The Role of Rehabilitation and Functional Assessment during SARS COVID-19

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The Work Expert
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Every COVID-19 case is writing its own story...
Safe return to work...

Worker

Work tasks ⇔ Environment

... a maximised fit
Holistic Medical Surveillance

Medical Surveillance
Medical evaluation to determine absence of disease and critical contraindications

Physical and Functional Work Capacity Assessment (RFA)

Vocational Rehabilitation and Health Promotion

Legal Requirement
MHSA Section 13
Medical Surveillance needs to be appropriate considering the health hazards employees are exposed to

DMRE Guidelines for minimum standards of fitness

8.4.1.6. The employee’s medical condition should be interpreted in functional terms and in the context of the job requirements
Referral criteria for a baseline RFA Assessment

Referral criteria for a Baseline Functional Work Capacity Assessment:

• Two negative COVID-19 Tests
• Pre-exercise heart rate ≤100 bpm
• Tympanic temperature < 37.4°C
Assessment of Physical and Functional Work Capacity

**Performance skills**
(Mobility and ADL)

- Self report assessments: questionnaires
- Clinical observations,
- Rating scales (AMA Guidelines)
- Functional Capacity Evaluation (cognitive affective etc.)

+ Consideration of personal and environmental factors

= Impairment

**Body Functions & Structures**

AMA Guidelines
Measuring deviation from the norm

= Limitation

**Fitness to work**

Performance area: Work

- Work Capacity Assessment against the inherent job requirements to determine safe and productive execution of work tasks

+ Consideration of personal and environmental factors

= Restriction

Reference: WHO Classification of Function- ICF Model
Minimum Standard of Fitness – Cardiorespiratory

DMRE Requirement

8.5.1 The cardiovascular system needs to be able to take the physical exertion of a particular category of work.

8.5.2 Respiratory system

8.5.2.1 The respiratory system should be free from acute or chronic disease which may impair the ability to meet the required physical performance of a particular category of work.
Physical activity and the immune system

![Graph showing the relationship between exercise dose and infection risk. The graph depicts a J-shaped curve, indicating that sedentary lifestyles are associated with high infection risk, moderate exercise has a protective effect, and prolonged or intense exercise increases infection risk.]

Figure 1. “J-shaped” model depicting dose-dependent effect of exercise on risk and severity of respiratory tract infections. Sedentary persons are considered to be at normal risk of URTI. Exercise of low-to-moderate intensity or frequency is associated with reduced risk of URTI (3,18,23,25,34) while high-intensity exercise is associated with an increased risk of infection (8,11,24). [Adapted from Nieman DC, Johanssen LM, Lee JW. Infectious episodes in runners before and after a roadrace. J Sports Med Phys Fitness. 1989;29(3):289–96. Copyright © 1989 BMJ Publishing Group Ltd. Used with permission.]
# Heat Stress Management

**TABLE 1.2:** Framework for HSM work practices on the basis of the most important casual factors in the development of heat stroke

<table>
<thead>
<tr>
<th>CAUSAL FACTOR</th>
<th>WORK PRACTICE</th>
</tr>
</thead>
</table>
| Strenuous work               | - Adequate physical work capacity (physical evaluation)  
- Self-pacing (educational)  
- Work-rest cycles (administrative and mandatory, if required) |
| Suspect heat tolerance       | - Overall fitness for work in hot environments:  
  - Medical evaluation  
  - Physical evaluation  
  - Screening for heat intolerance |
| Dehydration                  | - Education  
- Alcohol-induced  
- Insufficient fluid replacement | - Provide potable and palatable water at place of work  
- Introduced water-breaks |
| Excessively hot environments | - Ongoing monitoring and control  
- Action plans  
- Emergency planning |

Reference: DMR Thermal Stress guideline, annexure 7 pg. 70.
Low work capacity...

*Premature fatigue, which may impact on*

- tolerance of PPE, facemasks, encapsulated garments,
- safe evacuation using self rescuers,
- safe work practices, i.e. self-pacing in hot work environments, shortcuts, trip and fall accidents, and
- health implications – compromising the immune system.
Health Risks

- Dust
- Noise
- Heat
- Radiation
ENVIRONMENTAL & TASK DEMANDS ELICITS

<table>
<thead>
<tr>
<th>Position</th>
<th>Energy consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting</td>
<td>3 - 5%</td>
</tr>
<tr>
<td>Standing</td>
<td>8 - 10%</td>
</tr>
<tr>
<td>Stooping</td>
<td>50 - 60%</td>
</tr>
<tr>
<td>Kneeling</td>
<td>30 - 40%</td>
</tr>
</tbody>
</table>

CARDIORESPIRATORY AND/OR MUSCULOSKELETAL RESPONSES
Classification of Work Demands

The exposure to physical demanding work tasks and work environments can be categorised as follows:

