

**The Role of Primary Care Physicians in Return to work
after Occupational Injury or Disease:**

A Systematic Review of Guidelines and Literature

by

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Abstract

Objective: My thesis aims to review the role of primary care physicians (PCPs) in the return to work (RTW) process following an occupational injury or illness. A systematic review was conducted to examine and synthesize evidence from scientific literature and guidelines addressing this topic.

Methods: *Literature* – Four major databases were searched for peer-reviewed studies published in English, between January 1980 and September 2008. Studies were selected to undergo further review if they explored the experiences of primary care physicians, focused on occupational injuries or pain, and included return to work as an outcome. Methodological quality appraisal and data extraction were performed for relevant studies. *Guidelines* – Guidelines on the role of physicians in return to work were searched and obtained from various medical associations and compensation boards. The searches were limited to English only.

Results: *Literature* – A total of 1022 papers were identified, and 40 studies met the inclusion criteria. Of those studies, 30 were of sufficient quality to be included in this review. There was strong evidence that, in addition to usual care, collaborative effort among stakeholders, early contact between the physician and workplace is associated with early RTW. There was also strong evidence to support several key concepts in physician's disability management, including time and incentives, advocacy, trust and respect, knowledge and education, awareness of external factors, processes of care. There was moderate evidence that the use of evidence-based care has limited effect on disability improvement and RTW. The level of evidence regarding the effect of early RTW advice on RTW and degree of recovery was mixed. An acronym, CAPP, is proposed to denote the five major roles for PCPs in RTW management. *Guidelines* – A total of 11 guidelines were identified from various sources. There are remarkable consistencies among

the developed guidelines, and also between guidelines and scientific literature. None of the reviewed guidelines; however, are evidence-based since there was no systematic search and quality appraisal of the literature as part of their formulation.

Conclusions: Evidence-based findings from this review support that PCPs have an important role in facilitating timely RTW for their patients, and they can serve as both facilitators and barriers along the process. Recommendations are made for future guideline development and intervention studies involving physicians.

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List of Abbreviations

AAOS	American Academy of Orthopaedic Surgeons & the American Association of Orthopaedic Surgeons
ACOEM	American College of Occupational and Environmental Medicine
AMA	Alberta Medical Association
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CMA	Canadian Medical Association
EMBASE	Excerpta Medica Database
FCE	Functional Capacity Evaluation
GP	General practitioner
HCP	Health care provider
LBP	Low back pain
MEDLINE	Medical Literature Analysis and Retrieval System Online
MMA	Manitoba Medical Association
MSK	Musculoskeletal
OMA	Ontario Medical Association
OP	Occupational physician
PCP	Primary care physician
PubMed	Public/Publisher MEDLINE
RCT	Randomized-controlled trial
RTW	Return to work
TSO	The Stationary Office (London, UK)
WorkCover SA	WorkCover South Australia
WorkSafe BC	Workers' Compensation Board of British Columbia
WSIB	Workplace Safety and Insurance Board of Ontario

Chapter 1: Introduction

For several decades, the employment rate has increased steadily across the world. In Canada, the employment rate grew at an annual rate of 1.7 percent between 2001 and 2006 (Statistics Canada, 2008). Work-related illnesses, injuries and fatalities have also become prominent as a result of today's growing workforce. While it is essential that business and industry prioritize the health and safety of their workers, small and medium-sized companies often lack the financial resources to employ occupational health professionals for injury prevention. With the shortage of occupational physicians in the field, primary care physicians (PCPs) are responsible for the majority of work-related injury and illness care. As well, they are the main advisors to injured workers on disability prevention and work reintegration.

My thesis aims to provide a critical analysis of PCPs' role in returning injured workers back to work. I undertook a comprehensive systematic review of the literature and guidelines on this topic. This chapter presents an overview of occupational illness and injuries, as well as important themes pertaining to primary occupational health care, return to work and involvement of stakeholders. Chapter two and three provide descriptions of the methodology and results from the systematic review. Chapter four discusses the main findings and implications, strengths and limitations of this work, and recommended actions for future practice and research. Chapter five presents a concluding remark.

1.1 Occupational Diseases

An occupational disease is a health condition caused by exposure to workplace health hazards by means of inhalation, absorption, ingestion or direct contact (National Safety Council, 1995; Workplace Safety and Insurance Board in Ontario [WSIB], 1998). Common health hazards may include dust, gases or fumes, noise, toxic substances, vibration, radiation, infectious

germs or viruses or extreme temperatures (WSIB, 1998). Exposure to these hazards can cause adverse reactions to the body and lead to acute, chronic or even life-threatening health conditions. Some examples of work-related diseases are asthma, dermatitis, hearing loss, cancer, respiratory diseases, and lung problems, to name a few. In fact, it is estimated that about 3% to 9% of all cancers in the Canadian population are work-related (United Steelworkers Canada, 2008).

In Canada, the WSIB systematically collects statistics on occupational illnesses from insured workplaces. Yet, there is no detailed information about the prevalence of the different types of occupational disease. In fact, statistics on work-related illnesses are often grouped under the same category with workplace injuries, as the broad category of “time-loss injuries/illnesses”. In the United States; however, statistics are more readily available and occupational diseases generally accounted for nearly 6 percent of the 4 million workplace injury and illness cases. In 2007, there were approximately 21.8 cases reported per 10,000 full-time workers (Bureau of Labour Statistics, 2008).

1.2 Occupational Injuries

An occupational injury is defined as any injury resulting from repetitive work or a single instantaneous exposure in the work environment, such as a cut, fracture, sprain, or amputation, to name a few (NSC, 1995). Given the substantial proportion of people in the labour force, many will undoubtedly suffer some sort of injury in the workplace over the course of their work lives.

1.21 *Prevalence & Costs*

In 1996 through to 2005, an average of one million Canadian workers suffered from an occupational injury, disability or death annually (Human Resources and Social Development Canada [HRSDC], 2007). In many cases, the consequences of occupational injury and illness can

be substantial. These include job transfer, possible long-term health problems or disability, burden on the family of the injured worker, high medical expenses and compensation costs, and loss of work-time and income (Statistics Canada, 2007). Thus, occupational injuries and diseases have become a major concern not only to the employee, but also employers, healthcare workers, and society as a whole. Indeed, occupational injury and illness is directly linked to work absenteeism. In 2005, roughly one in 48 Canadian workers was severely injured and missed at least one day of work. In other words, there was approximately one compensated time-loss injury for every 21 seconds worked in the Canadian workforce (HRSDC, 2007).

In recent years, the economic costs of work-related injuries are increasing rapidly. Direct costs are the payments made to injured workers and their medical care providers, while indirect costs cover the expense of lost productivity, overtime, time associated with accident investigations, administrative costs with recordkeeping, training and replacement, and possibly increased insurance premiums (Michael, 2002a; Waehrer, Dong, Miller, Haile, & Men, 2007). In 2005, Workers Compensation Boards in Canada spent an estimated \$6.8 million in benefits, corresponding to an average of nearly \$20,000 per new compensated time-loss injury or fatality (HRSDC, 2007). After factoring in indirect costs, occupational injuries cost the Canadian economy an annual total of an estimated \$13.5 billion (HRSDC, 2007). In the United States, direct costs alone cost the U.S. compensation boards approximately \$48.3 billion in 2006. Combining both direct and indirect costs, the total economic burden of workplace injuries in the United States was estimated to be over \$200 billion (Liberty Mutual Research Institute for Safety [LMRIS], 2008; Michael, 2002b). Among all injury types, overexertion ranked first as the leading cause of injury, and it cost U.S. businesses \$12.4 billion in direct costs in 2006. This was followed by falls on the same level costing \$6.4 billion in direct costs (LMRIS, 2008).

At the micro level, the costs of illness and disability resulting from injury also involve businesses, injured workers and the workers' families. Illness and disability from serious injury not only lead to wage losses and household productivity losses, but also the company's work output. In the United States, employees who missed six or more days of work cost employers nearly \$1 billion per week (LMRIS, 2004). Furthermore, the costs of occupational injury and disease are beyond economic costs. Besides direct and indirect costs, quality of life costs are also associated with work-related injury and illness. Quality of life costs are the costs associated with pain and suffering of the injured workers, as well as the costs paid by their immediate family (Leigh, Waehrer, Miller, & McCurdy, 2006; Waehrer et al., 2007). A study by Leigh et al. (2006) shows that the costs of pain and suffering loss generally account for a substantial proportion of all occupational injury and illness costs. As a whole, the costs of occupational injuries are enormous and thus, it is important to prevent and properly manage occupational injury and disease.

1.22 *Incidence & Sources of Reported Occupational Injuries*

Overall, occupational injuries account for a substantial proportion of all reported injuries. According to the 2003 Canadian Community Health Survey (cycle 2.1), more than one quarter (28%) of employed workers aged 18 to 75 who reported at least one activity-limiting injury had sustained their most serious injury at work (Statistics Canada, 2007).

In 2003, hand injuries accounted for one-third of all reported work injuries, and this was mostly reported by the sales and service sector (Statistics Canada, 2007). This was followed by lower back injuries, which mainly involved white-collar workers. Among all types of injuries, sprain or strain was the most common, followed by cuts and fractures. A study by Tate (1992) on workers' compensation cases also found that back and neck injuries occurred more often than all

other types of injuries. In terms of mechanisms, overexertion or strenuous movement and falls accounted for almost half of all reported work injuries (Statistics Canada, 2007). These findings correspond closely with those from the United States, where overexertion and falls also accounted for 50% of all disabling workplace injuries in 2006 (LMRIS, 2008).

Men are more likely than women to be injured on the job, regardless of occupation (Islam, Velilla, Doyle, & Ducatman, 2001). Compared with male workers among all age groups, men aged 25 to 34 are most likely to be injured at work. The proportion of work injuries decline thereafter and reaches its lowest at age 65 to 75 (Statistics Canada, 2007). Besides age and sex, several employment factors also correlate with the risk of work injury. Men and women employed in trades, transport and equipment operation, primary industries, and processing and manufacturing are at greater risk of work injury. Furthermore, workers with lower income, who work in shift work and those in heavy labour have an increased risk of on-the-job injury. There is also a relationship between long working hours and injury; those who work 45 to 79 hours per week are 40% more likely to get injured than those who work less than 35 hours per week.

Given the overview of this section, occupational injury and diseases are important public health problems that affect many injured workers. As well, they place enormous burden on the economy and society as a whole. It is important to note that the majority of individuals with work-related injuries consult with their PCPs at least once during their recovery period. Thus, appropriate disability management from primary care physicians is a potentially important factor to minimize unnecessary disability and morbidity.

1.3 Primary Care Physicians (PCPs)

PCPs provide a wide spectrum of health services, including treatment of acute and chronic illnesses, health education and prevention, to name a few. Ideally, they form close

relationships with patients and offer a core commitment to continuity of care (McWhinney, 2000). PCPs also act as the gatekeeper in the health care system regulating access to more costly procedures and specialists. Furthermore, they have an important role in occupational health.

In this review, a PCP is defined as a physician who provides both the first contact and continual care for a patient with occupational injuries. PCPs can be a family physician, general practitioner (GP) or occupational physician (OP).

In North America, PCPs are mainly family physicians and GPs. There are few occupational physicians and most occupational medicine is managed by the PCP (Frazier et al., 1999). In fact, there are only 160 physicians currently registered with the Occupational and Environmental Medical Association of Canada (June Hylands, personal communication, May 27, 2009).

In most European countries such as the Netherlands and Sweden, OPs can also serve as PCPs in managing injured workers. In Europe, it is legally required to provide workers with occupational health services provided by physicians. In 2004, there were 813 physicians registered with the Swedish Association of Occupational Health physicians (Swedish Medical Association, 2005). In the Netherlands, every worker is linked to an occupational health service whereby the OPs will advise the employee to return to work with appropriate modification of work tasks or hours (van Duijn, Lotters, & Burdorf, 2005). Together with the supervisor, the OPs will discuss the plan for modified work or temporary work situations. Thus, these OPs act as PCPs and provide care to injured workers until they are capable of returning to work.

In many health care systems, the PCP is the first health care professional who is consulted by the worker for work-related injury or disease. A survey conducted in 1980 revealed that 85% of the surveyed GPs in Louisiana had come upon work-related illnesses or injuries in

their practices, and almost half the respondents reported such encounters at least once a day (Campbell & Nicolle, 1981). On average, a full-time family doctor can expect to see up to five patients per week with occupational injuries or conditions (Merrill, Pransky, Hathaway, & Scott, 1990).

A study by Govender, Ehrlich and Mohammed (2000) found that the majority of the GPs had diagnosed more than one case of occupational disease in the last 6 months. Similarly, most workers (67%) with occupational upper extremity disorders report their family doctor or PCP as the treating physician (Feuerstein, Shaw, Lincoln, Miller, & Wood, 2003). On the whole, the results of a recent systematic review confirm high incidence rates of GP consultations for work-related conditions. In particular, MSK disorders are the primary work-related reasons for physician consultation general practice (Weevers, van der Beek, Anema, van der Wal, & van Mechelen, 2005).

Concerning the management of work-related MSK conditions, 70% of patients managed in primary care for low back pain are also prescribed medications, with non-steroidal anti-inflammatory drugs (NSAIDs) as the most common drug (Cherkin, Wheeler, Barlow, & Deyo, 1998; Nyiendo, Haas, Goldberg, & Sexton, 2001). In another study, 30% of injured workers have received back X-rays, while 10% have received MRI services. Overall, family physicians are less likely to order x-ray services than other medical specialists (Hart, Deyo, & Cherkin, 1995). Similarly, Tate (1992) found that workers with compensation claims most often receive physical examinations, diagnostic procedures (EMG, x-rays, etc.) and conservative treatments in conjunction with the use of prescribed medications as their medical treatments.

Several studies have examined GPs' referral patterns in managing injured workers, particularly those with musculoskeletal conditions. More than a third of workers with

occupational low-back disability are referred to non-occupational medicine specialists, most commonly orthopaedic surgeons and neurosurgeons (Phelps, Vogel, & Shellenberger, 2001; Tacci, Webster, Hashemi, & Christiani, 1998). In addition, referrals are made relatively early in the course of care by their physicians, typically within the first two weeks of management (Tacci et al., 1998). When dealing with injuries, most family physicians suggest that the main difficulties stem from repetitive strain injuries or where the cause is often unclear (Russell, Brown, & Stewart, 2005).

1.4 Disability Management

After a work-related injury or illness, the ultimate goal is to return injured workers to safe and sustainable work. Physicians can take various steps to assure that the worker can return to work as soon as possible, which is a part of disability management. After filing for a work injury or disease, one of the first tasks for a physician is to assess the work ability of their patients and rate their functional capacity for work accommodation or issue sickness certificates for sickness absence and disability pension, whether it is temporary or permanent (Mayhew & Nordlund, 1988). To qualify for employment insurance sickness benefits in Canada, injured or ill workers have to demonstrate inability to work and present proof of incapacity issued by a physician or certified health practitioner (HRSDC, 2009).

In most countries, physicians certifying sickness absences will assess the degree of disease or injury. In the case of workers' compensation, the physician will also assess the work-relatedness of the condition. Although this is a common task for most physicians, certain conditions such as musculoskeletal disorders can be hard to identify and assess for severity and causation. This is followed by the determination of the level and extent of impairment, that is, whether or not the injured worker is capable of working. Furthermore, physicians should also

evaluate the benefits and disadvantages associated with sickness absence for the worker (Soderberg & Alexanderson, 2003). According to Ford, Ford and Dowrick (2000), some of the negative aspects of sickness absence include depression and marginalization. Consequently, the physician has to determine the duration and status of sick leave and whether or not the worker needs to remain off work.

When determining recommendations on time away from work, many physicians agree that clinical observations are the most important factor for consideration. This is followed by past experience with the patient, objective test results, the patient's description of the job's physical demands, employer input, the patient's request or expectations, and patient-reported stress (Pransky, Katz, Benjamin, & Himmelstein, 2002). In addition, they will also recommend and arrange necessary treatment and rehabilitation during the absence period for the worker. Lastly, the physician will issue a sickness certificate clearly stating the diagnosis, the duration and grade (full or part-time) of sickness absence or reduced work ability, with recommended treatment or rehabilitation measures (Soderberg & Alexanderson, 2003).

Clearly, sickness certification is a complex yet important step in disability management. These tasks often influence the lives of patients as well as the financial burden on workplaces, insurance companies and society. Nevertheless, this time-consuming practice is not without its shortcomings. A review of recent publications in sickness certification practices revealed that there was a large discrepancy between different physicians in the length of sickness certification for similar patients (Soderberg & Alexanderson, 2003). Furthermore, there continue to be ongoing discussions among physicians concerning the problems with issuing sickness certifications and its consequences, as well as the concern with limited resources (Coe, 1975; Ford et al., 2000).

Sickness certification is the first and integral part of disability management, and this part of the process is well documented in the literature. Thus, the focus of this study is on the latter portion of the disability management process, namely return to work.

1.5 Return to work (RTW)

Following sickness certifications and the approval of the insurance authorities, the injured worker will be on disability benefits. The next step is to develop appropriate treatment and rehabilitation plans for the worker to assure safe and sustainable return to work. The type of treatment or rehabilitation program recommended to the injured worker will vary depending on the type of injury or disease. Furthermore, the duration of rehabilitation will also differ by individuals and the extent of their injuries. Examples of common rehabilitation programs include physical conditioning programs coupled with cognitive-behavioural interventions (Schonstein, Kenny, Keating, Koes, & Herbert, 2003), exercise interventions (Kool et al., 2004; Staal, Rainville, Fritz, van Mechelen, & Pransky, 2005), participatory ergonomics programs (Loisel et al., 2001), and vocational medical rehabilitation (Holopainen, Nevala, Kuronen, & Arokoski, 2004), to name a few.

Prolonged absence from work may lead to increased anxiety, fear of re-injury and loss of self-esteem (Barab-Ettipio & Centono, 1985; Padgett, Collins Hollander, Warden, Coleman, & Schwart, 1993; Schwartz, 1993). When workers return to work on modified duties, they are more likely to resume their normal duties in a timely fashion. A study shows that “Therapeutic Return to Work”, a workplace rehabilitation program that arranged modified work duties and a graduated return to pre-injury tasks, improved the probability of workers resuming their full duties and staying at work (Durand & Loisel, 2001). Other studies confirm that when workers are accommodated, they are significantly more likely to permanently return to work and less

likely to experience further periods of absence arising from their injury (Butler, Johnson, & Baldwin, 1995; Crook, Moldofsky, & Shannon, 1998; Krause, Dasinger, & Neuhauser, 1998). This research suggests that early return to function and work as part of the recovery may help workers achieve better long-term outcomes.

Despite numerous RTW research studies, there is a lack of consensus as to what constitutes a successful return to work outcome and how to define it. A recent systematic review by Boyle and colleagues (2008) found that a variety of definitions have been used to define RTW in the literature. Definitions range from the very vague to the most comprehensive, which considers successful RTW when the worker has returned to work for at least 30 days at the same job with the same level of pay.

While many studies use return to work as the primary outcome measure, others have criticized this because it does not capture other important information about the burden of injury or disability (Baldwin, Johnson, & Butler, 1996; Bültmann et al., 2007). Some authors suggest that multiple outcome measures should be used during follow-up in order to provide a more complete picture of the complex RTW process, which involves the recurrence of work absence, persistence of disability and the effects of disability on work performance (Bültmann et al., 2007). In spite of the potential shortfalls, Kendall and Thompson (1998) suggest that RTW as a dependent measure is less susceptible to biased reporting.

In this review, return to work is defined as time loss from work, the time until the worker has returned to their previous employment, full or partial work resumption, return to modified or full duties, or sickness absence benefit status.

Various factors have been shown to influence the time to RTW after a period of work absence. In general, these factors include individual characteristics and demographic factors,

physical job factors, and psychosocial factors within the workplace organization. Individual characteristics that are associated with longer durations of work disability include high levels of pain, greater severity of injury and the presence of psychological illness such as depression (Claussen, Bjorndal & Hjort, 1993; Dasinger, Krause, Deegan, Brand, & Rudolph, 2000; Lanier & Stockton, 1988; Vendrig, 1999).

Recovery expectations also affect the time to return to work. Injured workers with positive work-related recovery expectations are less likely to have prolonged disability (Gross & Battie, 2005; Hogg-Johnson & Cole, 2003; Vendrig, 1999). Those who rate themselves as much better than expected have a 30% faster rate in benefit terminations (Cole, Mondloch, Hogg-Johnson & The Early Claimant Cohort Prognostic Modelling Group, 2002). Hence, Franche and Krause (2002) propose to apply a new readiness for change model to RTW within the broader framework of occupational disability management. This model identifies individual and social factors that impact an individual's ability to initiate and maintain the behaviour of returning to work after an injury or illness. It also recognizes that individuals proceed through stages of change, including decisional balance, self-efficacy and change processes about RTW.

