FCBOM Project

Using a Modified OMPQ to Triage Care for Soft Tissue Injuries in Workers' Compensation

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Summary

Prolonged absence from work can be detrimental to both employer and worker. The longer a worker is off work, the greater the risk of never returning to gain employment. If we can identify early who is at risk for prolonged disability (prolonged recovery, chronic pain disability), then we might be able to implement an intervention to prevent the detrimental outcomes. Research suggests that psychosocial factors may be more important than biological factors in predicting prolonged disability. Two important psychosocial factors are pain catastrophizing and fear avoidance. The background section of this report reviews the literature on the importance of psychosocial factors in general and these two in particular; and interventions for pain catastrophizing / fear avoidance.

The Örebro Musculoskeletal Questionnaire (OMPQ) is one validated tool for identifying workers with psychosocial risk factors for prolonged disability. WorksafeNB uses a modified version that it calls the "Pain and Activity Questionnaire" (P&A). The background section reviews research related to these tools. In March 2008, WorksafeNB used the P&A questionnaire to triage claimants with a soft tissue injury (STI) who were still off work at 4 weeks post-accident or recurrence into low, grey zone, medium-high and high risk; and then to provide different interventions based on risk category. The focus of this study was to evaluate the effectiveness of interventions for the medium-high (P&A score 140-147) and high risk (P&A score > 147) claimants. Claimants in the low risk category continued to receive care as per current practice, and were not included in the analysis.

Historic controls were used to evaluate the effectiveness of interventions. The background section reviews the historic relationship of P&A score to claim outcomes – fraction of claimants on benefits at 26 weeks, fraction working at 26 weeks, average claim duration to 26 weeks, average total claim costs to 26 weeks. With increasing P&A score (increasing predominance of psychosocial barriers to recovery), there was an increasing trend to poorer claim outcomes at 104 weeks.

The study's design was observational cohort. All claimants with an STI who were still off work at 4 weeks post-accident or recurrence completed a P&A questionnaire. Claimants with a score under 140 received usual care and were not included in the study. Claimants with a score of 140-147 (medium-high risk) received a case management only intervention. Claimants with a score over 147 received case management intervention plus multidisciplinary active rehab with cognitive behavioural therapy and work simulation. The intervention claimants formed a prospective cohort. The control claimants formed a retrospective cohort. The researcher was not involved in determining claim acceptance, who got a P&A Questionnaire and what care a claimant would get.

Both interventions produced a statistically and clinically (business case) significant reduction in mean claim duration, increase in fraction of claims closed and increase in fraction of claimants working at 26 weeks after disablement (accident or recurrence). The case manager intervention for the "P&A 140-147" group was highly successful. The multidisciplinary intervention for "P&A >147" group was moderately successful. In the former group, 40% less were on benefits at 26 weeks, 50% more were working and average claim duration was reduced by 5 weeks. In the latter group, 30% fewer were on

benefits at 26 weeks, 20% more were working and average claim duration was reduced by 4 weeks.

Cost savings include treatment avoided by going off benefits within 26 weeks of disablement. Based on a review of medical treatment after 26 weeks for control claimants with a P&A score 140-147, 31% had more physiotherapy, 29% had imaging studies, 27% were referred to at least one specialist, 13% were referred to a pain clinic for nerve blocks, 13% had surgery, 11% had vocational rehab, and 6% had acupuncture. At 26 weeks, this group had 40% fewer claimants on benefits. This should translate into a 40% reduction in medical treatments for this group after week 26. For control claimants with a P&A score >147, 41% had more physiotherapy, 29% had imaging studies, 27% were referred to at least one specialist, 18% were referred to a pain clinic for nerve blocks, 13% had surgery, 11% had vocational rehab and 6% had acupuncture. At 26 weeks, this group had 30% fewer claimants on benefits. This should translate into a 30% reduction in medical treatments for this group after week 26.

The study showed that pre-intervention P&A scores are not fixed. Addressing psychosocial factors can reduce the P&A score towards less predominance of psychosocial pain generators. Biological-based treatment is then likely to be more effective. Better outcomes were associated with a greater drop in P&A score after the intervention. For claimants who were not working at 26 weeks, cognitive-behavioural therapy produced a clinically significant drop in scores in the "P&A >147" group compared to no change in the "P&A 140-147" group.

Psychosocial factors can be more important determinants the biological factors in delayed recovery / prolonged disability. This study showed that the modified OMPQ (P&A) questionnaire is a useful tool to stratify claimants into risk groups for prolonged disability based on psychosocial factors; and to tailor intervention caremaps according to risk.

The report is presented in eight sections, including this summary. The background section reviews the literature that was the foundation for using the OMPQ to triage care of claimants with STIs, selection of a cutoff point, selection of controls, and the selection of interventions according to risk group. The third section states the objectives of the study. The fourth section covers methodology. Results are presented in the fifth section, followed by discussion. The last section lists the references used throughout the report.

Background – The Problem

Prolonged absence from work can be costly to both employer and worker. For the employer, in addition to medical costs there are the indirect costs of initial reduced productivity, maybe paying overtime to others to get work done, and possibly later hiring and training of replacement workers. For some workers, to the surprise of their physician a few more weeks off unexpectedly become months.

Research shows that the longer someone is off work, the less likely they are to return to any form of work. Disability management programs teach that there is a 50% probability of RTW if someone is off work for 26 weeks, and 25% if off for 52 weeks (Alyward and Sawney 2007). This was likely derived from Waddell's (1987) plot of the fraction of workers' compensation low back pain claimants off work over time. WorksafeNB's experience is a 63% probability of RTW if off at 26 weeks and 30% if off at 52 weeks.

