workplace characteristic. Union status has been shown to be an important variable in prognostic studies of return to work (17;48;51;67). There is a clear need for future research to consider these factors more directly in RTW intervention studies.

While this review has focused on secondary prevention outcomes (work disability duration, quality of life after injury and economic impacts of RTW programs), it is important to recognize that all of these cultural structure elements have also been associated with primary prevention outcomes such as lower injury and disability rates (48;51;71;96). There is growing evidence that primary and secondary prevention efforts work best when they work together (36). In order to do so effectively, workplace organizational structure must be flexible enough to integrate resources (both financial and personnel resources) from the traditionally separate programs directed at workplace health and safety and disability management.

Conclusion

Our best evidence synthesis supports that RTW interventions can reduce work disability duration and associated costs. The evidence regarding improving quality of life outcomes was weaker. The results of the best evidence synthesis of the quantitative studies are summarized in Table 6.

Table 6. Summary table of evidence synthesis for the outcomes of work disability duration, quality of life outcomes, and costs

Intervention components	**Level of evidence for the work disability duration outcome**	**Level of evidence for quality of life outcomes**	**Level of evidence for outcome of costs**
Three core components	Moderate	Mixed	Moderate
Work site visits	Moderate	Moderate for **no** impact	Moderate
Supernumerary replacement	Insufficient	Insufficient	Insufficient
RTW coordinator	Moderate	Mixed	Moderate
Educational - Healthcare providers	Limited for **no** impact	Limited for **no** impact	No evidence
Educational - Supervisors and managers	Moderate	Insufficient	Insufficient
Educational - Workers	No evidence	No evidence	No evidence
Educational - Insurance staff	No evidence	No evidence	No evidence
Cultural structure - People-oriented	Limited	No evidence	No evidence
Cultural structure - Safety culture	Limited	No evidence	No evidence
Labour-management cooperation	Moderate	Mixed	Limited

A moderate level of evidence was found supporting that the three Core DM components significantly reduce work disability duration and associated costs. Our synthesis also shows that other RTW components, such as ergonomic work site visits and the presence of RTW coordinators, can be critical to a successful RTW intervention. Cultural and organizational factors in the workplace may also play an important role in determining whether an RTW intervention will have a positive impact on workers and the workplace.

In terms of educational components in RTW interventions, we found limited

evidence that educating healthcare providers led to no reductions in work disability duration and to no impact on quality of life outcomes. However, there was moderate evidence that education provided to supervisors and managers led to reductions in work disability duration. Education to consisted primarily of education on participatory ergonomics (73-77), as well as safety training (2;48;55)).

We noted that no studies which met our quality criteria focused on educational components provided to workers or insurance managers. Therefore, we could not synthesize evidence in these areas.

We conducted a narrative review of the relationship between healthcare providers and the workplace. It suggests that a strong occupational component is a critical feature among the most promising combined occupational-clinical RTW interventions. (23;24;73-77;107;113-115) . The nature and intensity of healthcare provider intervention needs to be carefully considered relative to the duration of work disability. Work-specific guideline-based clinical interventions of low intensity might be optimal in the acute phase, with more intensive occupational-clinical interventions being necessary for later phases.

Regarding quality of life outcomes, the level of evidence for the various RTW components considered varied between insufficient to limited. This is clearly an area of research which needs further enquiry. Our results also draw attention to the importance of including quality of life as an important outcome when evaluating RTW interventions.

Systematic Review of the Qualitative Studies - The Social Relations of Return to Work

The role of workplace social relations in return to work

Return to work is a complex physical, social, and institutional process. An overall finding of this review is that the successful return to work of an injured worker is

dependent on the goodwill, creativity, and flexibility of a number of key players in the process. Return to work is therefore a precarious event, subject to fracture when ideal conditions have not been achieved.

Guidelines to employers recommending cooperation and motivation are not always practical or simple for employers to follow. While employers may recognize that all parties should cooperate and communicate, certain realities in workplaces and among the institutions with whom they are required to cooperate may make this difficult to achieve. The strength of these qualitative studies is that, for the most part, they examine the realities of day-to-day conditions guiding return to work. These studies discuss and describe physical, social and organizational pre-conditions for the implementation of any RTW intervention by reference to everyday issues faced by ordinary workplaces.

The following sections detail the findings of the synthesis of qualitative literature on return to work. First, the meta-ethnographic synthesis method is described. Second, the underpinnings of return to work are described in the need for goodwill and trust among all RTW parties. Third, key players and processes in return to work process are described and discussed. In each case, we discuss the implications for practice of these findings. Finally, this section provides a brief discussion of the overall findings of the qualitative synthesis of literature on return to work. A key area of promise for successful RTW implementation is identified in a stronger role for intermediary parties: for the supervisor as a key intermediary between the worker and the employer, and for a rehabilitation or occupational health professional as an intermediary between the treating physician and the workplace.

A meta-ethnographic approach

This report synthesizes knowledge that has been gained through a systematic review of 13 qualitative research papers that met pre-determined criteria for relevance and were of sufficient quality to inform the issue of workplace-based return to work. A meta-ethnographic approach (18;29) was used to synthesize the findings from these studies.

A meta-ethnography is designed to go beyond a description and summary of studies in order to bring together findings on a particular theme in a way that yields results

which, in conceptual terms, are larger than the parts. For this study, we instituted a process of topic relevance, methodological appropriateness, and quality appraisal. Then, using the 13 papers that met these criteria, we systematically synthesized findings that could inform workplace-based RTW practices. This process involved a re-interpretation of findings through 'key concepts'. Key concepts in the studies were examined in relation to others in the original study and across studies in a process similar to constant comparison (105) (Table 1.8 in Appendix 1). The purpose was to derive concepts that encompass more than one of the studies being synthesized.

This process of analytic synthesis yielded new insights into the process of workplace-based return to work that were not evident in any one of the papers included in the review. These new insights point to the ways that return to work is a precarious event and also to the ways that intermediary parties can facilitate return to work.

Synthesis of evidence

The need for goodwill, trust and flexibility among all parties

A key finding of this review is that whether parties actually collaborate in return to work is dependent on goodwill and local culture, *even when procedures are standardized, and workplace has proactive approach to injury(4;97).* RTW interventions are often characterized as medical, with attention paid to workplace physical terrain, but a successful return to work also needs to take into consideration workplace social terrain and labour relations dynamics (62). Goodwill is an intangible, but influential factor that affects workplace ideas about attribution of injury, the magnitude of resources allocated to return to work and prevention (4;31;70), the ability of workers to be able to successfully negotiate the process, and the level of creativity that is applied to devising and managing modified work (70).

The conditions for goodwill exist largely in the social environment of the firm. For instance, goodwill is more likely to exist when a worker has 'occupational bonding', or meaningful and respectful relations, with employers and co-workers (62). Goodwill is also more present when a worker has 'capital' in the moral economy of a firm, that is, when he or she is sufficiently respected that workplace parties are motivated to make the

necessary effort to facilitate a successful return to work (31).

Several studies examined conditions for the absence of goodwill and discussed consequences of this absence. An absence of goodwill can exist among workers if they perceive that managers or healthcare providers are not acting in their best interests. For instance, workers and unions may doubt the integrity of management if they suspect that production statistics are a priority and that return to work is being approached only as a cost-saving opportunity (6;31;50;62). Similarly, an injured worker may perceive that occupational health nurses are more concerned with their own case load than with the workers' best interests. Such conditions may undermine worker motivation to return to work (6;86). Employers can lack goodwill when they suspect that their workers have taken advantage of their injury to reduce their effort at work. In this case, a process of 'moral rupture' can occur which leads to social hardening on the part of the employer, as he or she resolves to be less accommodating to future injured workers (31).

The social environment of the firm can affect worker recovery. Several studies found that injured workers experience diminished social status, feelings that they don't fit in, and a need to justify the genuineness of injury to their employers, co-workers and friends (86). Workers also feel under scrutiny regarding entitlement to compensation and time off work (31). These may perpetuate a vicious circle of psychological trauma (86), and lead to re-injury, as workers attempt to demonstrate the veracity of their injury by taking actions such as returning to work against medical advice (31) .

The presence or absence of goodwill is affected by numerous key players in return to work, each connected directly or indirectly to employers and the workplace. The following sections detail findings relating to the relationship between workers and 'the system', early contact with workers, employer contact with physicians, modified work, union relations, the role of supervisors in return to work, and organizational environments. These findings are also outlined in Figure 2.5 of Appendix 2.

Relations between injured workers and 'the system'

Several studies point to aspects of workers' compensation and healthcare systems that hinder workers' ability to negotiate the complex path to return to work. In various jurisdictions, such as Ontario, Quebec and Manitoba, the system is set up in a way that workers are expected to be self-reliant, to be able to assert their legal rights, and to be able to balance the demands of the workplace, insurers, and health professionals during process of recovery and return to work (31;39). However, injured workers often feel *vulnerable and less than self-reliant* (7;31;39;62;86). When workers are injured, they are unsure about process, procedures and entitlements and they require some form of guidance or support from their workplace. Workers often do not understand rules about workers' compensation (7) or the language used by healthcare and insurance professionals (20;62;86). This lack of knowledge of process and procedures can set the stage for complex rehabilitation, misunderstandings between workers and their workplace, and poor strategizing with respect to healthcare and return to work (6;7;86).

Even when injured workers are advised about processes and procedures, the system requirements can be difficult to meet. For instance, injured workers have a difficult time documenting everything for workers' compensation while also trying to get on with their lives and work (20). Workers also have a difficult time meeting the 'duty to cooperate' with return to work because this 'cooperation' is a negotiated process with no clear guidance on exactly how and when to fulfill this duty (31).

Implications

The studies did not review ways of improving the contact between injured workers and the system. However, the studies did point to various needs of workers: to be their own case manager, to the need for simplified procedural language, and to the need for workplace support and guidance when negotiating return to work.

The nature of early contact with the injured worker

Early contact with injured workers is a part of the prescribed RTW process in Ontario, and several studies have addressed the *nature of this contact* as an important component of return to work. Future cooperation, flexibility, and credibility are at stake

during this phase of return to work. Injured workers have reported that, when away on long term leave, they welcome a friendly social phone call from workplace. This type of social contact can be a motivator for a worker considering a return to work; the contact reminds them that they haven't been forgotten, and that people in their workplace care about their situation (79). Three studies reported RTW processes that worked well and also cost less when employers initiated the rehabilitation process right after injury. These employers initiated identification of worker needs, consultation with professionals, and notification to the appropriate social insurance offices (62;70) and did not wait for an insurer, health professional, or the worker to arrange return to work (39).