In terms of demographic factors, younger injured workers are more likely to return to work sooner (Bigos et al., 1986; Dasinger et al., 2000). In particular, with each 10-year increase in age, the probability of returning to work is reduced by 10%. In addition, workers with longer pre-injury employment (longer than one year) have a 29% higher chance of RTW (Dasinger et al., 2000). Besides age and duration of pre-injury employment, education and wages before injury have also been found to be significantly related to RTW outcomes (Tate, 1992).

High physical job demands are also barriers to return to work. Dasinger and colleagues (2000) found that workers with a heavy work index (sum of the worker's scores on the lifting,

pushing or pulling, and bending items) have an 18% lowered chance of return to work than those who spent less time performing these physical demands at the pre-injury job. Furthermore, psychosocial factors within the workplace organization are important predictors of RTW. In fact, Krause, Dasinger, Deegan, Rudolph and Brand (2001) found that high psychological demands and low supervisory support are independently associated with a 20% lower RTW rate among workers with compensated low-back injuries. On the contrary, workers with high job control over work and rest periods are 30% more likely to return to work.

The presence of an active RTW program, such as work modification programs, as well as a people-oriented work culture climate with supportive peer and supervisors, influences the success of return to work (Hunt, Habeck, Vantol, & Scully, 1993; Institute for Work and Health, 2003; Kirsh, 2000). Furthermore, Merrill (1997) demonstrated the significance of two additional factors, seniority in the workplace and availability of employment, in the prediction for RTW. To a larger extent, complex rules and structures within the legislative or insurance systems also affect RTW, leading to worker disempowerment (Frankcom, 1992; Tate, 1992). Clearly, RTW is a process influenced by multidimensional factors.

1.6 Roles of Stakeholders in RTW

The RTW process includes a large number of stakeholders with different roles and responsibilities. While there are no standard principles for successful return to work, it is necessary for all stakeholders to do everything possible in order to reduce disability. As suggested by Reynolds, Wagner and Harder (2006), keys to successful disability management include offer of early return to work options by employers (work accommodation), addressing barriers and concerns of stakeholders, and for physicians to treat, communicate and guide the patients through the return to work process. More importantly, optimal outcomes can be

achieved with increased collaboration among these stakeholders.

1.61 *Worker Responsibilities*

Today, many compensation systems rely on the self-reliance policy for return to work. This model problematically assumes that injured workers are knowledgeable about their rights and responsibilities, and they can make informed decisions and advocate for themselves in a pressure-free environment for re-integration to work (Eakin, MacEachen, & Clarke, 2003). Although many injured workers recover from injuries in a relatively predictable manner and return to work in a timely fashion, others are not very knowledgeable of the RTW process and experience many problems during their recovery. Some of these workers feel misunderstood and unfairly treated by decision-makers and various other stakeholders involved (MacEachen, Kosny, & Ferrier, 2007). Others feel that the RTW process victimizes them, which leaves them powerless and dependent on the system (Beardwood, Kirsh, & Clarke, 2005). The lack of trust and support from compensation systems, employers and health care professionals further impedes the RTW process (Beardwood et al., 2005; MacEachen et al., 2007).

Nevertheless, injured workers can still take ownership of their recovery and minimize the impact of disability and return to work sooner. To ensure a successful RTW, Gaines (1998) suggests that the injured worker adhere to all prescribed medical, physical therapy, occupational therapy and RTW recommendations.

1.62 *Role of the Workplace*

In recent years, progressive businesses have begun to recognize the value and importance of employees in building a competitive workforce. When an employee is injured on the job, the employer can be faced with high expenditures for work absences, termination costs, replacement costs and retraining costs, to name a few. Thus, employers should also do everything possible to

keep recovering employees in the workplace environment.

Overall, when asked about the roles that employers play in RTW, many emphasize the need for a structured back-to-work program (Gaines, 1998; Nordqvist, Holmqvist, & Alexanderson, 2003). Such programs should allow employers to maintain ongoing, empathic contact with employees regarding their recovery status. In particular, there has been a growing interest in workplace-based RTW interventions. Amick et al. (2000) found that organizational policies and practices are important in reducing the number and consequences of work-related disabilities, which include having a people-oriented culture, good safety climate, disability management policies and practices, and ergonomic practices at the workplace. Gard and Larsson (2003) also show that motivation is essential for successful RTW. If an employer is motivated and willing to listen to their employees, it helps motivate the injured worker to recover and return to work sooner.

Temporary workplace accommodation should also be provided to the injured worker, and fellow workers should be informed of the possible changes in task assignments upon return of the injured worker (Nordqvist et al., 2003). Indeed, workplace offers of accommodation are associated with less time on disability benefits among workers with compensated soft-tissue injuries (Hogg-Johnson & Cole, 2003). In addition, employers should work cooperatively with the treating physician to reduce medical and compensation costs. This mutual collaboration further allows the treating physician to understand the company's production processes and the availability of various work transitional programs, hence allowing the injured worker to keep working (Callahan, 1994; Gaines, 1998).

1.63 Challenges with Workers' Compensation Systems

Workers' Compensation is an insurance system that provides for and works with

employers to cover lost wages, health care benefits and rehabilitation expenses for workers who are injured in the course of doing work-related activities (Association of Workers' Compensation Boards of Canada [AWCBC], 2007). In Ontario, it is the legislative responsibility of employers to accommodate injured workers. These benefits are funded by employers in the form of a premium, whereby a certain dollar amount per \$100 of payroll is deducted. In North America, each province and state has its own Workers' Compensation plan. The employers do not necessarily pay the same amount of premiums, but rather, the premium reflects the relative hazards to which the workers are exposed and the employer's claim record (AWCBC, 2007). In Sweden and other European countries, injured workers may be covered under the public health insurance administration, with some form of compulsory social sickness insurance.

Research evidence regarding the effect of workers compensation benefits on return to work is mixed. While some studies have identified no association between receiving workers' compensation and recovery (Dworkin, Handlin, Richlin, Brand, & Vannucci, 1985; Mendelson, 1982), other studies suggest a correlation between disability benefits and prolonged recovery (Guck, Meilman, Skultety, & Dowd, 1986; Guest & Drummond, 1992; Million, Haavik, Jayson, & Balsler, 1981; Sanders & Meyers, 1986). Similarly, the majority of the studies included in a critical review of literature (WorkCover Western Australia, 2001) also conclude that the receipt of workers' compensation has a negative association with the speed and degree of recovery outcomes following occupational injury. However, these findings are equivocal and further research is needed to clarify this association.

In most countries, workers' compensation authorities also rely on family physicians to combine their traditional clinical care with tasks aiming to facilitate timely return to work (WSIB, 2004). They mainly require physicians to assess the nature of the injury and perform sickness certification, offer treatment and rehabilitation plans and assists in return to work. The

WSIB, for example, has published a guideline with useful information to assist physicians and other health care professionals in returning patients back to work.

1.64 Supports from Medical Associations

Medical associations also play a role in supporting various players in the RTW process, particularly the physicians. In recent years, much has been published by these associations to help physicians in assisting RTW. In Canada, formal position statements have been published by the Canadian Medical Association, Alberta Medical Association, Manitoba Medical Association, and Ontario Medical Association. As noted by Reynolds et al. (2006), these documents describe the employer and worker relationship, as well as the involvement of multiple stakeholders and physicians in disability management. They recognize the importance of family physicians in supporting the employer-employee relationship, and providing guidance and expertise on appropriate use of resources.

These messages; however, are not always translated into practice and carrying out these roles is no easy task. Very often, family physicians experience frustration and difficulty when dealing with injured workers and RTW (Russell et al., 2005).

1.65 Role of Primary Care Physicians

In recent years, many insurance compensation boards have made changes to their rehabilitation policies in an effort to reduce the frequency and duration of disability claims. These reforms lead to greater responsibilities for physicians to facilitate return to work that is beyond traditional diagnosis and treatment. To a large extent, their role has expanded to include advice and support to the injured worker, functional abilities assessment and communication with the employer. Also, physician-patient interactions have an important effect on patient's health outcomes and RTW. Specifically, good communication between the physician and patient

is associated with better physiological, behavioural and subjective health status (Kaplan, Greenfield, & Ware, 1989). Besides positive health outcomes, recent studies have also shown that effective communication is an important component of early return to work and disability prevention among injured workers (Kosny et al., 2006; Pransky, Shaw, Franche, & Clarke, 2004; Shaw, Zaia, Pransky, Winters, & Patterson, 2005).

Managing patients with work-related injury can be challenging for physicians because they are expected to work closely with all involved stakeholders in addition to their patients and their patients' families. Unfortunately, most primary care physicians have very little understanding of the complexities of compensation systems and workplace physical demands (Gaines, 1998). Failing to comply with regulations on filing injury reports may lead to delayed RTW or denied treatment (Gaines, 1998; Richards & Rathburn, 1993). Furthermore, conflicting agendas among physicians and other stakeholders may adversely affect the patient's medical condition and rehabilitation progress. As mentioned previously, medical associations see physicians as the patient's advocate in the RTW process. As an advocate, their role is to promote, preserve and protect the health of the injured worker. While many injured workers rely on physicians for guidance about treating and coping with illness and injury, employers and compensation administrators also rely on treating physicians as the source for informed and accurate data regarding the worker's ability to work (American Medical Association, 2008). In order to prevent unnecessary disability, physicians must work cooperatively with all involved groups, and more importantly, to clarify their roles during the RTW process.

To date, there has not been a comprehensive systematic review of the scientific literature and guidelines developed by medical associations relating to the role of primary care physicians in RTW. Previous systematic reviews have focused on sickness certification practices and RTW

interventions (Franche et al., 2005b; Soderberg & Alexanderson, 2003).

1.7 Thesis Objective

The objective of my thesis is to examine and synthesize evidence on the role of primary care physicians in RTW process following an occupational injury or illness. This paper reports on the results of a systematic review of the scientific literature and other guidelines released by medical associations and other groups. Finally, I summarize the best evidence on what a primary care physician can do to return injured workers back to safe and sustainable work.

Chapter 2: Methods

2.1 Study Design

This is a systematic review of the published and grey literature concerning the role of primary care physicians in the RTW process related to occupational pain and injuries.

2.2 Search Strategy

Electronic database searches of MEDLINE, EMBASE, CINAHL, and PubMed were conducted for scientific literature published from January 1980 to September 2008. Hand searching of the reference lists within the retrieved articles and citation reference searching were also performed to include publications that were not retrieved in the original search. Citation reference searching enables one to locate other relevant articles that have been cited in a previously identified paper. As well, content experts in the field were contacted for any relevant publications that may have been missed in the searches.

2.3 Selection of Databases

Among all electronic databases, MEDLINE (Medical Literature Analysis and Retrieval System Online) is considered to be the most widely known and used database for health sciences literature. MEDLINE contains more than 16 million records in its database, and its powerful search tool using MeSH and topic subheadings allows the opportunity for comprehensive searches (Stave, 2003; U.S. National Library of Medicine [NLM], 2008b). In this review, MEDLINE was chosen as the primary electronic search engine. Although MEDLINE is comprehensive, using a single literature search engine has been shown not to capture all pertinent and available citations. Searching two or more databases provides greater coverage of all possible citations (Suarez-Almazor, Belseck, Homik, Dorgan, & Ramos-Remus, 2000).

While MEDLINE, EMBASE, CINAHL and PubMed are similar search engines, it is

important to search these databases because prior studies have shown differences in their literature scope and coverage. Overall, EMBASE (Excerpta Medica Database) is more commonly used by researchers and practitioners in Europe (Suarez-Almazor et al., 2000). A study by Wilkins, Gillies and Davies (2005) found that EMBASE yielded more than twice as many citations as MEDLINE for topics on primary care diagnoses relating to therapy. Indeed, only five percent of the citations were common to both databases. To ensure a comprehensive coverage in family medicine, it is recommended to combine both EMBASE and MEDLINE searches (Wilkins et al., 2005).

When comparing MEDLINE and CINAHL (Cumulative Index to Nursing and Allied Health Literature), there is considerable overlap in literature coverage (Brazier & Begley, 1996). However, CINAHL's unique use of tertiary subheadings allows one to tailor the search to achieve greater specificity (Brenner & McKinin, 1989). Even though MEDLINE constitutes the largest part of PubMed (Public/Publisher MEDLINE), PubMed is not synonymous with MEDLINE. In addition to MEDLINE citations, in-process citations in PubMed identifies records pending for indexing with MeSH that will be subsequently added to MEDLINE or converted to out-of-scope status (NLM, 2008a). PubMed also contains publisher-supplied citations, which are records transmitted to the NLM electronically by journal publishers before the date that a journal was selected for MEDLINE indexing (NLM, 2008a; Stave, 2003). Similar to MEDLINE, this freely accessible electronic database contains some powerful search modes – Related Articles, Clinical Queries, and automatic term mapping, which allow the retrieval of citations that other strategies might miss (Stave, 2003).

2.4 Search Terms

The literature search was based on a combination of keywords and MeSH headings with

the focus on primary care physicians, return to work, and work-related injuries. MeSH headings are Medical Subject Headings, which consist of more than 19,000 terms representing an enormous number of concepts in the database. These subject headings are arranged hierarchically, and narrower headings fall under one or more broader headings (Stave, 2003). When combined with free-text searching, it is recognized as a good search strategy because it maintains a balance between recall and precision (Stave, 2003). It is noteworthy that the actual search terms used vary depending on the database, as each database contains its own unique sets of MeSH headings. In addition to keywords and MeSH headings, search terms used in related systematic reviews published by the Cochrane Collaboration were adopted (Khan, Ng, & Turner-Stokes, 2008; Rautiainen et al., 2008). The search strategies were further reviewed and approved by a library scientist to ensure appropriateness and comprehensiveness. The initial search was not limited by language and year range. A complete list of search terms for all databases is presented in Table I below.

Table I. Database Search Terms

Focus	MeSH Headings				Keywords (.mp.)
	<u>MEDLINE</u>	<u>EMBASE</u>	<u>CINAHL</u>	<u>PubMed</u>	
Primary Care Physicians (PCPs)	<ul style="list-style-type: none"> • Attitude of health personnel • Family practice • Occupational health physicians • Physician-patient relation • Physician's practice patterns • Physicians • Physicians, family • Physicians' role 	<ul style="list-style-type: none"> • General practitioner • General practice • Practice guideline • Physician attitude • Doctor-patient relation • Health personnel attitude • Physician • Occupational physician 	<ul style="list-style-type: none"> • Physicians, family • Family practice • Physician attitudes • Physician's role • Physician-patient relations • Attitude of health personnel • Physicians 	<ul style="list-style-type: none"> • Physicians, family • Family practice • Physician's role • Physician-patient relations • Physicians • Physician's practice patterns • Occupational health physician 	<ul style="list-style-type: none"> • Family physician\$ • Doctor-patient relation\$ • General practitioner\$ • Occupational physician\$ • Physician\$ role\$ • Primary care physician\$

Focus	MeSH Headings				Keywords (.mp.)
	<u>MEDLINE</u>	<u>EMBASE</u>	<u>CINAHL</u>	<u>PubMed</u>	
Return to work (RTW)	<ul style="list-style-type: none"> • Absenteeism • Rehabilitation, vocational • Sick leave 	<ul style="list-style-type: none"> • Absenteeism • Vocational rehabilitation • Medical leave • Work resumption 	<ul style="list-style-type: none"> • Job re-entry • Sick leave • Absenteeism • Rehabilitation, vocational 	<ul style="list-style-type: none"> • Sick leave • Vocational rehabilitation • Absenteeism 	<ul style="list-style-type: none"> • Job re-entry • Medical leave • Return to work • Sick leave • Work absenteeism • Work resumption • Work capacity* • Work rehabilitation* • Job retention* • Re-employment*
Occupational Injury	<ul style="list-style-type: none"> • Accidents, occupational • Occupational diseases • Workers' compensation • Wounds and injuries* 	<ul style="list-style-type: none"> • Occupational diseases • Occupational accident • Work disability • Workman compensation • Injury 	<ul style="list-style-type: none"> • Occupational-related injuries • Occupational diseases • Worker's compensation • Wounds and injuries • Accidents, occupational 	<ul style="list-style-type: none"> • Occupational disease • Worker's compensation • Wounds and injuries • Accidents, occupational 	<ul style="list-style-type: none"> • Work-related condition\$ • Occupational injur\$ • Work injur\$ • Work\$ compensation\$ • Injur\$* • Accident\$* • Trauma\$* • Harm\$* • Wound\$* • Fall\$* • Burn\$* • Poison\$* • Fatal\$* • Drown\$* • Suffocat\$* • Lacerat\$* • Scald\$* • Asphyxi\$* • Shoot* • Shot* • Gunshot\$* • Electric shock\$*
<p>* Terms adapted from systematic reviews published with the Cochrane Collaboration RTW Keywords*: Khan et al., 2008 Occupational Injury Keywords*: Rautiainen et al., 2008</p>					

The titles and abstracts of all the identified papers were initially screened by one reviewer in which the exclusion criteria were applied. Publications were excluded if they were: (i) non-English; (ii) conducted prior to 1980; (iii) used children as participants; (iv) opinion papers, letters, commentaries or editorials; (v) narrative reviews; or (vi) case studies.

Subsequently, two reviewers independently reviewed the titles and abstracts of the remaining papers and ranked each on the basis of relevancy using the inclusion criteria. Publications were considered as probably relevant if the study: (i) explored the experiences of primary care physicians; (ii) mentioned the return to work process or a RTW outcome; (iii) focused on work-related pain or injuries. When the reviewer was uncertain about any of the three criteria mentioned above the paper was labelled “unsure of relevance”. Publications were ranked as not relevant if any one of the three criteria was not mentioned. In cases of disagreement, the reviewers discussed the abstract until consensus was reached. Only studies that were ranked as probably relevant and unsure of relevance were retained for full-text review. Together, both reviewers screened the full-text publications in detail to determine eligibility. Once again, disagreements were resolved through consensus.

2.5 Mixture of Study Designs

Many systematic reviews focus only on randomized controlled trials (RCTs) (Khan, Kunz, Kleijnen, & Antes, 2003). However, it is not realistic to undertake RCTs in all settings. For instance, RCTs are not ethical or practical under certain circumstances such as determining whether high intake of dietary fat is a risk factor for breast cancer, or testing iterative approaches to complex patient care, like the role of primary care physician in RTW. Thus, it is essential to consider well-conducted observational studies and quasi-experimental studies, particularly when studying health policies (Barton, 2000; Pocock & Elbourne, 2000).

Observational studies included in this review are cross-sectional designs, case-control studies and cohort studies. In general, observational studies are not as good as well-conducted or rigorous randomized controlled trials in eliminating most confounding factors. Furthermore, a recent study found that quality assessment does not routinely occur in systematic reviews of observational studies. Where it does occur, there is no clear consensus on the method used (Mallen, Peat, & Croft, 2006). Despite the challenges, several quality checklists that target observational studies were used in this review and this will be discussed in detail in the next section. In contrast, quasi-experimental studies are experimental studies without randomization, in which the allocation of subjects to different intervention groups is not random (Khan, ter Riet, Popay, Nixon, & Kleijnen, 2001). Unlike observational studies, however, there is presently no methodological checklist or scale that targets quasi-experimental studies. Nevertheless, it is suggested that the same quality criteria used in RCTs can also be used to assess quasi-experimental studies (Khan et al., 2001).

Finally, this systematic review also reviewed a Delphi study. The Delphi method is a structured communication process between researchers and experts in the field who can provide valuable insights in developing themes, directions, or predictions about a particular topic (Landeta, 2006). Although the Delphi method is a recognized research technique, there is a lack of well-developed methodological tools available to assess its quality.

2.6 Quality Assessment

The methodological quality of each relevant publication was assessed using several quality assessment checklists. Overall, the quality checklists are tailored specifically to the type of study design. In this review, the SIGN guidelines (Scottish Intercollegiate Guidelines Network, 2004) were chosen to assess cohort studies, randomized-controlled trials, systematic

reviews and meta-analyses. The NICE checklist (National Institute for Health and Clinical Excellence, 2007) was used to assess the quality of qualitative studies, whereas a modified STROBE checklist was used for cross-sectional studies (Strengthening the Reporting of Observational Studies in Epidemiology, 2007). Quasi-experimental studies were evaluated using the SIGN checklist for RCTs excluding the randomization component. Finally, the quality of the Delphi study was evaluated using different indicators suggested by Landeta (2006).

The SIGN (Scottish Intercollegiate Guidelines Network) methodology meets the criteria used by AGREE (Appraisal of Guidelines for Research and Evaluation in Europe) with the aim to identify good quality guidelines. The SIGN guidelines are based on a systematic review of the evidence undertaken by the guideline development group members. In case-control and cohort studies, quality is assessed by a checklist based on a number of key questions with six criteria for internal validity. These focus on the selection of subjects, assessment of measuring methods, absence of confounding and the quality of the statistical analysis. The checklists for RCTs, systematic reviews and meta-analyses also involved a series of questions determining the internal validity of the studies. (See Appendix 1 to 4 for complete SIGN checklists).

