

Evaluation of a return to work coordination programme for injured workers in a public hospital in Singapore

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ABSTRACT

Introduction: This study evaluates the effectiveness of a hospital-based return to work (RTW) programme in facilitating injured workers to RTW earlier through personalised case management. Factors associated with programme effectiveness are also examined.

Method: This was a quasi-experimental study comparing 81 participants who underwent conventional treatment before the RTW programme with 108 participants who directly received the RTW intervention. Analyses included time to RTW and the factors associated with dropout. Stratified analysis and multivariate logistic regression were used to mitigate potential selection bias from the additional recruitment process for the intervention group.

Results: Participants in the intervention group returned to work 59.5 days earlier, with 84% able to RTW 6 months post injury compared with the control (63%; $P < 0.01$). Stratified analysis found the intervention to be associated with better RTW outcomes among males, younger workers, non-residents, blue-collared workers, workers from the construction, marine, manufacturing and metalworking industries, and workers having lower Work Ability score (WAS), while light-duty provision was a possible confounder. The better outcomes in the intervention group were also independent of company size and injury severity. After adjusting for the above factors, the intervention group had 2.2 times higher odds of RTW at 6 months (95% confidence interval 0.84–5.90). Lower WAS and longer delay in initial RTW assessment were associated with delayed RTW within the intervention group. Migrant workers experienced higher dropout rates, thus being identified as a vulnerable group.

Conclusion: The RTW coordination model of care is effective in facilitating RTW, with early programme referral being an important facilitator and WAS as a useful screening tool for delayed RTW.

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INTRODUCTION

Workers who have sustained an injury at work often face difficulties returning to work, according to a study showing that over 40% of injured workers in Singapore experienced increased lethargy at work and that about 40% had difficulties in performing work at pre-injury standards.¹ One in 4 workers also felt that certain work activities might lead to re-injury,¹ while some had the mentality that full recovery was needed before they could return to work (RTW). Another study showed that lower self-perceived work ability was associated with

a longer duration of sickness absence.² Nevertheless, the need for full recovery has been disproved by many studies showing that gradual RTW can be a therapeutic goal.^{3,4}

RTW coordination has been shown to be useful in addressing the barriers patients face in returning to work.⁵⁻⁷ A randomised controlled trial conducted in Singapore demonstrated that the injured workers who received RTW coordination returned to work 10 days earlier than workers in the control group, with a higher proportion of workers in the intervention group returning

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CLINICAL IMPACT

What is New

- This study highlights the real-world effectiveness of a return to work (RTW) programme, with comparison against a control group that underwent conventional treatment.
- Migrant workers had higher likelihood of earlier RTW and dropout rates from the RTW programme.

Clinical Implications

- Personalised case management by occupational therapists who follow through the patient's recovery journey, from medical appointments to providing updates to the employer on patient's readiness to RTW can overcome RTW barriers.
- Occupational health professionals and policymakers are integral for uptake of RTW programmes and to safeguard the rights of injured workers.

to modified jobs.⁸ Notably, migrant workers were excluded from the trial.

Following this trial, the Singapore Ministry of Manpower (MOM) partnered with 7 public hospitals in Singapore to implement an RTW programme in 2017, providing case management and coordination for injured workers to help them regain their work ability and long-term employability.⁹ This programme is covered under the Work Injury Compensation Act (WICA), allowing workers to file claims for work-related injuries without having to file a civil suit.¹⁰ A team comprising RTW coordinators (RTWCs) and administrative staff was formed to implement the programme in each hospital. Prior to this programme, there was no standard clinical practice to facilitate the RTW of patients with work injuries, and any RTW issues were addressed by the treating physicians or therapists on an ad-hoc basis.

This study aims to evaluate the real-world effectiveness of the RTWC model of care in a public hospital in Singapore for patients with work injuries and to examine the factors associated with better RTW outcomes, providing useful information for programme improvement. This study included migrant workers to gain new insights into RTW issues for this group, given the substantial proportion of migrant workers in Singapore's workforce.

METHOD

Study design

This was a quasi-experimental study conducted in a single public hospital. Data were dichotomised into 2 periods: 1 October 2017 to 31 December 2017 before the RTW programme commenced (control group), and 1 June 2018 to 1 June 2020 after the start of the programme (intervention group). Ethics approval was given by the Institutional Review Board of the National Healthcare Group in Singapore.