<table>
<thead>
<tr>
<th>Occupations with physical demands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very heavy</td>
</tr>
<tr>
<td>Fire Fighter</td>
</tr>
<tr>
<td>Emergency Services</td>
</tr>
<tr>
<td>Heavy</td>
</tr>
<tr>
<td>Mechanical Artisan</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>Artisans</td>
</tr>
<tr>
<td>Light</td>
</tr>
<tr>
<td>Instrumentation Technicians</td>
</tr>
<tr>
<td>Roaming</td>
</tr>
<tr>
<td>Foremen</td>
</tr>
<tr>
<td>Engineers</td>
</tr>
</tbody>
</table>

DMRE Guidelines for Minimum Standards of Fitness Table1: The categorisation for strenuous work
RFA Job Analyses

James Bond

<table>
<thead>
<tr>
<th>Name</th>
<th>Element Type</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climbing Stairs ability</td>
<td>Functional Ability</td>
<td></td>
</tr>
<tr>
<td>Ladder climbing ability</td>
<td>Functional Ability</td>
<td></td>
</tr>
<tr>
<td>Maximum load handling ability</td>
<td>Functional Ability</td>
<td>25 kg</td>
</tr>
<tr>
<td>Dexterity - Above head</td>
<td>Dexterity</td>
<td>1</td>
</tr>
<tr>
<td>Dexterity - Kneeling</td>
<td>Dexterity</td>
<td>1</td>
</tr>
<tr>
<td>Dexterity - Standing on a ladder</td>
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</tr>
<tr>
<td>Dexterity - Susine</td>
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<td>1</td>
</tr>
<tr>
<td>Dexterity - Table tap / Strooping</td>
<td>Dexterity</td>
<td>2</td>
</tr>
<tr>
<td>Climbing stairs (standard)</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Frequent lifting capacity (19kg)</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Handling loads in restricted work areas</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Impact activity</td>
<td>Functional Capacity</td>
<td>1</td>
</tr>
<tr>
<td>Mobility in restricted work areas</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Pulling a load</td>
<td>Functional Capacity</td>
<td>1</td>
</tr>
<tr>
<td>Pushing / pulling vertical</td>
<td>Functional Capacity</td>
<td>1</td>
</tr>
<tr>
<td>Pushing a load</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>PWC (walking: even/uneven and inclines)</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
</tbody>
</table>

Working Environment
- Surface controlled
- Surface uncontrolled

Requirement Information

Job Allocation
- Artisan Assistant (KOMATSU)
- Intensity: Moderate 16

Anthropometric Requirements
- Other Information

Psychomotor requirements
- Slow static equipment

Notes
Assessment methodology Vocational Rehabilitation

**Occupation**

**Type of injury/disease**

Physical Intensity of the occupation: Very heavy, Heavy, Moderate, Light, Roaming

(Calculated by the RFA test system)

FWC requirements
(pull through from job analyses)

Psychomotor requirements
(pull through from the RFA job analyses)

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<td>Static</td>
</tr>
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- Exposure risks (pulled through from OREPS’ only risks flagged)
- Special PPE requirements
- Anthropometrics

RTW

Type of Assessment

- Cardiorespiratory
- Upper / lower limb conditioning etc.
- Psychomotor training / CogniPlus
- Educational
- Stress management
- Back care
- Healthy Lifestyle etc.

Home programs

Workplace visits
# RFA Assessment

## Objective Assessment of Work Capacity

<table>
<thead>
<tr>
<th>Physical Work Capacity Test (PWC)</th>
<th>Functional Work Capacity Test (FWC)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim:</strong> To determine the inherent aerobic capacity to cope with physical aspects of the work.</td>
<td><strong>Aim:</strong> To assess functional abilities necessary to perform a specific task / to meet essential job demands</td>
</tr>
</tbody>
</table>
RFA Test Methodology

Work Physiology Approach

- Individuals’ work response is used to measure the heaviness of the task and sustainable capacity for task completion.
- Physiological monitoring of heart rate is the best index of stress imposed by a task.
- Linear relationship between oxygen consumption and heart rate response.
- When the task is not heavy, the heart rate response exhibits a steady state for clients who is not burdened by disease.
- If the burden placed on the worker is too high in relation to their capacity for sustained physical work, the individual will fatigue.
- An individual’s physical tolerance to work is inversely proportional to his/her physical condition.
- The closer the task is to the workers maximum capacity, the shorter the length of time an individual can work.
- By comparing an individual's actual heart rate during FWC tasks to work tolerance data, determine the actual capacity of the individual for work.

References
Basic principle

Basic principle of assessment is that normal healthy individuals should be able to sustain a full-shift (8 hours) work rate at levels corresponding to about 30-40 percent of maximal aerobic power or VO$_2$ max without undue fatigue in any industrial setting.