Alyward and Sawney (2007) note that prolonged inactivity has been shown to be linked to deterioration in mental and physical health. Talmage and Melhorn (2005) list a number of studies showing an association between unemployment and increased rates of morbidity and mortality. About 7 years ago, WorksafeNB did a study of the impact of failure to return to work (RTW). Claimants on full LTD experienced an average $15,000 drop in family income, 18% experienced chronic stress, and 12% had broken up with their significant other. Prolonged absence from work can be harmful to the worker. How can we avoid this?

The majority of claimants get back to work quickly. WorksafeNB's experience is that 60% of claimants are off benefits by week 4 and 75% by week 12. WorksafeNB would like to identify claimants at week 4 who are at risk for prolonged recovery/disability in order to intervene to prevent detrimental consequences for these injured workers – while not interfering with the recovery of those who are going to get back to work quickly. There are lots of studies that attempt to predict prolonged disability. In the past, many have focused on "biological" (physical, ergonomic) factors as predictors.

Increasingly, research is finding that psychosocial factors are important predictors for filing a workers' compensation claim [especially job dissatisfaction, psychological demands, supervisor support and stress] (Bigos, Battié et al. 1991; Krause, Ragland et al. 1998; Linton 2001; Pearce 2006; Ghaffari, Alipour et al. 2008); and for prolonged recovery [especially fear avoidance and pain catastrophizing] (Crombez, Vlaeyen et al. 1999; Fritz, George et al. 2001; Severeijns, Vlaeyen et al. 2001; Buer and Linton 2002; Picavet, Vlaeyen et al. 2002; Boersma and Linton 2005).

Bigos *et al*. (1992) reported on a 4-year prospective study of 3,020 Boeing employees. Job dissatisfaction and distress were better predictors of filing a future claim for a back injury than were physical factors. Krause *et al*. (1998) reported on a 5-year prospective study of 1,449 urban transit workers. In addition to heavy physical job demands, workers with a high level of job problems, psychological demands, job dissatisfaction and low supervisor support were at higher risk of filing a future claim for neck and back injury. Pearce (2006) notes the Australian experience with repetitive strain injury. Whether neck, back or upper extremity, if the predominant pain generator is psychosocial then labeling it as a biological injury can misdirect treatment and prevention efforts. Picavet, Vlaeyen

et al. (2002) showed that persons without low back pain (LBP) who have a pain catastrophizing and/or fear avoidance score in the upper tertile were 3 times more likely to develop LBP with disability within the next six months than persons with scores in the lower tertile.

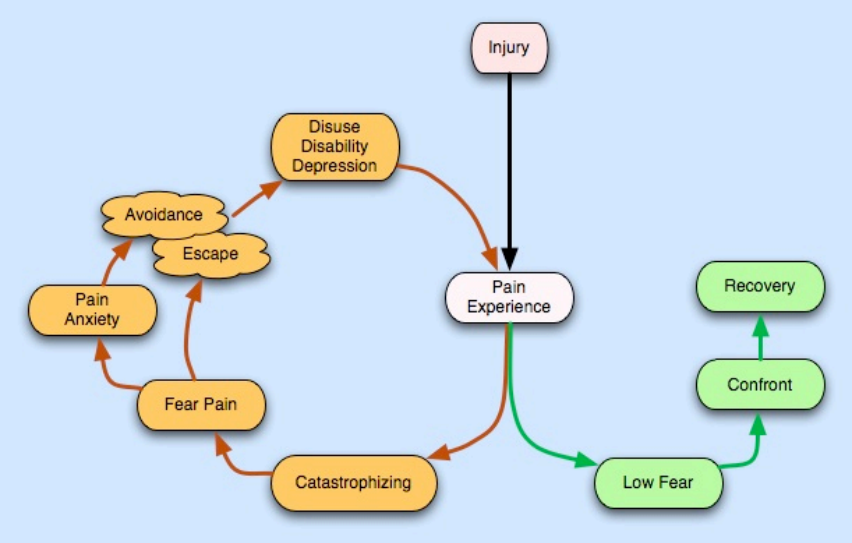
Once a worker has an injury, research suggests that psychosocial factors may have an important role in the development of chronic pain and prolonged disability. Severeijns, Vlaeyen *et al*. (2001) studied 211 persons with chronic pain. Controlling for physical impairment and pain duration, they found significant correlation between pain catastrophizing and pain intensity, pain disability and psychological distress. Crombez, Vlaeyen *et al*. (1999) studied persons with chronic LBP. Tampa Scale of Kinesiophobia (TSK) and Fear-Avoidance Belief Questionnaire-physical (FABQ) scores significantly correlated with self-reported disability; and were better predictors of disability and poor weight lifting performance than were pain intensity and pain duration. In the subacute and chronic injury phases, pain disability is a function of perceived disability (lack of self-efficacy), which in turn is a function of pain-related fear and pain catastrophizing (Denison, Asenlof et al. 2004). Pain-related fear and pain catastrophizing can be more disabling than biomechanical pain intensity (Crombez, Vlaeyen et al. 1999; Severeijns, Vlaeyen et al. 2001; Denison, Asenlof et al. 2004; Sullivan, Lynch et al. 2005). Increased pain catastrophizing may intensify biomechanical pain rating (Severeijns, Vlaeyen et al. 2001; Buer and Linton 2002; Sullivan, Lynch et al. 2005; Swinkels-Meewisse, Roelofs et al. 2006a). In chronic pain, some studies found pain intensity to be unrelated to the degree of physical impairment (Severeijns, Vlaeyen et al. 2001). Others found pain intensity but not disability to be related to the degree of physical impairment (Peters, Vlaeyen et al. 2005).

WorksafeNB's experience is that claimant's with minimal or no physical impairment can be more disabled than claimants with definite impairment (e.g., for workers with accidents in 2006, the median duration on benefits was 48 weeks for full rotator cuff tear (RCT) and 80 weeks for partial RCT – claimants with shoulder plus nerve injury have median claim duration of 72 weeks).