There are occasions when neither the injured worker nor their workplace contact are in the right mind set be in contact immediately following an injury. Pre-return contact can constitute a motivational barrier to the worker's return to work, especially if the worker did not fit in, had performance problems, or had pre-injury problems with workplace relations (6;31). This contact can also be unhelpful if the injured worker senses that their employer is not forthcoming about support and reintegration, or is unhelpful about worker rights and entitlements (62). Because this early contact with the

worker is a required part of the process, it can be perceived by a worker as an unwelcome obligation rather than as care-oriented. In these cases, the worker may feel that the employer is concerned about finances rather than the worker's health.

Implications

The studies point to the need for employers to facilitate the worker's process of return to work by offering information about the worker's rights and entitlements, and by offering support for the worker to reintegrate to the workplace.

Employer contact with physicians

The difficulties experienced by injured workers as they negotiate institutional processes are echoed by employers in their relations with physicians as they attempt to make RTW arrangements for injured workers. Several studies describe employer difficulty with doctors who are either difficult to contact, or who do not promote or assist with an *early* return to work for workers (5;6;20;31;39;62). For instance, one study mentions that physicians were frequently unavailable or hostile when contacted by employers or occupational health nurses for more information about injured workers' physical abilities (20). This issue with physician contact and the timing of return to work is problematic for employers when they need additional physician input before they can design an appropriate modified job for an injured worker.

The practice of working through injury, following the notion of 'hurt versus harm', is not always appreciated by doctors (20). For instance, some physicians arrive at diagnoses which they believe involve prolonged treatments and absence from work. Physicians generally do not make workplace visits that would allow for a full understanding of RTW requirements of the worker (39) and they don't always follow guidelines that advocate early return to work (6). This quality of interaction with physicians can be difficult for both employers and for workers as they attempt to comply with early RTW requirements. Employers face costly lost-time worker absences when physicians advocate late return to work (31), and workers have difficult relations with employers when their treatment requires a prolonged absence (62).

Physicians, on the other hand, have three key reasons for not advocating early return to work. First, physicians who are patient advocates may be reluctant to advise a return to work before they are quite sure that the worker is able to deal with the work tasks and environment (20). Second, physicians may not want to risk losing a patient. So even when a family physician may be inclined to recommend a return to work, he or she may not wish to challenge a patient who is convinced that time off of work is necessary for recovery (20). Third, physicians have a lack of financial incentive to go along with early return to work. Doctors have no direct interest in returning workers to modified work because they do not share costs of worker absenteeism, worksite visits are outside of their range of interest and activity, and physician pay structures do not allow for more than an immediate interaction with a worker (6;39).

This disconnect between physicians and employers around return to work can result in employers being inappropriately drawn into workers' treatment issues. One study shows how employers who have difficulty contacting physicians, or who feel that physicians delay worker return to work, end up taking on the role of mediating and coordinating RTW process. Although employers should be told only of the functional abilities of an injured worker, employers who are drawn into taking an interest in worker medical progress often learn details of treatment and begin to make judgments about worker abilities. This leads employers to second-guess physicians, and draws them inappropriately into practical front line decisions about worker injury and recovery (31).

Implications

Rehabilitation or occupational healthcare providers can play a key role in return to work because they can negotiate these barriers between employers and physicians. Such healthcare providers have sufficient medical credibility to be able to communicate with busy, relatively inaccessible physicians, and they can conduct work site visits to assess RTW conditions (20;56). Also, workplace evaluations conducted by this type of healthcare provider can offer tailored advice that is sensitive to the physical and social work environment, as well to organizational and industrial relations issues such as restructuring or changes in work organization (56).

Social, physical and financial aspects of modified work

Once early contact requirements have been fulfilled, and workers have been assessed for functional ability, employers must consider appropriate modified work for injured workers. Ideally, workers should be offered modified work that is flexible and tailored to their particular needs (50). This work should be useful and have production value in order to make it meaningful to the worker, their co-workers, and their supervisor (4). Ideal modified work arrangements can be difficult to coordinate and achieve, so creativity, respectful internal relations, cooperation, and good team processes are required to facilitate the process (7;39). Every workplace is different, and so employers must be motivated, active, and notice their own opportunities for modified work (70).

The studies reviewed referred to social, physical, and financial components of modified work which need to be considered in order to achieve adequate modified work conditions. First, the studies refer to social aspects of modified work such as relationships between injured workers and their co-workers, and social dislocation (62). Co-workers may resent the injured worker if they have to take over some of his or her work load, or if the injured worker gets the 'easier' job--especially when this job has been co-opted from another worker. Co-workers also may not want to assist an injured worker with tasks (6;31;62;70). Both supervisors and co-workers may resent having an injured worker present if this impacts poorly on production statistics and therefore on team performance rankings or financial bonuses. Difficult relations with co-workers can be compounded because injured workers often find it difficult to communicate about their impairments. It is difficult for injured workers to tell people about their restrictions, to ask for help, or explain why their impairment makes them unable to come to the assistance of a co-worker (20;31). One study suggested that further sickness absence is influenced by how co-worker relations accept and facilitate the injured worker's modified work situation (79).

Modified work can involve difficult social dislocation. When injured workers return to work they are still physically and emotionally fragile, and modified work is ambiguous—the worker is not normal but is at work (31) . If worker is placed temporarily in new work area, he or she has to adjust to new sets of relationships, routines, and

sometimes to new behavioral requirements (20). Modified work can also include gender and class dislocations (31). For instance, a male truck driver may be given 'light' work in the office where only women work and where he feels socially and physically ill at ease. These social aspects of modified work may impact strongly on the success or failure of an arrangement, as modified work that is poorly planned can be refused or resisted by the worker (6).

A second component of modified work is the physical arrangement of this work. Modified work may be difficult to implement because of equipment design, production schedules, or time pressure of jobs (20). One study notes that when modified work is planned, the selection of this work is usually left to the supervisor and is rarely based on ergonomic consideration of tasks (6). This is a problem because, if work is not tailored to the individual workers' needs, it may predispose the worker to reinjury(7). Another physical aspect of modified work relates to co-worker burden. The job modification may require co-workers to take over some of the injured worker's duties thereby increasing their own physical load (62).

A third component of modified work is financial, and includes costs associated with modification of tasks, keeping a job open, and workers' compensation premium surcharges (20;31;70). Employers may be reluctant to provide modified work because of costs associated with changing procedures and accommodating the injured workers' specific needs. Where employers find that the provision of appropriate modified work is awkward, difficult, or expensive, workers may be given meaningless work so that employers can avoid workers' compensation premium surcharges (31).

Implications

Several studies pointed to the need for someone in the workplace to manage the social and physical aspects of modified work. For instance, whoever is coordinating the RTW needs to have an understanding of what tasks are appropriate for the injured worker, both from an ergonomic perspective and from a social perspective. One solution is to include the worker in decision-making processes (6) so that work is

meaningful and not just legally compliant (20). There is also a need for someone in the workplace to communicate the worker's restrictions to co-workers as soon as possible to avoid misunderstandings about the injured worker's intent and ability (79).

Union advocacy and return to work

Unions in some workplaces support return to work and promote the practice of modified work among their members (20). This is more likely if they have been involved in the development and implementation of the RTW program although this situation is relatively rare; more often, they act in an advocacy role (7,21, 40). However, RTW legislation can set unions at odds with injured workers because the requirement to provide alternative or modified work conflicts with seniority clauses in collective agreements. Also, multiple unions within a workplace with multiple rules can impede temporary reassignments for modified work (4;20). Unions can be reluctant to facilitate modified work arrangements if they support the right to stay off work (6) and if they (similar to some physicians as noted above) have not bought into the idea of 'early' return to work before full recovery. In these situations, unions may be sensitive to the possibility that production statistics are the most important priority of management, and that return to work is being approached as a cost-saving mechanism. Unions may also consider that workers have not voluntarily consented to modified work (4).

Implications

Good union-management relationships offer a way of overcoming some of the obstacles detailed(39). Joint health and safety committees offer a forum for joint planning of return to work. Even if unions buy in to the process of return to work, they also need to alter collective agreements so that modified work does not conflict with seniority clauses. It may be necessary for unions to highlight to their members that return to work is a benefit to all workers.

The role of supervisors in the day-to-day social relations of return to work

Supervisors were identified in several studies as important to the success of return to work due to their proximity to the worker and their ability to manage day-to-day social relations and physical conditions in the work environment. Although supervisors usually cannot make large changes--such as to production schedules, organizational policies, time and engineering constraints—they are uniquely situated to manage the day-to-day human relations aspects of return to work.

There are many human relations needs associated with return to work. As detailed above, injured workers may have difficulty returning to work and maintaining modified duties because of difficult social relations with co-workers who resent the modified work given to the injured worker. Co-workers may be reluctant to help the injured worker with tasks when they already have their own jobs to do, and they may resent fiscal penalties associated with production downturns. Also, it is difficult for the injured worker to tell all of their co-workers about their abilities and restrictions, to manage any suspicions co-workers may have about the legitimacy of the injury, and to ask for help when needed.

Supervisors can play an important intermediary role in these physical and social aspects of injured worker accommodation. Physical aspects of accommodation involve the implementation and regular monitoring of safe modified work environment for the worker. Supervisors are in a position to monitor work, to ensure that modified work is meaningful, and that duties are rotated (97). When production needs change, supervisors are on location to consider appropriate changes to the modified jobs (20;62). Supervisors can ensure that work restrictions of workers are upheld, because injured workers are often reluctant to complain about breaches (6). Supervisors are also in a position to monitor the appropriateness of the worker's job practices and habits. For instance, one study noted that when workers returned from off-site rehabilitation they reverted to their old unsafe working techniques (70).

Supervisors can tend to social aspects of accommodation by smoothing the social path for workers and by being a champion for the injured worker. A supervisor can be a well-placed advocate in the workplace who can lend legitimacy to the worker's condition

and restrictions and thereby validate the worker's injury before his or her peers (20;62;79;97). One study suggested that, even if the workplace has an on-site nurse who is managing a RTW program, the supervisor should still be closely involved because he or she is present every day, has closest contact with worker, and is aware of social and physical dynamics that may help or hinder the RTW process (97).