Qualitative studies were evaluated using the modified NICE methodological checklist (See Appendix 5). NICE stands for the National Institute for Health and Clinical Excellence and the criteria used in the qualitative checklist were adapted from the Qualitative Research and Health Working Group (Bromley et al., 2002) and the National CASP (Critical Appraisal Skills Programme) Collaboration for Qualitative Methodologies (2002). The modified version of the checklist also adapted concepts from Kuper, Lingard and Levinson (2008). Quality assessment was based on factors related to the aims of the research, study design, recruitment and data collection, data analysis, findings or interpretations, and implications of research.

For cross-sectional studies, a modified version of the STROBE guideline was employed. The STROBE checklist was developed by an international, collaborative initiative of epidemiologists, methodologists, statisticians, researchers and journal editors with the aim to improve the reporting of observational studies. The checklist was modified by means of deleting some items from the original checklist that were not relevant to this review topic. Quality was assessed using a checklist of 20 items related to the title, abstract, introduction, methods, results, and discussion sections of publications (See Appendix 6 for modified STROBE checklist).

To date, no consensus exists on the ideal methodological tools for assessing the quality of Delphi studies. Using the main characteristics and indicators as suggested by Landeta (2006), I have created a methodological checklist to evaluate the quality of the execution of a Delphi process. The checklist consists of seven items that focus on the quality and stability of the panel of experts, time between rounds, comments gathered from the experts, stability of the results, quality and intensity of participation, modification of opinions and consensus and convergence of opinion (See Appendix 7 for new Delphi checklist).

The overall quality of the study was then coded as “+++” for very high quality, “++” for high quality, “+” for medium quality and “-” for low quality. Based on the responses in these criteria, studies were considered of very high-quality if more than 80% of the criteria are fulfilled, high-quality if 65% to 80% of the criteria are fulfilled, medium-quality if 50% to 64% of the criteria are fulfilled and low-quality if fewer than 50% of the criteria are fulfilled. When assessing the quality of each paper, some items in the checklist may not be applicable and were disregarded.

In addition to the fulfillment of checklist criteria, I also considered the participation and follow-up rates when assessing the methodological quality of observational studies (See Table

II). Specifically, selection bias arises when there is a lot of non-participation or attrition in cohort and cross-sectional studies. Simulation studies conducted by Kristman, Manno and Côté (2004, 2005) indicate that selection bias due to non-participation becomes problematic if there is less than 80% participation rate. Thus, an extra set of criteria were considered when assessing cross-sectional and cohort studies.

Finally, the quality assessment was independently undertaken by two reviewers and discrepancies were resolved through consensus.

Table II. Quality Assessment Chart

Types of Study	Quality	Criteria
Cohort Cross-sectional	Very High (+++)	(i) Fulfilled more than 80% of the checklist criteria AND (ii) more than 80% of participation rate
	High (++)	(i) Fulfilled 65% to 80% of the checklist criteria AND (ii) more than 80% of participation rate
	Medium (+)	(i) Fulfilled 50% to 64% of the checklist criteria AND (ii) has 60% to 80% of participation rate, OR less than 60% but the authors discuss or provide analysis about non-participation (selection bias/attrition)
	Low (-)	(i) Fulfilled less than 50% of the checklist criteria AND (ii) has less than 60% of the participation rate with no effort to explain selection bias
Others (qualitative, Delphi, systematic review, quasi-experimental, RCT)	Very High (+++)	Fulfilled more than 80% of the checklist criteria
	High (++)	Fulfilled 65% to 80% of the checklist criteria
	Medium (+)	Fulfilled 50% to 64% of the checklist criteria
	Low (-)	Fulfilled less than 50% of the checklist criteria

2.7 Data Extraction

Data were extracted from studies assessed as being of medium, high or very high in quality. Specific tables were constructed and based on the type of study design, with each having slightly different headings. The data extraction for qualitative and Delphi studies included authors, quality, location, method, sampling, recruitment, and the focus of study. In addition to these categories, cross-sectional and cohort studies also included a column for key findings. For

quasi-experimental and RCTs, extracted data included authors, study design, quality, sampling, recruitment, intervention groups, outcomes and follow-up, and key findings. These are summarized in the evidence-based tables (See Table IV in the Results section).

2.8 Data Synthesis

Once the data were extracted into evidence tables, it was synthesized into findings. In this review, however, there were important differences between the studies in terms of study designs, sample populations, jurisdictional settings, interventions used, units of analysis, and statistical methods. These studies were too heterogeneous to be combined statistically, making a meta-analysis unfeasible. Therefore, findings from studies were collated using an alternative approach.

Emphasis was put on findings from high quality studies and those with consistent results across studies. Key concepts across studies were identified, and direct comparison of concepts across reviewed studies was done (See Table VI in the Results section).

For each of the key concepts, the results were synthesized according to three levels of scientific evidence that are based on the number, quality and outcome of the studies (See Table III). These criteria are adapted and modified from a systematic review conducted by Hoogendoorn, van Poppel, Bongers, Koes, & Bouter (2000).

Table III. Best Evidence Synthesis Chart

Level of evidence	Consistency of Findings
Strong evidence	There are generally consistent findings supporting the hypotheses or statements, <i>in multiple high-quality studies</i>
Moderate evidence	There are generally consistent findings supporting the hypotheses or statements, <i>in (1) one high-quality study & one or more lower-quality studies or (2) in multiple lower-quality studies</i>
Mixed evidence	Only one study available or inconsistent findings in multiple studies

2.9 Grey Literature

In recent years, medical associations have produced documents to assist and support physicians in helping patients to return to work. These guidelines recognize the importance of physicians in making work capacity determinations, interacting with different stakeholders and negotiating return to work between employers and employees (McGrail et al., 2001). In Canada, position statements have been issued by several medical associations. Similarly, the Worker's compensation boards in Ontario and British Columbia have also published a practical guide to help physicians assist their patients to return to work. Internationally, two American medical associations, The Stationary Office in London, and the compensation board in South Australia have published position statements to aid physicians. Other guidelines have been published in countries such as The Netherlands, but they are not available in English and are not included in this review.

Searching of the guidelines included the use of internet search engines, guidelines detected from the systematic literature search, and resources from content experts. The reviewed guidelines were mainly obtained through phone requests, official websites, peer-reviewed journals, and emails from content experts. All guidelines were acquired between August 2008 and March 2009.

Subsequently, systematically developed guidelines that are based on scientific evidence would undergo quality assessment using the AGREE instrument (Appraisal of Guidelines Research and Evaluation, 2003). Unlike guidelines that are based on expert opinions, evidence-based guidelines are systematically reviewed statements that are derived from original research studies. They often provide physicians with the average length of disability for multiple illnesses or injuries best treatment, and modified work possibilities, to name a few (Stutzman, 2001).

To ensure guidelines are indeed evidence-based, therefore, I contacted various associations by phone and email to determine the process of their guideline development and whether or not a systematic review was conducted to gather evidence. I have attempted to contact the associations at least two times over a two-week period. The guidelines are considered as non evidence-based if they fulfill two criteria: (i) there was no response to my request after two weeks, and (ii) their printed or published guideline did not specify a systematic search and scientific appraisal of the quality of the supporting literature.

Chapter 3: Results

A. RESULTS OF GUIDELINE ASSESSMENT

I have identified a total of 11 guidelines from my systematic search and recommendations from content experts (See Table IV for the complete list). These guidelines focus on the physician's responsibilities and involvement with return to work.

3.1A General Characteristics

Two guidelines were discovered from the systematic literature search and they are published in peer-reviewed journals (ACOEM, 2006; CMA, 1997). The guidelines, issued by the Alberta Medical Association, Ontario Medical Association, and WSIB, were obtained from their official websites. Extensive internet searches further uncovered guidelines developed by WorkCover South Australia, the Workers' Compensation Board of British Columbia and the American Academy of Orthopaedic Surgeons & the American Association of Orthopaedic Surgeons (AAOS), which are also available from their websites. Position statements by the American College of Occupational and Environment Medicine and the Stationary Office in London (TSO) were recommended by content experts. Lastly, the Manitoba Medical Association's position statement was obtained via phone request (See flowchart in Figure I).

Of the 11 guidelines, seven are developed by medical associations, while the remaining four are developed by workers' compensation boards. Among all reviewed guidelines, the Alberta Medical Association (AMA) and the Ontario Medical Association (OMA) were the first North American medical associations to establish formal position statements outlining the role of physicians in RTW in 1994. Unlike compensation boards, however, guidelines issued by medical associations do not state whether the patients or workers are injured at work. Most reviewed guidelines (except OMA) do not specify primary care physicians as their target audiences, but

state that the general principles are appropriate to other physicians and health care professionals involved in disability management. The length and comprehensiveness of these guidelines also vary, ranging from a 2-page concise statement (WorkSafe BC, 2003) to a comprehensive 45-page guideline (WorkCover SA, 2008). Relative to all guidelines, WorkCover Southern Australia is the most comprehensive guideline for physicians concerning RTW, while WorkSafe British Columbia is the least comprehensive (a pamphlet-like brochure).

3.2A Non Evidence-Based & Quality Assessment

In general, the purpose of a clinical practice guideline is to assist practitioner in providing appropriate health care for specific situations (Institute of Medicine, 1992). In this case, the RTW guidelines summarize evidence for managing the RTW process.

Only two of the guidelines (ACOEM, 2008; AAOS, 2000) have explicitly stated they are consensus statements, and others do not mention their process of guideline formulation, or the methodology used to support their findings. Using the criteria as described in the methods section, I conclude that none of the reviewed guidelines were developed using an evidence-based approach. These guidelines did not include a systematic search and quality review of the literature in their formulation. Even so, statements in many of the guidelines are informed and supported by findings from round-table expert panels, scientific studies, literature reviews and a number of other publications. Moreover, some of these documents are reviewed periodically by stakeholder committees and are revised accordingly to reflect the current state of knowledge.

Given that the guidelines are not evidence-based, their quality could not be assessed by the AGREE instrument (Appraisal of Guidelines Research and Evaluation, 2003). Thus, the quality of reporting and recommendations from these guidelines remains uncertain. In spite of this weakness, I will briefly report major themes from the guidelines in the following sections.

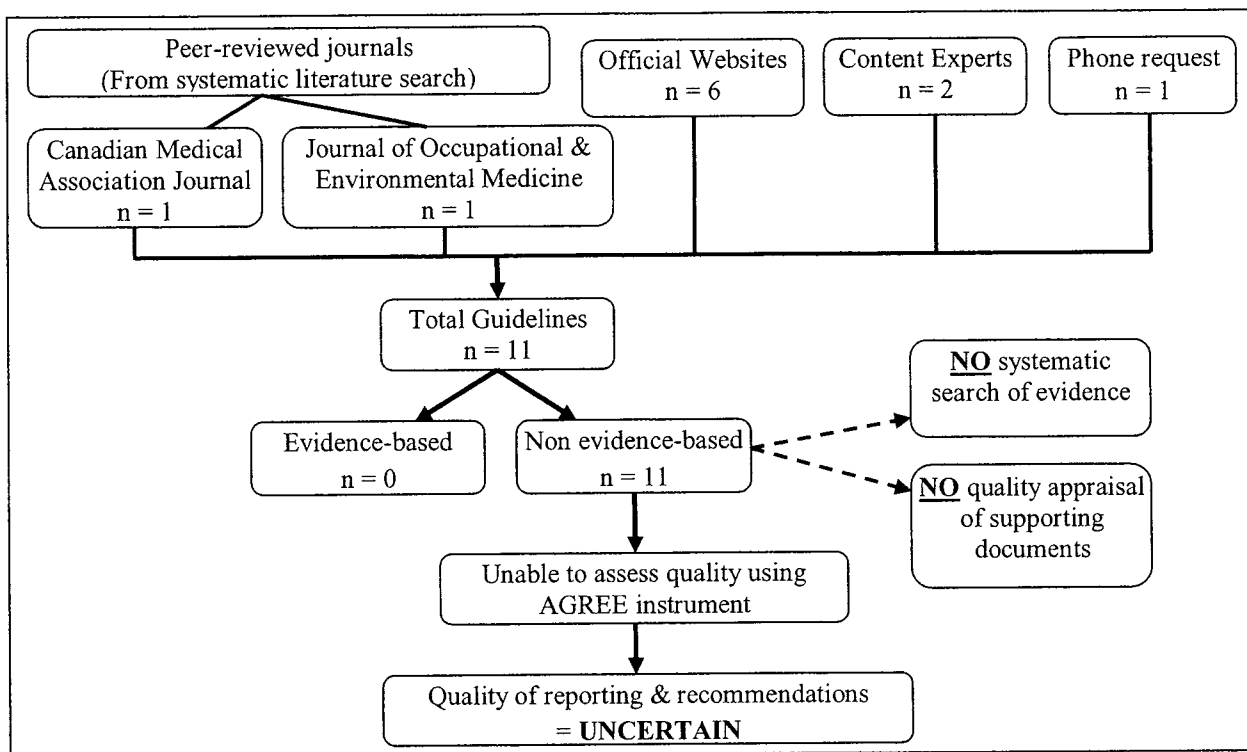


Figure I. Flowchart of systematic guideline search

3.3A Consistencies among Guidelines

There are remarkable consistencies among the reviewed guidelines, and this may be partly due to the fact that concepts are adapted or shared among some the statements developed by other medical associations. These relationships are depicted in Figure II.

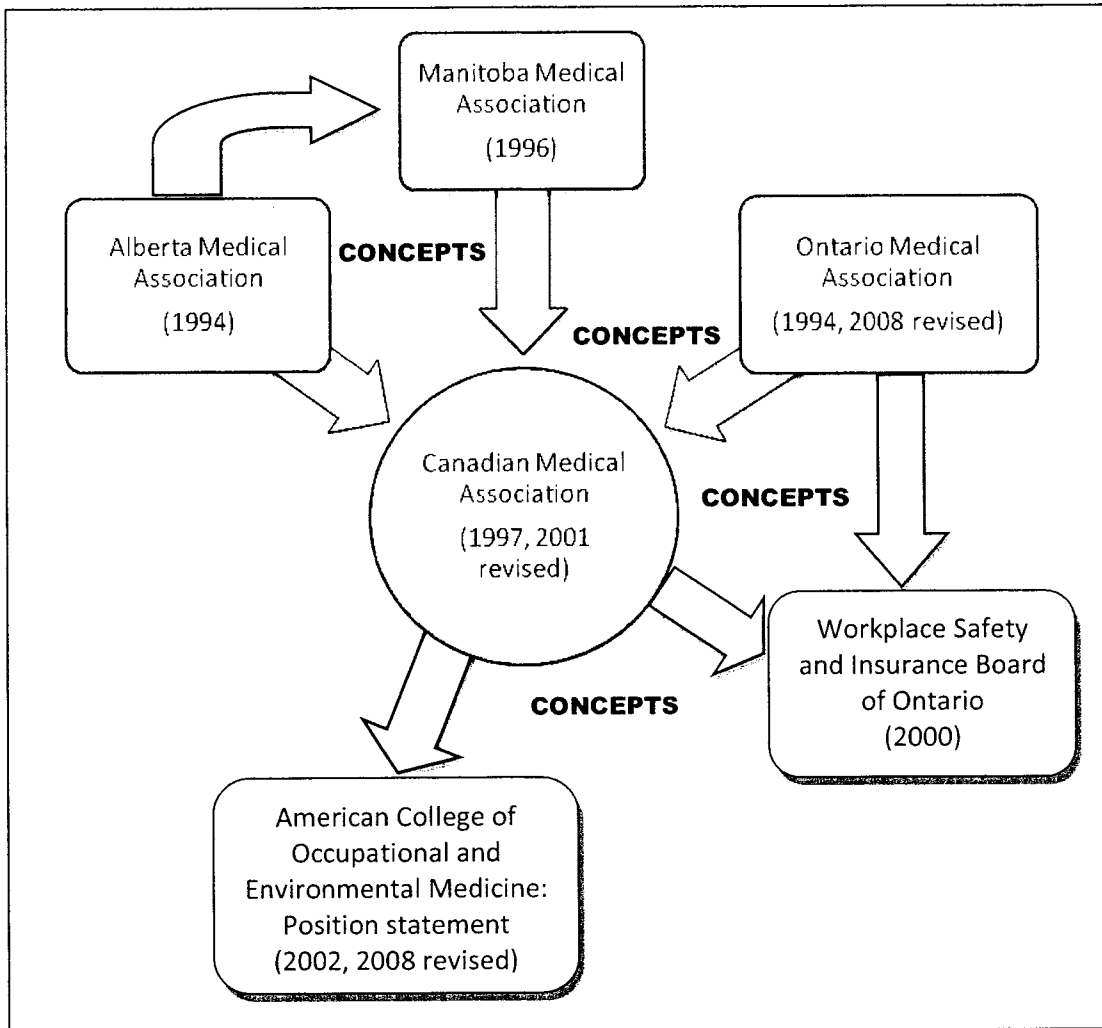


Figure II: Shared Concepts across Selected Guidelines

In particular, the AMA, MMA and CMA guidelines outline essentially the same key points, but the latter is more comprehensive as concepts are also adapted from the OMA guideline. The guideline issued by the WSIB also includes some of the main concepts from the CMA and OMA statements. Likewise, ACOEM guideline also shares some of the concepts in CMA guideline. A number of key concepts have also emerged among the guidelines (See Table IV).

Table IV. Key Concepts of Reviewed Guidelines

Theme	Canada						International				
	AMA (1994)	CMA (1997, 2001)	MMA (1996)	OMA (1994, 2008)	WorkSafe BC (2003)	WSIB (2000)	AAOS (2000)	ACOEM (2006)	ACOEM (2002, 2008)	TSO (2007)	WorkCover SA (2008)
Role of PCPs in RTW											
- Early RTW planning	x	x	x	x	x	x	x	x	x	x	x
- Offer prompt access to medical care		x		x		x	x	x	x		x
- Be familiar with worker's demands at work and home	x	x	x			x	x	x	x		x
- Be responsible to patient and society	x	x	x	x		x		x	x		
- Encourage gradual work resumption	x	x	x	x	x	x	x	x	x	x	x
- Advocate, advise & support		x		x		x	x	x	x		x
- Identify & address potential RTW barriers		x				x		x	x	x	
- Collaborate with other stakeholders	x	x	x	x	x	x	x	x	x	x	x
- Be communicative	x	x	x	x	x	x	x	x	x	x	x
- Establish RTW timelines & discuss expectations for recovery with patient	x	x	x		x	x	x		x	x	x
- Assess capabilities (Fitness for work)	x	x	x	x	x	x	x	x	x	x	x
- Prepare specific activity prescriptions or restrictions	x	x	x	x	x	x	x	x	x	x	x
- Discuss preventions		x		x		x	x	x	x		x
RTW program/options				x		x		x	x		x
Obstacles to recovery or RTW process						x		x		x	x
Role of other stakeholders											
- Employee				x			x				x
- Employer	x	x	x	x	x	x	x	x	x		x
- Other health professionals				x				x	x		x
- Other involved stakeholders				x			x	x	x		x
Disability income support						x		x			
Patient confidentiality	x	x	x	x		x			x	x	
Billing for health care services	x	x	x	x		x		x	x		
Information for patient	x		x								
Various injury healing & recovery times											x
Case study examples											x
System & infrastructure improvements								x			
Policy and third party Reporting Requirements				x							

3.4A Role of PCPs

All guidelines conclude that physicians have an active role in the RTW process, where they can serve as advocates, communicators, resource managers, and facilitators in achieving timely and safe return to work. In this section, I provide a brief summary of six major roles because they are emphasized across all guidelines. These include (i) early RTW planning; (ii) encouragement of gradual work resumption, (iii) collaboration; (iv) communication; (v) assessment of capabilities; and (vi) concise activity prescriptions or restrictions.

3.41A Plan RTW early

It is essential that RTW planning begins as early in the disability period as possible. Other ways of early planning include the incorporation of RTW as part of the treatment or care, use of evidence-based treatment plans, and discussion of benefits of work with patients.

3.42A Encourage gradual work resumption

Physicians need to be aware that patients do not have to be fully recovered in order to RTW, and that work can be a part of functional recovery from injury. Two guidelines (ACOE, 2008; WorkCover SA, 2008) list some options for graduated RTW by means of work accommodation, as well as ways to increase capacity to work, such as modifying work hours and physical demands of duties.

3.43A Be collaborative and communicative

Successful RTW does not solely rely on physicians, but rather, it is a collaborative effort that requires input from all players. Thus, all guidelines emphasize the need for physicians to interact and work with multiple stakeholders. They should discuss RTW planning with both employer and employee, as well as communicate with the employer with regards to the patient's functional abilities and any other concerns. To aid the RTW process, physicians may contact

other health professionals to consult or obtain additional medical records because referrals to other health services may require clarification on diagnosis, treatment or other issues. Contacting relevant authorities or disability claim managers can help physicians obtain more information on coverage, reports and case management.

3.44A Assess capabilities

One of the responsibilities of physicians is to assess the patient's capabilities prior to return to work, whether it is returning to partial or full work duties. This requires the use of appropriate judgement and clinical expertise. It may also require some knowledge of the workplace.