Pain Catastrophizing / Fear Avoidance

Vlaeyen developed a model of how pain catastrophizing and pain-related fear lead to disability [see Figure 1] (Vlaeyen and Linton 2000; Buer and Linton 2002; Leeuw, Goossens et al. 2007). Most injured persons don't respond to pain with catastrophizing and fear avoidance. They stay active and participate in rehab. They recover quickly. Depending on the circumstances, persons with a tendency to pain catastrophizing overreact to pain. They develop catastrophic thinking about their pain. This leads to pain-related fear, which in turn leads to avoidance of activity – bed rest for LBP (Sieben, Portegijs et al. 2005; Verbunt, Sieben et al. 2008), reduced participation in household duties, family activities, social and leisure activities and active rehab (Gheldof, Vinck et al. 2006; Swinkels-Meewisse, Roelofs et al. 2006a; Swinkels-Meewisse, Roelofs et al. 2006b). In WorksafeNB's experience, these are the claimants with minimal or no objective clinical findings who seek notes from their family physician to stop physiotherapy and OT-assisted RTW programs. Avoidance traps the worker in the whirlpool of disuse, disability, depression and chronic pain.

Figure 1: Fear Avoidance-Pain Catastrophizing Model



Picavet, Vlaeyen et al. (2002) reported on a general population study of persons with LBP. Persons with fear avoidance and pain catastrophizing scores in upper tertile were 1.7 times more likely to have chronic LPB. But only persons with the high fear avoidance score were more likely to have disability from chronic LBP at 6 months follow-up (OR = 2.6). Buer and Linton (2002) showed that persons with fear avoidance scores in the upper quartile were 2.5 times more likely to have reduction in activities of daily living (ADL) than persons in the lower quartile. Those with pain catastrophizing scores in the upper quartile were 1.8 times more likely to have a reduction in ADL than persons in the lower quartile. These studies suggest that fear avoidance may be more important than pain catastrophizing in prolonging disability.

Injury Phases

Hogg-Johnson, Frank *et al*. (1994) suggest that predictors of LBP may be dependent on the injury phase – biological factors being more important in prolonging recovery in the acute phase and psychosocial factors more important in subacute and chronic phases. Fritz, George *et al*. (2001) showed that screening for fear avoidance aided in predicting which persons with LBP of less than 3 weeks would be disabled and off work after 4 weeks of physical therapy. They controlled for physical impairment and pain intensity. Sieben et al. (2005) studied 247 persons with acute LBP of less than 3 weeks. Pain intensity was a stronger predictor of pain disability than fear avoidance. The correlation for fear avoidance was higher in persons with low job satisfaction and persons using bed rest for acute LBP.

Gheldof, Vinck, Vlaeyen *et al*. (2005) studied 1294 workers for factors associated with short- vs. long-term disability (sick leave) for LBP. Risk factors for short-term disability were high physical load, pain severity, pain radiating into the ankle-foot and pain-related fear. Risk factors for long-term disability were pain radiating into the ankle-foot, and pain-related fear – pain intensity and physical demands were not important determinants of long-term sick leave. Grotle *et al*. (2006) looked at the impact of fear-avoidance beliefs over the course of LBP in those with only acute LBP and those going on to

develop chronic LBP. Both groups started with similar scores on the FABQ-physical scale. In persons with acute LBP only, the FABQ-physical scores declined over the next 30 days. In the group going on to develop chronic LBP, the FABQ-physical scores remained the same but the FABQ-work scores increased.

Therapy

If psychosocial factors are important determinants of prolonged pain disability, what can we do to mitigate prolonged work absence and its potential harmful consequences? George, Fritz *et al*. (2003) caution that whatever intervention we employ, it needs to be targeted at the high risk group – otherwise we risk creating disability in persons who would otherwise be off work for a short duration. Those with high fear avoidance scores benefited from a fear-avoidance intervention – less disability at 6 months, compared to those receiving standard care. Those with low fear avoidance scores who received the fear-avoidance intervention had more disability at six months compared with those receiving standard care. Linton (2002) reported on the benefit of cognitive-behavioural therapy (CBT). Those with low risk of prolonged disability from fear avoidance, pain catastrophizing, distress, etc. showed no benefit from CBT. Those with moderate risk showed some benefit. Those with high risk showed a large reduction in the number of sick days at 6 months follow-up.

Smeets, Vlaeyen, *et al*. (2006) studied the impact of three 10-week interventions on pain catastrophizing, disability and pain intensity – active rehab alone, CBT alone, active rehab + CBT. While they found no difference in reduction of pain catastrophizing across treatment groups, they showed that persons with a reduction in pain catastrophizing had reduced disability, fewer complaints and less pain. Woby et al. studied the impact of an 8-week active rehab + CBT intervention. Reduction in FABQ-physical and FABQ-work were associated with reduced disability at the end of the intervention. A reduction in pain catastrophizing was not uniquely associated with reduced disability. This suggests that the impact of CBT on reducing disability is through its impact on fear avoidance. This is consistent with the earlier observation that fear avoidance may be more important than pain catastrophizing in prolonging disability. A reduction of disability was not associated with a reduction in pain intensity. The focus of therapy should be on restoring function and not on pain reduction.

The above studies cover general and occupational populations in Europe, North America and Australia. The findings are not limited to musculoskeletal (MSK) pain. Sullivan (2005) showed that pain catastrophizing could predict disability in persons with neuropathic pain. Granot (2005) found a significant correlation for pain catastrophizing and post-op pain intensity scores, making screening for psychosocial pain generators useful in this context as well. While psychosocial factors may not be as important as biological determinants of disability and work absence for most injured persons in the acute injury phase, they are useful predictors for some and become more important than biological determinants in the subacute and chronic injury phases.