Inclusion and exclusion criteria

Inclusion criteria for this study were workers who had sustained work injuries and were covered under the WICA, had been given more than 14 days of medical-certified leave post injury, and are Singaporeans, permanent residents or migrant workers with a valid work pass of more than 9 months.

Control group

The control group comprised injured workers who had received medical treatment in the hospital in the 3 months before the RTW programme. These patients had received standard care, which included routine medical and rehabilitation treatment. The study team sent an invitation to these patients before giving them a call to obtain participation consent and information about their medical and RTW status at 6 months post injury, such as time taken to RTW or whether they remained unemployed.

Intervention group

Participants in the intervention group were either recruited from an MOM-provided listing of injured workers who had received medical treatment in the hospital, or were internally referred by the medical team (such as hand surgery and orthopaedics). Potential participants were screened for eligibility by the administrative staff. Patients who did not meet the inclusion criteria or were uncontactable were excluded. Eligible patients who gave consent to join the RTW programme were recruited into the intervention group.

Three RTWCs provided the intervention. The RTWCs were occupational therapists with more than 5 years of clinical experience and had undergone specialised training in functional capacity evaluation and occupational assessment.

The RTW programme consisted of personalised case management through an RTWC to assist the injured worker to RTW. Upon recruitment of a patient, the

RTWC conducted a vocational assessment to understand the patient's functional capacity post injury, to determine the patient's job demands and to identify enablers and challenges for RTW. The RTWC would also initiate early contact with the employer to verify the job demands and explore if modified duties were available when required. The RTWC would then attend the following medical appointment of the patient to update the doctor on the patient's job requirements and discuss the RTW plan. Subsequently, the RTWC would provide regular updates to the employer on the patient's progress and readiness to RTW. If warranted, the RTWC would conduct workplace assessments and provide recommendations for workplace accommodations.

Outcomes

Baseline data included demographics and occupational variables, injury-related information like the Injury Severity Score, time taken to RTW, RTW status at 6 months post work injury, current job scope, total duration of medical leave, whether there was any provision of light duty by the treating physician, and the assessment of work ability based on the Work Ability score (WAS), which is the first item of the Work Ability Index.¹¹ The WAS measures the worker's self-assessment of the current work ability as opposed to the lifetime best on a scale from 0 (cannot work at all right now) to 10 (my work ability is at its best right now).¹¹ The WAS has been found to have high convergent validity with the Work Ability Index and is predictive of work ability.¹¹⁻¹³ Six months was set as the timepoint at which the RTW status was tracked, as most participants were expected to complete the programme within this time frame. For the control group, 6 months was the only timepoint at which the participants' RTW status was known.

Statistical analyses

To evaluate the effectiveness of the programme, outcomes from the control and intervention groups were compared. Baseline data of participants who dropped out of the RTW programme were also analysed to determine the factors influencing the participants' ability to continue with the programme. Fisher's Exact test and chi-square statistics were conducted to compare categorical variables, whereas the non-parametric Mann-Whitney U test was used for continuous variables in the event of non-normality. Statistical analyses were done using Stata version 16 (StataCorp LP, College Station, US). Statistical significance was set at $P < 0.05$.

To mitigate potential selection bias given that the intervention group underwent an additional recruitment

process, stratified analysis was first utilised to compare the RTW outcomes between the control and intervention groups across different demographic and occupational strata. Multivariate logistic regression was then done to adjust for these factors. As our results subsequently showed multiple possible effect modifiers and one possible confounder (light-duty provision), different multivariate models were built. The first model was based on the identified effect modifiers, second model was adjusted for the potential confounder separately, and a third model was adjusted for all these factors combined. The results are expressed as odds ratios with 95% confidence intervals.

RESULTS

Participants

A total of 226 participants were recruited, with 82 in the control group and 144 in the intervention group. One participant in the control group was lost to follow-up, whereas 36 dropped out from the intervention group owing to the following reasons: not allowed to work in Singapore as work visa was converted to Special Pass by employer ($n=10$); chose to pursue common law compensation ($n=8$); not keen to adhere to RTW plan ($n=7$); repatriated to home country ($n=4$); uncontactable ($n=4$); family not supportive ($n=2$); and other personal reasons ($n=1$). Data from 189 participants were analysed, with 81 in the control group and 108 in the intervention group.