3.45A Provide concise activity prescriptions/restrictions

After assessing the worker's capabilities, the physician should prepare well described and specific activity prescriptions or restrictions for the employer. Physicians should consider task limitations, schedule modifications, environmental restrictions, and medical aids or personal protective equipment. For activity restrictions, physicians should state whether it is temporary or permanent, and specify an estimate of duration with temporary restrictions. Other considerations include restriction based on personal risk, restriction based on risk to others, limitations (inability), comfort (tolerance), and workplace limitations.

3.46A Other important responsibilities

Although not outlined among all guidelines, there are also other important roles that physicians should fulfill so as to manage disability effectively. These include providing prompt access to medical care to avoid unnecessary time loss; taking an appropriate medical history, diagnose, treat, make appropriate referrals, and monitor recovery; and become familiar with the worker's physical job demands and the environmental hazards in the workplace.

While the physician remains as the patient's advocate, he or she needs to find a balance that is fair to their patient, the employer and possibly the compensation/insurance board. Physicians should also establish timelines and fully discuss expectations on recovery times or important dates with their patients. Other important responsibilities include identifying and addressing potential RTW barriers; suggesting appropriate preventive measures to avoid recurrences of injury or illness in their patient; and providing guidance, education and reassurance to patients to overcome RTW and disability problems.

3.5A Additional information in the guidelines

In addition to outlining the role of physicians in RTW, most guidelines have also provided useful and relevant information for physicians in managing injured or ill patients. Several guidelines have devoted sections to the RTW process, with a varying degree of comprehensiveness. Some guidelines provide a list of core values and useful RTW pointers for physicians (OMA, 2008), while others offer comprehensive step-by-step management strategies along the recovery process (WorkCover SA, 2008).

A few guidelines have outlined factors that may affect RTW and the degree of recovery (ACOEM, 2006; TSO, 2007; WorkCover SA, 2008; WSIB, 2000). As well, many statements present physicians with useful information on disability income support for their patients (ACOEM 2006; WSIB 2000), the procedures for billing health care services and confidentiality issues (AMA, 1994; ACOEM, 2006; ACOEM, 2008; CMA, 2001; MMA, 1996; OMA, 2008; TSO, 2007; WSIB, 2000).

All but one guideline (TSO, 2007) has discussed the role of employers in RTW. The common theme holds that while PCPs provide medical recommendations concerning the patient's fitness to work, employers share the responsibilities by providing appropriate

accommodations upon the return of injured worker. The role of other key players have also been noted, including the injured worker or patient, other health care professionals, rehabilitation coordinators or consultants, case managers, unions and other private insurers. All in all, the main role of these stakeholders is to cooperate and work with each other to ensure the injured worker returns safely back to work.

3.6A Final Note

While there are remarkable consistencies across the reviewed guidelines, there is no evidence that the findings were consistently and systematically identified, evaluated and selected. Hence, one needs to be cautious when drawing conclusions about a primary care physician's role in the RTW process. The findings from these documents are preliminary only and shall be used only as an introduction or overview of the topic. In general, these guidelines fall short with respect to scientific quality.

B. RESULTS OF SCIENTIFIC LITERATURE

3.1B Summary of Literature Search

From the initial search of seven sources, 1022 studies were identified for possible inclusion in this systematic review. After removing duplicates and applying exclusion criteria, 327 abstracts were screened to determine relevancy. 98 studies that were of unsure or probable relevance were retained and full-text articles were screened to determine if they met the inclusion criteria. Of these studies, 44 were selected to undergo methodological quality assessment. On two instances, however, the same study was presented in multiple publications with only minor differences ([Anema et al., 2007; Steenstra et al., 2006a; Steenstra et al., 2006b]; [Hlobil et al., 2005; Staal et al., 2004]). In this case, only the most comprehensive publication was reviewed and the several publications were counted as one study. In another study, the consensus statement was published separately from the original study and again, the two documents were considered as one study. Consequently, the methodological qualities of 40 studies were assessed.

3.2B Quality and Characteristics of Reviewed Studies

Thirty studies were judged to be of sufficient quality to proceed to data extraction (See Figure III), and these accepted studies are of medium, high or very high quality. Overall, 14 studies were judged to be of medium quality, 15 studies of high quality, and one study of very high quality (See Table V).

Many of the included qualitative studies are well-conducted with sound qualitative methodology. These studies had a clear aim of the research with an appropriate methodology. The sampling strategy, data collection and analysis were also done appropriately. Nevertheless, their levels of evidence are not as strong as experimental studies. Many of the high-quality studies also consisted of RCTs. These RCTs had high internal validity, and the methods for

sampling, data collection and analysis are sufficiently rigorous.

The majority of the medium-quality studies are comprised of cohort and cross-sectional studies. Many of these studies had low participation rates, ranging from approximately 40% to 60%. While the results may not reflect the opinions or truths of the target population, the authors have made an effort to provide some analysis or discussion of the minimal differences between participants and non-participants. Hence, these studies were accepted for this review but were rated as medium quality.

Ten studies were excluded due to low methodological quality. Specifically, one RCT, one quasi-experimental, three cohort and four cross-sectional studies were rejected because of low internal validity. Selection bias, information bias and confounding variables were identified across the studies, and these biases would likely result in invalid or misleading conclusions. When selection bias was present in these studies, the authors did not discuss issues of non-participation or perform any type of analysis. One qualitative study was rejected because its methods were poorly reported and not appropriate. There were inadequate strategies for ensuring rigour in data collection and analysis.

In terms of the types of included studies, eight are qualitative studies, one is Delphi study, one is a systematic review, five are cross-sectional studies, six are cohort studies, three are quasi-experimental studies, and six are RCTs. It is worth-mentioning that three of the qualitative studies identified in the search are inter-related (Baril et al., 2003; Clarke, Cole, & Ferrier, 2002; Friesen, Yassi, & Cooper, 2001), but because each paper offers experiences of different stakeholders that are explicitly stated in one study but not another, these are reported separately as three publications. These studies should not, however, be considered as fully independent.

More than half of the reviewed studies on PCP's disability management place their

emphasis on occupational musculoskeletal-related disorders (19 studies), with low back pain and injury being the most frequently studied. One study looks at work-related stress, and ten studies have not specified the nature of the work injury or illness. Finally, it is noteworthy that the reviewed literature contains findings from different social and policy environments.

3.3B Identification of Key Concepts

A brief descriptive summary of the studies' characteristics and main findings are tabulated in Table V, categorized by the types of study design. As most studies cover more than one concept or role, I chose to organize my findings through the identification of major concepts consistent across the 29 studies.

Eight key concepts are identified across all studies (See Table VI), including (i) time and incentives; (ii) advocacy; (iii) knowledge and education; (iv) trust and respect; (v) awareness of external factors; (vi) processes of care; (vii) communication; and (viii) collaboration. These major concepts relate to physician's own experiences and their role in disability management, stakeholder's perceptions on PCPs' role in disability management, and various factors that influence PCPs with their practices and management of the RTW processes. On the basis of this knowledge, recommendations can be made with regards to the role that physicians should take for successful RTW. These recommendations will be addressed later in the paper.

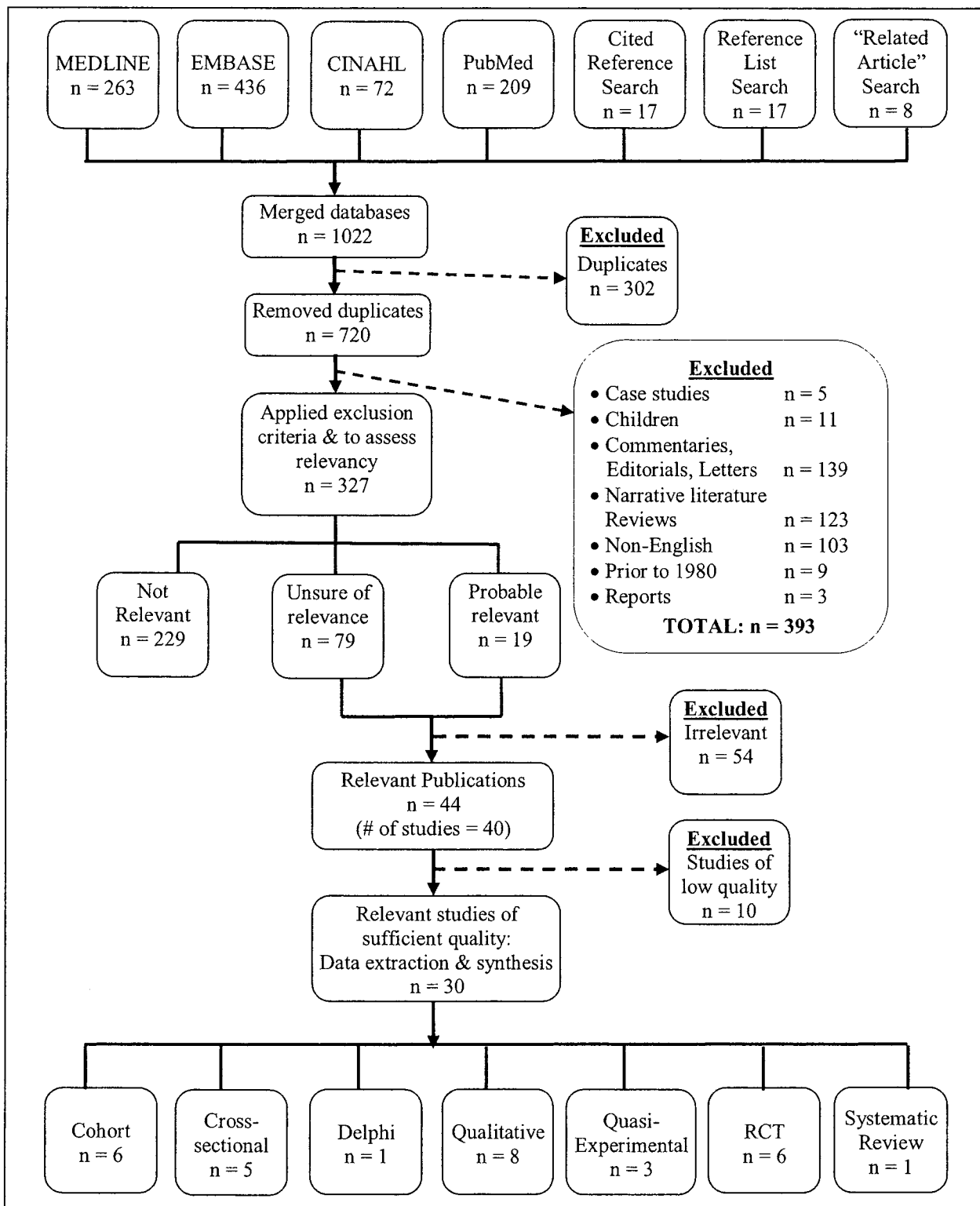


Figure III. Systematic Search of Research Studies

Table V: Evidence-based Tables (A to G)

A. Qualitative Studies of the Role of Primary Care Physicians in Return to Work (RTW)

Authors, Year of Study	Quality	Location	Method	Sample	Recruitment	Key Findings
Baril et al. (2003)	High (++)	Ontario, Manitoba, Quebec, Canada	Interviews, focus groups, document review	Total of 258 participants in three provinces (including injured workers, supervisors, union, managers, health & safety and occupational professionals, health care providers, compensation board officials, government officials, regulatory officials and advocacy group members)	Sampled for variation in workplace and RTW system (size, sector), in 3 regions across Canada	<ul style="list-style-type: none"> - Roles and mandate of different stakeholders may lead to tensions and conflicts - Personal and socio-demographic factors, beliefs and attitudes, and motivation of injured workers are believed to influence RTW success - Some reported difficulties with treating physicians, issues with advocacy and knowledge - Other common RTW facilitators/barriers include respect, communication, collaboration, labour relations
Beardwood et al. (2005)	Very High (+++)	Toronto, Ontario, Canada	Semi-structured interviews	A diverse sample of 17 injured workers who had encountered problems with the RTW process	Recruited participants by advertising on bulletin boards, new-letters and employment sector of two daily newspapers	<ul style="list-style-type: none"> - Injured workers believed that the rehabilitation process victimizes them and renders them dependent and powerless - Perceived health professionals and bureaucrats as barriers to their rehabilitation - Many workers encountered negative attitudes of doctors, and medical uncertainty further prevents them from seeking appropriate treatment

¹ Quality (% of checklist criteria fulfilled): **Very high** = 80% or above; **High** = 65%-80%; **Medium** = 50%-64%

Authors, Year of Study	Quality	Location	Method	Sample	Recruitment	Key Findings
Clarke et al. (2002)	High (++)	Ontario, Canada	Semi-structured interviews	Total of 64 participants including injured workers, union, managers, health and safety professionals, occupational health care providers, health care providers, compensation professionals	Sampled for variation in experience and company size, based on information from municipal publications, word-of-mouth, snowball sample, physicians in one city, and local labour council	<ul style="list-style-type: none"> - Workplace/employer factors, provision of health care and rehabilitation for the injured workers, complexity of third party systems, and worker factors can affect RTW success - Other concerns related to health care providers include: potentially adversarial nature of compensatory claims, limited time and financial incentives, role conflicts, communication, functional status assessment, and issues of trust
Friesen et al. (2001)	High (++)	Manitoba, Canada	Semi-structured interviews and focus groups	Total of 55 participants including injured workers, union, managers, occupational health care providers, health care professionals, compensation departments and regulatory agency officials	Recruited on basis of their experience, knowledge or importance in RTW process in the workplace	<ul style="list-style-type: none"> - Perceived barriers to RTW include delays of all types of treatment and ineffective communication among stakeholders - Facilitators include establishment of RTW programs in the workplace, teamwork, effective communication, and trust and credibility among stakeholders - Differing stakeholder perspectives need to be addressed to achieve successful RTW
Kenny (1995)	Medium (+)	New South Wales, Australia	In-depth semi-structured interviews	49 injured workers and 23 employers	Stratified purposeful sampling technique: Sample drawn from a study population provided by the Work-Cover Authority of New South Wales	<p>Common themes:</p> <ul style="list-style-type: none"> - Insufficient knowledge of the workers' compensation system among employers and employees - Inadequate communication among all involved stakeholders (employer, worker, physicians, etc.) - General negative perception by the employers toward injured workers - There are structural and organizational difficulties in the implementation of occupational rehabilitation

Authors, Year of Study	Quality	Location	Method	Sample	Recruitment	Key Findings
MacEachen et al. (2007)	High (++)	Toronto, Ontario, Canada	In-depth semi-structured interviews	37 members of three injured worker peer support groups	Recruited from peer support group membership lists and subsequent direct telephone contacts	<ul style="list-style-type: none"> - There is a lack of mutual trust in the patient-physician relationship: workers were reluctant to share difficult medical problems with physicians Dimensions of peer support: <ul style="list-style-type: none"> - Worker experience of being misunderstood by system providers - Need for advocate and social support within an empathetic community - Help with procedural complexities of the workers' compensation system and the health care system
Reynolds et al. (2007)	High (++)	British Columbia, Canada	Semi-structured interviews	7 family physicians	Recruited from the British Columbia College of Physicians and Surgeons (BCCPS) online physician directory or through previous contacts with researchers	<ul style="list-style-type: none"> - Physicians' practices do not typically follow the Canadian Medical Association policy - Many reported the lack of appropriate work accommodations and communication as sources of frustration with dealing with employers - Process or policy issues and role conflicts were reported as frustrations with compensation boards and private insurers - Physicians were least frustrated when working with the patient/worker - Physicians' experience with employer RTW programs was mainly positive
Russell et al. (2005)	High (++)	South-Western Ontario, Canada	In-depth interviews	10 family physicians	Sampled for variation in experience, practice characteristics, geographic group, solo and familiarity with occupational medicine	<ul style="list-style-type: none"> - Most physicians do not enjoy dealing with workers' compensation problems - Many felt that they are challenged by time and are concerned with patient confidentiality - They are also challenged by the conflicts of role, but appreciated the collaboration among stakeholders - Also highlighted the importance of effective communication

B. Delphi Study of the Role of Primary Care Physicians in Return to Work (RTW)

Study	Quality	Location	Method	Sample	Recruitment	Key Findings
Beaumont (2003a) & Beaumont (2003b)	Medium (+)	United Kingdom	<p>Initial semi-structured telephone interview, followed by a three-round collation and feedback of opinion via email</p> <p>Carried out over a 4 month period from July to October 2002</p>	<p>25 key informants from a range of stakeholders</p> <p>Including: GPs Occupational health professionals Policy officers or advisers Presidents, chief executives or chairman Medical director Medical or occupational health advisors Insurance manager Professors</p>	<p>- GPs and occupational health professionals were first recruited</p> <p>- Other stakeholders were recruited as the study progressed on the basis of initial interview suggestions</p>	<p>- GPs have a crucial role in rehabilitation and RTW, but some are not aware how influential their role is</p> <p>- GP's role may be compromised by time constraints, inadequate knowledge of the workplace and occupational health issues, role conflicts and confidentiality</p> <p>- Communication between GPs and occupational health professionals is often poor</p> <p>To overcome potential barriers there needs to be:</p> <p>- A change of attitude, culture and systems</p> <p>- Mutual collaboration</p> <p>- More education</p>

C. Systematic Reviews of the Role of Primary Care Physicians in Return to Work (RTW)

Study	Quality	Purpose	Search Strategy	Inclusion Criteria	Quality Appraisal	Key Findings
<p>Franche et al. (2005b)</p>	<p>High (++)</p>	<p>To review the effectiveness of workplace-based RTW interventions</p>	<p>A Search of seven databases (MEDLINE, EMBASE, CINAHL, PsycInfo, Sociological Abstracts, ASSIA, ABI) A review of peer-reviewed working papers from relevant research institutes and personal libraries</p>	<p>Included: English and French Between January 1990 and December 2003 Peer-reviewed studies of RTW interventions provided at the workplace to workers with work disability associated with musculoskeletal or other pain-related conditions</p>	<p>Conducted by a pair of reviewers Evaluated using nine methodological criteria by consensus</p>	<ul style="list-style-type: none"> - Of 4124 identified papers, 10 studies were of sufficient quality and included in this review - Work disability duration is significantly reduced by work accommodation offers and contact between healthcare provider and workplace - There was moderate evidence that disability is reduced by interventions which include early contact with worker by workplace, ergonomic work site visits, and presence of a return to work coordinator - There was also moderate evidence that these five interventions reduce costs associated with work disability

D. Cross-sectional Studies of the Role of Primary Care Physicians in Return to Work (RTW)

Study & Design	Quality ²	Location	Sample, Recruitment & Participation Rate	Focus of study	Key findings
Anema et al. (2002) Postal survey	Medium (+)	The Netherlands	<ul style="list-style-type: none"> - 300 OPs of 467 patients, who were between 18 and 60 years old, were sick-listed and receiving full or partial compensation for at least 3 months due to LBP, had a paid job where the employer had contacted Occupational Health and Safety Service - 64% participation rate 	<p>OPs' perspectives of the obstacles for RTW in disability management of LBP patients who are sick-listed for 3-4 months</p>	<p>OPs reported a number of obstacles:</p> <ul style="list-style-type: none"> - Duration of curative treatment - Clinical waiting period prior to treatment - Non-cooperative employee - View of treating physician - Mental block of patients - Lack of job motivation - Personal circumstances - Conflict at work <p>Communication between OP and treating physician was limited, but was significantly related to two RTW obstacles:</p> <ul style="list-style-type: none"> - Passivity with regard to RTW - Clinical waiting period prior to treatment

² Quality (% of checklist criteria fulfilled + % of participation rate): **Very high** = (Checklist: 80% or above AND Participation: 80% or above);

High = (Checklist: 65%-80% AND Participation: 80% or above);

Medium = (Checklist: 50%-64% AND Participation: 60% to 80% OR less than 60% with discussion/analysis provided)

Study & Design	Quality ²	Location	Sample, Recruitment & Participation Rate	Focus of study	Key findings
Guzman et al. (2002) Faxed survey	Medium (+)	Manitoba, Canada	<ul style="list-style-type: none"> - 232 physicians - Participation rate: 51.3% - Included are GPs, family physicians and emergency physicians - Selected physicians who saw at least 10 workers with injury claims in 1998 and were active in primary care practice in Manitoba at time of survey 	Physicians' views on facilitating factors, barriers, attitude and knowledge about RTW, and changes to increase involvement	<ul style="list-style-type: none"> - Main facilitating factors include: <ol style="list-style-type: none"> 1) physicians' ability to explain nature and prognosis of injuries to worker 2) willingness of workplace to accommodate injured worker - Main barriers reported were: <ol style="list-style-type: none"> 1) workers misunderstandings and fears of injuries 2) non-supportive supervisors and co-workers - 48% requested change for better workplace job accommodation - In general, 88.6% of physicians agreed they had a role in planning RTW
Kosny et al. (2006) Telephone survey 17-43 days post-injury	Medium (+)	Ontario, Canada	<ul style="list-style-type: none"> - 187 Ontario workers - Participation rate: 60.8% - Selected workers with accepted or pending lost-time claims for back, neck or upper extremity occupational MSK injuries, who were employed by firms that had workers' compensation coverage in Ontario - Identified through WSIB claim database 	The association between RTW approximately one month post injury and early proactive HCP communication with the patient and workplace	<ul style="list-style-type: none"> - Early RTW is positively associated with health care provider giving a patient a RTW date (OR³ = 3.33, 95% CI⁴: 1.62-6.87) and guidance on prevention of recurrence and re-injury (OR = 2.71, 95% CI: 1.24-5.95) - Contact by HCP with the workplace was associated with RTW, but the association was weaker when adjusted for confounding variables (OR = 1.72, 95% CI: 0.83-3.58)