OMPQ

Treating a predominantly psychosocial pain generator with a biological model is ineffective and will prolong disability. These people need a biopsychosocial model of

treatment. In WorksafeNB's experience, treating clinicians are often reluctant to identify the predominant problem as psychosocial, but are willing to use self-report questionnaires that will. We need a tool that will distinguish those at high risk for prolonged recovery due to psychosocial factors from those at lower risk, so that these claimants can be targeted with the appropriate intervention(s). The literature is packed with predictive tools. One such tool is the Örebro Musculoskeletal Pain Questionnaire [OMPQ] (Linton and Boersma 2003). It is a self-administered 25-item composite of other tools, looking at job dissatisfaction, anxiety, depression, pain catastrophizing and fear avoidance. The questionnaire was initially tested in Sweden on 122 persons with LBP of less than 3 months. At 6-months follow-up, 81% of patients were correctly classified for functional category (recovered, not recovered) and 68% for sick days category (0 days, 1-30 days and > 30 days).

Hurley (2000), working with Linton, translated the OMPQ into English and used it in a physiotherapy context in Ireland. 118 patients with LBP for less than 12 weeks were given the questionnaire and followed for one year. Those with a higher score had higher use of analgesic medication prior to physiotherapy, had more physiotherapy treatments, had less leisure time exercise, were more likely to be off work for LBP and were less likely to RTW following treatment. The OMPQ correctly classified 80% of those who failed to RTW after physiotherapy. Dunstan *et al*. (2005) reported on the use of the OMPQ in a workers' compensation context in Australia. Claimants with an MSK injury were screened between 4 and 12 weeks, and then followed for 6 months. Claimants who did not RTW within 6 months had a significantly higher average score compared with claimants who did.

Margison and French (2007) studied usefulness of a modified OMPQ (referred to as "P&A" in NB) to predict biological-based treatment failure in the workers' compensation system. Claimants with high psychosocial scores (> 147) were more likely to be classified as "unfit to RTW" at the end of a 6-week active physical therapy program than claimants with scores under 148. The study also validated a French translation of the OMPQ. Westman *et al*. (2008) recently reported on a 3-year follow-up of 158 persons with MSK pain and sick leave of 28 or more days. OMPQ correctly classified 78% of those remaining on sick leave. Hockings et al. (2008) published a systematic review of the predictive value of the OMPQ. The authors concluded that the OMPQ demonstrated a moderate ability to correctly predicted prolonged disability and sick leave.

Selecting a cutoff point

Selecting a cutoff point for high-risk persons is a tradeoff between sensitivity and specificity. The higher the cutoff point, the higher the specificity but lower the sensitivity. Many of the studies had cutoff points between 100 and 120 (Hurley, Dusoir et al. 2000; Linton and Boersma 2003; Westman, Linton et al. 2008). The Margison and French (2007) study used one of "> 147". From a case management perspective, one wants a low risk of sending someone for an intervention they don't need and might produce disability where there was none. The case manager wants high specificity (i.e., low false positive).

The score "> 147" recommended by CHAID analysis[1] had a false positive rate of 6%. Sensitivity was 14% – lots of false negatives but this can be addressed in a couple of ways. One can use a stepped approach whereby a lower threshold is used to identify a group of claimants at lower risk for a different intervention approach. The questionnaire can be re-administered if pain increasingly becomes a barrier to participation in rehab or RTW. Case managers can also be on the lookout for amber flags and move the claimant into a higher level of intervention if indicated.

High Risk Study Control Group

The study used historic controls, since all claimants with an STI during the pilot study (March 1, 2008 to February 28, 2009) were given an intervention if they were off work at 4 weeks post-accident or recurrence and had a P&A score over 139. These 2006 accident controls helped to frame the problem that WorksafeNB wanted to solve. A P&A questionnaire had been administered within 3 months of accident, prior to starting a work conditioning program. No change in care had been made based on the P&A score. Two years later the researcher looked back at the outcomes of these claims.

Claimants with scores "< 99" had claim outcomes similar to those expected from the biological model and a "predominantly biological pain generator". Those with scores "> 139" had claim outcomes that were inconsistent with a biological model and predominantly biological pain generator. Comparison of outcomes of the three P&A score groups is presented in Table 1, using both "> 139" and "> 147" as the upper cutoff point. For comparison of this control group against a treatment group, claims in analysis of the 2006 claims were limited to those soft tissue injuries (STIs) with "injury diagnosis" codes similar to those in the treatment group.

27% of claimants fell into the "< 99" group, 16% fell into the "> 139" group, and 10% fell into the "> 147" group. The expected healing time (EHT) for STIs is 12 weeks – 26 weeks is more than twice the EHT. 35% of claimants in the lower group were on benefits beyond 26 weeks, 83% were working at 104 weeks and 8% had a work restriction at 104 weeks. The upper group was much more disabled. In the "> 139" group, 74% were off work beyond 26 weeks, only 58% were working at 104 weeks and 24% had a work restriction. Outcomes were slightly worse for the "> 147" group. The results show a "dose-response" gradient – increasing scores are associated with increasing disability due to psychosocial factors.

Table 1: New STI Claims 2006 -- Claim profiles by P&A Group

	P & A Score			
	< 99	99-139	> 139	> 147
Sample size	71 (27%)	146 (57%)	38 (16%)	22 (10%)
% duration > 26 wks	35%	47%	74%	77%
% working	83%	77%	58%	50%
% work restriction	8%	18%	24%	27%

[1] CHAID analysis using SPSS Answer Tree (version 3) – see Margison and French (2007) for a description of the test and its use in the original analysis.