Comparisons of the demographics and pre-injury occupational information of the participants of the 2 groups are shown in Table 1. Specifically, both groups were comparable in terms of nationality and injury severity, with the conventional group having a lower median age at time of injury. The majority of the patients in the intervention group (92%) and control group (96%) had mild injuries, with upper limb injuries being the most common injury (58% in control group, 81% in intervention group), followed by lower limb and back injuries (28% in control group, 15% in intervention group). Participants in the intervention group had a higher proportion of blue-collar workers (Table 1), with majority classified as cleaners and labourers (47%), and plant and machine operators and assemblers (26%). The body site of injury was also similar between blue-collar and white-collar workers.

Factors associated with RTW status at 6 months

The intervention arm took a significantly shorter median duration to RTW (81.5 days) than did the conventional

treatment arm (141 days; Table 1), with a higher proportion of participants being able to RTW 6 months post injury (84%) compared with the control (63%). A higher proportion of participants in the intervention group were also able to RTW to the same pre-injury job at 6 months (64%) compared with the control group (49%, $P=0.054$), with this percentage increasing to 82% upon discharge from the programme. Among the participants in the intervention group who were unable to RTW at 6 months, 24% had moderate or severe injuries and 89% had undergone surgical treatment, compared with 7% and 64% in the conventional group, respectively.

The factors associated with the RTW status at 6 months are shown in Table 2. For both the control and intervention groups, a higher WAS at baseline and light-duty provision were associated with better RTW status, while age, nationality, occupation type and industry sector had differing associations between both groups. Subsequent stratified analysis found several potential effect modifiers, with intervention being associated with better RTW outcomes among males, younger workers, non-residents, blue-collar workers, workers from the construction, marine, manufacturing and metalworking industry, and workers with a lower baseline WAS (Table 3). The better RTW outcome seen in the intervention group was also independent of company size and injury severity. Light-duty provision seemed to be a possible confounder, with a smaller difference in RTW status noted between the control and intervention groups.

The above factors were subsequently used in the multivariate logistic regression, with the RTW status at 6 months post injury as the dependent variable (Table 4). After adjusting for these factors, the intervention group had 2.2 times higher odds of returning to work at 6 months compared with the conventional treatment group.

Factors associated with earlier RTW (within 80 days)

Variables associated with earlier RTW in the intervention group included non-residents, duration elapsed from injury to RTW assessment, total number of days of medical leave, total number of days of light duty and WAS at discharge ($P<0.05$; Table 5). A total of 55.1% of the participants who are non-residents returned to work earlier compared with the residents. Participants who returned to work later had experienced a longer delay in their RTW assessment (84.5 days), had taken more median days of medical leave (116 days) and light duty (57 days), and had a lower median WAS at discharge compared with those who returned to work earlier.

Dropouts

Of the 111 non-residents recruited in the intervention group, only 70.3% completed the intervention. Of those who dropped out of the RTW programme, 92% were migrant workers. Analyses of baseline data of participants who dropped out showed that they had a significantly lower baseline WAS of 3 compared with a median score of 8 in those who completed the intervention. They also had a significantly longer duration of medical leave (110 days) than those who completed the intervention (76.5 days; Table 6).

DISCUSSION

Effectiveness of the RTW programme

This study demonstrated that an RTW programme in a public hospital was effective in enabling participants to RTW earlier by about 60 days, with an additional 20% able to RTW at 6 months post injury compared with participants who received standard care. These are important outcomes as earlier RTW benefits both employers and workers in terms of financial goals and job sustainability.¹⁴⁻¹⁶ Our results are also similar to studies showing that the RTWC model of care helps to expedite RTW.⁵⁻⁷ In our study, the intervention group had a similar duration of first RTW (81 days) as other participants in another Singapore hospital (64 days); also, the proportion of patients able to RTW (84%) was similar to patients with work injuries in an overseas RTW coordination programme in Malaysia (75%).^{17,18} This duration, however, is longer compared with that from a randomised controlled trial on the RTW coordination in Singapore in which participants were recruited directly from the hospital's emergency department database,⁸ suggesting that later recruitment into the programme could be associated with a longer duration to RTW.

The study also showed that the RTW programme was effective for specific demographic and occupation groups, including foreigners and blue-collar workers. As of December 2022, the total foreign workforce in Singapore numbered 1.15 million, excluding domestic workers,¹⁹ representing a substantial proportion of the blue-collar workforce in Singapore. While the previous study by Tan et al.⁸ had focused on Singaporeans and permanent residents, this study was able to recruit a good proportion of migrant workers into the RTW programme.

WAS as a screening tool for RTW

Work ability is defined by the extent to which a worker's capabilities are matched by the demands at work.²⁰ Factors associated with poor work ability include poor musculoskeletal capacity, high mental

Table 1. Descriptive statistics of the control and intervention groups.