³ OR = Odds Ratios

⁴ 95% CI = 95% Confidence Interval

Study & Design	Quality ²	Location	Sample, Recruitment & Participation Rate	Focus of study	Key findings
Pransky et al. (2002) Postal survey	Medium (+)	Massachusetts, United States	<ul style="list-style-type: none"> - 181 primary care providers - 43% participation rate - Including internists, family and GPs) - Randomly selected from 550 licensed physicians registered in the 1999 Massachusetts Board of Registration in Medicine (BRM) roster 	Perspectives of PCPs' role in disability management, barriers and opportunities for improvement in practice	<ul style="list-style-type: none"> - GPs provided opinions about work ability in 9% of all visits - Assessments were based on patient input and observations - Direct communication with employers was rare - Most GPs believed that they have a role in making disability decisions, only 6% disagreed - Perceived lack of alternative work at the workplace as significant problem - Significant barriers were perceived to be patient-specific factors
Russell & Roach (2002) Postal survey	Medium (+)	Western Australia	<ul style="list-style-type: none"> - 208 GPs - Participation rate: 50.1% - Recruited from the 415 eligible Western Australian GPs who were on the mailing list of a GP journal - Excluded were GPs that were no longer in general practice, on leave, or unable to be contacted 	<p>Likelihood that GPs would:</p> <ul style="list-style-type: none"> - Choose to open a workers' compensation claim - Provide time off work for the patient described in the vignette 	<ul style="list-style-type: none"> - 85% of GPs advised hypothetical patient to return to work, while 44% chose to initiate a worker's compensation claim - GPs with training or experience in occupational health were less likely to advise the patients to stay away from work, but just as likely to initiate a claim - Some perceived barriers to effective work stress management include the adversarial nature of compensation system, lack of confidence in knowledge and patient confidentiality

E. Cohort Studies of the Role of Primary Care Physicians in Return to Work (RTW)

Study & Design	Quality ⁵	Location	Sample, Recruitment, Participation Rate & Attrition	Focus of study	Key findings
<p>Dasinger et al. (2001)</p> <p>Retrospective</p> <p>Telephone interviews were conducted between July and December, 1997, at least 6 months after the claimants' last temporary disability payment and from 10 months to 3.7 years after their injury date</p>	<p>Medium (+)</p>	<p>Northern California, United States</p>	<ul style="list-style-type: none"> - 433 claimants with LBP diagnosis, had an injury date between 1994 and 1996, and had at least 1 day of temporary disability within 14 days after injury - Recruited from a complete 3-year cohort of 721 low back injury claims - 60% participation rate - Final sample size = 325 claimants - Claims were identified from the administrative databases of three Northern California district offices of a single large workers' compensation insurance carrier - Attrition: 0% 	<p>The effect of patient-reported doctor communication on duration of disability (in days)</p>	<ul style="list-style-type: none"> - Doctor proactive communication was associated with greater chance of RTW only during the acute phase (< 30 days of disability; Relative RTW rate = 1.39, 95% CI: 1.01-1.92) - This effect decreased when workload and injury characteristics were taken into account (Relative RTW rate = 1.26, 95% CI: 0.89-1.77; $p^6 = 0.20$) - A positive RTW recommendation was associated with nearly 60% higher RTW rate during the sub-acute/chronic phase only (> 30 days of disability; Relative RTW rate = 1.61 to 1.68; $p < 0.02$)

⁵ Quality (% of checklist criteria fulfilled + % of participation rate): **Very high** = (Checklist: 80% or above AND Participation: 80% or above);

High = (Checklist: 65%-80% AND Participation: 80% or above);

Medium = (Checklist: 50%-64% AND Participation: 60% to 80% OR less than 60% with discussion/analysis provided)

⁶ p = Probability

Study & Design	Quality ⁵	Location	Sample, Recruitment, Participation Rate & Attrition	Focus of study	Key findings
<p>Franche et al. (2007)</p> <p>Prospective</p> <p>Telephone interviews were conducted 1 month and 6 months after injury</p> <p>Administrative claim information was extracted from the WSIB database</p>	<p>High (++)</p>	<p>Ontario, Canada</p>	<ul style="list-style-type: none"> - 632 Ontario workers with a lost-time claim for back or upper extremity work-related MSK disorders (accepted or pending claims), and were absent from work for a minimum of 5 days within the first 14 calendar days after injury - 61% participation rate - Attrition: 29% (446 participants completed the interview at 6-months) - Selection bias & attrition analyses were conducted 	<ul style="list-style-type: none"> - The relationship between six early RTW disability management strategies and work absence duration - Comparison of self-reported and administrative outcomes on work absence duration 	<ul style="list-style-type: none"> - Work accommodation offer and acceptance, and advice from health care provider to the workplace on re-injury prevention were significantly associated with less work absence duration - Having an ergonomic worksite visit was predictive of shorter duration of work absence as indexed by the WSIB administrative outcome only
<p>Kominski et al. (2008)</p> <p>Retrospective</p> <p>Survey data</p> <p>Claims with dates of injury between April 1 and June 20, 2005</p>	<p>Medium (+)</p>	<p>California, United States</p>	<ul style="list-style-type: none"> - 1001 out of 2855 eligible injured workers - 35.1% participation rate - Adjusted sample size = 965 claimants - Randomly selected from the 5260 claims from the state's Workers' Compensation Information System (WCIS) - Attrition: 0% 	<p>The impact of primary treating physician's occupational medicine orientation, interpersonal behaviour, access to and timeliness of care on RTW and some degree of recovery</p>	<ul style="list-style-type: none"> - Some primary treating physician's behaviours significantly increased the likelihood of return to work and some degree of recovery - Workers with physicians who treated them with respect (OR = 0.35, p = 0.02), or good explanation on their medical conditions (OR = 0.36, p = 0.04) were less likely to report a non-working status - Yet, patients with problems accessing specialty care were more likely to report a non-working status (Adjusted OR = 5.97, p < 0.01) or had poor improvement in their injury (Adjusted OR = 3.84, p < 0.01)

Study & Design	Quality ⁵	Location	Sample, Recruitment, Participation Rate & Attrition	Focus of study	Key findings
Mahmud et al. (2000) Prospective Review of LBP claims filed between June 1 to August 31, 1995	Medium (+)	United States	<ul style="list-style-type: none"> - 98 cases with acute, uncomplicated, disabling work-related LBP - Randomly selected from the 3214 workers' compensation LBP claims filed in 1995 - Participation rate: 100% - Attrition: 0% 	The effect of health care utilization and physician's initial management of work-related LBP on disability duration	<ul style="list-style-type: none"> - Length of disability was significantly shorter with no utilization of specialty referrals (RR = 1.94, 95% CI: 1.15-3.29) and fewer provider visits (RR⁷ = 4.28, 95% CI: 2.43-7.52) - Shorter length of disability was also associated with no use of magnetic resonance imaging (RR = 2.91, 95% CI: 1.45-5.84), and use of opioids for less than 7 days (RR = 2.58, 95% CI: 1.22-5.47) - Patients were more likely (RR = 3.78, 95% CI: 1.6-8.9) to get off disability status if treatment course did not involve extended opioid use and early diagnostic testing
Sears et al. (2007) Retrospective Review of administrative back injury claim data filed between July 1, 2004 and June 30, 2005 (the first year after implementation of SHB 1691) ⁸	High (+++)	Washington United States	<ul style="list-style-type: none"> - 2779 back sprain or strain claims - Claims were selected from the State Fund database (filed by nurse practitioners or PCPs) - Claims included workers aged 18 to 70 who were injured on or after July 1, 2004, had both a first medical visit at a primary care facility (e.g. office, clinic, urgent care) and an accepted State Fund workers' compensation claim filed by a nurse practitioner or PCP - Participation rate: 100% - Attrition: 0% 	Comparison of quality and process of care indicators for nurse practitioners and PCPs back injury claims from Washington State	<ul style="list-style-type: none"> - Nurse practitioner claims were less likely to be involved with time loss compensation than PCP claims - There were strong associations between quality and process of care indicators with disability and duration of time loss

⁷ RR = Relative Risk

⁸ Substitute House Bill (SHB) 1691 took effect July 1, 2004, which authorized nurse practitioners to independently perform those functions of an attending physician within their scope of practice (except for rating permanent impairment; Sears et al., 2007)

Study & Design	Quality ⁵	Location	Sample, Recruitment, Participation Rate & Attrition	Focus of study	Key findings
<p>van Duijn et al. (2005)</p> <p>Prospective</p> <p>Questionnaires were administered at baseline and 12 months after inclusion</p>	<p>High (++)</p>	<p>The Netherlands</p>	<ul style="list-style-type: none"> - 164 employees on sick leave for 2-6 weeks due to musculoskeletal complaints completed 2 questionnaires - Recruited by the OPs during consultations or selected from the absenteeism register of a Dutch Occupational Health Services - Participation rate: 85.9% - Attrition: 27% (164 employees completed questionnaire at 12 months) 	<ul style="list-style-type: none"> - To determine the individual and work-related factors that are associated with modified work - The influence of modified work on the duration of sick leave and health-related outcomes 	<ul style="list-style-type: none"> - Modified work was less likely assigned by OP if regular work involved frequent lifting and poor relationship with colleagues - Employees were more likely to return to modified work if they had better mental health (OR = 1.89, 95% CI: 1.22–2.93); prolonged periods of standing in regular jobs (OR = 5.21, 95% CI: 2.13–12.75); and less required skills (OR = 1.24, 95% CI: 1.01–1.52) - Health outcomes such as pain, disability, and general health were not related to performing modified work - Modified work, as the only advice given by OP, did not affect the total duration of sick leave

F. Quasi-Experimental Studies of the Role of Primary Care Physicians in Return to Work (RTW)

Study & Location	Quality	Sample, Recruitment & Participation Rate	Intervention Groups	Outcomes, Follow-up & Attrition	Key Findings
Faber et al. (2005) Zuid, Holland, The Netherlands	Medium (+)	<ul style="list-style-type: none"> - Intervention region: 21 GPs, 20 OHPs and 56 patients - Control region: 28 GPs, 27 OHPs and 56 patients - Participation rate of GPs & OHPs: 33% - GPs and OHPs selected patients with nonspecific LBP on sick leave for 3-12 weeks 	<ol style="list-style-type: none"> 1. GPs and OHPs in intervention group received a 4-hour joint training course focused on a collaboration protocol for the treatment of LBP patients (n = 41) 2. GPs and OHPs in control group did not receive the training, performed usual care (n = 55) 	<p>Primary:</p> <ul style="list-style-type: none"> - Severity of back pain (VAS) - Functional disability (RMDQ) - Duration of sick leave - Frequency of collaboration <p>Secondary:</p> <ul style="list-style-type: none"> - General health status (EuroQol) - Patient satisfaction - Medical consumption <p>Follow-up at 3 & 6 months:</p> <p>Attrition:</p> <ul style="list-style-type: none"> - 3 months: 48% GPs; 25% OHPs - 6 months: 75% GPs; 55% OHPs (based on the 3 months sample) 	<ul style="list-style-type: none"> - There was little collaboration between physicians during the study period - The intervention did not influence sick leave - Workers in the intervention group returned to work significantly later (p = 0.005) but were more satisfied with the care of OHPs (p = 0.01) - There was no significant difference for pain, disability, quality of life and medical consumption between the two groups (p > 0.35)
McGuirk & Bogduk (2006) Newcastle, New South Wales, Australia	Medium (+)	<ul style="list-style-type: none"> - 253 consecutive workers who reported low back injury - Audited of the records of all workers in a health service who registered an accident - Participation rate: 100% 	<ol style="list-style-type: none"> 1: Care provided by staff specialist according to evidence-based guidelines (occupational physician with postgraduate training in MSK medicine) (n = 164) 2. Transferred to usual care by their GPs (n = 27) 3: Usual care from their GP (n = 62) 	<p>Primary:</p> <ul style="list-style-type: none"> - Return to normal duties - Time off work <p>Secondary:</p> <ul style="list-style-type: none"> - Recurrence and/or persistence of pain <p>No follow-up & attrition</p>	<ul style="list-style-type: none"> - Workers in evidence-based care had less time off work (PP⁹ = 0.01, 95% CI: 0.00-0.02), spent less time on modified duties (PP = 0.37, 95% CI: 0.30-0.44) and had fewer recurrences (PP = 0.06, 95% CI: 0.02-0.10) than workers with usual care - Of all groups, more workers in evidence-based care spent less than 2 weeks on modified duties (PP = 0.70, 95% CI: 0.58-0.82) - A significantly greater proportion of workers in evidence-based care resumed normal duties immediately (PP = 0.63, 95% CI: 0.56-0.70), and fewer developed chronic pain (PP =

⁹ PP = proportion

Study & Location	Quality	Sample, Recruitment & Participation Rate	Intervention Groups	Outcomes, Follow-up & Attrition	Key Findings
<p>Mortelmans et al. (2006)</p> <p>Leuven, Belgium</p>	<p>Medium (+)</p>	<ul style="list-style-type: none"> - 1564 workers, aged 18 to 50, with sub-acute (1-12 months) sickness absence - Workers' abilities to work were assessed by one of 15 social insurance physicians from the Christian Sickness Fund - Participation rate: 84% 	<ol style="list-style-type: none"> 1. Intervention group with structured information exchange between social insurance and OPs using a communication form (n = 505) 2. Control group with no structured individual information exchange between social insurance and OPs (n = 1059) 	<p>Primary:</p> <ul style="list-style-type: none"> - Patient's sickness absence benefit status one year after benefit onset <p>Secondary:</p> <ul style="list-style-type: none"> - Rate of non-dependence on benefit - Work resumption rate - Number of sickness absence benefit periods - Gradual work resumption rate (calculated with the number of patients using a gradual work resumption permission granted by social insurance physicians) - Median of cumulative benefit duration in days - Median of graduate work resumption duration in days - Median of pre-gradual work resumption benefit duration in days <p>Follow-up: 1 year</p> <ul style="list-style-type: none"> - Attrition: 1% 	<p>0.02, 95% CI: 0.00-0.04)</p> <ul style="list-style-type: none"> - There was no significant difference between the intervention and control groups in the rate or duration of sickness absence benefit status and gradual work resumption ($p > 0.2$) - 86% in the intervention group received no sickness absence benefit at the end of the study versus 84% in the control group (RR = 1.02, 95% CI: 0.91-1.15) - There were also no significant differences in the other seven outcome parameters - Information exchange between physicians did not greatly influence work resumption among patients on sickness absence in this study

G. Randomized Controlled Trials of the Role of Primary Care Physicians in Return to Work (RTW)

Authors, Treatment Arms, Country	Quality	Sample & Recruitment	Intervention Groups	Outcomes, Follow-up & Attrition	Key Findings
Anema et al. (2007); Steenstra et al. (2006a) & Steenstra et al. (2006b) 2-stage, 4-arm RCT Amsterdam, The Netherlands	High (++)	<ul style="list-style-type: none"> - 99 OPs, 25 ergonomists and 47 physiotherapists were recruited from thirteen Dutch Occupational Health Services and sixteen physiotherapy centres - 196 workers aged 18 to 65 with nonspecific LBP, and full or partial sick leave due to LBP lasting 2 to 6 weeks - Excluded were workers with LBP due to specific causes, several coexisting medical conditions, pregnancy, and sick leave due to LBP less than 1 month before the current episode of sick leave 	<p>Stage 1 (n=196):</p> <ol style="list-style-type: none"> 1. Usual care with OPs according to Dutch guidelines for LBP (n = 100) 2. Workplace intervention of work assessment and modifications based on participatory ergonomics, including all major stakeholders (i.e. the worker, employer, OP and GP) (n = 96) <p>Stage 2 (n=112): Still sick-listed at 8 weeks</p> <ol style="list-style-type: none"> 1. Usual care with OPs according to Dutch guidelines for LBP (n = 57) 2. Graded activity comprised of exercise program with operant-conditioning behavioural approach (n = 55) 	<p>Primary:</p> <ul style="list-style-type: none"> - Time until full return to work (days) <p>Secondary:</p> <ul style="list-style-type: none"> - Function status - Pain intensity <p>Follow-up: 1 year</p> <p>Attrition:</p> <p>0% (primary outcome) 12% (secondary outcomes)</p>	<ul style="list-style-type: none"> - The workplace intervention was more effective on return to work (median RTW of 77 days versus 104 days for usual care; HRR¹⁰ = 1.7, 95% CI: 1.2-2.3) - While workplace intervention improved disability, graded activity had a negative effect on return to work and functional status for workers who were still sick-listed at 8 weeks (HRR = 0.40, 95% CI: 0.30-0.60) - Combining the workplace intervention with graded activity resulted in no added benefit

¹⁰ HRR = Hazard Rate Ratio

Authors, Treatment Arms, Country	Quality	Sample & Recruitment	Intervention Groups	Outcomes, Follow-up & Attrition	Key Findings
Hazard et al. (1997) 2-arm RCT Burlington, Vermont	Medium (+)	<ul style="list-style-type: none"> - 59 back-injured workers with high disability risk scores on a predictive questionnaire (VDPQ) - All filed back injury reports to the Department of Labour and Industry - Contacted participants within 15 days of injury 	<ol style="list-style-type: none"> 1. Intervention group with a designated primary treating physician receiving risk of disability and guideline letters (n = 30) 2. Control group with no intervention received (n = 29) 	<p>Primary:</p> <ul style="list-style-type: none"> - Impact of care on return to work - Days of work loss - Current work status <p>Secondary:</p> <ul style="list-style-type: none"> - Self-assessed pain - Satisfaction with health care - Use of health care services <p>Follow-up: 3 months Attrition: 10%</p>	<ul style="list-style-type: none"> - Physician intervention had no significant impact on return to work, self-assessed pain, or satisfaction with health care - Of the 30 designated physicians, only 1 stated the information provided in the letters had affected the care of patients - Risk notification and practice guidelines sent to physicians did not reduce disability
Loisel et al. (1997) 4-arm RCT Quebec, Canada	High (++)	<ul style="list-style-type: none"> - 104 workers with compensated back pain who were absent from work for more than four weeks - Excluded were workers with other comorbid condition that may limit participation 	<ol style="list-style-type: none"> 1. Clinical intervention with back pain specialist, using back school program, functional rehabilitation therapy, therapeutic RTW, also involved early provider contact with workplace (n = 31) 2. Occupational intervention with OP and the use of participatory ergonomics, also involved early provider contact with workplace (n = 22) 3. Full intervention - combination of #1 and 2 (n = 25) 4. Usual care with attending physicians, the use of video on back pain to worker, and questionnaire to supervisor (n = 26) 	<p>Primary:</p> <ul style="list-style-type: none"> - Duration of absence from regular work or any work <p>Secondary:</p> <ul style="list-style-type: none"> - Functional status - Pain <p>Follow-up: 1 year Attrition: 9% (of the original 130 workers)</p>	<ul style="list-style-type: none"> - Workers in the full intervention group returned to regular work 2.41 times faster than those with only usual care (95% CI: 1.18-4.89) - Workers who received occupational intervention returned to work 1.91 times faster than those without (95% CI: 1.18-3.10) - Functional status and pain outcomes were improved among workers in the three intervention groups, but this effect was not found for those in the usual care group - The occupational intervention accounted for the largest effect

Authors, Treatment Arms, Country	Quality	Sample & Recruitment	Intervention Groups	Outcomes, Follow-up & Attrition	Key Findings
Rossignol et al. (2000) 2-arm RCT Montreal, Canada	High (++)	<ul style="list-style-type: none"> - 110 workers compensated for LBP for 4-8 weeks - Recruited at the Montreal Regional Office of the Quebec Workers' Compensation Board (QWCB) - Excluded were workers with history of compensation or previous spinal surgery 	<ol style="list-style-type: none"> 1. Intervention group consisted of the CORE program (coordination of primary health care), performed by two PCPs and a nurse in liaison with the treating physicians (n = 54) 2. Usual care with their treating physicians (n = 56) 	<p>Primary:</p> <ul style="list-style-type: none"> - Duration of absence from work <p>Secondary:</p> <ul style="list-style-type: none"> - Pain intensity (VAS) - Functional outcomes - Health care consumption - Overall satisfaction <p>Follow-up: 6 months</p> <p>Attrition:</p> <ul style="list-style-type: none"> - 3 months: 13% - 6 months: 18% 	<ul style="list-style-type: none"> - Workers in the CORE group returned to work 6.6 days sooner than workers in usual care, but the effect was not significant - CORE group showed significant improvement in functional status at 6-month follow-up ($p < 0.02$) - CORE group used 3 times less specialized imaging tests of spine at 3 months ($p < 0.01$) and were 2 times more likely to exercise at 6 months ($p < 0.05$)
Staal et al. (2004) & Hlobil et al. (2005) 2-arm RCT Amsterdam, The Netherlands	High (++)	<ul style="list-style-type: none"> - 134 airline workers on full or partial sick leave for four weeks due to LBP - Excluded were workers with specific causes for their LBP 	<ol style="list-style-type: none"> 1. Graded activity group consisted of a biweekly 1 hour exercise sessions with physiotherapists (n = 67) 2. Usual care group received usual guidance and advice from OP, and treatment from GP according to Dutch LBP guideline (n = 67) 	<p>Primary:</p> <ul style="list-style-type: none"> - Total number of days absent from work due to LBP <p>Secondary:</p> <ul style="list-style-type: none"> - Functional status - Pain intensity <p>Follow-up: 1 year</p> <p>Attrition: 9%</p>	<ul style="list-style-type: none"> - The graded activity group was more effective than the usual care group (median days of work absence of 58 days versus 87 days for usual care). - The effectiveness of graded activity group occurred 50 days from randomization onward (HRR: 1.9, 95% CI: 1.2-3.2) - Workers in the graded activity group also had improved functional status and pain outcomes, but the effect was small and insignificant