	P & A Score			
	< 99	99-139	> 139	> 147
Avg. claim duration (wks)	31.9	37.0	46.6	54.6
Avg. total claim cost	$20,859	$25,732	$31,170	$32,821
Avg. medical aid cost	$8,482	$11,987	$15,646	$17,229

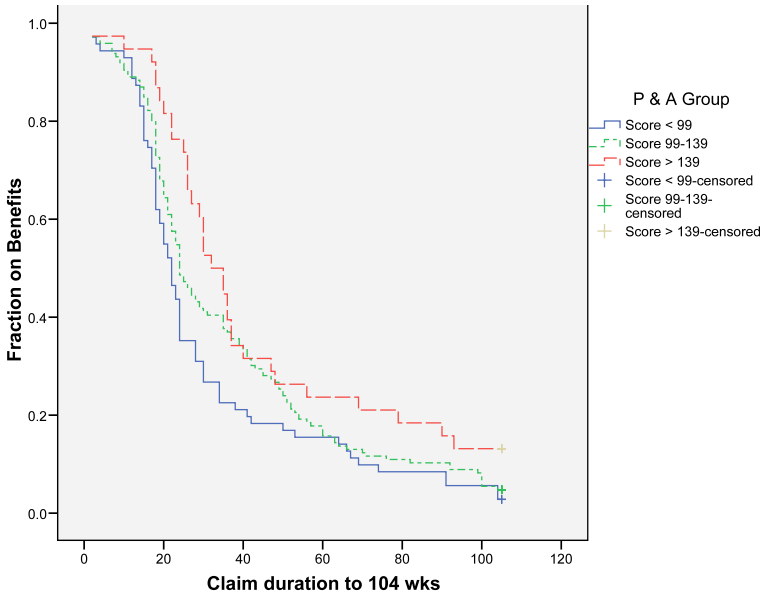
Further analysis found that claimants with mild STIs and a high P&A score were more likely to be on opioids and in quantities exceeding recommended doses compared to claimants with fractures, dislocations, meniscal tears. In claimants with strain or sprain and a score < 99, 34% of prescriptions were for opioids and none exceeded recommended quantities. This was effectively no different than for claimants with the more severe MSK injuries where 30% of prescriptions were for opioids. When the P&A score was > 147,

- 47% of prescriptions were for opioids in the more severe MSK injuries with 0% of opioid prescriptions exceeding recommended quantity limits – compared with
- 60% of prescriptions for opioids in the less severe MSK injuries with 3% of opioid prescriptions exceeding recommended quantity limits.

The primary distinguishing feature between the two groups is that the predominant pain generator in the < 99 group is biological and in the > 147 group it is psychosocial.

Figure 2 is a continuance (Kaplan-Meier survival) plot for these three groups. The plot is similar to that found in many medical research articles. In cancer studies, the fraction surviving is plotted on the Y-axis. Duration is plotted on the X-axis. In this case, survival becomes "survival on benefits" and an event is claim closure within 104 weeks. The Kaplan-Meier plots were produced using SPSS (version 15).

Figure 2: Continuance (Survival) Plot of 2006 STI Claims by P&A Group



The fraction of claimants going off benefits was significantly worse for the "> 139" group (dashed red line) compared to the "< 99" group (solid blue line). About 15% of claimants with a score over 139 were off work at 104 weeks compared to 5% for claimants with score below 99. The plot also shows the "99-139" group (dotted green line) to have worse claim closure outcomes than the "< 99" group between weeks 25 and 60. But, it is the "> 139" group that the 2008 pilot was focusing on to improve outcomes.

Psychosocial factors appear to lead to more pain disability than biological factors in the subacute and chronic injury phases – especially in persons with minimal mechanism of injury and minimal physical impairment. For the busy physician, the biological model is safe but ineffective. With treatment failure comes the patient's belief that they have something more serious that the physician has missed. They want imaging, which risks high false positives in persons over 40-45 years. They want referrals to surgeons. The surgeon is under pressure to do something.

The P&A Questionnaire (OMPQ) appears to be a useful tool in distinguishing claimants with a "predominantly biological pain generator" from claimants with a "predominantly psychosocial pain generator". Those with a P&A score <140 would continue in the regular STI caremap. Those with a score > 139 would get one of two interventions.

High Risk Study Intervention

What is the best way to deliver an active rehab plus CBT program? Sullivan (2003) reported on a project in Nova Scotia that uses community-based physiotherapists. WorksafeNB considered doing it through an "augmented work conditioning" program. The regular work conditioning program is composed of active rehab delivered by a physiotherapist plus assisted return to work delivered by an occupational therapist. The augmented program included a social worker. While the program was a success – 61% return to work rate compared with 66% for a multidisciplinary functional restoration with CBT (MDR), the volume of referrals were too small to support implementing through the regular working conditioning network of 11 clinics.

Claimants with a P&A score between 140 and 147 (P&A-1 group) would get the case manager intervention in addition to usual primary physiotherapy and work conditioning if needed. Claimants with a P&A score over 147 (P&A-2 group) would get the case manager intervention and be referred to one of two MDR providers. The case manager intervention consisted of a face-to-face meeting with the claimant to discuss the claimant's progress, recovery expectations, disability duration guidelines; contacting the claimant's primary care physician to discuss care plans; and contacting the employer to discuss opportunities for accommodation or transitional work. The tool would help the case manager to flag which claimants needed the extra attention.

Objective of the study

The objective of the pilot was to demonstrate the effectiveness of:

1. the modified OMPQ ("P&A") to triage claimants with STIs who are off work at 4 weeks post-accident or recurrence into an appropriate caremap;

2. a case management intervention with multidisciplinary active functional restoration program with CBT for getting claimants with P&A scores > 147 back to work; and
3. a case management intervention without MDR for getting claimants P&A scores 140-147 back to work.

Effectiveness for WorksafeNB would be return to work and claim closure by 26 weeks. Based on the 2006 claims, what additional interventions would be avoided if interventions in the pilot project were successful?