Heart rate is being used as indicator for an industrial physiological measurement mainly because it is:

- Uncomplicated to administer and interpret
- It reacts to both dynamic and static work loads and
- It is reproducible

Several researches endorse using heart rate as a primary measurement criteria as it has a linear relationship with energy expenditure, and it can be measured without interfering with the work task in progress. Heart rate is also the best index for physical work because it is reasonably similar for all persons during work.

References:
Davies C. Heart rate and respiration in relation to working capacity. Scotland: University of Edinburg.
ISO Standard 8996
Assessment of RFA

- Work output
- Physiological effort

Supporting assessments: BORG Pain Scale, BORG Rating of Perceived Exertion & Clinical Observations
RFA PWC Assessment

Stepping with heart rate transmitter belts

Automatic data capturing and transmission to RFA Software for report creation.

PWC Test results indicate sufficient cardio-respiratory fitness for the current occupation.
# Premature Fatigue Risk

<table>
<thead>
<tr>
<th>VO\textsubscript{2}Max</th>
<th>Corresponding heart rate</th>
<th>Tolerable for…</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40% of VO\textsubscript{2}Max</td>
<td>100 - 115bpm</td>
<td>8 hours</td>
</tr>
<tr>
<td>45% of VO\textsubscript{2}Max</td>
<td>125bpm</td>
<td>2 hours</td>
</tr>
<tr>
<td>50% of VO\textsubscript{2}Max</td>
<td>130bpm</td>
<td>1 - 2 hours</td>
</tr>
<tr>
<td>50 - 75% VO\textsubscript{2}Max</td>
<td>140 - 150bpm</td>
<td>&lt; 1 hour</td>
</tr>
<tr>
<td>&gt; 75% VO\textsubscript{2}Max</td>
<td>&gt;150bpm</td>
<td>20 minutes</td>
</tr>
</tbody>
</table>

Functional Work Capacity
Monitoring of effectiveness of rehabilitation

Level 1

Outcome
Job allocation / re-allocation

Rehabilitation

Level 2
(screening)

Prospective employees
Transfers
Medical transfers

Level 3

Entry level rehabilitation assessment

In-service employees
Transfers
Medical transfers

Level 1

Rehabilitation

Rehabilitation

1 Heavy type of work categories
2 Light to heavier type of work
Assessment Outcomes of COVID-19 cases

Period of data sample: 1 June - 17th of September 2020

Size of data sample:

Number of clients tested: 695
Number of assessments performed: 810

Type of assessments

• Risk based medical out of cycle: 79%
• Initial risk based medical assessment – New Employees: 18%
• Initial risk based medical assessment for novices: 3%

Outcomes
Recommended: 81%
Not recommended: 16.7%
Not for assessment: 1.2%
Invalid: 0.6%
Cases presenting with limitations (n =133)

Prevalence of risk factors
Age ≥ 50 years: 25%
Body Mass Index ≥ 30: 37%

Comorbidities: 25%
• Hypertension: 15 cases
• Immunocompromised: 7 cases
• Diabetes: 7 cases
• Asthma: 1 case
• Orthopedic condition: 2 cases
• Cardiomyopathy: 1 case

Physical Demands of the occupation
Nature of work employees will be exposed to
• Very heavy: 8%
• Heavy: 27%
• Moderate: 36%
• Light: 26%
• Roaming: 3%

Vocational Rehabilitation
• In-house rehab program
• Home program
Duration
7 - 60 days +
Average: 3 weeks
Case Studies

Case Study No 1: 57-year-old male Stope Team Leader (Very heavy)

<table>
<thead>
<tr>
<th>Date</th>
<th>19/07/2017</th>
<th>30/07/2020</th>
<th>13/08/2020</th>
<th>25/08/2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWC Test Outcomes</td>
<td>118</td>
<td>142</td>
<td>135</td>
<td>112</td>
</tr>
<tr>
<td>Assessment</td>
<td>New Employee</td>
<td>Return to work post COVID-19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Immunocompromised on HAART, normal BMI (27.57)
Good response to conditioning program
Post COVID-19 last FWC Assessment correlates with 2017 pre-employment assessment outcomes

Case Study No 2: 33-year-old male Stope Rock Drill Operator (Very heavy)

<table>
<thead>
<tr>
<th>Date</th>
<th>17/03/2017</th>
<th>11/08/2020</th>
<th>17/09/2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWC Test Outcomes</td>
<td>130</td>
<td>161</td>
<td>159</td>
</tr>
<tr>
<td>Assessment</td>
<td>New Employee</td>
<td>New Employee Assessment - POST COVID-19</td>
<td></td>
</tr>
</tbody>
</table>

No other known medical conditions
BMI 2017 - 23.35 / BMI 2020 – 20.96
Not included in vocational rehabilitation program, not an in-service employee
Case Study No 3: 32-year-old female Loco Driver (Moderate)