Authors, Treatment Arms, Country	Quality	Sample & Recruitment	Intervention Groups	Outcomes, Follow-up & Attrition	Key Findings
<p>Verbeek et al. (2002) 2-arm RCT The Netherlands</p>	<p>High (++)</p>	<ul style="list-style-type: none"> - 120 workers with LBP for at least 10 days on sick leave - Workers were patients at the occupational health services of eight different academic and peripheral hospitals in the Netherlands - Excluded were workers with specific pain located below the scapula and above the gluteal fold 	<ol style="list-style-type: none"> 1. Intervention group consisted of early occupational health management by OP according to LBP guidelines (n = 61) 2. Reference group with management by the worker's supervisor during the first 3 months of sick leave (n = 59) 	<p>Primary:</p> <ul style="list-style-type: none"> - Time until RTW after a 1-year follow-up <p>Secondary:</p> <ul style="list-style-type: none"> - Time until recurrence - Number of days lost over a 1-year period for all reasons and LBP - Rates of RTW at 3 and 12 months - Pain intensity - Functional disability - General health perception <p>Follow-up: 1 year</p> <p>Attrition:</p> <ul style="list-style-type: none"> - 3 months: 8% - 12 months: 10% 	<ul style="list-style-type: none"> - There were no significant differences with the time until RTW or other health outcomes - Recurrences occurred more frequently in the intervention group than reference group, but the effect diminished at one year follow-up - Pain intensity, functional disability and general health perception also did not differ between the two groups - Early occupational health management by OP did not have a positive effect on workers with LBP

Table VI. Eight Key Concepts from the Reviewed Literature

Authors & Year of Study	Summary of Key Findings											
	Sources of Data				Key Concepts							
	MSK	PCPs	Other Stakeholders	Other (Intervention trials, Claims Data or Reviews)	Time & Incentives	Advocacy	Knowledge & Education	Trust & Respect	Awareness of External Factors	Processes of Care	Communication	Collaboration
Anema et al. (2002)	x		x				x		x		x	
Anema et al. (2007); Steenstra et al. (2006a); Steenstra et al. (2006b)	x			x								x
Baril et al. (2003)	x	x	x		x	x	x	x	x		x	x
Beardwood et al. (2005)		x	x				x			x		
Beaumont (2003a); Beaumont (2003b)		x	x		x	x	x	x			x	x
Clarke et al. (2002)	x				x	x	x				x	
Dasinger et al. (2001)	x		x		x	x	x				x	
Faber et al. (2005)	x			x								x
Franche et al. (2005b)	x			x							x	
Franche et al. (2007)	x		x								x	
Friesen et al. (2001)	x	x	x		x	x	x	x	x		x	x
Guzman et al. (2002)	x	x			x	x	x	x			x	
Hazard et al. (1997)	x			x						x		
Kenny et al. (1995)			x			x	x				x	
Kominski et al. (2008)			x				x				x	
Kosny et al. (2006)	x		x								x	
Loisel et al. (1997)	x			x							x	x
MacEachen et al. (2007)			x				x					
Mahmud et al. (2007)	x			x						x		
McGuirk & Bogduk (2007)	x			x						x		
Mortelmans et al. (2006)				x								
Pransky et al. (2002)		x			x	x	x	x			x	x
Reynolds et al. (2007)		x				x	x	x			x	x
Rossignol et al. (2000)	x			x						x		
Russell et al. (2005)		x			x	x					x	x
Russell & Roach (2002)		x			x	x	x	x			x	
Sears et al. (2007)	x			x							x	
Straal et al. (2004) & Hlobil et al. (2005)	x			x						x		
van Duijn et al. (2005)	x		x								x	
Verbeek et al. (2002)	x			x							x	

3.31B Time & Incentives

Four high-quality qualitative studies and four medium studies present discussions about time and financial incentives on physician's RTW management.

Several studies have noted the importance of time constraints when physicians are managing injured workers (Baril et al., 2003; Clarke et al., 2002; Friesen et al., 2001; Russell et al., 2005). Challenged by the lack of time, patient visits to physicians are almost always brief in duration, and many physicians express the concern of not getting enough information about their patient's workplace conditions (Baril et al., 2003). Although many believe that having guidelines from medical associations is a great idea, their practice may not be as close to the ideal because they do not have the time to follow those (Friesen et al., 2001). These frustrations have led many physicians to believe that time constraints may negatively influence their performance in disability management and RTW planning (Beaumont, 2003a; Beaumont, 2003b; Guzman, Yassi, Cooper, & Khokhar, 2002; Russell & Roach, 2002).

In addition to insufficient time, some physicians have few incentives to spend extra time to understand their patient's workplace issues and their involvement in RTW planning is limited by a lack of reimbursement to do so (Friesen et al., 2001; Guzman et al., 2002). In another study, however, reimbursement for time spent working with employers or compensation boards was not seen as a major impediment to helping patients RTW (Pransky et al., 2002). On the whole, it has been suggested that more time and better reimbursement for physicians may lead to greater participation in RTW (Guzman et al., 2002).

Other physicians and stakeholders have also proposed to offer incentives for employers to make more alternative duties available to improve disability management practice (Baril et al., 2003; Pransky et al., 2002). While some perceive the latter option favourably, others stress that

such incentive programs may lead to avoidance of reporting or premature RTW (Baril et al., 2003). Overall, there is *strong evidence* indicating that time constraints and the lack of financial incentives are important concerns for physicians when managing disability and RTW.

3.32B Advocacy

The PCPs' role is to act as the patient's advocate by promoting and preserving their health and well-being. Due to conflict of interests, however, many are challenged with fulfilling the various expectations from all involved stakeholders. Four high-quality qualitative studies and four medium-quality studies discuss the topic of patient advocacy and role conflicts.

Many physicians describe themselves in a conflict of interest, but their patient remains their first priority (Baril et al., 2003; Russell et al., 2005). Physicians believe they should adopt a position that will be in the best interests of their patients, particularly in judging the potential harm for patients to return to work (Clarke et al., 2002). However, their perceived commitment to their patients is often in conflict with requirements for adherence to guidelines and pathways of care as proposed by the insurers (Russell et al., 2005). Physicians are cautious when dealing with other stakeholders, because such contacts may impinge on patient confidentiality or impact on the doctor-patient relationship (Beaumont, 2003a; Beaumont, 2003b; Russell et al., 2005; Russell & Roach, 2002). Other stakeholders, mainly employers, see physicians functioning primarily as patient advocates and as having a lack of interest in the problem of costs associated with worker absenteeism (Baril et al., 2003; Kenny, 1995). In particular, employers feel that physicians take the opinions of injured workers at face value without further investigation. They also feel that physicians tend to put their patients on compensation and certify their injuries as work-related far too easily (Kenny, 1995). Contrary to such viewpoints, one study has noted that only 5.5% of PCPs surveyed support deferring to unreasonable work absence requests (Pransky

et al., 2002).

Because many PCPs often have an enduring relationship with the injured worker and their family, some stakeholders have voiced concern about prolonged absences authorized by treating physicians. In particular, treating physician's clinical decisions may be affected by the injured worker's negative financial consequences as a result of altered benefit status (Baril et al., 2003; Clarke et al., 2002). In addition, some employers feel that treating physicians may at times reinforce the idea that injured workers could receive a large lump sum payment because of their injuries, and that the amount will increase in proportion to the time away from work (Kenny, 1995). This misconception by workers, along with the other types of role conflicts mentioned above, can serve as a barrier to successful disability management and RTW.

Despite these shortcomings, many physicians believe their role in patient advocacy is essential for effectively managing disability and RTW (Beaumont, 2003a; Beaumont, 2003b; Pransky et al., 2002; Reynolds, Wagner, Harder, & Zimmer, 2007; Russell et al., 2005). The core values of this role encompass the assessment of functional ability against the requirements of the job and workplace in order to provide advice to patients and employers on RTW (Beaumont, 2003a; Beaumont, 2003b). Many physicians also believe that they have a role in dealing with confidentiality issues, namely protecting patient confidentiality (Pransky et al., 2002; Reynolds et al., 2007). On the whole, the physician's ultimate responsibility is oriented to the needs of their patients, including advocacy, and most importantly, finding a balance between RTW and their patients' wishes (Beaumont, 2003a; Beaumont, 2003b; Pransky et al., 2002; Russell et al., 2005).

Therefore, the best evidence synthesis approach offers *strong evidence* that patient advocacy plays an important role in facilitating effective disability management.

3.33B Knowledge and Education

One very high-quality qualitative study, four high-quality qualitative studies, and six medium-quality studies present the problems regarding physician's level of education and knowledge on occupational health and RTW.

Unlike health professionals with specialization in occupational health, many PCPs may not have adequate training and knowledge on disability issues and RTW to optimally manage sick or injured workers. Indeed, physicians have expressed uncertainty when asked to assess workers' functional status to RTW (Clarke et al., 2002). Many stakeholders also feel that physicians are in need of education on various aspects of occupational rehabilitation.

Some employers feel that some physicians lack expertise in MSK disorders and that their practice may not be up-to-date with recommended guidelines for treating low back pain. These guidelines promote normal activity and RTW as part of the recovery process (Baril et al., 2003). Ideas about chronic pain recovery vary substantially among physicians, reflecting the need for a more current understanding of this issue (Clarke et al., 2002). Physicians' lack of training in physical capacity determination has resulted in some nurses viewing physiotherapists as more resourceful than doctors in outlining work restrictions for injured workers (Clarke et al., 2002).

Many stakeholders view physicians as obstacles to the RTW process because they are largely unaware of the beneficial effect of work on health (Beaumont, 2003a; Beaumont, 2003b). They have inadequate knowledge about their patients' jobs (Beaumont, 2003a; Beaumont, 2003b; Friesen et al., 2001) and the principles of occupational rehabilitation, particularly on the topic of early RTW and the use of suitable duties as transition to normal duties (Kenny, 1995). A survey of physicians shows that they recognize their lack of knowledge as a detrimental factor in returning injured workers to work. In particular, they acknowledge their inability to objectively

determine the readiness of their patients to safely RTW as a potential hindrance to the process (Pransky et al., 2002). Others do not feel confident in their knowledge of the specific legislative requirement involved in a work-related claim (Russell & Roach, 2002). As well, the lack of awareness of employers' available RTW programs or services (Guzman et al., 2002) can also serve as potential impediments for physicians in helping RTW.

Their lack of knowledge and uncertainty may ultimately result in imprecise diagnoses, multiple tests, inefficient or unnecessarily delays in treatments, vague or inappropriate descriptions of work restrictions, or improper refusal of modified work proposals from the employer (Baril et al., 2003; Beardwood et al., 2005). Indeed, one study shows that injured workers commonly receive contradictory advice from different physicians (Beardwood et al., 2005). Those with experience in occupational health, however, are less likely to advise patients with occupational work stress to stay away from work (Russell & Roach, 2002).

In addition to their lack of knowledge, some physicians are worried about liability issues with re-injury after the worker has returned to work (Pransky et al., 2002). This corresponds to the employer's perceptions that many doctors worry about their liability if their patient suffers a re-injury, and thus, they may not be as aggressive in positively reinforcing workers to return to work or perform some form of modified duties (Friesen et al., 2001; Kenny, 1995).

To facilitate the RTW process, or improve on disability management, some stakeholders feel that physicians should be educated on job demands, benefits of modified work and the role of other health professionals in RTW (Beaumont, 2003a; Beaumont, 2003b; Friesen et al., 2001). Besides physicians, there is also a need to educate workers, employers and unions on their role in safe and early RTW (Clarke et al., 2002; Friesen et al., 2001; Guzman et al., 2002; Pransky et al., 2002; Reynolds et al., 2007). To further promote recovery, physicians should empower their

patients to take control of their problem (Clarke et al., 2002). To further increase their understanding of RTW, the use of clear guidelines and best practice examples can be useful (Pransky et al., 2002). Improved use and access to medical and disability management services may also aid physicians in dealing with disability or RTW concerns (Guzman et al., 2002; Pransky et al., 2002; Reynolds et al., 2007).

Therefore, the best evidence synthesis approach offers *strong evidence* that the lack of adequate education and knowledge are potential impediments to managing disability and RTW.

3.34B Trust and respect

One very high-quality qualitative study, five high-quality qualitative studies and three medium-quality studies suggest that trust and respect among all stakeholders are important. At the present, there appears to be some distrust and potential credibility issues directed towards physicians from other stakeholders. For example, some employers feel that long absences from work are unnecessary and blame physicians as the source of unnecessary costs to the system (Baril et al., 2003). Some employers also do not respect the physical restrictions prescribed by physicians, but nonetheless, workers are forced to agree with employers' arrangements, even when they are inappropriate for their abilities or needs (Baril et al., 2003; MacEachen et al., 2007). Such disrespect may in turn affect the worker's willingness to participate in the proposed RTW process (Baril et al., 2003). Physicians also feel that their medical opinions should be given greater respect and consideration by other stakeholders (Clarke et al., 2002; Reynolds et al., 2007). In a more positive light, it is seen as helpful to managers and supervisors when they receive support from nurses or physicians in the selection of modified work tasks for injured workers, or when physicians previously evaluated jobs to facilitate placement (Baril et al., 2003).

Interestingly, some injured workers also experience a lack of trust from their treating

physician. They have been subjected to negatives attitudes from some physicians and other health professionals, who do not believe or listen to their complaints. Some feel their concerns are disregarded (Beardwood et al., 2005). Others have complained about receiving superficial consideration during medical investigations and that some physicians have predetermined their diagnosis (Beardwood et al., 2005), even when the description of their symptoms is inconsistent with the chosen diagnosis. In fact, workers sometimes feel that alternative practitioners are more helpful than medical doctors when managing their injuries (Beardwood et al., 2005). In one study, injured workers report their reluctance to share their medical symptoms with treating physicians, particularly with health problems that are considered as embarrassing (MacEachen et al., 2007). Overall, many injured workers feel misunderstood and disrespected when dealing with their primary care physicians during their recovery.

Trust allows stakeholders to work together in a coherent and efficient manner, thus creating positive results for the well-being of injured workers. Several studies have noted the need to establish trust, commitment and credibility among all parties in facilitating RTW (Baril et al., 2003; Clarke et al., 2002; Friesen et al., 2001). While accreditations may optimise disability management among physicians (Russell & Roach, 2002), others suggest that changes in physicians' and stakeholders' attitudes are crucial as well. This includes showing more respect toward the opinions of others even if there are disagreements in practice, culture and systems (Beaumont, 2003a; Beaumont, 2003b; Reynolds et al., 2007). Finally, one study shows that when physicians treat workers with courtesy and respect, there is significantly more improvement in their recovery (Kominski, Pourat, Roby, & Cameron, 2008).

Overall, the best evidence synthesis approach offers *strong evidence* that trust and respect between physicians and stakeholders are central components to facilitating timely RTW.

3.35B Awareness of External Factors

Three high-quality qualitative studies and five medium-quality studies demonstrate that many physicians are aware of external factors that may facilitate or hinder the RTW process. These include the characteristics of injured workers and workplaces, as well as factors associated with the insurance compensation system.

Workers' attitudes are seen by many physicians as a major barrier to RTW, particularly when they are passive or non-cooperative (Anema, van der Giezen, Buijs, & van Mechelen, 2002), or when they have fears and misunderstandings about their injuries (Guzman et al., 2002). Physicians have also identified some psychosocial obstacles to RTW, including conflicts at work, job dissatisfaction, personal and family difficulties, economic incentives to stay out of work, lack of job motivation, somatisation and mental blocks such as depression (Anema et al., 2002; Baril et al., 2003; Guzman et al., 2002; Pransky et al., 2002). While physicians sometimes attribute workers' motivation to RTW as a key factor, other stakeholders believe this is influenced by the workplace culture (Baril et al., 2003). Indeed, physicians agree that RTW may be hindered when light duty is not available in the workplace, as well as the presence of non-supportive supervisors and colleagues (Guzman et al., 2002, Pransky et al., 2002). A lack of resources for physicians to deal with those issues and the difficulty of solving these issues has been identified as an important problem (Beaumont, 2003a; Beaumont, 2003b; Guzman et al., 2002; Pransky et al., 2002). The administrative demands of managing a work injury and the adversarial nature of the compensation systems may all compromise the effectiveness of physicians' disability management (Guzman et al., 2002; Russell & Roach, 2002).

When workers are reluctant to try modified work, most physicians agree that assessment of personal and workplace issues is important to facilitate timely and safe RTW (Guzman et al.,

2003). Many physicians also suggest that RTW programs should be established at the workplace (Friesen et al., 2007). Furthermore, employers should increase their willingness and ability to accommodate injured workers or physician's work restrictions (Guzman et al., 2002, Reynolds et al., 2007). To address physicians' administrative workload, insurance forms should be concise and relevant, providing an outline of worker's physical limitations (Reynolds et al., 2007).

On the whole, there is *strong evidence* supporting the need for physicians to become more aware of the external factors that may facilitate or hinder successful RTW.

3.36B Processes of Care

Effective disability management by physicians, namely access, timeliness, and process of care are considered by stakeholders as important determinants of RTW success. The general processes of care are discussed by one very high-quality and two high-quality qualitative studies; one high-quality and three medium-quality observational studies.

Overall, access and timeliness of care are concerns for many injured workers. Many workers have experienced difficulties in obtaining an accurate diagnosis, accessing appropriate treatment interventions in a timely fashion and getting physicians to fill in compensation forms accurately or punctually (Baril et al., 2003; Beardwood et al., 2005; Friesen et al., 2001). Hence, many workers are forced to consult different physicians or specialists for those services (Friesen et al., 2001). These delays are perceived to be a result of the complexity of the condition, as well as physicians' lack of knowledge in occupational health issues (Beardwood et al., 2005).

Occupational health nurses have cited frequent delays when processing claims and conveying other information between physicians and employers, physician and insurer, and insurers and employers as major determinants of RTW (Friesen et al., 2001). Others have cited long duration of treatment, delays in processing and delivering information, and long waiting times before

treatment as main factors that inhibit RTW (Anema et al., 2002; Baril et al., 2003; Friesen et al., 2001).

Some experts have pointed out that ineffective management of injured workers can affect the length of disability and RTW. Injured workers whose treatment course involves greater utilization of speciality referrals, provider visits, diagnostic testing and prolonged use of opioids are less likely to improve RTW (Kominski et al., 2008; Mahmud et al., 2007). However, there are low response rates in these studies and results are in need of confirmation in future studies.

There is also a strong association between process of care indicators and duration of disability. A high-quality cohort study conducted by Sears, Wickizer, Franklin, Cheadle and Berkowitz (2007) found that injured workers whose first visit to the PCP is within one day of injury are less likely to have any time loss from work. Among those with time loss, the duration is shorter. Time loss duration is also shorter when reports are filed within 7 days of first PCP visit and that work-relatedness is specified in the report. Likewise, injured workers who receive regular PCP care, such as transfers of care, regular visits and intensity of care are likely to experience less time loss (Sears et al., 2007).

Overall, the level of evidence regarding processes of care on RTW success is *strong*.

3.361B Evidence-Based Care

Among all reviewed studies, two high-quality RCTs, one medium-quality RCT and one medium-quality quasi-experimental study look at the effect of evidence-based care on the impact of return to work. All of these studies make use of evidence-based guidelines for the management of low back pain.

Of the four studies, only one medium-quality study reveals a statistically significant improvement in workers' RTW with the use of an evidence-based approach. Compared to usual

care by GPs, McGuirk & Bogduk (2007) found that workers who were enrolled in evidence-based care had less time off work, spent less time on modified duties, and had fewer recurrences. When prescribed modified duties, 70% of these workers returned to work within two weeks.