Table 2: Comparison of interventions in 2006 claims after week 26 – 2 P&A groups

	Group 1: Score < 99	Group 2: Score > 139
Physiotherapy	28%	37%
Imaging	19%	29%
Specialist consult	10%	24%
Acupuncture	1%	8%
Injections (blocks)	3%	16%
Surgery	7%	13%
Vocational rehab	6%	11%

Table 2 shows the percentage of 2006 claims receiving additional intervention after week 26. "Group 2" represents P&A-1 and P&A-2 combined. For claims with scores "> 139", 37% had additional physiotherapy, 29% had imaging studies, 24% were referred to one or more specialists, 8% had acupuncture, 16% were treated in injection-based pain clinics, 13% had surgery and 11% got vocational rehab. The percentages were "clinically" different between P&A-1 and P&A-2 groups for physiotherapy, specialist consult, acupuncture and injections (see Table 3).

Table 3: Comparison of interventions in 2006 claims after week 26 – 3 P&A groups

	Group 1: Score < 99	Group 2: Score 140-147	Group 3: Score > 147
Physiotherapy	28%	31%	41%
Specialist consult	10%	19%	27%
Acupuncture	1%	6%	9%
Injections (blocks)	3%	13%	18%

Methodology

The study design was observational cohort (longitudinal). Randomized control trials were not a management option and would have required going through an ethics committee. Controls formed a retrospective cohort. Intervention claims formed a prospective cohort.

The 1-year pilot started March 1, 2008. Claimants with STI and off work at week 4 following an accident or recurrence were referred to a primary physiotherapy clinic to get a P&A questionnaire completed. Claimants with a P&A score > 139 became cases. Controls were the 38 claimants with an accident in 2006, who had been referred by a case manager to work conditioning and found to have a score > 139 at intake assessment. The researcher had no control over who was referred to either work conditioning or primary physiotherapy to complete the questionnaire.

The STI caremap would have three paths:

1. Claimants with a score under 140 received primary physiotherapy as usual and were later moved into work conditioning if progress was slow.
2. Claimants with a score of 140-147 received primary physiotherapy as usual and were later moved into work conditioning if progress was slow. In addition, these claimants received additional intervention by their case manager to identify and address potential barriers to recovery.
3. Claimants with a score > 147 were referred to a multidisciplinary active rehab program with cognitive-behavioural therapy and work simulation plus the case manager intervention.

One year was chosen to ensure that enough claimants would be triaged into the 140-147 and > 147 paths to be able to demonstrate a significant benefit, if present. Rather than waiting until sufficient time has elapsed following the study to get long-term outcomes, interim analyses would be done during and after the pilot starting at a point where sufficient claims that had reached at least 26 weeks tracking from date of accident. Because of the staggered entry into the study, there needs to be a standardized interval from accident date against which outcomes are determined. Over time, this interval can be expanded.

By May 2009 (point of data extraction), claims with an accident date the end of October 2008 had been tracked for 26 weeks to April 30 (information system updated to this date). The full 1-year dataset will not have been tracked for at least 26 weeks until after the end of August 2009.

Data on costs was obtained through electronic querying of WorksafeNB's MISNT database. Costs were adjusted to 2008 dollars. Data on outcomes was extracted manually from the claimant's electronic case management file for:

- Claim closure
- Duration to claim closure
- Working status
- Work restriction

Data was analyzed using SPSS 16. There being 3 independent groups, one-way ANOVA was used to compare outcomes. The null hypothesis is one that any difference between the groups is due purely to chance. Kaplan-Meier survival analysis procedure was used to produce the continuance (survival) plots.

Researchers usually select an alpha (α) value of 0.05 to determine statistical significance. In field trials, the cutoff probability for getting a difference by chance is sometimes raised to 0.10. This has the effect of increasing the chance of a Type 1 error – incorrectly rejecting the null hypothesis. To be careful not to claim a benefit to the change in approach to case management when there really was not one, the author will stick with α = 0.05 as the results of the study may change the practice of case management.

Results

There were 36 claimants remaining in the control group after dropping 2 who had surgery prior to week 26. There were 171 claimants in the intervention group – 62 had a P&A score between 140-147, and 109 had a score > 147. Comparisons of outcomes are provided in Table 4 along with P values.

Table 4: Comparison of Intervention and Control Groups as of 26 weeks

	Control Group	Intervention Group		
	P&A: > 139	P&A: 140-147	P&A: > 147	P Value
Sample size	36	62	109	
% duration > 26 weeks	67%	24%	38%	<0.001
% claim closed at 26 weeks	33%	76%	62%	<0.001
% working at 26 weeks	17%	68%	39%	<0.001
Avg. claim duration to 26 weeks	24.0 wks	18.7 wks	20.2 wks	<0.001
Adjusted mean total claim cost	$15,529	$12,729	$13,953	0.251
Adjusted mean medical aid cost	$6,930	$6,296	$7,137	0.686
Adjusted mean RLOE cost	$8,108	$5,709	$6,325	0.017

Using a censored interval of 26 weeks post-accident, 67% of controls had a duration of over 26 weeks compared with 24% for the P&A-1 group and 38% for the P&A-2 group. The difference was statistically significant ($P < 0.001$). Differences in the fraction of claims closed at 26 weeks, fraction of claimants working at 26 weeks, mean claim duration as of 26 weeks and adjusted mean wage replacement (RLOE) cost to 26 weeks were statistically and "clinically" significant. Differences in adjusted mean medical aid cost to 26 weeks and adjusted mean total claim costs to 26 weeks were not statistically significant.

Technically 7 comparisons are being made, therefore alpha should be adjusted accordingly to 0.007. Based on this, the differences are statistically significant for fraction of claimants with duration longer than 26 weeks, fraction of claims closed at 26 weeks, fraction of claimants working at 26 weeks, mean claim duration as of 26 weeks. The differences in adjusted mean costs were not statistically significant.