In order to enable and encourage supervisors to manage these social and physical aspects of return to work, workplaces have to remove disincentives for the supervisor to engage with the process. Several studies mentioned obstacles to the supervisor's role in return to work. Supervisors may lack skills for managing complex psychosocial workplace dynamics. They may also lack training about ergonomic principles and how to keep work within the injured worker's restrictions and so may expect too much of workers (6;20). There can be a lack of managerial consensus about RTW processes (4). The RTW role may be an added unwanted burden, especially when clashing priorities orient the supervisor to see return to work as an obstacle to production (5;21;(4;6;20). Managers may not have enough time in their work day to manage non-production needs such as the extra social and physical needs of return to work (79). For instance, in small businesses, there is little room for managing return to work in an already burdened management role. One study found that small businesses approach return to work by 'playing it smart', that is, by finding ways around this requirement (31).

Implications

Supervisors can play a key role in return to work if they obtain added training and there is some modification of their position. They can be given more human resource communication skills, such as problem solving skills training, and active listening skills. They can also learn to use supportive communication approaches that validate worker complaints, include the employee in collaborative problem-solving and decision-making, and are responsive to employee concerns (97).

Supervisors can be given basic training in ergonomics so that they will better understand the ongoing interaction between the injured worker and the changing

workplace tasks (97). Return to work can be made a central part of supervisor's job including performance evaluation rather than an 'extra' to their production responsibilities. This may require adjustment of production quotas (6).

Return to work and organizational environments

The studies reviewed identified three aspects of the organizational environment that can affect return to work: extra-organizational economic context, organizational buy-in to the RTW process, and internal dynamics and processes that affect return to work.

A work organization's economic context can affect internal practices relating to return to work. Growing companies will acquire personnel and expertise and will have greater availability of modified positions. Also, such companies will more likely have resources to hire people to facilitate occupational health and safety procedures (4). However, if an organization is downsizing, a lack of jobs for everyone means that organizations will have difficulty finding modified work for injured workers (39). With financial constraints, there may be increased emphasis on management of claims, with the interpersonal aspect of return to work outweighed by financial concerns (20).

Even if an organization is in good fiscal health, there is a need for workplace parties to *buy in* to the RTW mandate. Return to work can be expensive, with increased claim costs, personnel effort, and time (20). In some cases, this may override premium surcharge incentives to initiate return to work. There is a need, then for organizations to accept the usefulness, suitability, and viability of the RTW process in order for it to work. If a workplace pays lip service to RTW mandates, and is motivated only by premium costs, then distractions and disincentives can multiply. In order for a RTW program to have credibility, it needs to be endorsed by managers, union leaders, and supervisors (6;20;39).

Within organizations, certain internal dynamics and processes can facilitate return to work. First, managerial consensus about how to achieve return to work in the organization is needed (4). For instance, if return to work is tied to company culture as a formal expression of its concern for human resources, it can also be communicated to

workers as a benefit (50). Second, it is useful to have well developed methods for tracking and disseminating information about workplace injury and prevention (50;79). This type of information can help employers to be more assertive about responsive service from case managers, insurance carriers, and technical consultation. Third, it may be helpful to build health and safety components into managerial jobs (7;50). For instance, health and safety performance can be compared between time periods, or between departments. In large companies, formal procedures can be developed for return to work that take into account workplace values (4;7) .

Implications

Return to work may be more difficult to implement in workplaces where economic constraints are prevalent. These may be larger workplaces that are downsizing, or small workplaces that tend not to have health and safety infrastructure, or external resources, or enough positions for modified work (4). One study suggests that workplace membership in organizations such as Safe Communities (in Ontario) or prevention mutuals (in Quebec) can raise awareness of RTW issues and promote development of RTWstrategies in small and medium companies by exposing them to a range of management models (4). Successful return to work depends on buy-in and consensus among all workplace parties, including upper management, unions, and supervisors (4). This process requires organizational commitment, such as building health and safety components into managerial jobs.

Conclusion

The goal of a meta-ethnography is to bring together findings on a particular theme and to re-interpret them in a way that produces new knowledge. This analysis of qualitative literature on workplace-based return to work has identified physical, social and organizational conditions in ordinary workplaces that affect how employers can implement early and safe RTW practices.

Three important findings have emerged from this analysis. First, return to work is a socially fragile event that requires complex coordination among many players. This means that a successful return to work less than straightforward; it requires planning and sensitivity to the needs and experiences of workers, co-workers, physicians, supervisors, and managers. Second, conditions of good will and trust are central to any successful RTW arrangement. These intangible but influential aspects of social environment are referred either directly or indirectly in all of the studies reviewed. Third, successful RTW planning requires a stronger role for intermediary players. Employers can coordinate more effectively with physicians if a rehabilitation or occupational healthcare provider facilitates communication, and employers can devise more appropriate and meaningful modified work for injured workers if supervisors play a stronger role in the process.

Summary and Recommendations

This literature review was innovative due to its incorporation of both quantitative and qualitative literature. This novel approach reaped great benefits, as we developed a more encompassing view of the RTW process, a view which is both evidenced-based and contextualized in the social fabric of the workplace.

In this section, we will first review our main findings, pooling information from both the best-evidence synthesis of the quantitative literature and the meta-ethnographic synthesis of the qualitative literature. Three themes emerging from our literature review and associated with the three core disability management components will then be discussed: Early contact with the worker, the work accommodation process, and the healthcare providers and the workplace. This will be followed by a discussion of the actors in the RTW process and their culture. We conclude with recommendations for future workplace-based RTW interventions.

Summary of main findings

This systematic literature review offers substantive answers to the following question: What workplace-based RTW interventions work under what kind of conditions?

We first focused on identifying the nature of interventions offered in the quantitative studies reviewed. Certain RTW intervention components have been identified by groups such as the National Institute for Disability Management and Research (78) and by researchers (15) as being critical to workplace-based disability management programs. We observed a good representation of the following disability management components in the quantitative studies reviewed: 1) Early contact with worker, 2) Offer of work accommodation, and 3) Contact between healthcare provider and workplace. Based both on their endorsement by research groups and their high frequency in the RTW interventions reviewed, we refer to these three components as “Core disability management” components. We also examined “Additional disability management components”. These included disability management components which are either not specifically endorsed by main research groups, or not frequently found in the interventions of the quantitative studies reviewed. The additional disability

management components we focused on were the following: Ergonomic work site visits, Supernumerary replacements, Presence of a RTW coordinator, and Integrated occupational-clinical approach.

We will now review the main results of the best-evidence synthesis regarding the impact of core and additional disability management components, as well as the results of the quantitative and qualitative reviews regarding the roles of various RTW actors, and of systems in the RTW process.

Work disability duration and associated costs

Based on our review of the quantitative literature, we found that workplace-based RTW interventions can and do work in reducing work disability duration of injured or ill workers, and in reducing associated costs such as wage replacement costs and healthcare costs. A best evidence synthesis of the quantitative literature provided moderate evidence that interventions which include the three core disability management components - early contact with the worker, offer of a work accommodation, and healthcare provider contact with the workplace - lead to important reductions in work disability duration and associated costs. Similarly, there was moderate evidence that interventions including the following additional disability components led to reductions in work disability duration and associated costs: Ergonomic work site visits, presence of a RTW coordinator, education about RTW or safety training to the workplace, and labour-management cooperation in RTW interventions.

It is important to note that moderate evidence regarding the effectiveness of workplace-based RTW interventions with regards to reductions in work disability duration and associated costs was obtained for studies using a follow-up period of up to one year only. Only one study included in our review examined these outcomes beyond one year and found continued impact on work disability duration and associated costs at a mean of 6.4 years post-injury (77). Sustainability of return to work is of primary concern when examining the impact of work disability on workers. A first return to work is far from being sustainable, as a study of Ontario workers with permanent partial impairments has established (17). Workplace injury lead to future loss of income in workers associated with subsequent work disability periods as well as lower labour market earnings (82;109).

Clearly, future research needs to address the sustainability of effects beyond one year after onset of the disability.

Quality of life outcomes

The benefits of workplace-based RTW interventions in terms of quality of life for workers were less evident in our best evidence synthesis. Mixed evidence was obtained regarding the impact on quality of life outcomes of interventions which included the three core disability management components - Early contact with the worker, offer of a work accommodation, and contact between healthcare provider and the workplace. For additional disability management components, the level of evidence supporting a positive impact of interventions on quality of life ranged between insufficient evidence for supernumerary replacements and education to the workplace, to mixed evidence for the presence of a RTW coordinator and labour-management cooperation. The best evidence synthesis even led to moderate evidence supporting *no* impact on quality of life for work site visits, and to limited evidence supporting *no* impact on quality of life for interventions with education for healthcare providers. Of note is the fact that none of the quantitative studies examined quality of *work* life when returning to work.

These results are cause for concern and need to be considered with caution in light of methodological aspects of the studies considered, reasonable outcomes to expect, and the larger social context of workers.

The measures used in the studies considered were generally adequate to examine quality of life as the majority were condition-specific measures, which are more sensitive to change than general health perception questionnaires (44). However, sample sizes were often small and may have led to insufficient statistical power to detect clinical differences.

The question remains regarding how healthy one can expect workers to feel when returning to work following an injury. It may be expected that they will feel less healthy than usual when facing the challenge of returning to work, but in the longer term will regain their health. However, even with best intentions of assisting workers to resume their normal work activities, the risk of returning workers too soon needs to be kept in mind. When workers return prematurely, they are at higher risk of relapse (83) and they

also may generate fear in other workers regarding return to work after injury.

When workers report poor health following their return to work, it is very likely that their poor health translates into other indirect and human costs in other life roles such as caregivers, parents, and volunteers in the community. In addition, the cost to their own personal life, in terms of their sense of vitality and their ability to pursue their interests remains unexplored. There is a need to assess the human cost of work-related injuries in non work-related aspects of the life of workers, and to investigate what type of interventions will improve the health of workers returning to work. As well, future research should include measures of quality of work life to quantify the impact of return to work on this aspect of workers' lives.

Workplace social relations and the actors in the RTW process

From the qualitative literature emerged the challenges injured or ill workers and other RTW actors face. A rich picture of the roles of the various actors, of their impact on the worker, as well as of their own challenges, led to a specification of human interactions embedded in workplace-based RTW interventions. The role of the supervisor in the RTW process appears to be of particular importance. As well, the need to integrate healthcare providers, other than physicians, emerged as an important finding.

The importance of the impact of systems, such as the healthcare system and unions, on the potential of success of RTW interventions also needs to be considered. Difficulties the worker faces in negotiating these systems were evident.

How the two syntheses converged

We were interested to note that our syntheses of the quantitative and qualitative literature converged around three main themes -- despite the fact that the two syntheses processes had occurred quite separately from each other. We will now discuss our findings related to these themes: Early contact with the worker; the work accommodation process, and healthcare providers and the workplace.