On the other hand, the remaining three RCTs show that management of injured workers using guidelines did not influence worker's time to RTW, when compared with the control groups. Although no significant differences were found in RTW between workers in the evidence-based care and usual care, there was no delay in RTW (Hazard, Haugh, Reid, McFarlane, & MacDonald, 1997; Rossignol et al., 2000; Verbeek, van der Weide, & van Dijk, 2002). These studies consisted of PCP's early management of workers using LBP guidelines (Rossignol et al., 2000; Verbeek et al., 2002), and identification of the patient's risk and recommendations for care according to practice guidelines (Hazard et al., 1997). Taken together, there is *moderate evidence* that the use of evidence-based care has limited effect on disability improvement and RTW.

3.362B Usual Care

In general, one medium quasi-experimental study (McGuirk & Bodguk, 2007) and four high-quality studies (Anema et al., 2007; Hlobil et al., 2005; Loisel et al., 1997; Rossignol et al., 2000; Staal et al., 2004; Steenstra et al., 2006a; Steenstra et al., 2006b) found that physicians who provide usual care to injured workers are less likely to obtain positive results on RTW outcomes compared to workers who received intervention programs. For instance, Loisel et al. (1997) found that workers with compensated back pain of at least 6 weeks duration who only received usual care from their physicians had longer duration of absence from regular work and from any work. In the usual care group, workers received treatment from their treating physician, who was free to prescribe any test, treatment or referral to a specialist for care. In the end, these

workers returned to work 2.41 times slower than workers that received occupational and clinical interventions at the workplace. At one year follow-up, the functional status and pain also remained higher among workers in usual care than intervention groups. In another study, airline workers who received usual care for sub-acute low back pain were absent from work for 87 days on average, compared to 58 days for those receiving a behaviour-oriented graded activity program (Staal et al., 2004).

Therefore, the best synthesis evidence approach offers *strong evidence* that physicians need to provide more than basic usual care to their patients to facilitate safe and timely RTW.

3.37B Communication

3.371B Importance of Communication

Five high-quality qualitative studies and six medium-quality studies discuss an important RTW factor – regular communication among stakeholders. Many studies have found that communication among physicians and other stakeholders is often very poor or virtually non-existent (Anema et al., 2002; Baril et al., 2003; Beaumont, 2003a; Beaumont, 2003b; Clarke et al., 2002; Friesen et al., 2001; Kenny, 1995; Reynolds et al., 2007; Russell & Roach, 2002). In extreme cases, communication between parties may be filled with suspicion of conflicting interests (Beaumont, 2003a; Beaumont, 2003b; Friesen et al., 2001). Even though communication with other parties seldom extends beyond the use of standard workers' compensation forms, many physicians acknowledge the advantage of communicating with other health professionals involved in the workers' compensation system (Russell et al., 2005).

One observational study found that communication between physicians and the OPs is limited, involving a simple request or exchange of information on diagnosis, treatment, and prognosis. Yet, communication occurs more frequently when the injured worker is passive about

RTW and when there are long clinical waiting periods (Anema et al., 2002).

Some authors have reported that injured workers face difficulties and experience barriers to return to work when there is little or poor communication between the treating physician and workplace, insurance company and the workplace, the insurance company and physician, or when they fail to communicate fully with the worker (Friesen et al., 2001; Kenny, 1995). As well, physicians often fail to discuss the availability of suitable duties, poorly specify the nature of work restrictions and conditions for RTW, and provide vague information in medical certificates (Clarke et al., 2002; Kenny, 1995; Pransky et al., 2002; Russell & Roach, 2002).

Employers also designate physicians as the most difficult stakeholder to be in contact with. Timing of physician contact with the employer often varies because most physicians wait for employers to initiate the contact (Russell & Roach, 2002). In a typical case scenario, most physicians would simply ask the patient for more information and clarification about alternative duties or RTW issues, while a few would communicate with employers or stakeholders (Pransky et al., 2002; Reynolds et al., 2007). When asked about the preferred method of communication, physicians generally favour faxing, followed by phone calls. The choice of method, however, may depend on the specific stakeholder involved, focus of the request or contact, as well as expectations for physician's response (Reynolds et al., 2007).

To minimize unnecessary delays and improve RTW success, good communication among all parties is considered very important by many authors (Baril et al., 2003; Friesen et al., 2001; Guzman et al., 2002; Pransky et al., 2002; Reynolds et al., 2007). Physicians should work on their ability to explain the nature and prognosis of the condition to injured workers (Guzman et al., 2002) and craft communication and information gathering that is consistent with how medical care is provided (Reynolds et al., 2007). There should also be improvements in

communication with employers about alternative duty availability and assignments (Pransky et al., 2002). Likewise, others have suggested several workplace strategies that can improve communication between the workplace and treating physicians (Baril et al., 2003).

Overall, these qualitative and observational studies demonstrate *strong evidence* that all stakeholders perceive communication as an important element in PCP's disability and RTW management. The association between physician communication and RTW is addressed in the following two studies (Kominski et al., 2008; Sears et al., 2007).

Injured workers with PCPs who explain their medical conditions and treatments in an understandable way are less likely to report a non-working status (Kominski et al., 2008). A high-quality cohort study also shows that workers are less likely to have any time loss if there is telephone communication between stakeholders after the patient's first visits, but time loss duration is not affected (Sears et al., 2007).

3.372B *Physician Contact with the Workplace*

One high-quality systematic review, one high-quality RCT and one medium-quality observational study all demonstrated that work disability duration due to MSK or other pain-related conditions are significantly reduced when there is health care provider contact with workplaces (Franché et al., 2005b; Kosny et al., 2006; Loisel et al., 1997). One high-quality cohort study did not detect a significant association; but yet, advice from PCPs to the workplace on re-injury prevention is found to be a significant predictor of shorter work absence duration among injured workers (Franché et al., 2007). On the whole, there is *strong evidence* supporting that contact by a physician with the workplace significantly reduces duration of work disability.

3.373B *Early RTW Advice & Proactive Communication*

In two medium-quality observational studies, PCP's early advice to the workplace on re-

injury prevention is significantly associated with shorter work absence duration at 6 months after injury. Injured workers who have received positive recommendations from PCPs also experience shorter duration of RTW. Specifically, PCPs who provided patients with RTW dates or tell them they are ready to RTW have higher RTW rates (Dasinger, Krause, Thompson, Brand, & Rudolph, 2001; Kosny et al., 2006).

In another medium-quality study, however, advice on modified work to injured workers did not influence the total duration of sick leave among employees with MSK complaints (van Duijn et al., 2005). Dasinger and colleagues (2001) found that physicians who used proactive communication with injured workers was associated with a greater likelihood of early RTW during the acute phase of disability, but this effect disappeared when physical and psychosocial aspects of the pre-injury work environment were taken into account. In addition, Kominski et al. (2008) showed that physicians who discussed work restrictions and re-injury prevention, and understood worker's physical and mental job demands are not associated with better RTW outcomes for injured workers. Therefore, the best evidence synthesis approach demonstrates *mixed evidence* on early RTW advice and proactive communication.

Taken together, there is *strong evidence* supporting the importance of shared communication and the benefit of physician contact with the workplace, but mixed evidence on early RTW advice and physician proactive communication.

3.38B Collaboration with stakeholders

In addition to communication, collaboration with stakeholders is also a major concept among reviewed studies. Overall, four high-quality qualitative, two medium-quality Delphi and cross-sectional studies discuss the importance of collaboration among stakeholders. Likewise, two high-quality RCTs and two medium-quality quasi-experimental studies provide additional

evidence on this topic.

Several qualitative studies have noted that physicians experience various frustrations when collaborating with stakeholders involved in disability management. One study has noted that employers rarely supply information to the physicians, and that often there is a lack of appropriate work accommodation and interpersonal conflict mediation at work. Physicians rate their experience with employers with RTW programs positively, and they also believe that these programs will certainly enhance patient outcomes (Reynolds et al., 2007).

Due to potential conflicts of interest, many physicians are uncomfortable dealing with the compensation system (Russell et al., 2005). Insurers' processes, policies and their lack of understanding about how to effectively collaborate with family physicians are cited as sources of physician frustration (Reynolds et al., 2007; Russell et al., 2005). Collaborating with injured workers, on the other hand, is considered as the least problematic issue among all stakeholders. In fact, slightly more than half of the physicians in one study believed that they had a positive influence on their patients' self-perception of disability (Pransky et al., 2002). Facing time constraints, many physicians regard the partnership with stakeholders and other health professionals, such as physiotherapists or occupational therapists, as helpful resources in RTW (Baril et al., 2003; Friesen et al., 2001).

Effective disability management and RTW entail collaborations among stakeholders in making decisions about the worker's ability to return to work. However, there continues to be a strong difference in the views about the decision-making process. Some physicians believe they have a role in making decisions about work disability (Pransky et al., 2002; Reynolds et al., 2007), and that decision making should be based on both physicians' and employers' opinions. However, others believe that the physician's job is to provide guidance, and that they should not

be asked to make disability or RTW decisions (Reynolds et al., 2007). Despite various guideline recommendations, physicians continue to be asked by stakeholders, mainly insurers or employers, to make RTW decisions (Reynolds et al., 2007).

To facilitate effective disability management and early RTW, it is crucial to endorse a team approach to rehabilitation between GPs and occupational health professionals, as well as increasing collaboration with other health professionals (Beaumont, 2003a; Beaumont, 2003b). In two quasi-experimental studies, enhanced information exchange and collaboration between physicians did not result in faster work resumption for workers (Faber et al., 2005; Mortelmans, Donceel, Lahaye, & Bulterys, 2006). In two high-quality RCTs, however, study investigators did find that workers who are placed in a workplace intervention group with participation of all major stakeholders (worker, employer, OP, GP) are able to return to work significantly sooner than those in the control group with usual care (Anema et al., 2007; Loisel et al., 1997; Steenstra et al., 2006a; Steenstra et al., 2006b), with a difference of 77 in the intervention group versus 104 days in the usual care group (Anema et al., 2007; Steenstra et al., 2006a; Steenstra et al., 2006b).

Taken together, the best evidence synthesis approach provides *strong evidence* to support the importance of collaborative efforts in physician's disability management.

Chapter 4: Discussion

The best evidence synthesis in this review provides support that PCPs have a crucial role in disability management and returning injured workers to safe and sustainable work. The analyses of key concepts derived from guidelines and the scientific literature further reveal some key findings.

4.1 Main Findings and Implications

In this review, there was strong evidence to support many key concepts in physician's disability management, including time and incentives, advocacy, knowledge and education, trust and respect, awareness of external factors, and processes of care. Furthermore, there was strong evidence that physicians who collaborate with stakeholders, and include contact with the workplace are associated with early RTW.

There was also strong evidence that injured workers with physicians who provide more than just usual care have better RTW outcomes. It is worth mentioning that the interventions reviewed in this study aimed at providing care at the sub-acute phase of low back injuries. Thus, they might not be as cost-effective in the acute phase. Therefore, physicians should consider the length of time between injury and care when choosing the best care for their patients.

This review shows that evidence-based care, particularly guideline implementation, has not had the effect that one might expect. It is possible that the PCPs are not actually aware of or using the guideline for some reason, or that the guidelines are not practical in the real world setting. Also, some guidelines might be evidence-based and still not make a change in outcomes.

The guidelines so far are not really evidence-based, which could account for the lack of enthusiasm for their use. Furthermore, they may not be useful or change outcomes because they are not evidence-based. Guideline implementation is a science onto itself, and it is usually hard

to get clinicians to practice in accordance to guidelines or to become evidence-based. On the whole, guidelines should be validated or tested to ensure their effectiveness.

While many qualitative and observational studies noted the importance of communication between physicians and other stakeholders, there is mixed evidence on the effect of early RTW advice and degree of recovery among injured workers. This may be due to potential workplace factors that could overwhelm any positive influence of physician advice on the RTW process, such as work management on occupational health issues. As well, communication style may vary by physicians, and how a patient interprets his or her doctor's inquiries and advice may be critical to the success of physician communication.

Another issue that deserves consideration is that there is little good scientific evidence examining the PCP's role in RTW. Only six RCTs were of sufficient quality to undergo review, and the rest of the reviewed studies were comprised of high-quality qualitative studies and medium-quality observational studies. While these documents offer insightful perspectives and shared experiences of PCP's role in RTW, one cannot be certain about a true causal relationship underlying the observed associations or surveyed opinions. The majority of these observational studies also have very low participation rates. This may be due to the use of physicians as participants, and they are usually hard to get to participate in surveys. Such selection bias affects the quality of the studies, resulting in a number of medium-quality studies. When conducting observational studies in the future, authors should pay closer attention to the participation and follow-up rates to minimize bias. Authors may offer some types of incentives or bonuses, or pilot test survey methods to be certain that they have good participation rates before embarking on studies. More importantly, this finding highlights the need for more scientifically-sound and rigorous studies to conclude what works for PCPs in order to achieve successful RTW.

Another finding relates to the status of the current literature, where there appears to be more opinion than science. My literature search reveals that nearly half of the studies identified are opinion-based, comprised mainly of commentary, editorials, letters and narrative literature reviews. Likewise, the guidelines developed by the medical associations and compensation boards are not based on systematic searches of evidence, and they do not include quality appraisal of supporting documents. Although there is a high degree of consistency between the guidelines and the available scientific literature, scientifically sound guideline development may be an important tool in improving patient outcomes. As well, it could inform physician's decision-making and clinical practice.

While the ultimate success of job reintegration will depend on factors relating to the worker, workplace, system or environment, findings from this review further suggest that physicians can serve as both facilitators and barriers along the RTW process. For instance, when physicians collaborate with multiple stakeholders, their RTW outcomes are better. Their actions or level of competency may further support or undermine the degree of recovery or success of RTW outcomes.

4.2 Evidence-based Recommendations

Based on the findings with strong and moderate level of evidence, the following section provides relevant recommendations as to what a PCP should do to successfully return an injured worker back to work in a timely fashion. I have proposed an acronym, CAPP_A, to denote the five major roles for PCPs in RTW practice and management. CAPP_A stands for collaborate and communicate, advocate, plan, provide and aware.

Collaborate & Communicate: Regardless of the methods of communication, physicians should make an effort to communicate and work with the other involved stakeholders regarding their

patient's functional abilities or other RTW concerns. In particular, workers return to work sooner if there is contact by a physician with the workplace. Ideally, physicians should also inform patients about their conditions and provide employers with concise medical certificates or work restrictions. As well, the PCP should contact other health care professionals and relevant authorities for advice or clarification on disability coverage and process. However, it is simply unrealistic to believe that PCPs can assume all these roles because of the lack of time and incentives. Thus, the insurer may need to incent these physician behaviours through appropriate compensation.

Advocate: Being their advocate, physicians should educate, provide guidance, support and give medical advice to their patients. Without compromising the patient's confidentiality and trust, physicians should also maintain a balance in fulfilling their advocacy role and the priorities of other stakeholders during the RTW process. It is important that they recognize the therapeutic role of early RTW while also protecting their patients from re-injury.

Plan: RTW planning should begin early in the disability period, and physicians should encourage and discuss with their patients the benefits of early work resumption, through accommodation or modified duties. The worker's capability to work should also be assessed before recommending RTW.

Provide: Prompt medical care should be provided to patients, this includes an accurate diagnosis, appropriate referrals and treatment plans, and punctual completion of compensation forms to avoid unnecessary disability duration or delays in recovery. Information pertinent to the patient's recovery should be provided to insurers and other involved stakeholders.

Aware: Physicians should consider and be aware of their patient's job demands and workplace

environment when determining suitability for return to work. It is also essential to identify, and if possible, address factors that may facilitate or hinder the worker's recovery and successful RTW.

It is clear that the responsibilities of PCPs in RTW extend beyond managing injured worker's physical conditions, but to broader complexities relating to other psychosocial factors and collaborative efforts with many players. In addition to communicating with their patients, PCPs should also learn to listen to their needs. Cole et al. (2002) showed that physician's prognostic uncertainty is reduced by about one-sixth if they are aware of their patient's recovery expectations. More importantly, injured workers who hold more positive expectations are more likely to stop collecting disability benefits sooner and report better health outcomes (Cole et al., 2002). Thus, PCPs may consider providing their patients with more positive encouragement and constructive recommendations when managing disability and RTW accommodations.

4.3 Reality Check: Assessing the Present Challenges

Across many areas of medical practice, evidence-based clinical practice guidelines have been developed to represent the gold standard in health care. If based on sound research studies, guidelines have demonstrated effectiveness in improving health care (Bishop & Wing, 2003). However, RTW is never a one-size-fits-all solution to all injured workers. Not only does the recovery progress vary with the individual's functional status and the nature of the condition, but successful RTW also requires the collaboration of a large number of key stakeholders. These elements, coupled with the shortage of scientific research focusing on the role of PCPs in RTW, may account for the lack of evidence-based guidelines from medical associations and compensation boards.

This review shows that many guidelines may be based on studies that are not very scientific, and this may be one reason why some guidelines are not being followed. Others

suggest that a lack of awareness and familiarity with guidelines accounts for physician's lack of use of the recommendations. The lack of agreement, self-efficacy, outcome expectancy, and the inertia of previous practice habits further affect physicians' attitudes on guideline adherence (Cabana et al., 1999). In addition to adequate knowledge and attitudes, variations in individual practice styles and patient demands may be sufficient to overwhelm any efforts at guideline implementation (Di Iorio, Henley, & Doughty, 2000).

Some of the difficulties when implementing guideline recommendations may be explained by a few common themes found in this review, including the issues with time constraints, lack of financial incentives, and limited education or resources. Some make the point that physicians are overworked and have minimal training in disability management, and that these are the main reasons why the guidelines are not followed (Dorrell, 2002). While others, such as the OMA, feel that it is important to reinforce guideline recommendations with appropriate financial incentives to enhance the adoption of proposed roles (OMA, 2008). Although many medical schools may provide students with clinical training in traditional occupational health conditions, there is relatively little training in workplace disability prevention (Wynn, Williams, Snashall, & Aw, 2003). For example, many family physicians lack training in occupational medicine prior to establishing practice because disability management is not a formal component in the undergraduate medical curriculum of any medical school in Ontario (OMA, 1991). In practice, PCPs learn about disability management on the job and from interacting with occupational health practitioners. Many specialists enjoy teaching GPs and giving them suitable tools to handle certain problems and make appropriate patient referrals (Berendsen et al., 2006). Nonetheless, physician may encounter problems when they use disability assessment tool.

Whether it is to assess the patient's functional capabilities, translate medical impairment into functional limitations, or determine feasibility for work reintegration, physicians who have difficulties completing these tasks sometimes consider the use of functional capacity evaluations. FCE is often performed by a regulated health professional, and is one of the many resources that is used to determine what are safe and acceptable physical work demand levels for workers prior to return to work. However, most PCPs lack the time and skills to administer FCEs.

According to some disability claims experts, FCE assessment is useful for assessing MSK disorders (Wind, Goutteborge, Kuijer, Sluiter, & Frings-Dresen, 2006). In fact, many FCE users believe that such evaluation is particularly useful for RTW planning and that it is more credible than physician's broad statements of physical restrictions (Strong, Baptiste, Clarke, Cole, & Costa, 2004). The usefulness and applicability of FCE, however, remains controversial because of a lack of research supporting the predictive validity of FCE for RTW. There are difficulties extrapolating information from an FCE assessment taken at a single point in time and contextualizing it to work performance (Gibson & Strong, 1997; King, Tuckwell, & Barrett, 1998; Strong et al., 2002; Wind et al., 2006). Overall, the prognostic ability of FCEs for RTW outcomes is quite low (Gross, Battie, & Cassidy, 2004), providing little scientific evidence to support the benefits of FCEs in assisting physicians with RTW management.

As the patient's advocate, it is the physician's responsibilities to provide support and discuss options for RTW with their patients. While the concept of constructive support and guidance is agreed upon by many physicians, back pain patients seldom receive practical instructions from their physicians on how to cope with everyday problems (Verbeek, Sengers, Riemens, & Haafkens, 2004). These patients are likely to remain dissatisfied with their care, which may in turn affect their speed of recovery. Perceived satisfaction can be affected by many

factors; these include, but may not be limited to quality of care, information about the diagnosis, effective and thorough treatment, respect and courtesy, taking the patient's complaint seriously, and good explanations about injury and treatment (Butler & Johnson, 2008). Nevertheless, it remains unclear as to what extent the level of satisfaction affects return to work. Such perceived satisfaction is likely to vary from person to person, and thus, physicians must learn to listen to each of their patient's needs and determine the appropriate course of treatment and rehabilitation.

With their extensive medical knowledge, PCPs are seen as authoritative and credible by other stakeholders. This may lead to communication that is unidirectional, with the patient and workplace taking on a passive role (Pransky et al., 2004). Consequently, this can delay recovery and job reintegration. Most importantly, a lack of collaboration between physicians, other health professionals and disability managers can prevent successful RTW.

One explanation of these shortcomings is the nature of the physician's role. Several studies show that the physician's role as the patient's advocate may prevent successful collaboration with other stakeholders who hold different interests. Lack of time, minimal incentives, disrespect and distrust are also regarded as barriers to establishing collaborative care practices. These are consistent with the results of a previous study by Berendsen et al. (2006). Another explanation for a lack of collaboration may be differences in perceived professional status toward other stakeholders. Although many specialists express interests in collaborating with GPs, others feel that they have nothing to learn from GPs, and do not consider GPs as equal in terms of professional expertise (Berendsen et al., 2006). Thus, it is evident that collaborative relationships can be a challenge in workplace disability prevention.