<table>
<thead>
<tr>
<th>Date</th>
<th>PWC Test Outcomes</th>
<th>27/8/2020</th>
<th>31/08/2020</th>
<th>07/09/2020</th>
<th>15/09/2020</th>
<th>22/09/2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>148</td>
<td>Discontinued coughing, dyspnea</td>
<td>144 Strain on FWC Assessment</td>
<td>137 Fatigue and limited upper limb strength on FWC</td>
<td>147 Conditioning program recommended</td>
<td>139 Fatigue and limited upper limb strength on FWC</td>
</tr>
<tr>
<td>Assessment</td>
<td>New Employee</td>
<td>Return to work post COVID-19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Anxiety disorder
BMI 2005 - 21 / BMI 2020 – 32
Respiratory symptoms limited 1st PWC Assessment
Employee remains to present with fatigue and limited strength on FWC Assessment
Rehabilitation Framework

CLIENT

Date of injury/illness: 
Medical intervention: 
Date of surgery: 
Date treatment started: 
Date of referral to rehab: 
Medical history Tick list (use the one available on QMed)
Medication: 

ASSESSMENT

Date of assessment: 
Physical Work Capacity result: 

FWC RESULTS (pull through from view report section) 
Mobility 
Manual Material Handling 
Dexterity 
Psychomotor test results 
Treatment notes: 

TREATMENT GOALS

Date: 
DROP DOWN LIST: Headings with subheadings- e.g. 

Heading: Improve Cardiorespiratory fitness 
Subheading: PWC results from 160-140

INTERVENTION

TRAINING PROGRAMS (DROPDOWN LIST)
- Cardiovascular training program
- Upper limb strength training program
- Lower limb strength training program
- CogniPlus training program
- Ergonomic worksite visit

EDUCATIONAL (DROPDOWN LIST)
- Back care 
- Ergonomics in the workplace 
- Healthy Lifestyle 
- Stress management

HOME PROGRAMS (DROPDOWN LIST)
- Operator stretch program 
- Female post-partum training program 
- Physical conditioning program

Occupation:
Physical Intensity of the occupation: Very heavy, Heavy, Moderate, light, Roaming 
(Calculated by the RFA test system)

FWC requirements
(pull through from job analyses)

<table>
<thead>
<tr>
<th>Test element</th>
<th>Assignment Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climb Stairs ability</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Ladder climbing ability</td>
<td>Functional Capacity</td>
<td>1</td>
</tr>
<tr>
<td>Movement - lifting skills</td>
<td>Functional Capacity</td>
<td>25 lbs</td>
</tr>
<tr>
<td>Deadly - above head</td>
<td>Dexterity</td>
<td>1</td>
</tr>
<tr>
<td>Deadly - kneeling</td>
<td>Dexterity</td>
<td>1</td>
</tr>
<tr>
<td>Deadly - standing on a ladder</td>
<td>Dexterity</td>
<td>1</td>
</tr>
<tr>
<td>Deadly - standing</td>
<td>Dexterity</td>
<td>1</td>
</tr>
<tr>
<td>Deadly - Table top / floor</td>
<td>Dexterity</td>
<td>2</td>
</tr>
<tr>
<td>CLiming ability (standing)</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Prospects White packages (32kg)</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Handling loads in restricted work areas</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Sound activity</td>
<td>Functional Capacity</td>
<td>1</td>
</tr>
<tr>
<td>Height in static work areas</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>Pulling a load</td>
<td>Functional Capacity</td>
<td>1</td>
</tr>
<tr>
<td>Pushing / pulling - Static</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
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</tr>
<tr>
<td>Moving / pushing / pulling - Static</td>
<td>Functional Capacity</td>
<td>2</td>
</tr>
<tr>
<td>PWC ability: over/average and below</td>
<td>Functional Capacity</td>
<td>1</td>
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Psychomotor requirements
(pull through from the RFA job analyses)

<table>
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<tr>
<th>Psychomotor demand</th>
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<tbody>
<tr>
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- Exposure risks (pulled through from OREPS’ only risks flagged)
- Special PPE requirements
- Antropometrics

CLIENT ASSESSMENT

Occupation:  
Physical Intensity of the occupation: Very heavy, Heavy, Moderate, light, Roaming  
(Calculated by the RFA test system)  

FWC requirements
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CLIENT REHABILITATION AGREEMENT

Digital signature

TREATMENT GOALS

Date: 
DROP DOWN LIST: Headings with subheadings- e.g. 

Heading: Improve Cardiorespiratory fitness 
Subheading: PWC results from 160-140
Hygiene and Infection Control

Hand Hygiene

Social Distancing

Awareness

PPE
It is health that is real wealth, not pieces of gold and silver...

Mahatma Gandhi
Thank you