Early contact with the worker

Early contact with the worker was frequently part of the interventions reviewed, as in six of the seven quantitative intervention studies reviewed, contact with the injured or ill

worker occurred within the first three months of injury. Of those, three studies specified that contact was made within the first week following injury (3;8-11;23;24;45;107;113-115). These contacts were made by either the workplace, a healthcare provider tied to the workplace, or by the insurer.

The qualitative literature focused more exclusively on early contact made by the workplace. It clearly highlights that contact *per se* is not sufficient to contribute constructively to the RTW process (5;53;57)(6;79;86). The nature of the contact is critical in maintaining the worker's attachment to the workplace. Such contact must be friendly, tactful and informative. Workers benefit from obtaining information on their rights, from being linked with appropriate professionals and insurance offices, and from being asked about their needs (62;70). In some instances, contact with the worker can be complicated by pre-existing workplace relations problems. Awareness of pre-existing issues is important.

The initial contact by the employer can motivate workers to return to work as they are reminded that people at the workplace care about them (70). Early contact also provides a window of opportunity for initiating the RTW process in a respectful manner, which can promote a climate of trust and goodwill.

The work accommodation process

Work accommodation, or modified work, remains a pivotal component of effective workplace-based RTW interventions. This knowledge is well accepted in the disability management area and supported by strong empirical evidence (66). Two well-designed prospective studies in our review, conducted with Ontario claimants, supported the high effectiveness of work accommodations on reducing work disability duration (14;27;54).

Rich contextual information was derived from the qualitative literature regarding the optimal conditions under which modified work should be offered. The process by which a work accommodation is offered demands creativity and flexibility. It appears to works best when it involves cooperation between worker, co-workers, and supervisor. Modified work should be tailored to the worker's needs. It should minimize social dislocation of the worker, be useful, and have production value. These social aspects of modified work impact strongly on the successful outcome of a work accommodation

process (15;23;41)(20;31;62).

In the absence of third party input on ergonomic aspects of the modified work, modified work is often handled by the supervisor (6). If the changes are poorly tailored to the worker's physical condition, the risk of re-injury can be high (7). For that reason, ergonomic work site visits can facilitate appropriate matching of the physical demands and conditions of the modified work to the worker's capabilities, and avoid a scenario where re-injury risks are high.

The evidence reviewed from the quantitative literature suggests that ergonomic work site visits lead to significant reductions in work disability duration and associated costs. These visits are conducted by third party specialists, such as physiotherapists, ergonomists, occupational therapists. The intervention costs of involving these professionals is offset by reductions in wage replacement costs considered up to six years after entry in the intervention program (73-77). Our review suggests that ergonomic work site visits should be considered a core disability management component.

The impact of relationships with co-workers in the work accommodation process is well captured by the review of the qualitative literature. Co-workers can resent the extra workload associated with a work accommodation in their team or unit (5;23;46)(6;31;70) . In turn, workers returning to work may not feel comfortable asking for help and explain their needs (15;23)(20;31). One potential solution to this strained dynamic is the supernumerary replacement position. Having an extra person to take on the work which cannot be completed by the worker returning to work can resolve these issues. This remains an uncommon arrangement, possibly because it requires financial agreements to cover the costs of the supernumerary replacement position. Only one study reviewed (23;24;107;113-115) was considered in the best-evidence synthesis. Results of this study were supportive of the effectiveness of interventions which include a supernumerary arrangement, however future research needs to replicate this finding.

Many players are involved in the provision of a work accommodation to injured or ill workers, and in the larger RTW process. Best evidence synthesis of the quantitative literature suggests that the role of the RTW coordinator may be a key factor in the optimization of the effectiveness of RTW interventions. The RTW coordinator can

facilitate communication between multiple players, and coordinate the services provided by them.

One of the most telling “study stories” about the role of RTW coordinators is the one found in the Scheel study (88-90): This intervention involved setting up workshops designed to encourage physicians to use Active Sick Leave (ASL) program. The intervention involved availability of RTW coordinators, and sending written reminders to physicians to use the ASL program (88-90). When the RTW coordinators were withdrawn from the program, the targeted physician behaviour (use of the “Active Sick Leave” program) dropped to zero. Without the RTW coordinator, the physicians were not using ASL anymore, possibly due to decreased time or motivation.

The qualitative studies point to many possible points of “communication break-down” in the RTW process - between the healthcare providers and the workplace (4;15;29), between the worker and complex systems, such as the insurer or the healthcare system (6;57)(7;86). In many ways, the RTW coordinator can fill those gaps of communication by acting as a liaison between multiple parties, by organizing meetings, and ensuring that all language is understandable to workers.

Healthcare providers and the workplace - A continuum of integration

The review of quantitative studies focused on RTW activities of healthcare providers if they fell in the following categories: 1) If the clinical service was provided in the workplace and had a close tie with the workplace 2) If the intervention, such as an education program for physicians, was initiated by the workplace. The review of the qualitative studies focused on the relationship between physicians and the workplace.

We conceptualize the role of the healthcare provider in relation to the workplace as a continuum of integration. On one end of the continuum, we find a minimum of contact between healthcare provider and the workplace - as little as one phone call. At the other end of the continuum, we find highly combined occupational-clinical RTW intervention programs (8-11;45;73-77)(112)(23;24;107;113-115). Interventions of studies reviewed often included both a minimal contact between physician and the workplace, and an integrated occupational-clinical RTW intervention program. The “integration” was characterized by high involvement of disciplines other than medicine within the context of

the workplace. They often included a strong ergonomic component led by ergonomists, physiotherapists (59), and occupational therapists (8-11;45)(59)(23;24;73-77;107;113-115)(72). Another defining feature was the facilitation of multidisciplinary discussions through planned meetings and communications between the multiple players from both the clinical and workplace domains (8-11;45;73-77).

Both the quantitative and qualitative studies converged on similar questions - What is the optimal intensity and nature of healthcare provider involvement? How can communication be facilitated between the workplace and busy and inaccessible physicians?

What is the optimal intensity and nature of healthcare provider involvement?

While the role of healthcare providers remains critical in the RTW process, the importance of their role may not be proportional to the intensity of the intervention required. This may come as a great relief to these busy and often overworked professionals.

The review of quantitative studies suggests that the optimal intensity of healthcare provider involvement may differ according to the injury phase. In addition, in accordance to the phase-specific model of MSK conditions (37;68), different components of combined occupational-clinical approaches may be optimal for different phases.

Four quantitative studies (59)(73-77)(112)(23;24;107;113-115), involving various intensities of healthcare involvement, various types of population (still working or off work), and different phases of work disability, were considered to understand the optimal nature and intensity of healthcare provider involvement.

In the acute phase of work disability, a low intensity guideline-based and work-specific clinical consultation conducted by a physiatrist and a physiotherapist led to positive results for individuals who were either limited in their work capacity but still working, or off work (59). With the same type of population, a high intensity occupational-clinical intervention was also very effective in reducing work disability duration, in reducing costs, as well as in improving functional status (23;24;107;113-115). However, it remains unknown if the same benefits could have been obtained with a lower intensity intervention.

In the subacute phase, with workers who were completely off work, occupational and combined occupational-clinical interventions proved to be effective and to reduce costs (73-77). However, it is the occupational component of the combined approach which appears to be the potent component of the combined approach. This suggests that in the subacute phase, the high level of clinical involvement of the combined approach may not be necessary to achieve the same positive results. The occupational component, based primarily on the participatory ergonomic approach, seems to be the critical component of this intervention.

For the chronic phase of work disability, no studies were conducted with the point of entry in the study trial during the chronic phase. This is understandable given that the longer workers remain off work, the more likely they are to not return to work. The incentive to initiate contact and to offer a RTW intervention so late in the work disability process is simply not present. However, future research exploring the optimal intensity and nature of healthcare providers during the chronic phase of disability is needed.

Qualitative studies highlighted the presence of a disconnect between employers and physicians (4;6;20;39), with each group having different agendas and different roles. Employers often experience frustration attempting to access physicians; once contact is made, they may have difficulty working with the physicians to facilitate early and safe return to work.

Our review suggest three explanations for physicians' behavior in the RTW process (20). First, they often have a long-standing relationship with their patients and see themselves as the patient advocate. Therefore, they will err on the side of caution and not recommend a return to work until they are sure that the worker is ready to cope with the work demands. Second, physicians may not want to jeopardize their relationship with the patient, and so they may be reluctant to "go against" patient wishes if the patient is not ready to return. Third, there is no financial incentive for the physician to work towards an early return to work, like there is for the employer. In some regards, it may be beneficial to have such opposing interests within the RTW process to ensure a balanced approach to return to work. Nevertheless, the disconnect between employers and physicians remains an important problem to address.

How can communication be facilitated between the workplace and the physicians?

Educational programs have been considered as aids in facilitating the uptake of guideline-based interventions. These interventions are aimed at bridging the gap between the workplace and the healthcare system, and at promoting maintenance of workers' usual activities. However, our findings from the quantitative studies suggest there are important problems when it comes to achieving acceptable uptake and implementation of these guideline-based clinical interventions (88-90;112). Challenges in changing the behavior of physicians have been noted before, and research suggests that multiple approaches - addressing both social and scientific influences - are required to initiate and support guideline-based change in practice (38;46).

One Norwegian intervention of high intensity, involving workshops for physicians, availability of RTW coordinators, and written reminders to physicians (88-90) led to minimal increases in uptake of the targeted guideline-based intervention - from 11.5% to only 17.7% (69-71). A Dutch study (112) found that even when attendance to training was acceptable, actual implementation of the guidelines remained poor. Poor uptake of the guideline-based interventions remains a very likely explanation for the negative findings of these studies regarding the effectiveness of the interventions. It should be noted however that one guideline-based intervention in Finland offered to workers who were not severely work-disabled led to positive findings in terms of work disability duration (59). This may support the effectiveness of such interventions in certain types of conditions.

Who can assist physicians and other healthcare providers in implementing guideline-based interventions? Who can assist them in communicating with the workplace? A key finding of the review of quantitative studies was the fact that, in the Norwegian study, the increase in use of the targeted intervention dropped to zero when the RTW coordinators were withdrawn from the program (88-90). The presence of an RTW coordinator had a critical impact on the uptake and implementation of this guideline-based intervention. A RTW coordinator can also greatly facilitate the communication between employers and healthcare providers, and extend the area of influence to other actors. They should be considered as having a motivating and coordinating role for the other actors in the RTW process, including the worker.