4.4 Ongoing Efforts to Improved Disability Management

Given the issues with time constraints and minimal financial incentives, it is perhaps

impractical to expect overworked physicians to take on the responsibility of RTW coordination. As well, results of this study found that many aspects of the RTW process are beyond PCPs' scope of practice and experience.

To improve RTW outcomes, some argue that disability issues should be handled by rehabilitation and occupational specialists who have had more formal training and stronger capabilities in dealing with the various stakeholders (Rondinelli, Robinson, Scheer, & Weinstein, 1997). However, this may not be a practical solution because there are few board-certified occupational physicians in Canada. This is more problematic among rural or northern communities because of shortages of health care providers. One solution might be to have RTW coordinators assist physicians with RTW management.

RTW coordinators are primarily responsible for identifying available suitable duties in the workplace, working to overcome barriers to RTW and informing injured workers of their legal rights, responsibilities and requirements (WorkCover SA, 2008). This role can be fulfilled by individuals from any stakeholder group, such as health care professionals, insurance case managers or rehabilitation consultants. Above all, nurse practitioners have considerable medical knowledge and could assume the role of RTW coordinator. In this role, they would be more responsive to workplace requests, and more available to visit the worker's workplace and attend workplace-based activities with other involved stakeholders than the PCPs (Andersen, 2008). In addition to alleviating physicians' workload, the use of a RTW coordinator could benefit many employers. Organizations without designated occupational health services may find RTW coordinators more efficient and financially acceptable in reducing work disability duration and associated costs (Franche, Baril, Shaw, Nicholas, & Loisel, 2005a). Even when RTW is achieved, the RTW coordinator could still monitor the worker's progress periodically to prevent

recurrent disability.

While the appeal to the benefit of RTW coordinator seems justified, the concept of RTW coordinator is still relatively new. Problem may arise when there is a lack of formal guidance in their role as coordinators. A recent literature review reveals that substantial variation exists in the background, training and the specific methods for coordinating RTW (Shaw, Hong, Pransky, & Loisel, 2008b). In addition, it is uncertain as to who would pay for the service. While RTW coordinator is typically hired by external parties, smaller companies lack financial resources to provide such service. Besides RTW coordinator, the presence of return to work programs managed by the workplace and insurers may also assist PCPs in facilitating early RTW.

Consistent with general beliefs, the success of workplace-based RTW programs are often shaped by the organizational culture of problem solving, knowledge exchange and equitable participation of workers, supervisors and health professionals (Shaw, Domanski, Freeman, & Hoffele, 2008a). Indeed, the need for communication and teamwork extends beyond the physician's disability management practice to workplace involvement and RTW programs. A number of studies have demonstrated the positive effect of participatory ergonomics programs or modified duties at the workplace in supporting timely RTW and disability prevention (Krause et al., 1998; Loisel et al., 2001; Williams & Westmorland, 2002). This refers to the employers who take an active role in attending to safe behaviour, promoting prevention strategies and using modified duties to facilitate RTW (Frank et al., 1998; Habeck, Leahy, Hunt, Chan, & Welch, 1991). Likewise, a recent systematic review concludes that successful workplace-based RTW interventions include work accommodation offers; early contact between the healthcare provider, worker and workplace; ergonomic worksite visits; and the presence of a RTW coordinator (Franche et al., 2005b).

Workplace RTW interventions or programs, however, are not always successfully implemented. In some studies, compliance of management and employees to ergonomic advice was low, and injured workers perceived little support from colleagues in implementing ergonomic changes at the workplace (Dellve, Lagerstrom, & Hagberg, 2002; Urlings, Nijboer, & Dul, 1990). Varying practices and policies across jurisdictions, different workplace settings and stakeholders' interests also add to the complexity of workplace intervention designs.

Recently, Ammendolia and colleagues (2009) developed a best-evidence workplace-based RTW program for occupational low back pain using an intervention mapping approach. This framework encompasses the complex nature of RTW, tailoring interventions within the RTW program to the needs of various stakeholders and settings. One of the key features of this program is the presence of trained personnel to take control and coordinate the RTW process. More importantly, inputs from all important stakeholders, including physicians are essential to the program success and timely RTW.

4.5 Directions for Future Research

Based of this review, I have made several recommendations for future research and guideline development practices. My systematic review shows that many of the reviewed studies examine the role of PCPs in RTW using non-experimental methods. It has been long established that RCTs have the highest methodological quality. In reality, RCTs are costly and difficult to conduct in occupational health and RTW research. Despite these challenges, it remains essential to conduct studies with higher experimental control and rigor. Particularly, studies may explore various intervention strategies involving physicians that will assist them in managing injured workers and promote early and safe RTW. This review also found number of cohort and cross-sectional studies that are of medium-quality. More research with better methodology and higher

participation rates are needed to confirm the findings of my review.

While many studies confirm the importance of collaboration between physicians and stakeholders on the success of RTW, more research needs to be conducted to specify effective methods in actual practice. This review only found mixed evidence on the influence of physician early advice on worker's RTW, thus more studies are needed in the future to clarify this relationship. Since regulations and legislations regarding occupational health vary by jurisdiction, it is also essential to replicate RTW studies with significant results to ensure they work within the local health care and compensation system.

It is clear that PCPs play an important role in patient's job reintegration process, but yet, future research needs to explore ways to get physicians more involved in the process. For instance, there is a need to investigate the effectiveness of offering physicians financial incentives to engage in the RTW process. Research should be conducted to measure the effects of intermediary health care providers, or RTW coordinators, on physician's disability management practice. To create positive change in the long run, the effective transfer of scientific research evidence to physician's daily practice should also be accelerated.

Finally, future guideline development should move towards an evidence-based approach. This involves conducting a systematic search and scientific evaluation of the available literature using standard protocols. It is also important to make more use of scientific studies in guideline development, rather than using narrative literature reviews or opinion papers.

4.6 Strengths and Limitations

To date, this is the first systematic review to summarize and provide evidence-based findings on the role of primary care physicians in managing the RTW process of injured workers. In particular, both the available guidelines and scientific literature have been reviewed and

reflect an emerging consensus on the physician's role in safe and sustainable RTW. An additional strength of this review is that the search strategy and selection criteria were established a priori, which limits selection bias. Potential bias is also minimized by contacting the content experts in the field to ensure relevant scientific literature and guidelines were not missed. Furthermore, I have not limited my review to RCTs, but have included a wide range of study designs with well-conducted methodologies. This allows the identification of important and unique perspectives on the RTW process, as well as identifying barriers and facilitators in relation to the physician's responsibilities in managing RTW.

In addition, I applied a priori criteria for quality assessment of the literature and thereby used the best evidence to formulate my conclusions. Finally, many of the recommendations in the CAPP framework could be applied across all types of disability or injuries because they are not disease specific.

A limitation of this review is the low quality of many of the reviewed studies, whereby the acceptance of medium-quality studies may weaken the level of evidence on the PCP's role in RTW. Nonetheless, the medium-quality studies are generally more similar to high quality studies than to the low-quality studies. While it is a strength that I have applied a tool to screen the quality of the evidence, the use of a checklist to assess the quality of qualitative studies may be a potential limitation. There is much debate about whether a checklist is too rigid in appraising qualitative evidence, because the nature of qualitative study is non-standard, unconfined and dependent on the subjective experience of both the researcher and interviewees (Greenhalgh & Taylor, 1997).

Due to limited resources, the exclusion of non-English studies and guidelines may have introduced language bias, which could narrow the scope of included studies. While my search

was comprehensive and thorough, it is not actually possible to find every relevant document and some grey literature will inevitably be missed. Finally, this review includes studies from different jurisdictional settings. The varying policies, compensation systems, healthcare systems and social values associated with RTW may affect the degree of evidence for effectiveness and perspectives in RTW management.

Chapter 5: Conclusion

In summary, this synthesis has brought together findings from a range of scientific studies and guidelines from professional associations on the topic of physician's role in RTW management. Focusing on general occupational injuries, evidence-based findings from this review support that PCPs have an important role in facilitating timely RTW for their patients, and they can serve as both facilitators and barriers along the process.

My findings confirm that RTW for injured workers can often be improved through effective teamwork with other stakeholders and contact by physicians with the workplace. More communication and collaboration can increase PCPs' awareness of available modifiable work, reduce unnecessary time loss from treatment or rehabilitation, and improve employer's awareness of the need for specific work accommodations. The physicians' focus on advocating for patients' rights, early planning for job reintegration, providing prompt medical care and encouragement, as well as identifying potential psychosocial barriers for RTW is very important.

In order to improve RTW, a fundamental change of culture and attitude is needed. There could be more education opportunities for physicians on disability management, more emphasis on promoting trust and respect among stakeholders, and more progress in arranging alternative solutions to deal with time and financial incentives. Alternatively, the integration of workplace interventions and intermediary players into the process may have a beneficial effect on PCPs' disability and RTW management. Most importantly, more scientifically rigorous research is needed to assist all stakeholders in making informed decisions and establishing best practice.

In summary, this review serves as an informative tool on physician's role in RTW for a variety of stakeholders and can: (1) aid policy makers and inform professional guidelines and primary care programs; (2) aid primary care physicians to more effectively manage RTW of their

patients following an injury; (3) reduce the burden of workplace disability; (4) inform existing physician training programs to improve injured workers' care; (5) allow other stakeholders to better understand the responsibilities of PCPs.

RTW should not be prescriptive, but rather, flexibility is required in planning and structuring job reintegration for injured workers. The CAPP framework summarizes the important principles of RTW, and it needs to be operationalized into methods that could be tested in future studies. The success of CAPP, coupled with evidence-based practice could offer physicians an effective and realistic approach to achieving better RTW outcomes for all.

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Appendix 1

		Methodology Checklist 1: Systematic Reviews and Meta-analyses	
Study identification (Include author, title, year of publication, journal title, pages)			
Guideline topic:		Key Question No:	
Checklist completed by:			
Section 1: Internal validity			
In a well conducted systematic review		In this study this criterion is:	
1.1	The study addresses an appropriate and clearly focused question.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.2	A description of the methodology used is included.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.3	The literature search is sufficiently rigorous to identify all the relevant studies.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.4	Study quality is assessed and taken into account.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.5	There are enough similarities between the studies selected to make combining them reasonable.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
SECTION 2: OVERALL ASSESSMENT OF THE STUDY			
2.1	How well was the study done to minimise bias? Code ++, +, or –		
2.2	If coded as +, or – what is the likely direction in which bias might affect the study results?		

Appendix 2


 Methodology Checklist 2: Randomised Controlled Trials			
Study identification (<i>Include author, title, year of publication, journal title, pages</i>)			
Guideline topic:	Key Question No:		
Checklist completed by:			
Section 1: Internal validity			
<i>In a well conducted RCT study.....</i>			
	In this study this criterion is:		
1.1	The study addresses an appropriate and clearly focused question.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.2	The assignment of subjects to treatment groups is randomised	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.3	<i>An adequate concealment method is used</i>	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.4	Subjects and investigators are kept 'blind' about treatment allocation	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.5	The treatment and control groups are similar at the start of the trial	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.6	The only difference between groups is the treatment under investigation	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.7	All relevant outcomes are measured in a standard, valid and reliable way	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.8	What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?		
1.9	<i>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)</i>	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.10	Where the study is carried out at more than one site, results are comparable for all sites	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Section 2: OVERALL ASSESSMENT OF THE STUDY			
2.1	<i>How well was the study done to minimise bias?</i> Code ++, +, or –		
2.2	If coded as +, or – what is the likely direction in which bias might affect the study results?		
2.3	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?		
2.4	Are the results of this study directly applicable to the patient group targeted by this guideline?		

Appendix 3

SIGN 		Methodology Checklist 3: Cohort studies	
Study identification (Include author, title, year of publication, journal title, pages)			
Guideline topic:		Key Question No:	
Checklist completed by:			
Section 1: Internal validity			
In a well conducted cohort study:		In this study the criterion is:	
1.1	The study addresses an appropriate and clearly focused question.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Selection of subjects			
1.2	The two groups being studied are selected from source populations that are comparable in all respects other than the factor under investigation.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.3	The study indicates how many of the people asked to take part did so, in each of the groups being studied.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.4	The likelihood that some eligible subjects might have the outcome at the time of enrolment is assessed and taken into account in the analysis.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.5	What percentage of individuals or clusters recruited into each arm of the study dropped out before the study was completed.		
1.6	Comparison is made between full participants and those lost to follow up, by exposure status.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
ASSESSMENT			
1.7	The outcomes are clearly defined.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.8	The assessment of outcome is made blind to exposure status.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.9	Where blinding was not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.10	The measure of assessment of exposure is reliable.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.11	Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.12	Exposure level or prognostic factor is assessed more than once.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable

CONFOUNDING			
1.13	The main potential confounders are identified and taken into account in the design and analysis.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
STATISTICAL ANALYSIS			
1.14	Have confidence intervals been provided?		
Section 2: OVERALL ASSESSMENT OF THE STUDY			
2.1	How well was the study done to minimise the risk of bias or confounding, and to establish a causal relationship between exposure and effect? <i>Code ++, +, or –</i>		
2.2	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the exposure being investigated?		
2.3	Are the results of this study directly applicable to the patient group targeted in this guideline?		

Appendix 4

		Methodology Checklist 4: Case-control studies	
		Study identification (Include author, title, year of publication, journal title, pages)	
Guideline topic:		Key Question No:	
Checklist completed by:			
Section 1: Internal validity			
In an well conducted case control study:		In this study the criterion is:	
1.1	The study addresses an appropriate and clearly focused question	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
SELECTION OF SUBJECTS			
1.2	The cases and controls are taken from comparable populations	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.3	The same exclusion criteria are used for both cases and controls	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.4	What percentage of each group (cases and controls) participated in the study?	Cases: Controls:	
1.5	Comparison is made between participants and non-participants to establish their similarities or differences	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.6	Cases are clearly defined and differentiated from controls	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.7	It is clearly established that controls are non-cases	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
ASSESSMENT			
1.8	Measures will have been taken to prevent knowledge of primary exposure influencing case ascertainment	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.9	Exposure status is measured in a standard, valid and reliable way	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
CONFOUNDING			
1.10	The main potential confounders are identified and taken into account in the design and analysis	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
STATISTICAL ANALYSIS			
1.11	Confidence intervals are provided		
SECTION 2: OVERALL ASSESSMENT OF THE STUDY			
2.1	How well was the study done to minimise the risk of bias or confounding? Code ++, +, or –		
2.2	Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the exposure being investigated?		
2.3	Are the results of this study directly applicable to the patient group targeted by this guideline?		

Appendix 5

Modified Methodology checklist: qualitative studies (NICE)

The criteria used in this checklist are adapted from:

- The Qualitative Research and Health Working Group, Liverpool School of Tropical Medicine (Bromley H, Dockery G, Fenton C, et al.) *Criteria for evaluating qualitative studies*. www.liv.ac.uk/lstm/download/guidelines.pdf. Accessed 25 August 2003.
- National CASP Collaboration for Qualitative Methodologies. Critical Appraisal Skills Programme (CASP) (2002) *10 questions to help you make sense of qualitative research*. Oxford: Public Health Research Unit.
- Kuper, A., Lingard, L., & Levinson, W. (2008). Critically appraising qualitative research. *British Medical Journal*, 337, a1035.

Study identification <i>Include author, title, reference, year of publication</i>			
Checklist completed by:			
Guideline topic:		Key question no:	
Criteria:		How well is this criterion addressed? (Circle one option for each question)	
1 Aims of the research			
1.1	Are the aims and objectives of the research clearly stated?	Clearly described Unclear Not reported	Comments
1.2	Is a qualitative approach appropriate?	Appropriate Unclear Not appropriate	Comments
2 Study design			
2.1	Is (are) the research question(s) clearly defined and focused?	Clearly defined and focused Unclear Not focused Not defined	Comments
2.2	Are the methods used appropriate to the research question(s)?	Appropriate Unclear Inappropriate	Comments
3 Recruitment and data collection			
3.1	Is the recruitment or sampling strategy appropriate to the aims of the research?	Appropriate Unclear Not appropriate	Comments

3.2	Were the data collected appropriately?	Appropriate Unclear Not appropriate	Comments
3.3	Are the roles of researchers clearly described?	Clear Unclear Not reported	Comments
3.4	Have potential ethical issues been addressed adequately, including reflexivity*? *Reflexivity refers to recognition of the influence of a researcher brings to the research process	Adequate Unclear Not adequate	Comments
4 Data analysis			
4.1	Is the data analysis done appropriately?	Appropriate Unclear Not appropriate	Comments
5 Findings/interpretation			
5.1.	Are the findings internally coherent, credible?	Valid Unclear Potential bias	Comments
5.2	Are the findings relevant?	Relevant Unclear Limited relevance	Comments
6 Implications of research			
6.1	Are the implications of the study clearly reported?	Clearly reported Unclear	Comments
6.2	Is there adequate discussion of the study limitations?	Adequate Inadequate Not reported	Comments
OVERALL ASSESSMENT OF THE STUDY			
How well was the study conducted? <i>Code ++, + or -</i>			
Overall, is what the researchers did clear?			Yes No

Appendix 6

Modified Methodological Checklist: Cross-sectional Studies (STROBE)

Study identification <i>Include author, title, reference, year of publication</i>			
1. Introduction			
1.1	Are the specific objectives (and/or pre-specified hypotheses) clearly stated?	Clear described Unclear Not reported	Comments
2. Methods			
2.1	Are key elements of study design presented early in the paper?	Clearly presented Presented afterwards Not presented	
2.2	Are the settings, locations, and relevant dates (including periods of recruitment, exposure, follow-up, and data collection) clearly described?	Clearly described Unclear Not reported	
2.3	Are the eligibility criteria, sources and methods of selection of participants given?	Clearly reported Unclear Not reported	
2.4	Are methods of data collection adequate to answer the research question?	Adequate Not adequate Not reported	
2.5	Are all outcomes, exposures, predictors, potential confounders, and effective modifiers clearly defined?	Clearly defined Somewhat defined Few variables were defined Not defined at all	
2.6	Are the data sources and measures clearly described?	Clearly described Unclear Not reported	
2.7	Any efforts to address potential sources of bias are well described.	Well covered Adequately addressed Poorly addressed Not reported	
2.8	The study size is discussed in detail.	Clearly described Adequately described Poorly addressed Not addressed	
2.9	How the quantitative variables were handled in the analyses is clearly explained.	Clearly described Adequately described Poorly described Not addressed	
2.10	All statistical methods, methods used to examine subgroups and interactions, missing data, and sensitivity analyses are described.	Clearly described Somewhat described Selected methods were described Not reported at all	

2.11	Have analytical methods taking account of sampling strategy been described? (if applicable)	Clearly described Adequate described Poorly described Not applicable	
3. Results			
3.1	Are the numbers of individuals of study cleared reported (numbers of potentially eligible and included in the study)?	Well covered Adequately addressed Poorly addressed Not reported	
3.2	Are reasons given for non-participation at each stage?	Yes No Not applicable	
3.3	Are the characteristics of the study participants, information on exposures and potential confounders clearly reported?	Clear described Selected information were described Unclear Not reported	
3.4	Number of participants with missing data for each variable of interest is indicated.	Clearly indicated Adequately addressed Poorly addressed Not reported	
3.5	Numbers of outcome events or summary measures are reported.	Well covered Adequately addressed Poorly addressed Not reported	
3.6	Unadjusted estimates and if applicable, confounder-adjusted estimates (confidence intervals) and their precision are reported.	Well covered Adequately addressed Poorly addressed Not reported	
3.7	Other analyses done are reported (e.g. analyses of subgroups and interactions or sensitivity analyses)	Well covered Adequately addressed Poorly addressed Not reported	
4. Discussion			
4.1	Are the key results summarized with reference to study objectives?	Clearly summarized Unclear Not summarized	
4.2	Limitations of the study are discussed, taking into account sources of potential bias or imprecision.	Well explained Unclear Not reported	
4.3	The overall interpretation of results has considered objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	Clearly interpreted Adequately addressed Poorly addressed Not reported	
4.4	The generalisability (external validity) of the study results is clearly described.	Well described Unclear Not reported	
5. Overall Assessment of the Study			
How well was the study conducted? Code ++, + or -		Comments	

Appendix 7

New Methodological Checklist: Delphi studies

The criteria used in this checklist are adapted from:

- Landeta, J. (2006). Current validity of the Delphi method in social sciences. *Technological Forecasting and Social Change*, 73, 467-482

	Indicators	
1.1	The quality and stability of the panel of experts (e.g. number of experts, degree of participation)	
1.2	Time between rounds	
1.3	Comments gathered from the experts	
1.4	Stability of the results between rounds (degree of group and individual stability in answers)	
1.5	The quality and intensity of the participation	
1.6	Modification of the initial opinions as a consequence of repetition and feedback	
1.7	Consensus and convergence of opinion	
Overall Assessment of the Study		
	How well was the study conducted? (++, + or -)	