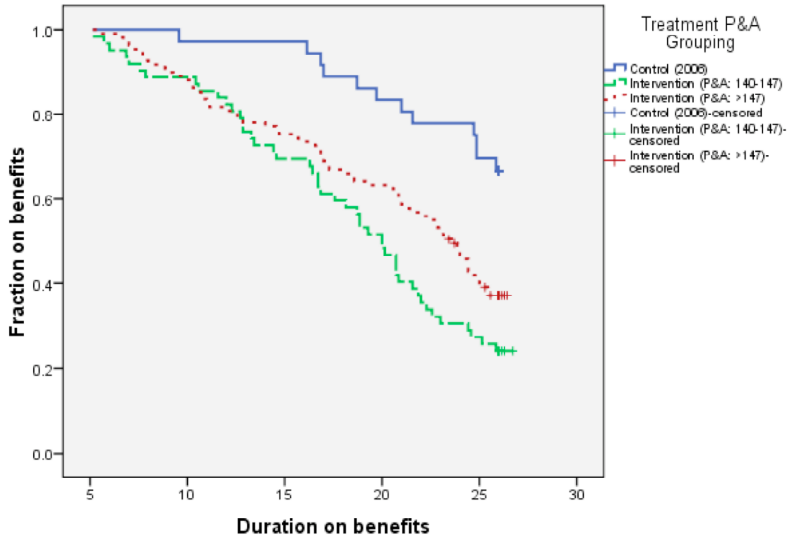
Based on visual inspection, both intervention groups show improvement over the control groups. The biggest improvement is in the P&A-1 group. Post-hoc analysis can be used to compare a group with the others. The choice of procedure depends on whether

variances in the groups are equal (homogeneous) or unequal (heterogeneous); and whether sample sizes are equal or unequal.

Looking at the 26 week comparisons, sample sizes were unequal and variance was heterogeneous. Games-Howell procedure was used. Compared with the control group, the P&A-1 group had a higher fraction of claims closed (P < 0.001), higher fraction of claimants working (P <0.001) and lower mean claim duration (P <0.001).

Compared with the control group, the P&A-2 group had a higher fraction of claims closed (P < 0.007), higher fraction of claimants working (P = 0.005) and lower mean claim duration (P <0.001). There was no significant difference between P&A-1 and P&A-2 groups (P = 0.316 for claim duration, 0.072 for working, and 0.153 for claim closed).

Figure 3: Continuance (Survival) Plots for Intervention and Control Groups as of 26 weeks



The Continuance (Survival) plots as of week 26 (Figure 3) show a significant difference in claimants coming off benefits for both intervention groups (Breslow test earlier curve P <0.001; Logrank / Peto test later curve P <0.001). Intervention claimants with P&A scores between 140-147 did better than those with scores over 147.

Thirty-two of the 62 claimants in the P&A-1 group had a post-intervention P&A questionnaire administered. The mean pre-intervention score was 143.9. The mean post-intervention score was 132.7. The drop of 11.2 points was statistically significant (P = 0.024). There was a moderate positive correlation between "drop in score" and "working" (r = 0.377; P = 0.033). The average drop in score for "not working" claimants was 0.67 (this group did not get CBT), compared with 20.5 for claimants who returned to work (P = 0.033). The small negative correlation (r = -0.214) between drop in score and claim duration was not statistically significant.

Sixty-eight of 109 claimants in the P&A-2 group had a post-intervention P&A questionnaire administered. The mean pre-intervention score was 160.2. The mean post-intervention score was 143.8. The drop of 16.4 points was statistically significant (P <0.001). There was a moderate positive correlation between drop in score and working (r = 0.268; P = 0.027); and a moderate negative correlation between drop in score and claim duration (r = -0.298; higher drop => lower duration; P = 0.014). The average drop in score for "not working" claimants was 12.1 (this group got CBT) compared with 27.5 for claimants who returned to work (P = 0.027).

A subset of the intervention claims have been tracked for 43 week – 29 in P&A-1 group and 52 in P&A-2 group. Outcomes compared with controls are given in Table 5.

Table 5: Comparison of Intervention and Control Groups as of 43 weeks

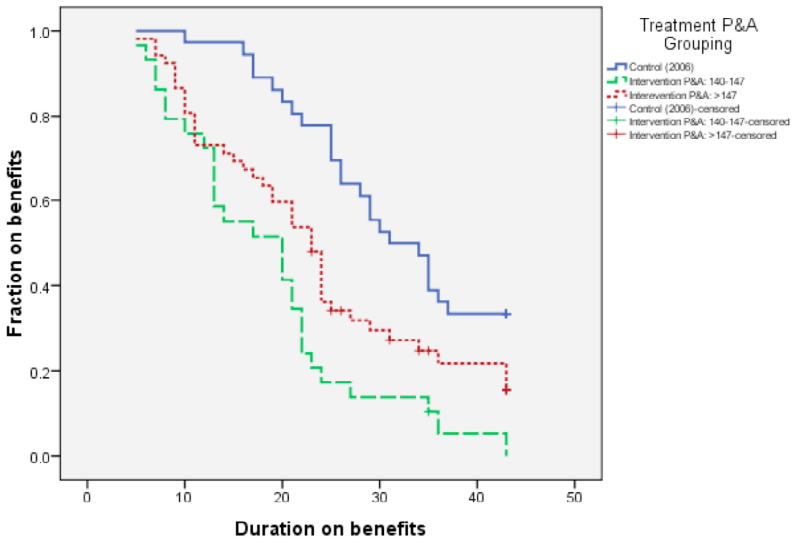
	Control Group P&A: > 139	Intervention Group P&A: 140-147	Intervention Group P&A: > 147	P Value
Sample size	36	29	52	
% claim closed at 43 weeks	67%	93%	77%	0.038
% working at 43 weeks	42%	86%	52%	0.001
Avg. claim duration to 43 weeks	31.8 wks	18.8 wks	24.1 wks	0.001
Adjusted mean total claim cost	$22,532	$15,010	$18,089	0.032
Adjusted mean medical aid cost	$11,529	$7,841	$10,220	0.189
Adjusted mean RLOE cost	$10,138	$6,297	$7,094	0.021