Variables	Conventional treatment (n=81)	Intervention treatment (n=108)	P value
Sex, no. (%)			
Male	72 (88.9)	96 (88.9)	1.00
Female	9 (11.1)	12 (11.1)	
Age at time of injury, median (IQR), years	32 (26–47)	36.5 (31–47)	0.01
Race, no. (%)			
Chinese	29 (35.8)	38 (35.2)	0.49
Malay	7 (8.6)	4 (4.0)	
Indian	19 (23.5)	31 (28.7)	
Other	26 (32.1)	35 (32.4)	
Nationality, no. (%)			
Non-resident	58 (71.6)	79 (73.2)	0.81
Resident	23 (28.4)	29 (26.9)	
Company size, no. (%)			
SME (≤200 employees)	48 (60.8)	65 (60.2)	0.94
Large (>200 employees)	31 (39.2)	43 (39.8)	
Occupation, no. (%)			
White and pink collar	17 (21.8)	11 (10.2)	0.03
Blue collar	61 (78.2)	97 (89.8)	
Industry sector, no. (%)			
Construction, marine, general manufacturing, metalworking	49 (60.5)	78 (72.2)	0.09
Other ^a	32 (39.5)	30 (27.8)	
Light duty given, no. (%)			
No	47 (58.0)	15 (13.9)	<0.01
Yes	34 (42.0)	93 (86.1)	
ISS score, no. (%)			
Mild injury (ISS 1–8)	78 (96.3)	99 (91.7)	0.62
Moderate injury (ISS 9–15)	3 (3.7)	5 (4.6)	
Severe injury (ISS 16–24)	0	2 (1.9)	
Critical injury (ISS ≥25)	0	2 (1.9)	
Work Ability score (baseline), median (IQR)	6 (0–8)	6 (5–7)	0.73
Average length of time taken to first RTW, median (IQR), days	141 (61–999)	81.5 (56.5–122)	<0.01
RTW category at 6 months from injury date, no. (%)			
Able to RTW ^b	51 (63.0)	91 (84.3)	<0.01
Unable to RTW	30 (37.0)	17 (15.7)	

IQR: interquartile range; ISS: Injury Severity Score; RTW: return to work; SME: small and medium enterprise

^a Includes (in decreasing order of frequency) transport and storage; hospitality, tourism, food and beverage; cleaning and landscape; wholesale and retail trade; pharmaceutical, health and social services; chemical, oil and gas; electronic and precision; energy and utilities; aviation; and others.

^b Categories include “same employer–same pre-injury job”, “same employer–modified job”, “same employer–similar job”, “same employer–different job” and “different employer–different job”.

Table 2. Association between return to work (RTW) status at 6 months and various demographic and occupational groups.

Variables	Proportion able to RTW at 6 months					
	All participants (n=189)		Conventional treatment (n=81)		Intervention treatment (n=108)	
	No. (%)	P value	No. (%)	P value	No. (%)	P value
Sex						
Male	126 (75.0)	1.00	43 (59.7)	0.14	83 (86.5)	0.09
Female	16 (76.2)		8 (88.9)		8 (66.7)	
Age at time of injury						
<35 years	64 (71.9)	0.33	24 (52.2)	0.02	40 (93.0)	0.06
≥35 years	78 (78.0)		27 (77.1)		51 (78.5)	
Race						
Chinese	55 (82.1)	0.11	23 (79.3)	<0.01	32 (84.2)	0.90
Malay	9 (81.8)		6 (85.7)		3 (75.0)	
Indian	39 (78.0)		13 (68.4)		26 (83.9)	
Other	39 (63.9)		9 (34.6)		30 (85.7)	
Nationality						
Resident	41 (78.9)	0.47	19 (82.6)	0.02	22 (75.9)	0.23
Non-resident	101 (73.7)		32 (55.2)		69 (87.3)	
Company size						
SME (≤200 employees)	88 (77.9)	0.24	33 (68.8)	0.16	55 (84.6)	0.90
Large (>200 employees)	52 (70.3)		16 (51.6)		36 (83.7)	
Occupation						
White and pink collar	21 (75.0)	0.97	16 (94.1)	<0.01	5 (45.5)	<0.01
Blue collar	119 (75.3)		33 (54.1)		86 (88.7)	
Industry sector						
Construction, marine, general manufacturing, metalworking	92 (72.4)	0.22	26 (53.1)	0.02	66 (84.6)	0.87
Other	50 (80.7)		25 (78.1)		25 (83.3)	
ISS score						
Mild injury (ISS 1–8)	136 (76.8)	0.08	50 (64.1)	0.55	86 (86.9)	0.03
Moderate, severe or critical injury (ISS ≥9)	6 (50.0)		1 (33.3)		5 (55.6)	
Light duty given						
No	36 (58.1)	<0.01	25 (53.2)	0.03	11 (73.3)	0.25
Yes	106 (83.5)		26 (76.5)		80 (86.0)	
Work Ability score (baseline)						
<7	63 (60.0)	<0.01	14 (32.6)	<0.01	49 (79.0)	0.11
≥7	79 (94.1)		37 (97.4)		42 (91.3)	