Another key finding from our review of qualitative studies was that rehabilitation and occupational healthcare providers can play a leading role in bridging the communication gap between the employer and the healthcare system. In some cases they have the opportunity to physically go to the workplace and conduct work site visits (39).

Rehabilitation and occupational health care providers possess both the medical and occupational background knowledge needed to assess an injured or ill worker's situation. They can also relate to both the workplace and to the medical systems, and have the sufficient credibility to be heard by all parties.

Both RTW coordinators and rehabilitation and occupational healthcare providers can play important roles in bridging the communication gap between the healthcare system and the workplace.

The actors in the RTW process and their culture

Current models of work disability incorporate the notion that for RTW programs to work, there needs to be multiple players involved in a cooperative process (35;37;39;94).

Our review of qualitative studies largely focused on the interpersonal aspects of these actors in the RTW process. The review of both qualitative and quantitative studies addressed the culture in which these actors operate, cultures which reflect the beliefs and values of the actors, and how these, in turn, influence behavior.

Since we have already presented our findings about the role of healthcare providers, we now turn to what the literature reveals about other actors in the RTW process and their culture - the workplace actors, the insurer, and the union, as they relate to the main actor, the worker. Ways to support the actors in the RTW process will also be discussed.

The workplace culture and the role of the supervisor

The supervisor is often the person responsible to make the initial contact with the worker, to plan and implement a work accommodation, and to mediate the overall tensions which may arise between the worker and the workplace. Supervisors face production demands which can compete with the demands of optimal RTW process (5)(6). The essential condition in which a RTW process can lead to positive outcomes is one where relations at work, and particularly with the supervisor, are marked by goodwill, trust and flexibility (5;15;23;36;41;57)(6;20;31;50;62;86). If distrust occurs on either side, supervisor or worker, a social breakdown can occur, where there is a “hardening” of each respective position, and decreased motivation to cooperate (31).

In many respects, the themes of goodwill and trust found in qualitative studies are echoed by the construct of workplace people-oriented culture found in the quantitative studies (2;48;55). People-oriented culture, a measurable aspect of workplace culture, is demonstrated through the company’s ability to foster trust between management and

labour, and its commitment to empower workers in decision-making, by sharing and seeking information with workers cooperatively. A closely related measurable aspect of workplace culture is safety culture (48;50), which reflects a workplace's commitment to safety issues, through active leadership, safety diligence, and safety training. It is closely related to people-oriented culture (48;50).

Our review found that both people-oriented culture and safety culture were associated with shorter work disability duration. Of interest is the fact that the presence of these two aspects of workplace culture are also associated with primary prevention outcomes such as reduction in incidence of injuries (48;55). This reflects the observation that primary and secondary prevention share common facilitators and risk factors (36). Indeed, primary and secondary prevention have traditionally been examined separately, with separate research designs and separate research teams, but we are now realizing that these two silos have more in common than was originally believed.

We will now discuss how workplaces can be supported in developing people-oriented and safety focused culture.

Workplaces face the very real pressure to prosper financially in order to remain viable. RTW processes are more difficult to implement in workplaces experiencing fiscal constraint. Even for a financially healthy workplace, return to work can be expensive, involving increased claim costs and increased commitments in time and energy. What organizational strategies can support optimal RTW processes? Workplaces need to "buy in" the RTW process. Managerial consensus about the RTW process can facilitate the buy in. As well, certain strategies such as tracking and disseminating workplace injury information, and building health and safety components in managerial jobs, can lead to wider support of the RTW process.

Formal education to the workplace can be instrumental in maintaining optimal workplace culture. Safety training to the workplace is frequently part of workplace policies and procedures. The observational studies (2;48;55) reviewed showed that safety training was associated with reduced work disability duration. The occupational intervention in the study by Loisel (73-77) was highly intensive in education to the workplace - it involved a two-day workshop for workplace staff focusing on both primary

and secondary prevention aspects, such as management of occupational risk factors for back pain, ergonomic analysis, and participatory ergonomics.

Workplace culture however can not simply be taught. Much of social research attempts to understand how we can motivate, initiate, and sustain human behavior change (1;84;85). In the area of clinical settings, three major strategies have been used to change behavior: Educational, motivational, and behavioral (41). In the workplace setting, aside from formal education which we have discussed, motivational strategies could involve providing concrete external incentives such as being rewarded for certain types of people-oriented or safety-oriented behavior. Internal motivations for adopting more respectful and safe behavior can possibly be changed through examining the pros and cons of certain types of behaviors, experimenting with new behaviors, planning for new behaviors (84;85). Behavioral strategies, such as top management modeling and endorsement of the targeted workplace culture by operationalization of policies, can be effective. As well, the introduction of third party actors, who bring with them and model new workplace cultural aspects, can facilitate the uptake of new behaviors.

Goodwill, trust, and flexibility are inspired and sustained by various human experiences. They seem to be first and foremost self-perpetuating - a workplace which is already people-oriented is more likely to stay that way than a workplace which is not. For that reason, it is important to not only initiate new people-oriented and safe behaviors, but also to focus on sustaining the gains in developing optimal workplace culture.

A workplace culture characterized by goodwill, trust, and flexibility, and which is people-oriented and safety focused, reinforces and is reinforced by particular types of organizational structures. These include top management support for disability management, proactive RTW policies, and RTW management incorporated in supervisor evaluation. These concrete steps in the unrolling of workplace values and beliefs can offer incentives, motivations, and procedural information which support optimal RTW processes. Clearly, both cultural and organizational structures are tightly interconnected.

The insurer - The workers' compensation boards

The qualitative studies in our review highlighted the many difficulties workers face

when trying to meet their “duty to cooperate” with regards to their interactions with workers’ compensation boards (6;7;31;39;62;86). Their navigation through that system is arduous, marked by a lack of information about process and procedures, when workers are feeling vulnerable and less than self-reliant. The frustrations and confusion engendered by this process can understandably lead to further communication break-downs between the worker, insurer, and employer.

The insurance system was involved in different ways in the interventions of quantitative studies reviewed. In one Swedish intervention (3), RTW-focused case management was provided by insurance staff. The intervention involved a workplace ergonomic assessment to facilitate the planning of a work accommodation, a focus on early contact with the worker, and the presence of a RTW coordinator. The intervention was successful in reducing work disability duration and associated costs, most likely because it facilitated communication among various parties - insurer, worker and employer.

Insurance companies can contribute to the RTW process with concrete financial arrangements. In a Norwegian study, the targeted program (88-90), Active Sick Leave, involved the social insurance administration covering 100% remuneration of normal wages of the worker during the work accommodation period, and of the supernumerary position if needed. There are too few studies examining the impact of supernumerary replacements to reach any conclusions regarding their effectiveness. However, they offer a potentially fruitful insurance-supported option to facilitate the work accommodation process and reduce the burden on co-workers.

Future studies should examine the impact of insurance-based case management and insurance-supported supernumerary replacements on the satisfaction of workers with the insurance system. One possible positive spin-off of proactive RTW case management may also be higher job satisfaction of insurance case managers.

Unions and labour-management relationships

Unions and labour representatives are mandated to protect the best interests of workers. However, the best way to do so, at least within the context of the RTW process, is not always obvious.

Unions can face conflicting responsibilities. For example, an employee seniority agreement which protects one group of workers can interfere with the process of work accommodations (4;5;15)(4;6;20)(39). Because unions naturally respect the rights of injured or ill workers to remain away from their jobs as long as necessary, they may impede the process of return to work.

However, when unions and labour representatives buy into the RTW process, their involvement is beneficial (4;20;39). Indeed, strong labour-management relationships and strong labour involvement are part of successful intervention programs. Given that conflict resolution in the RTW process was not a frequent component of RTW interventions in the studies reviewed, unions could play an important role in resolving such disputes.

Developing good relationships between unions, management, and intervention providers is key to the RTW process. Future research should pay even more attention to the role of labour and unions and to finding ways to enlist their support.

Recommendations

Our literature review sought to answer the question of *What works and in which conditions?* Even the best RTW interventions will fail if not provided in the right conditions.

Based on evidence from both quantitative and qualitative high quality studies, we offer some guiding principles for future workplace-based RTW interventions. They outline the essential components of an effective RTW intervention and also describe what conditions are vital to success.

What interventions are most likely to work?

- **We recommend that workplace-based RTW interventions include the following core disability management strategies: Early supportive contact with the worker, the offer of work accommodation, and contact between healthcare provider and workplace.** There is moderate evidence that interventions which include these three components lead to important reductions in work disability duration and in associated costs. There is mixed evidence that these programs lead to improvements in quality of life outcomes.
- **We recommend that workplace-based RTW interventions include a strong ergonomic component, as facilitated by the ergonomic work site visits.** There is moderate evidence that work site visits lead to reductions in work disability duration. There is moderate evidence that work site visits have no impact on quality of life.
- **We recommend that workplace-based RTW interventions include the services of a RTW coordinator**. There is moderate evidence that the presence of an RTW coordinator is associated with reduced work disability duration and associated costs. There is mixed evidence regarding its impact on quality of life. The RTW coordinator has a critical role in the RTW process. The coordinator can act as a liaison among RTW actors, prompt them to follow RTW protocols, and contribute to the development of a common language around the RTW process which would be accessible to the worker.
- **We recommend that supervisors be supported in the RTW process as their role is central.** Support can take many forms: Formal education, information provided by RTW coordinator, input derived from an ergonomic work site visit, top management support for proactive return to work, RTW management incorporated

in supervisor evaluation and in production quotas expectations, option of a supernumerary replacement.

- **We recommend that rehabilitation and occupational healthcare providers be more directly involved in bridging the gap of communication between the workplace and the healthcare system.** These providers can share the responsibility of interacting with the workplace with physicians. They can serve as liaisons bridging the different worlds of the healthcare system, the workplace, and the worker.
- **In the acute phase of work disability, for individuals who are not severely work-disabled or who may even still be working with some limitations, a low intensity guideline-based and work-specific clinical intervention by a physician or rehabilitation/occupational specialist is sufficient to lead to reductions in work disability duration and associated costs.** The work-specific intervention reviewed involved a basic clinical examination, reassurance about prognosis, information about good posture, advice to stay active and avoid bed rest, prescribed sick leave if necessary, consultation with a physiotherapist focusing on assessment of daily activities including work activities and feedback to the worker's general practitioner.
- **In the sub-acute phase of work disability, a combined occupational-clinical intervention with a strong occupational component, involving a high degree of ergonomic input, has been effective in reducing work disability duration and associated costs.** It is important to note however, that the most effective component of the combined approach appears to be the occupational component. It remains unclear if the healthcare providers' input during the sub-acute phase requires a degree of intensity as high as the one found in the Loisel combined occupational-clinical approach (73-77).
- **Insurance providers can consider expanding their investment in the following activities: Supporting and facilitating ergonomic work site visits, increasing the focus on return to work in their case management, and supporting supernumerary replacements.** Ergonomic input in RTW

interventions appears to be a key factor in successful RTW outcomes. As well, a RTW focused insurer-based case management program was effective in achieving positive RTW outcomes. And finally, although the evidence was insufficient to arrive at definitive conclusions, it suggests that supernumerary replacements may be an effective RTW strategy.