Differences in the fraction of claims closed at 43 weeks, fraction of claimants working at 43 weeks, and mean claim duration as of 43 weeks, adjusted mean total claim cost to 43 weeks and adjusted mean wage replacement (RLOE) cost to 43 weeks were statistically and "clinically" significant. While the difference in mean medical aid costs to 43 weeks was not statistically significant, the difference between P&A-1 and control looks "clinically" significant and was statistically significant using the independent t-test (P=0.40). Again, differences in costs are less significant than differences for the other variables.

Performing a post-hoc comparison of the 43-week subset, groups were unequal sample size. For duration to 43 weeks, the groups had a homogeneous variance. Fisher's Least Significant Difference was used for post-hoc analysis of this variable. Games-Howell was used in the remaining. Compared with the control group, the P&A-1 group had higher fraction of claims closed (P = 0.017), higher fraction of claimants working (P <0.001) and lower mean claim duration (P <0.001).

Compared with the control group, the P&A-2 group had lower mean claim duration (P <0.001). The fraction of claimants working was not significantly higher than controls (P = 0.615), but was significantly lower than the P&A-1 group (P = 0.012). The fraction of closed claims was not significantly higher than controls (P = 0.558), and was not significantly lower than the P&A-1 group (P = 0.090). The P&A-1 group had a significantly lower duration than the P&A-2 group (P = 0.049).

Figure 4: Continuance (Survival) Plots for Intervention and Control Groups as of 43 weeks



Continuance (Survival) plots as of week 43 (Figure 4) show a significant difference in claimants coming off benefits for the intervention groups (Breslow test earlier curve P <0.001; Logrank / Peto test later curve P <0.001). Intervention claims with P&A scores between 140-147 did better than those with scores over 147.

Discussion

Both interventions produced a statistically and clinically (business case) significant reduction in mean claim duration, increase in fraction of claims closed and increase in fraction of claimants working at 26 weeks after disablement (accident or recurrence). The case manager intervention for the P&A-1 group was highly successful. The multidisciplinary intervention for P&A-2 group was moderately successful. This study showed that pre-intervention scores are not fixed. Addressing psychosocial factors can reduce the P&A score towards less predominance of psychosocial pain generators. Biological-based treatment is then likely to be more effective. Better outcomes were associated with a greater drop in P&A score after the intervention. For claimants who were not working at 26 weeks, CBT produced a clinically significant drop in scores in the P&A-2 group compared to no change in the P&A-1 group.

In the 43-week subset, the P&A-1 intervention was again highly successful. From a "clinical" (business case) perspective, the P&A-2 group had better outcomes than the control group. But the difference was only statistically significant for claim duration. The other differences may become statistically significant as sample size increases. Or, over time the control group may catch up with the P&A-2 group. Getting the same percentage back to work earlier would be a successful outcome.

Focusing on the high risk group (P&A: > 147), the difference in reduction in claim duration has gone from 4 to 7 weeks as tracking increased from 26 to 43 weeks. The difference in mean total claim costs has gone from $1,500 to $4,500 as tracking increased from 26 to 43 weeks. One would expect differences in medical aid costs to become

apparent as tracking time increases further, because of the multidisciplinary program occurring within 26 weeks in the intervention group instead of sometime after in the control group. The benefit at 26 weeks is at least sustained in the subset at 43 weeks, suggesting that the larger intervention groups will continue to show a benefit when they as a whole reach 43 weeks; and that there will be increasing benefit as the groups approach 104 weeks.

The continuance (survival) plots show an immediate benefit in the first few weeks for both intervention groups. In the P&A-2 group, there would have been insufficient time in the first 1-2 weeks for this to be due to the multidisciplinary program. The early benefit in this group is likely due to case manager interventions that enabled return to work before program completion (e.g., supporting a claimant's search for work with another employer, thereby addressing the barrier and pain of job dissatisfaction).

Cost savings include treatment avoided in claimants going off benefits within 26 weeks of disablement. Based on a review of medical treatment after week 26 for control claimants with a P&A score 140-147 (see Table 2 and Table 3), 31% had more physiotherapy, 29% had imaging studies, 27% were referred to at least one specialist, 13% were referred to a pain clinic for nerve blocks, 13% had surgery, 11% had vocational rehab, and 6% had acupuncture. At 26 weeks, this group had 40% fewer claimants on benefits. This should translate into a 40% reduction in medical treatments for this group after week 26. Control claimants with a P&A score >147, 41% had more physiotherapy, 29% had imaging studies, 27% were referred to at least one specialist, 18% were referred to a pain clinic for nerve blocks, 13% had surgery, 11% had vocational rehab and 6% had acupuncture. At 26 weeks, this group had 30% fewer claimants on benefits. This should translate into a 30% reduction in medical treatments for this group after week 26.

Psychosocial factors can be more important determinants the biological factors in delayed recovery / prolonged disability. The modified OMPQ (P&A) questionnaire is a useful tool to stratify claimants into risk groups for prolonged disability based on psychosocial factors; and to tailor intervention caremaps according to risk. Claimants with a medium-high risk (P&A: 140-147) benefited from additional attention and intervention by the case manager. Claimants in the high risk group (P&A: > 147) benefited from additional attention and intervention by the case manager plus a multidisciplinary active functional restoration program with cognitive-behavioural therapy. Future research should look at whether the lower score for the medium-high risk group should be lowered.

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