ISS: Injury Severity Score; SME: small and medium enterprise

Table 3. Stratified analysis comparing return to work (RTW) status at 6 months between the control and intervention groups across different demographic and health factors.

	No. (%) unable to RTW at 6 months	No. (%) able to RTW at 6 months	<i>P</i> value
Sex: male			
Conventional treatment	29 (40.3)	43 (59.7)	<0.01
Intervention treatment	13 (13.5)	83 (86.5)	
Sex: female			
Conventional treatment	1 (11.1)	8 (88.9)	0.34
Intervention treatment	4 (33.3)	8 (66.7)	
Age at time of injury <35 years			
Conventional treatment	22 (47.8)	24 (52.2)	<0.01
Intervention treatment	3 (7.0)	40 (93.2)	
Age at time of injury ≥35 years			
Conventional treatment	8 (22.9)	27 (77.1)	0.88
Intervention treatment	14 (21.5)	51 (78.5)	
Nationality: Resident			
Conventional treatment	4 (17.4)	19 (82.6)	0.55
Intervention treatment	7 (24.1)	22 (75.9)	
Nationality: Non-resident			
Conventional treatment	26 (44.8)	32 (55.2)	<0.01
Intervention treatment	10 (12.7)	69 (87.3)	
Company size: SME ≤200 employees			
Conventional treatment	15 (31.3)	33 (68.8)	0.05
Intervention treatment	10 (15.4)	55 (84.6)	
Company size: Large >200 employees			
Conventional treatment	15 (45.5)	18 (54.6)	0.01
Intervention treatment	7 (16.3)	36 (83.7)	
Occupation: White and pink collar			
Conventional treatment	1 (5.9)	16 (94.1)	<0.01
Intervention treatment	6 (54.6)	5 (45.5)	
Occupation: Blue collar			
Conventional treatment	29 (45.3)	35 (54.7)	<0.01
Intervention treatment	11 (11.3)	86 (88.7)	
Industry: Construction, marine, general manufacturing, metalworking			
Conventional treatment	23 (46.9)	26 (53.1)	<0.01
Intervention treatment	12 (15.4)	66 (84.6)	
Industry: Other			
Conventional treatment	7 (21.9)	25 (78.1)	0.75
Intervention treatment	5 (16.7)	25 (83.3)	

Table 3. Stratified analysis comparing return to work (RTW) status at 6 months between the control and intervention groups across different demographic and health factors. (Cont'd)

	No. (%) unable to RTW at 6 months	No. (%) able to RTW at 6 months	P value
ISS Score: Mild injury (ISS 1–8)			
Conventional treatment	28 (35.9)	50 (64.1)	<0.01
Intervention treatment	13 (13.1)	86 (86.9)	
ISS Score: Moderate injury and above			
Conventional treatment	2 (66.7)	1 (33.3)	1.00
Intervention treatment	4 (44.4)	5 (55.6)	
Light duty given			
Conventional treatment	8 (23.5)	26 (76.5)	0.20
Intervention treatment	13 (14.0)	80 (86.0)	
Light duty not given			
Conventional treatment	22 (46.8)	25 (53.2)	0.17
Intervention treatment	4 (26.7)	11 (73.3)	
Work Ability score (baseline) <7			
Conventional treatment	29 (67.4)	14 (32.6)	<0.01
Intervention treatment	13 (21.0)	49 (79.0)	
Work Ability score (baseline) ≥7			
Conventional treatment	1 (2.6)	37 (97.4)	0.37
Intervention treatment	4 (8.7)	42 (91.3)	
For patient profile:			
1. Sex: male, and			
2. Age: <35 years, and			
3. Nationality: non-resident, and			
4. Occupation: blue-collar worker, and			
5. Industry: construction, marine, general manufacturing, metalworking, and			
6. Work Ability score (baseline) <7			
Conventional treatment	17 (81.0)	4 (19.1)	<0.01
Intervention treatment	3 (13.0)	20 (87.0)	

ISS: Injury Severity Score; SME: small and medium enterprise

Table 4. Univariate and multivariate logistic regression comparing return to work (RTW) status at 6 months between the control and intervention groups.