- **Researchers need to include longer follow-up periods to adequately assess sustainability of RTW. As well, they need to incorporate in their studies the following aspects: Assessment of quality of life and quality of work life, and assessment of the impact of work disability in non-work-related roles of workers.** Detailed appraisals of the methodological quality of the research in both quantitative and qualitative areas and recommendations are found in the Appendices 3 and 4 of this document.

In what conditions do interventions work best?

- **Trust, goodwill, and flexibility among RTW actors are the essential conditions for a RTW intervention to be successful.** These attributes are echoed both in the qualitative literature and in the measurable constructs of people-oriented workplace culture and safety culture found in the quantitative literature. They have been associated with optimal RTW outcomes.
- **The process by which work accommodation is offered should involve creativity, flexibility, and cooperation between worker and supervisor.** Work accommodation should be tailored to the worker's needs, should minimize social dislocation of the worker, and should have production value.
- **We must develop a common RTW language to enable better communication among various RTW actors, including the worker.** In order to develop a common language, meetings and roundtables should be organized to bring together the multiple stakeholders involved, with representatives of workers, unions, employers, insurers, and healthcare providers, under the direction of professional facilitators.
- **We must foster "buy in" of all stakeholders in the RTW process.** It is clear

that optimal return to work requires commitment of all parties involved. Bringing the stakeholders together, exploring their goals, constraints, and resources, will enhance harmonization of their efforts and maximize successful RTW process.

In summary, our systematic review represents the most comprehensive review to date which focuses on the literature concerning workplace-based RTW interventions and processes. None of the interventions or processes we identified are new; we found no single intervention or approach to be more highly effective than all others. But significant new knowledge can be derived from this review. This knowledge is reflected in the confidence we now possess which allows us to speak definitively about what is and what is not effective in RTW.

Both the knowledge and the confidence are firmly founded on the highly systematic approach used to conduct our reviews of both the quantitative and qualitative RTW literature.

A strong evidence base is essential if we are to engage the stakeholder community in expanding practices around effective return to work. It also helps those interested in generating and carrying out future research identify priority areas for investigation.

Looking Ahead: Knowledge Transfer & Exchange

Now that the evidence on workplace-based RTW interventions has been collected, quality-appraised and synthesized, we are ready to consider the challenge of moving this vital information off the page and into practice.

To fully appreciate this task, it is important to have a basic understanding of the knowledge transfer and exchange (KTE) model developed and currently practiced at the Institute for Work & Health.

Within the last decade, researchers and research-user stakeholders have recognized that the publication of single studies does little to facilitate the actual penetration of research knowledge into “real-world” environments.

At the same time, a growing body of evidence generated in various domains – such as continuing medical education and guideline implementation – suggests that “research transfer” should be a deliberate process, built on the best evidence about what is effective in enhancing knowledge uptake.

As various organizations have taken up the challenge of KTE, the original strategy for research transfer (pushing research knowledge out to potential audiences) soon transmuted to knowledge transfer and exchange or KTE.

The KTE philosophy recognizes that while researchers have knowledge to share which could be used to improve practice, practitioners possess real world, experiential knowledge which could be used to improve research. Indeed, KTE is built on the premise that ongoing relationships between knowledge providers and knowledge users provide an infrastructure for two-way knowledge transfer and exchange.

Thus, the focus has shifted from project-by-project research transfer to building relationships between researchers and audiences that foster an ongoing exchange of knowledge, ideas and experience for mutual benefit. The Institute for Work & Health, was among the earlier adopters of this philosophy and has developed a model of knowledge transfer and exchange that can be readily applied to transferring the research knowledge on workplace-based RTW interventions.

The Institute's KTE model is grounded in evidence and synthesized into five foundation principles. In operation, these principles are easily expressed as five questions:

***Question 1: What* does the research say?**

Evidence teaches that research messages are more likely to be taken up when they are expressed as compelling ideas that relate to the day-to-day decision-making of the audience and when they clearly address the question: "Who should act and what should be different?"

The Summary and Recommendations section of the review provides a full description of the essential disability management components, and the workplace conditions that optimize implementation of review findings. Translating this evidence into specific messages for individual audiences is the next task, and here the "exchange" philosophy would serve us well.

***Question 2: Who* is the audience for this information?**

The evidence shows that audience-specific delivery works. It also suggests that a comprehensive awareness of the target audience(s) is essential toward understanding specific barriers and facilitators to knowledge uptake .

Beginning with this principle that focuses attention on the audience, we can identify three distinct target groups which are mentioned repeatedly in the various studies (each of these audience groups can be subdivided further at a later stage):

Workplace Audience

This audience includes injured workers, their co-workers, their supervisor(s), top management and, where applicable, the union. In some instances the workplace may include specialized players such as RTW coordinators, disability managers, or other in-house occupational health specialists.

Healthcare Audience

This includes those who provide healthcare for injured workers such as physicians, physiotherapists, occupational therapists, and ergonomists. Such healthcare providers may act in a manner quite removed from the workplace or in synchrony with the workplace.

Insurer Audience

This includes people involved in relevant workers' compensation systems – in this case, WSIB policy-makers and those involved in service delivery teams. This audience also incorporates specific players working within private insurance delivery systems.

***Question 3: Who* is the best messenger?**

The evidence indicates that the audience's perception of the credibility of the messenger is directly related to the uptake of the knowledge transferred. Our next steps should be to discuss and identify the most credible messengers from the audiences we have identified.

***Question 4: How* should the message be delivered?**

Numerous techniques and methods for delivering research knowledge have been described and studied. Some work better than others, depending on the audience and the message, but interactive engagement appears most effective with all audiences. The next step includes some consideration and discussion of message delivery strategies.

***Question 5: What* effect(s) should we expect?**

If the research knowledge is applied, what should change? This requires thinking about what should change at all levels of the RTW system. Designing an evaluation at the outset of the knowledge transfer planning can help to ensure the right impacts are measured.

Applying our KTE model to findings from the systematic review of RTW interventions

The content of the systematic review of workplace-based RTW interventions provides a rich source of knowledge to apply the model. Specifically, we recommend that the WSIB, in collaboration with the IWH, begin translating this evidence into messages by engaging representatives of the various audiences described above.

The continued involvement of IWH knowledge transfer and exchange partners will help move this process along. Audiences must be involved at each of the following stages:

- translating the evidence into messages for practice
- planning specific mechanisms for transfer
- determining what impacts are of interest

One tested transfer mechanism that may be considered is the *'Work-Ready'* model. This was developed as a facilitated workshop aimed at bringing together a range of players involved in managing soft-tissue injury and RTW. The model is highly interactive and uses a case-study approach to discuss real-life scenarios, along with a tutorial to consider what the evidence contributes towards solutions.

From Research Report to Practice

The systematic review has defined which actions are most reliable in enhancing RTW and reducing worker disability and associated costs. The next step is moving our findings from concept to reality.

As KTE members of the systematic review team, we believe the Institute and the WSIB now stand on the brink of a common goal: promoting this new understanding of RTW with key players – both within the WSIB itself and also beyond its borders. The outcome we all desire is return to work after illness or injury that is safe, timely and sustained, and that serves the best interests of everyone involved.

Reference List

(1) Ajzen I, Fishbein M. Understanding Attitudes and Predicting Social Behavior. Englewood Cliffs, NJ: Prentice-Hall, 1980.

(2) Amick BCI, Habeck RV, Hunt A, Fossel AH, Chapin A, Keller RB et al. Measuring the impact of organizational behaviors on work disability prevention and management. Journal of Occupational Rehabilitation 2000; 10(1):21-38.

(3) Arnetz BB, Sjogren B, Rydehn B, Meisel R. Early workplace intervention for employees with musculoskeletal-related absenteeism: A prospective controlled intervention study. J Occup Environ Med 2003; 45(5):499-506.

(4) Baril R, Berthelette D. Etudes et recherches. Components and organizational determinants of workplace interventions designed to facilitate early return to work. R-263, i-53. 2000. Montreal, IRSST. Ref Type: Report

(5) A theoretical model of the implementation of early-return-to-work measures.: 2003.

(6) Baril R, Clarke J, Friesen M, Stock S, Cole D, Bombardier C et al. Management of return-to-work programs for workers with musculoskeletal disorders: A qualitative study in three Canadian provinces. Social Science & Medicine 2003; 57(11):2101-2114.

(7) Baril R, Martin J-C, Lapointe C, Massicotte P. Etude exploratoire des processus de réinsertion sociale et professionnelle des travailleurs en réadaptation. RR-082, 1-17. 1994. Montréal. Ref Type: Report

(8) Bernacki EJ, Guidera JA, Schaefer JA, Lavin RA, Tsai SP. An ergonomics program designed to reduce the incidence of upper extremity work related musculoskeletal disorders. Journal of Occupational & Environmental Medicine 1999; 41(12):1032-1041.

(9) Bernacki EJ, Guidera JA, Schaefer JA, Tsai S. A facilitated early return to work program at a large urban medical center. J Occup Environ Med 2000; 42(12):1172-1177.

(10) Bernacki EJ, Tsai SP. Managed care for workers' compensation: Three years of experience in an 'employee choice' state. J Occup Environ Med 1996; 38(11):1091-1097.

(11) Bernacki EJ, Tsai SP. Ten years' experience using an integrated workers' compensation management system to control workers' compensation costs. Journal of Occupational & Environmental Medicine 2003; 45(5):508-516.

(12) Berthelette D, Baril R. Les dimensions des interventions organisationnelles de maintien du lien d'emploi des travailleurs victimes de lésions professionnelles. Pistes 2002; 4(Novembre, 2).

(13) Briss P, Zaza S., Pappaioanou M, Fielding J, Wright-De Aguiro S., Truman BI et al. Developing an Evidence-based Guide to Community Preventive Services - Methods. American Journal of Preventive Medicine 2003; 18 (1S):35-43.