	Able to RTW at 6 months							
	Unadjusted		Model 1 ^a		Model 2 ^b		Model 3 ^c	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Control	1 [Reference]		1 [Reference]		1 [Reference]		1 [Reference]	
Intervention group	3.15 (1.58–6.26)	<0.01	5.21 (2.24–12.1)	<0.01	2.08 (0.96–4.49)	0.06	2.23 (0.84–5.90)	0.11

CI: confidence interval; OR: odds ratio

^a Model 1: Adjusted for sex, age, nationality, occupation, industry, work ability (baseline).^b Model 2: Adjusted for light-duty provision.^c Model 3: Adjusted for sex, age, nationality, occupation, industry, work ability (baseline), light-duty provision.

Table 5. Factors associated with earlier return to work (RTW) (within 80 days) in the control and intervention groups.

Variables	Proportion able to RTW within 80 days			
	Conventional treatment (n=81)		Intervention treatment (n=108)	
	No. (%) or median (IQR)	<i>P</i> value	No. (%) or median (IQR)	<i>P</i> value
Sex, no. (%)				
Male	25 (34.7)	0.28	48 (50.0)	0.76
Female	5 (55.6)		5 (41.7)	
Age at time of injury, no. (%)				
<35 years	16 (34.8)	0.63	24 (55.8)	0.25
≥35 years	14 (40.0)		29 (44.6)	
Race, no. (%)				
Chinese	15 (51.7)	0.07	17 (44.7)	0.72
Malay	4 (57.1)		3 (75.0)	
Indian	5 (26.3)		15 (48.4)	
Other	6 (23.1)		18 (51.4)	
Nationality, no. (%)				
Resident	12 (52.2)	0.08	10 (34.5)	0.07
Non-resident	18 (31.0)		43 (54.4)	
Company size, no. (%)				
SME (≤200 employees)	19 (39.6)	0.51	36 (55.4)	0.11
Large (>200 employees)	10 (32.3)		17 (39.5)	
Industry sector, no. (%)				
Construction, marine, general manufacturing, metalworking	13 (26.5)	0.02	40 (51.3)	0.46
Other	17 (53.1)		13 (43.3)	
Occupation, no. (%)				
White and pink collar	13 (76.5)	<0.01	3 (27.3)	0.20
Blue collar	15 (24.6)		50 (51.6)	
ISS score, no. (%)				
Mild injury (ISS 1–8)	30 (38.5)	0.29	51 (51.5)	0.16
Moderate injury and above (ISS ≥9)	0 (0)		2 (22.2)	
Light duty given, no. (%)				
No	15 (31.9)	0.26	8 (53.3)	0.72
Yes	15 (44.1)		45 (48.4)	
Work Ability score (baseline), median (IQR)				
Able to RTW within 80 days	8 (7–10)	<0.01	7 (5–8)	0.12
Unable to RTW within 80 days	0 (0–7)		5 (4–7)	

Table 5. Factors associated with earlier return to work (RTW) (within 80 days) in the control and intervention groups. (Cont'd)

Variables	Proportion able to RTW within 80 days			
	Conventional treatment (n=81)		Intervention treatment (n=108)	
	No. (%) or median (IQR)	<i>P</i> value	No. (%) or median (IQR)	<i>P</i> value
Work Ability score (first RTW), median (IQR)				
Able to RTW within 80 days	NC		8 (7–9)	0.08
Unable to RTW within 80 days	NC		7 (6–9)	
Work Ability score (discharge), median (IQR)				
Able to RTW within 80 days	NC		9 (8–10)	0.01
Unable to RTW within 80 days	NC		8 (7–9)	
Duration elapsed from injury to assessment, median (IQR), days				
Able to RTW within 80 days	NC		50 (39–70)	<0.01
Unable to RTW within 80 days	NC		84.5 (60–162)	
Total no. of medical leave days, median (IQR)				
Able to RTW within 80 days	NC		55 (42–67)	<0.01
Unable to RTW within 80 days	NC		116 (90–175)	
Total no. of light-duty days, median (IQR)				
Able to RTW within 80 days	NC		32 (15–57)	0.01
Unable to RTW within 80 days	NC		57 (29–93)	

IQR: interquartile range; NC: data not collected; RTW: return to work; SME: small and medium enterprise

work demands, lack of autonomy, poor physical work environment and high physical workload.^{11,20} In this study, participants with lower self-perceived work ability in the intervention group were more likely than those in the conventional treatment group to RTW at 6 months post injury, highlighting the positive impact of the RTW programme in assisting workers with poor to moderate self-reported work ability (WAS 0 to 7)¹¹ to the barriers in returning to work.

Studies have found self-reported work ability to be related to workers' perception of pain and physical functioning.^{21,22} The recovery process is often laden with patient's negative or uncertain expectations about recovery, requiring support by RTW practitioners to facilitate recuperation.²³ In particular, injured workers' perception of the need to attain full recovery before returning to work needs to be addressed with timely professional support in the programme.²⁴ Healthcare professionals thus need to consider how workers perceive their work ability to better support them in their RTW.²² As our study also found lower WAS to be associated with higher dropout rates from

the RTW programme, the WAS is potentially useful to screen for workers who are at risk for delayed RTW or dropout to benefit from early RTW assessment and intervention.¹¹

Light-duty provision

Light duty, or modified work, refers to temporary or permanent work that is physically or mentally less demanding than normal job duties.¹⁶ Current evidence has found that light duty or modified work helps to facilitate RTW for temporarily or permanently disabled workers, and injured workers who were offered modified work returned to work about twice as often as those who were not.¹⁶ In our study, those who were given light duty in both arms had better RTW outcomes. Notably, more than half of the participants in the control group did not receive light duty upon returning to work. These participants possibly lacked awareness of potential work modification, requested for medical leave instead of light duty or only wanted to RTW when fully recovered.²⁵ This finding could also be attributed to the reluctance of medical practitioners to issue light duty

Table 6. Factors associated with dropouts from the return to work programme.

Variables	Completed intervention (n=108)	Dropout (n=36)	<i>P</i> value
Sex, no. (%)			
Male	96 (73.8)	34 (26.2)	0.52
Female	12 (85.7)	2 (14.3)	
Age at time of injury, no. (%)			
<35 years	43 (70.5)	18 (29.5)	0.28
≥35 years	65 (78.3)	18 (21.7)	
Race, no. (%)			
Chinese	38 (84.4)	7 (15.6)	0.02
Malay	4 (57.1)	3 (42.9)	
Indian	31 (86.1)	5 (13.9)	
Other	35 (62.5)	21 (37.5)	
Nationality, no. (%)			
Resident	29 (90.6)	3 (9.4)	0.02
Non-resident	79 (70.5)	33 (29.5)	
Company size, no. (%)			
SME (≤200 employees)	65 (72.2)	25 (27.8)	
Large company (>200 employees)	43 (79.6)	11 (20.4)	0.32
Occupation, no. (%)			
White and pink collar	11 (78.6)	3 (21.4)	1.00
Blue collar	97 (74.6)	33 (25.4)	
Industry sector, no. (%)			
Construction, marine, general manufacturing, metalworking	78 (73.6)	28 (26.4)	0.51
Other	30 (79.0)	8 (21.1)	
Light duty given, no. (%)			
No	15	NC	
Yes	93	NC	
ISS score, no. (%)			0.16
Mild injury (ISS 1–8)	99 (76.7)	30 (23.3)	
Moderate injury and above (ISS ≥9)	9 (60.0)	6 (40.0)	
Work Ability score (baseline), median (IQR)	8 (6–8)	3 (0–5)	0.00
Days elapsed from injury to assessment, median (IQR)	64 (46–116)	76 (49.5–127.5)	0.43
Total no. of medical leave days, median (IQR)	76.5 (53.5–118)	110 (84.5–155.5)	<0.01
Total no. of light-duty days, median (IQR)	43 (25–78)	36.5 (0–83.5)	0.24

IQR: interquartile range; ISS: Injury Severity Score; NC: data not collected; SME: small and medium enterprise

instead of medical leave.²⁶ However, the term “light duty” may be non-specific, and MOM has previously given guidance that light duties should take into account the job demands and work environment.²⁷ Light duties would therefore vary for different vocations, and what it entails for blue-collar workers would be different from that for white-collar workers. In an RTW programme, the RTWC thus plays an important role in working with the employer and employee to recommend appropriate job-specific modified duties. Since all injured workers are entitled to full pay while being on light duties under WICA,²⁸ our study thus highlights the role of the RTWC in advocating for earlier RTW with modified duties to facilitate more successful RTW outcomes.²⁹