(14) Brooker A-S, Cole DC, Hogg-Johnson S, Smith J, Frank JW. Modified work: Prevalence and

characteristics in a sample of workers with soft-tissue injuries. J Occup Environ Med 2001; 43(3):276-284.

(15) Brooker A, Clarke J, Sinclair SJ, Pennick V, Hogg-Johnson S. Effective disability management and return to work practices. Toronto: Institute for Work & Health, 1998.

(16) Burton AK, Waddell G, Tillotson KM, Summerton N. Information and advice to patients with back pain can have a positive effect. Spine 1999; 24(23):2484-2491.

(17) Butler RJ, Johnson WG, Baldwin M. Managing work disability: Why first return to work is not a measure of success. Industrial Labor Relations Rev 1995; 48(3):452-469.

(18) Campbell R, Pound P, Pope C, Britten N, Pill R, Morgan M et al. Evaluating meta-ethnography: a synthesis of qualitative research on lay experiences of diabetes and diabetes care. Social Science & Medicine 2003; 56:671-684.

(19) Carroll LJ, Cassidy JD, Peloso PM, Garritty C, Giles-Smith L. Systematic search and review procedures: results of the WHO collaborating centre task force on mild traumatic brain injury. Journal of Rehabilitation Medicine 2004; Suppl. 43:11-14.

(20) Clarke J, Cole D, Ferrier S. Working Paper #127 Return to work after a soft tissue injury: A qualitative report. 2002.

(21) Cohen JE, Goel V, Frank JW, Bombardier C, Peloso P, Guillemin F et al. Group education interventions for people with low back pain: An overview of the literature. Spine 1994; 19(11):1214-1222.

(22) Contandriopoulos A-P, Champagne F, Denis J-L, avargues M-C. L 'évaluation dans le domaine de la santé: concepts et méthodes. Revue Epidémiologique et Santé Publique 2000; 48:517-539.

(23) Cooper JE, Tate R, Yassi A. Work hardening in an early return to work program for nurses with back injury. Work 1997; 8(2):149-156.

(24) Cooper JE, Tate RB, Yassi A. Components of initial and residual disability after back injury in nurses. Spine 1998; 23(19):2118-2122.

(25) Côté P, Cassidy JD, Carroll L, Frank JW, Bombardier C. A systematic review of the prognosis of acute whiplash and a new conceptual framework to synthesize the literature. Spine 2001; 26(19):E445-E458.

(26) Cott CA, Gignac MAM, Badley EM. Determinants of self-rated health for Canadians with chronic disease and disability. Journal of Epidemiology and Community Health 1999; 53:731-736.

(27) Crook J, Moldofsky H, Shannon H. Determinants of disability after a work related musculoskeletal injury. J Rheumatol 1998; 25:1570-1577.

(28) Dasinger LK, Krause N, Deegan LJ, Brand RJ, Rudolph L. Duration of work disability after low back injury: a comparison of administrative and self-reported outcomes. Am J Ind Med 1999; 35(6):619-631.

(29) Dixon-Woods M, Agarwal S, Young B, Jones D, Sutton A. Integrative approaches to qualitative and quantitative evidence. 2004. NHS Health development Agency. Ref Type: Report

(30) Drummond M, O'Brien G. What does economic evaluation mean? In: Stoddart and G.Torrance,

editor. Basic types of economic evaluatin. In, methods for the economic evaluation of health care programmes. Oxford: Oxford University Press, 1997: 8-11.

(31) Eakin JM, MacEachen E, Clarke J. 'Playing it smart' with return to work: small workplace experience under Ontario's policy of self-reliance and early return. Policy and Practice in Health and Safety 2004; 1(2):19-41.

(32) Ferguson KJ, Scharf T. Intervention research in agriculture: Examples from the swine confinement and respiratory health project. Am J Ind Med 1996; 29:386-391.

(33) Feuerstein M, Shaw WS, Lincoln AE, Miller VI, Wood PM. Clinical and workplace factors associated with a return to modified duty in work-related upper extremity disorders. Pain 2003; 102(1-2):51-61.

(34) Franche R-L, Krause N. Critical factors in recovery and return to work. In: Sullivan T, Frank J, editors. Preventing & Managing Disabling Injury at Work. New York, U.S.A.: Taylor & Francis, 2003: 33-55.

(35) Franche RL, Krause N. Readiness for return to work following injury or illness: conceptualizing the interpersonal impact of health care, workplace, and insurance factors22895. J Occup Rehabil 2002; 12(4):233-256.

(36) Frank J, Cullen K, Reardon R, IWH Ad Hoc Working Group. Preventing injury, illness and disability at work: What works and how do we know? 1-23. 2003. Toronto, Ontario, Institute for Work & Health. Ref Type: Report

(37) Frank J, Sinclair S, Hogg-Johnson S, Shannon H, Bombardier C, Beaton D et al. Preventing disability from work-related low-back pain: new evidence gives new hope - if we can just get all the players onside. CMAJ 1998; 158(12):1625-1631.

(38) Frank JW, Brooker AS, DeMaio S, Kerr MS, Maetzel A, Shannon HS et al. Disability resulting from occupational low back pain part II: What do we know about secondary prevention? A review of the scientific evidence on prevention after disability begins. Spine 1996; 21(24):2918-2929.

(39) Friesen MN, Yassi A, Cooper J. Return-to-work: The importance of human interactions and organizational structures. Work 2001; 17:11-22.

(40) Gatchel RJ, Gardea MA. Psychosocial issues: their importance in predicting disability, response to treatment, and search for compensation. Neurol Clin 1999; 17(1):149-166.

(41) Glanz K. Patient and public education for cholesterol reduction: A review of strategies and issues. Patient Education Counselling 1988; 12:235-257.

(42) Goldenhar LM, LaMontagne AD, Katz T, Heaney C, Landsbergis P. The intervention research process in occupational safety and health: an overview from the National Occupational Research Agenda Intervention Effectiveness Research team. J Occup Environ Med 2001; 43(7):616-622.

(43) Goldenhar LM, Schulte PA. Methodological issues for intervention research in occupational health and safety. Am J Ind Med 1996; 29:289-294.

(44) Govinda Raj A. Prognostic modeling of upper-extremity soft tissue disorders (dissertation).

University of Toronto, 2003.

(45) Green-McKenzie J, Parkerson J, Bernacki E. Comparison of workers' compensation costs for two cohorts of injured workers before and after the introduction of managed care. J Occup Environ Med 1998; 40(6):568-572.

(46) Grimshaw J, Russell IT. Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations. Lancet,The 1993; 342(8883):1317-1321.

(47) Guzman J, Esmail R, Karjalainen K, Malmivaara A, Irvin E, Bombardier C. Multidisciplinary rehabilitation for chronic low back pain: systematic review. BMJ 2001; 322(7301):1511-1516.

(48) Habeck RV, Hunt HA, VanTol B. Workplace factors associated with preventing and managing work disability. Rehab Counselling Bull 1998; 42(2):98-143.

(49) Habeck RV, Munrowd D. Employer-based rehabilitation practice: An educational perspective. Rehabilitation Education 1987; 1:95-107.

(50) Habeck RV, Scully SM, VanTol B, Hunt HA. Successful employer strategies for preventing and managing disability. Rehab Counselling Bull 1998; 42(2):144-161.

(51) Habeck RV, Leahy MJ, Hunt HA, Chan F. Employer factors related to workers' compensation claims and disability management. Rehabilitation Counseling Bulletin 1991; Special Issue: Disability management and industrial rehabilitation. 34(3):210-226.

(52) Hazard RG, Reid S, Haugh LD, McFarlane G. A controlled trial of an educational pamphlet to prevent disability after occupational low back injury. Spine 2000; 25(11):1419-1423.

(53) Hinkle L, Wolff HG. The nature of man's adaptation to his total envrionemnt and the relation of this to illness. Archives of Internal Medicine 1957; 99:442-460.

(54) Hogg-Johnson S, Cole D. Early prognostic factors for duration on benefits among workers with compensated occupational soft tissue injuries. Occupational & Environmental Medicine 2003;(In press.).

(55) Hunt HA, Habeck RV. The Michigan disability prevention study14961. 1993. Kalamazoo,Michigan, WE Upjohn Institute for Employment Research. Ref Type: Report

(56) Innes E, Straker L. Workplace assessments and functional capacity evaluations: Current practices of therapists in Australia. Work 2002; 18(1):51-66.

(57) International Labour Office. Managing disability in the workplace. ILO code of practice. Geneva: International Labour Organization, 2002.

(58) Jadad AR. Randomized control trials. British Medical Journal [On-line] . 2003. Ref Type: Electronic Citation

(59) Karjalainen K, Malmivaara A, Pohjolainen T, Hurri H, Mutanen P, Rissanen P et al. Mini-intervention for subacute low back pain: A randomized controlled trial. Spine 2003; 28(6):533-540.

(60) Karjalainen K, Malmivaara A, Van Tulder M, Roine R, Jauhiainen M, Hurri H et al. Multidisciplinary biopsychosocial rehabilitation for subacute low back pain in working-age adults: A systematic review within the framework of the cochrane Collaboration Back Review Group. Spine 2001;

26(3):262-269.

(61) Kempen GIJM, Miedema I, van den Bos GAM, Ormel J. Relationship of Domain-Specific Measures of Health to Perceived Overall Health among Older Subjects. J Clin Epidemiol 1998; 51(1):11-18.

(62) Kenny D. Barriers to occupational rehabilitation: An exploratory study of long-term injured workers. Journal of Occupational Health & Safety - Australia & New Zealand 1995; 11(3):249-256.

(63) Kingery PM, Ellsworth CG, Corbett BS, Bowden RB, Brizzolara JA. High-cost analysis: A closer look at the case for worksite-site health promotion. Journal of Occupational Medicine 2004; 36:1341-1347.

(64) Koehoorn M, Cole D, Hertzman C, Lee H. Work-related musculoskeletal disorders and costs of general health care utilization. Conference proceedings for the Sixteenth International Symposium - Epidemiology in Occupational Health.Barcelona, Spain. 2002. Barcelona, Spain., Sixteenth International Symposium - Epidemiology in Occupational Health. Ref Type: Abstract

(65) Koes BW, Van Tulder MW, Van Der Windt DAWM, Bouter LM. The efficacy of back schools: a review of randomized clinical trials. J Clin Epidemiol 1994; 47(8):851-862.

(66) Krause N, Dasinger LK, Neuhauser F. Modified work and return to work: a review of the literature. J Occup Rehab 1998; 8(2):113-139.