Early access to the RTW programme

Our results showed that early access to the RTW programme was vital for earlier RTW. Participants who took more than 80 days to RTW had experienced a delayed RTW assessment of 84.5 days compared with the 50 days for those taking 80 or less days to RTW. The longer duration to RTW assessment could be due to patient factors like lack of awareness on the benefits of early RTW or having perceptions of the need to attain full recovery before returning to work.²⁵ Healthcare factors limiting early RTW assessment include late referral by the medical team or a lack of awareness of the RTW programme. As medical practitioners are often the first point of contact to initiate patient referrals into the programme, the programme uptake is highly dependent on their knowledge of occupational rehabilitation and available RTW services. Increasing awareness and providing formal training on occupational rehabilitation can be implemented to encourage medical practitioners to introduce the RTW programme in a timely manner.³⁰

Migrant workers as a vulnerable group

In this study, migrant workers had a higher likelihood of earlier RTW. It has been found that some foreign workers returned to work prematurely because of fear of repatriation or of losing one's job, especially if employers place undue stress for injured workers to RTW earlier.³¹ There is therefore a need for RTWCs to work closely with employers to develop an RTW plan based on the patient's functional capacity and readiness to work, as well as to highlight the importance of injury prevention. The RTWC needs to serve as an advocate for migrant workers to ensure they RTW when medically safe.²⁹

In our study, migrant workers also experienced higher dropout rates. About half of the dropouts had their work

passes terminated and converted to Special Pass, or chose common law to settle their work injury compensation claims. There is currently limited legislation to protect migrant workers who are terminated from work due to work injuries, hence the need for relevant legislation to safeguard their rights.³² The RTWC needs to educate injured workers on their rights under the WICA and keep them engaged during the RTW process. Understanding their rights would help to influence their decisions and actions during the RTW process in terms of claims management and law-related procedures.³³ The RTWC also plays an important role in educating the employers on the benefits of retaining their workers, including maintaining productivity and reducing replacement worker costs.³⁴ For example, the RTWC can raise concerns and mediate issues that employees may have difficulties in broaching with their employers.²⁹

Strengths and limitations of the study

A particular strength of this study was the stakeholder engagement adopted throughout the process. The stakeholders were able to provide guidance in programme planning and evaluation. For example, the RTWCs were involved in the identification of programme indicators, clarification of findings and the discussion of results and recommendations. The findings were therefore relevant and contextualised within the RTW programme.

In addition, this study has provided useful data that the programme is effective for a diverse group of participants including migrant workers. The findings can be added to the current literature and benefit future policy planning.

The differential dropout caused by attrition in the intervention group could have resulted in selection bias, loss of statistical power in the data analysis, or both. This is exacerbated with the relatively small sample size, as the small number of observations for certain factors such as severe injuries and non-provision of light duties, affected the statistical power of the stratified and multivariate analyses. The initial screening that the intervention group underwent could be another selection bias, considering the injured workers who were recruited and consented to the study could have differing motivation levels or concerns in returning to work. Subsequent stratified analysis mitigated this bias to some extent by evaluating the effectiveness of the intervention within the same demographic and occupational group. On a related point, our study was not able to explore the motivational factors that workers have in returning to work, even though these factors both influence the participation in the programme as well as the time to first RTW, as was discussed for migrant workers earlier.

Exploring these factors either as a qualitative study or as part of programme evaluation would allow programme implementers to design a programme that is targeted to the needs of the workers. Another limitation is the lack of economic analyses of the programme, and future cost-benefit analyses are required to study the programme's cost-effectiveness. This study was also limited to patients who were injured at work and may not be generalisable to other patient groups, such as patients recovering from non-work conditions like heart condition or cancer treatment.

CONCLUSION

This study supports the effectiveness of an RTWC model of care implemented in a public hospital in Singapore and provided data that the programme is effective for a diverse group of participants, including migrant workers. The findings provide useful clinical information for occupational health professionals and policymakers to finetune current work processes and enhance the uptake of and outcomes from RTW programmes. Collaborative efforts between the RTWCs and the medical team will increase programme awareness and benefit more injured workers in the long run.

Disclosure

The authors declare no affiliations or financial involvement with any commercial organisation having a direct financial interest in the subject or materials discussed in the article.

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