(67) Krause N, Frank JW, Dasinger LK, Sullivan TJ, Sinclair SJ. Determinants of duration of disability and return-to-work after work-related injury and illness: Challenges for future research. Am J Ind Med 2001; 40:464-484.

(68) Krause N, Ragland DR. Occupational disability due to low back pain: a new interdisciplinary classification based on a phase model of disability8788. Spine 1994; 19(9):1011-1020.

(69) Laforge RG, Rossi JS, Prochaska JO, Velicer WF, Levesque DA, McHorney CA. Stage of regular exercise and health-related quality of life. Preventive Medicine 1999; 28(4):349-360.

(70) Larsson A, Gard G. How Can the Rehabilitation Planning Process at the Workplace Be Improved? a Qualitative Study from Employers' Perspective. Journal of Occupational Rehabiliation 2003; 13(3):169-181.

(71) Lewchuk W, Robb AL, Walters V. The effectiveness of Bill 70 and joint health and safety committees in reducing injuries in the workplace: the case of Ontario. Canadian Public Policy 1996; 22(3):2-20.

(72) Lincoln AE, Feuerstein M, Shaw WS, Miller VI. Impact of case manager training on worksite accommodations in workers' compensation claimants with upper extremity disorders. J Occup Environ Med 2002; 44(3):237-245.

(73) Loisel P, Abenhaim L, Durand P, Esdaile JM, Suissa S, Gosselin L et al. A population-based, randomized clinical trial on back pain management12457. Spine 1997; 22(24):2911-2918.

(74) Loisel P, Durand M-J, Diallo B, Vachon B, Charpentier N, Labelle J. From evidence to community practice in work rehabilitation: the Quebec experience24472. Clinical Journal of Pain. In press.

(75) Loisel P, Durand P, Abenhaim L, Gosselin L, Simard R, Turcotte J et al. Management of

occupational back pain: the Sherbrooke model. Results of a pilot and feasibility study.12229. Occup Environ Med 1994; 51:597-602.

(76) Loisel P, Gosselin L, Durand P, Lemaire J, Poitras S, Abenhaim L. Implementation of a participatory ergonomics program in the rehabilitation of workers suffering from subacute back pain. Applied Ergonomics 2001; 32(1):53-60.

(77) Loisel P, Lemaire J, Poitras S, Durand M-J, Champagne F, Stock S et al. Cost-benefit and cost-effectiveness analysis of a disability prevention model for back pain management: a six year follow up study. Occupational & Environmental Medicine 2002; 59:807-815.

(78) National Institute fo Disability Management and Research (NIDMAR). Code of Practice for Disability Management. 2000. Ref Type: Report

(79) Nordqvist C, Holmqvist C, Alexanderson K. Views of laypersons on the role employers play in return to work when sick-listed. Journal of Occupational Rehabilitation 2003; 13(1):11-20.

(80) Oxman AD, Guyatt GH. Validation of an index of the quality of review articles. J Clin Epidemiol 1991; 44(11):1271-1278.

(81) Patton MQ. How to Use Qualitative Methods in Evaluation. Sage Publications Inc., Newbury Park, California, 1987.

(82) Peterson MA, Reville RT, Stern RK. Compensating Permanent Workplace Injuries: A Study of the California System. 1998. Santa Monica, Rand Institute for Civil Justice. Ref Type: Report

(83) Pransky G, Benjamin K, Hill-Fotouhi C, Fletcher KE, Himmelstein J, Karz J. Work-related outcomes in Occupational Low Back Pain: A Multidimensional Analysis. 2001. Ref Type: Unpublished Work

(84) Prochaska V.O., Velicer WF, Rossi JS, Goldstein MG, Marcus BH, et al. Stages of change and decisional balance for twelve problem behaviors. Health Psychology 1994;39-46.

(85) Prochaska VO, Redding CA, Evers KE. The transtheoretical model and stages of change. In: Glanz K, Lewis RM, Rimer BK, editors. Health behavior and health education. San Francisco: Jossey-Bass, 1997: 60-84.

(86) Roberts-Yates C. The concerns and issues of injured workers in relation to claims/injury management and rehabilitation: The need for new operational frameworks. Disability & Rehabilitation 2003; 25(16):898-907.

(87) Rychetnik L, Frommer M, Hawe P, Shiell A. Criteria for evaluating evidence on public health interventions. J epidemiol community health 2002; 56(2):119-127.

(88) Scheel IB, Birger HK, Herrin J, Carling C, Oxman AD. Blind faith? The effects of promoting active sick leave for back pain patients: A cluster-randomized controlled trial. Spine 2002; 27(23):2734-2740.

(89) Scheel IB, Hagen KB, Herrin J, Oxman AD. A call for action: A randomized controlled trial of two strategies to implement active sick leave for patients with low back pain. Spine 2002; 27(6):561-566.

(90) Scheel IB, Hagen KB, Oxman AD. Active sick leave for patients with back pain: all the players

onside, but still no action. Spine 2002; 27(6):654-659.

(91) Scheer SJ, Radack KL, O'Brien DR, Jr. Randomized controlled trials in industrial low back pain relating to return to work. Part 1. Acute interventions. Arch Phys Med Rehabil 1995; 76(10):966-973.

(92) Scheer SJ, Watanabe TK, Radack KL. Randomized controlled trials in industrial low back pain. Part 3. Subacute/chronic pain interventions. [Review] [65 refs]. Archives of Physical Medicine & Rehabilitation 1997; 78(4):414-423.

(93) Schonstein E, Kenny DT, Keating J, Koes BW. Work conditioning, work hardening and functional restoration for workers with back and neck pain. The Cochrane Library, (Oxford) ** (2):2003 (CD001822) 2003;(Oxford):2003.

(94) Schultz IZ, Crook J, Fraser K, Joy PW. Models of diagnosis and rehabilitation in musculoskeletal pain-related occupational disability. J Occup Rehab 2000; 10(4):271-293.

(95) Schultz IZ, Crook JM, Berkowitz J, Meloche GR, Milner R, Zuberbier OA et al. Biopsychosocial multivariate predictive model of occupational low back disability. Spine 2002; 27(23):2720-2725.

(96) Shannon HS, Mayr J, Haines T. Overview of the relationship between organizational and workplace factors and injury rates. Safety Science 1997; 26(3):201-217.

(97) Shaw WS, Robertson MM, Pransky G, McLellan RK. Employee perspectives on the role of supervisors to prevent workplace disability after injuries. Journal of Occupational Rehabilitation 2003; 13(3):129-142.

(98) Shrey DE. Disability management in industry: the new paradigm in injured worker rehabilitation.24762. Disabil Rehabil 1996; 18(8):408-414.

(99) Sinclair SJ, Hogg-Johnson S, Mondloch MV, Shields SA. The effectiveness of an early active intervention program for workers with soft-tissue injuries: The early claimant cohort study1366. Spine 1997; 22(24):2919-2931.

(100) Slavin RE. Best-evidence synthesis: an alternative to meta-analytic and traditional reviews. Educational Researcher 1986; Nov.:5-11.

(101) Slavin RE. Best evidence synthesis: an intelligent alternative to meta-analysis. J Clin Epidemiol 1995; 48(1):9-18.

(102) Smith B, chronic pain expert advisory panel. Report of the Chronic Pain Expert Advisory Panel. Toronto: Workplace Safety & Insurance Board, 2000.

(103) Spencer LRJLJ&DL. Quality in Qualitative Evaluation: A framework for assessing research evidence. Occasional Paper No. 2, prepared by National Centre for Social Research for the Government Chief Social Researcher's Office, London, i-98. 2003. Government Chief Social Researcher's Office. Ref Type: Report

(104) Spitzer WO, LeBlanc FE, Dupuis M, Abenhaim L, Belanger AY, Bloch R et al. Scientific approach to the assessment and management of activity-related spinal disorders: a monograph for clinicians. Report of the Quebec task force on spinal disorders. Spine 1987; 12(7S):s4-s55.

(105) Strauss A, Corbin J. Basics of Qualitative Research. Thousand Oaks: Sage, 1998.

(106) Symonds TL, Burton AK, Tillotson KM, Main CJ. Absence resulting from low back trouble can be reduced by psychosocial intervention at the work place. Spine 1995; 20(24):2738-2745.

(107) Tate RB, Yassi A, Cooper J. Predictors of time loss after back injury in nurses. Spine 1999; 24(18):1930-1936.

(108) Teasell RW, Bombardier C. Employment-related factors in chronic pain and chronic pain disability. [Review] [59 refs]. Clinical Journal of Pain 2001; 17(4:Suppl):S39-S45.

(109) Tompa E, Mustard C, Sinclair S, Trevithick S, Vidmar M. Post-accident earnings and benefits adequacy and equity of Ontario workers sustaining permanent impairments from workplace accidents. 2003.

(110) Tompa E, Trevithick S, McLeod C. A systematic review of the prevention incentives of insurance and regulatory mechanisms for occupational health and safety. Institute for Work & Health, editor. 2004. Ref Type: Unpublished Work

(111) Van Tulder MW, Esmail R, Bombardier C, Koes BW. Back schools for non-specific low back pain (Cochrane review). Cochrane Library 1999;(3):1-15.

(112) Verbeek JH, Van der Weide WE, Van Dijk FJ. Early occupational health management of patients with back pain: a randomized controlled trial23228. Spine 2002; 27(17):1844-1851.

(113) Yassi A. Utilizing data systems to develop and monitor occupational health programs in a large Canadian hospital. Methods of Information in Medicine 1998; 37(2):125-129.

(114) Yassi A, Khokhar J, Tate R. The epidemiology of back injuries in nurses at a large Canadian tertiary care hospital: Implications for prevention.10042. Occup Med 1995; 45:215-221.

(115) Yassi A, Tate R, Cooper JE, Snow C, Vallentyne S, Khokhar JB. Early intervention for back-injured nurses at a large Canadian tertiary care hospital: an evaluation of the effectiveness and cost benefits of a two-year pilot project. Occup Med 1995; 45(4):209-214.

(116) Zaza S, Wright-De Aguero LK, Briss PA, Truman BI, Hopkins DP, Hennessy MH. Data collection instrument and procedure for systematic reviews in the Guide to Community Preventive Services.Task Force on Community Preventive Services. American Journal of Preventive Medicine 2000; 18:44-74.

(117) Zwerling C, Daltroy LH, Fine LJ, Johnston JJ, Melius J, Silverstein BA. Design and conduct of occupational injury intervention studies: a review of evaluation strategies. Am J Ind Med 1997; 32(2):164-179.